Teaching Design Strategies in Higher Education

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ABSTRACT

Higher education is one such activity which can convert population into human resource. Country's strength in the world today is its young population and will determine its future progress. Education not only improves the facilities and skills of people but also dramatically contributes to their physical well-being. The new teaching pedagogy lays emphasis on applying higher level thinking skills through relevant design projects, improving team-working skills and awareness of issues relating to ethics and professionalism. Outcome based educational experience to the students at all levels. Teaching design technology in the classroom can combine a personalized learning experience for each student, based on each student's strengths. But active learning technologies also reduce the teaching workload in higher level education. This paper starts with nature of higher education statement and the motivation for this study. Next, teaching design strategies, learning paradigm, theories, evaluation performance are described. Analysis of teaching techniques and conclusion are followed in the last section.

KEYWORDS: Education, Learning, Teaching, Assessment, Teaching Techniques

1. INTRODUCTION
We have entered an era where higher education in engineering may have to undergo fundamental changes, not only to benefit from pedagogical and technological innovations, but also to align with the attitudes and capabilities of today's students, and better prepare the graduates for the increasing and different demands of the new world of work. It is better to envision the changes, forecast the capabilities needed by tomorrow's engineers and make choices about what type of engineer we want to educate. Education and technology are two basic elements that play an important role in rendering individual life effective and efficient. Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. Successful implementation of the national educational technology strategic plan ultimately depends on the teacher's ability to integrate technology into his or her content areas, using pedagogical analysis that qualitatively improve student learning [3].

Teachers and instructional designers need to pay closer attention to the perspective of students' experiences and their abilities to be critical thinkers. Teaching design active learning activities and encourage students to participate and engage with classmates will enrich their learning experience and make learning more meaningful. The rapid development of technologies has made a big impact in personal life of individuals but also significantly influences the dynamic of learning. Without doubt, acquiring, sharing, and processing knowledge are all essential activities of learning. Students

also expect themselves to give and receive feedback to feel that they are part of learning and by sharing knowledge and arguing with others can enforce them to think critically. Based on the study results, instructors focused on more of content delivery features than collaborative learning activities in courses and to fulfill the learner's needs.

The nature of work is becoming more service-oriented as employees are dealing with a variety of people and needs. Recent graduates largely learn theory in school and need more practical application and experience. Employers cite higher level thinking skills as critical and find them lacking in new employees. A well-managed classroom increases learning because students spend more time on task. Both instruction and learning are easier in a well-managed classroom where students are expected to succeed.

Many of today's IT engineering tasks and curricula in higher education in engineering still focus on typical 20th-century how-to-do-it activities, associated with product and service design, manufacturing and support. In the coming decennia leaps in scientific discovery and innovations will be necessary in social, political, economic and technological fields. They will result in a transformation of life, business and global economy as we know it today. Technology, the domain of IT engineers and engineering scientists, will be an essential component in making such innovations possible.

2. TEACHING STYLES
Teaching style refers to the manner in which a teacher manages instruction and the classroom environment. There

are three major teaching styles permissive, authoritarian and democratic. **Permissive** teachers establish few rules and tend to be inconsistent in enforcing rules or applying consequences for misbehavior. **Authoritarian** teachers establish the classroom rules, learning is teacher centered, the student's role is to comply with the rules and complete all work satisfactorily. **Democratic** teachers establish a classroom environment that includes input on nearly all issues of management, voting privileges for students, and generally positive reactions to student desires and needs [5].

Most of instructors have a teaching style that is dominant but display characteristics that include some aspects of each of the other styles. The teaching style that identifies the personality in the classroom controls most aspects of the instruction, classroom management strategies and techniques. The teaching style determines how to implement classroom management tasks. Authoritarian and democratic teaching styles tend to be most effective because disruptions in the classroom are kept to a minimum.

3. LEARNING STYLES
Individuals have preferred ways of learning throughout the different stages of learning. Learning styles address the ways we perceive and process. Perceiving relates to the way we notice the world and the way we see reality. Processing relates to the way we internalize an experience and make it our own. Some people prefer to perceive the world through **concrete experience**. These people perceive by sensing and feeling, and prefer to solve the problems of a given task. Other people prefer **abstract conceptualization**. They like to think things through, analyze and intellectualize [5].

They function well in structured situations. Some people prefer to process new information by **active experimentation**. They look for practical ways of applying what they learn and are results oriented. Other people process through **reflective observation**. They likely see tasks from several points of view. They value patience and judgment. These are four general learning styles.

Of course, learning styles are only one characteristic of students. They have different capabilities, interests, personalities and racial or gender characteristics. Students mature at different rates. Students without much discipline or stability in their home life need discipline and stability in their school life and teaching methods.

3.1. Online Learning
The use of online learning is becoming more common and that e-learning gives ample opportunity to accommodate the different cognitive levels and preferences of learners. If programs are developing for teaching and learning where e-learning is incorporated, then knowledge of the learning paradigms and the application thereof is necessary. When teaching Computer Science, lecturers are faced with the difficulties of balancing practice and theory in classes. We should adapt our teaching methods to possible changes.

Online technologies provide change in the engagement of higher education institutions in lifelong learning and continuing professional development. Online discussions involved students with the topics so that all of the students who participated in the discussions correctly answered the questions and share the knowledge.

3.2. Active Learning
Learning makes real and teaching should involve professionals and connect the real-world outside to the classroom. Active Learning is a process where in students are actively engaged in building understanding of facts, ideas, and skills through the completion of instructor directed tasks and activities. Essentially, all activities are student centered and require the learner to be actively involved in construction of knowledge and understanding. Active learning not only emphasizes the development of students' skills but also their exploration of their own attitudes and values [2].

Graduate student learning can be benefit from active learning with its features of positive interdependence and structured individual and group accountability. The active learning consists of three factors, which are interrelated. These are: basic elements; learning strategies; and teaching resources. The basic elements of active learning are speaking, listening, reading, writing and reflecting. These five elements involve cognitive activities that allow students to clarify the question, consolidate and appropriate the new knowledge. The second factor of active learning is the learning strategies that incorporate the above five elements. These are small groups, cooperative work, case studies, simulation, discussion, problem solving and mini thesis writing. Third factor of active learning is teaching resources that teacher uses to encourage students to interact and participate actively in the activities [2].

3.3. Student-centered Learning
This learning is a move from teaching to learning. Education should be seen as a constructive and collaborative process between teachers and students as well as between students themselves. The issue of student-centered learning is often seen as a competence of faculties or higher education institutions. The activity was for each student to facilitate each learning activity and participate in the activities based on learning objectives. In this learning, teachers (we) center their planning, teaching and assessment on the needs and abilities of our students. Teachers should emphasize students to do meaningful learning activities and think about what they are doing [4].

3.4. Collaborative Learning
The core element of collaborative learning is working in groups rather than working individually. It can refer to any instructional method in which students work together in small groups toward a common goal. Students feel more connected, particularly with their classmates, and they noted the positive effects of learning space on their collaborative projects. Round tables inherently created a collaborative environment for learning and forced students to look at each other and thus changing the relationship. Collaboration can help to ensure that students share responsibility and seek to support each other [1].

3.5. Cooperative Learning
Cooperative learning can be defined as a structured form of group work where students pursue common goals while being assessed individually. The core element of cooperative learning is cooperation rather than competition and provides a natural environment to promote interpersonal skills. It is based on the premise that cooperation is more effective than competition among students for producing positive learning outcomes [1].

3.6. Problem-based Learning

This is an instructional method and used to provide the context and motivation for the learning. It is always active and usually using collaborative or cooperative. Problem based learning does provide a more challenging, motivating and enjoyable approach to education. Universities adopting Problem based learning are likely to positively influence student attitudes and study habits. Students will retain information longer and perhaps develop enhanced critical thinking, problem-solving skills and life-long learning skills in a natural environment [5].

3.7. Project Oriented Learning

Project-oriented learning helps learners develop skills to work in a knowledge-based, highly technological world. By bringing real-life context and technology to the curriculum through a project-oriented learning approach, learners are encouraged to become independent workers, critical thinkers, and lifelong learners. Project-oriented learning is like learner-centered instruction, so the focus is on learner activities. The process of project oriented learning –issue (prompts action), organizing statement (tell learners how to address issue) and solution process (find a solution)
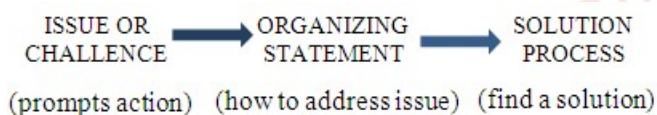

Figure1. Process of Project-oriented Learning

The above figure shows the process of project-oriented learning. It is an instructional method in which learners gain knowledge and skills by working for an extended period of time. The project-oriented learning can be divided into three processes. First, the learners have to investigate and respond to an engaging and complex question, problem, or challenge. Second, learners have to address the issue for real-life application of both technical and work readiness skills to solve a problem by taking part of each assigned topic. In the final process, learners are solving the workplace problem to simulate in the classroom setting through an activity that allows learners to practice their skills and reached to the solution. This design process of the project-oriented activity and the way learners work together to address the issue can deepen content knowledge and develop learners work readiness skills.

4. CURRICULUM DESIGN

Curriculum design is a planning framework to guide curriculum, instruction, and assessment. It is the systematic development of instructional specifications that follow learning and instructional theory to ensure the quality of instruction in higher education.

The curriculum design strategies practiced in the courses, such as content analysis, chunking, realistic objectives, learning engagement, feedback for students and evaluation throughout the process are important factors for learning to take place. There are numerous types of instructional design methods. It is the process of analysis of learner's needs and learning goals and the development of a delivery system to meet those needs. In this module, we use a specific instructional design method called Understanding by Design or Backward Design [1].

4.1. Backward Curriculum Design

Backward Design is an instructional design method that begins with the *end* in mind and works backward to design assessment and instruction based on these learning outcomes.
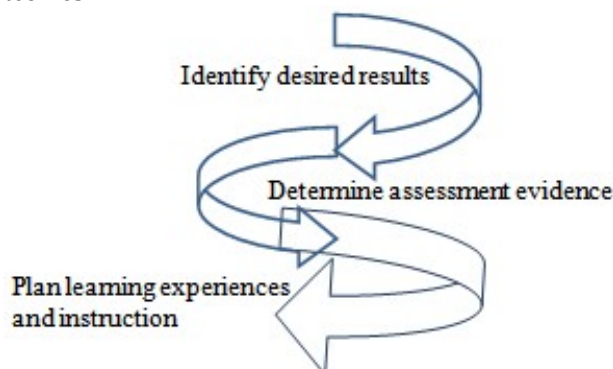

Figure2. Backward Curriculum Design

Backward curriculum Design has three steps:
➢ The instructor **identifies the desired results or goals**
➢ The instructor **determines the acceptable evidence**
➢ The instructor **plans the learning experiences and instruction**

Backward Design is goal oriented. In designing a lesson or curriculum unit, the instructor focuses on teaching and assessing for learner understanding and transfer of knowledge. The instructor also focuses on designing the curriculum—backward from those ends [1].

5. TEACHING ENVIRONMENT

New teaching environments create different ways of using learning theories in order to achieve maximum learning ability. New generations and new learning theories add to the problem. Understanding the way learning takes place is difficult, and this is complicated by changes in the students' environment as well as changing learning styles.

Instructors usually have big classes and each student has their own psychological profile. The norm in higher level educational institutes is an hour-long lecture, but studies have found that the attention span and learning ability of students decline after 20 minutes. This results in students only recording about 500 words out of a lecture consisting of 5000. New environments create different ways of using learning theories in order to achieve maximum learning ability. Engineering students are even more enraptured with the latest technological tools available due to their interest in the field. Using technology to construct a visually attractive lecture, the educator has ample opportunity to demonstrate behavior that will be effective in the field of Engineering, both in the practical and theoretical arena.

6. EVALUATION PERFORMANCE

Evaluation performance is any activity that measures what learners know and provides this information to an instructor so he/she can change instruction, reteach a lesson, provide support to a learner, or evaluate the learner's level of learning. The teachers uses to obtain, quantify, and describe information about learner knowledge or performance as an assessment. There are many different types of assessment. Exams, projects, essays, observation of learners, and questioning learners are a few examples. Each assessment is like a tool—it serves a different purpose [1].

Diagnostic assessment (before instruction): Instructor assesses learners have the pre-requisite knowledge and skills to successfully complete the unit of study. In terms of pre-requisite knowledge, in what areas do students appear to have some weaknesses and how students address these in the unit of study.

Formative assessment (during instruction): Instructors check learners seem to understand the material and having difficulties. Which learners really understand and how can instructor get to help the learners who are struggling? What strategies or examples should instructor use to help struggling learners?

Summative assessment (after instruction): In this assessment, how much have my learners learned? What should I do next? Should I go back and review and reteach material or move on? How can I improve how I instruct so more learners will do better in the next unit of study?

7. ANALYSIS OF TEACHING TECHNIQUES

Active learning is playing an increasing role in higher educational teaching to achieve the desired effect on the students' learning outcomes. Teachers need to explore and determine the most effective classroom techniques and practices. The goal is that the recommendations may serve to improve classroom management skills for beginning, as well as for veteran teachers in order to promote ongoing learning for all students. With the diverse population of students, changes in cultural behaviors and social and emotional pressure students had in their lives. As teachers learned more about a variety of instructional design approaches, they would be able to sample techniques that would fit their needs, will have more success in maintaining positive student behavior, to guide students toward successful rule compliance in the classroom, on the job, and in the community. Table 1 shows the mapping of the teaching techniques.

Table1. Mapping of Teaching Techniques

Techniques	Learner-Centered Instruction	Higher-Level Thinking	Facilitation	Employability
Work Readiness Skills	√	√		√
Linking Curriculum to Industry Needs		√	√	√
Facilitation Skills		√	√	
Participatory Learning	√		√	√
Instructional Design	√		√	√
Project-Oriented Learning		√	√	√
Learner-Centered Assessment	√	√		
Blended Learning	√	√	√	√
Finding and using Online Resources	√	√	√	

Teachers should have need to get the experiences of instructional teaching design strategies and learning in higher education and share these practices to other instructors. In mapping of techniques and learners' skills in transforming to learner-centered approach, the following facts are analyzed.

Higher Level Thinking Skills

Higher Level Thinking skills are developed when the instructor through leads activities that are rigorous and challenging and that focus on developing higher-level thinking. If leadership positions are promoted then employees need strong work readiness skills. Adaptability, collaboration, diligence, problem solving, time management and communication skills can be addressed through learner-centered instructional approaches.

As teachers design activities, teachers have to consider the activity encourages learners to be **adaptable and** the activity requires flexible thinking and need to balance diverse viewpoints to come to a workable solution. C**ollaboration is** fostered and learners need each other to complete the task. The activity challenging is enough that the solution doesn't come quickly and requires **diligence.**

Facilitators

Many faculty members (teachers) assume that their role is to teach. Instead, think: Teacher *role is to help students learn. Fa*cilitators, collaborators, leaders, and organizers are having great success in helping students prepare for lifelong learning and making them more capable to work in fields where they must acquire new skills and knowledge regularly.

Participatory Learning

Several newer teaching models stress active student participation, in which students process material presented in class via discussion with the instructor and peers, problem solving, and group activities interspersed with periods of listening and note-taking. In our approach, teachers present knowledge in a lecture format and the students passively gather that information by listening and taking notes. When an instructor can query and collect responses from every individual in the classroom, the instructor can gauge instantaneously what students understand, and which concepts they are failing to grasp.

Peer-teaching Technique

When peer-instruction techniques are used, students became involved in the teaching process. They were eager to argue over possible answers with each other as well as with the instructor. The approach used in the classroom is often helps students is to teach them to quickly sketch out a response to a question in their notes. Another method is to give some thinking questions or calculations at the end of class and tell students the next class will begin with students being called on to respond to those items. Writing also helps students learn to express their thoughts more clearly and focuses their attention on important elements of the course. It also provides valuable feedback to us as a collection of possible test questions.

Project-Oriented Learning

In current state, our class size is a little big, over 50. Instructor creates small groups with 4 or 5 people; there will be at least 10 groups. So there will be free rider although we

collect feedback at the end of the class and instructors observed every group activities. Instructors have to facilitate by ourselves, and don't have any other assistance in our class. So, teachers overcome to the occurring of free rider in our teaching higher education environment.

The size of groups are made into small. Teachers have to take time to explain to class that students' role is a "job" and like a real job they have to perform in that role. Students owe it to their team and themselves. Teachers make roles meaningful—they have to do and produce something unique to that role.

Teachers monitor students to keep an eye on them, walk around, and make sure everyone is working. If we see or hear that someone is not working, take them outside and talk with them. We ask students that what the problem is and figure out a way together to resolve it so they do their work. At the end of the day we must do an exit ticket where we ask specifically about student's team functioning, is going well and having problem. Look through exit slips and identify problems and teams who are having problems and talk with the team.

Student-centered Assessment
Students can assess themselves and each other. As their instructor, we can assess learners through actual performance-based tasks and rubrics. When assigning a team project, how well did the team members collaborate and contribute their individual pieces to the greater activity. The assessments match with the learning task to be measured by using an essay to assess a student's thinking and using a multiple-choice or short answer test to assess student's ability to identify or recall information [6].

Using student-centered assessment, teachers can assess different levels of learner knowledge: Levels range from basic knowledge to more high-level learning (the ability to apply, analyze, synthesize, and evaluate information). Assessments measure not just students learn, but *what, how, why,* and *under what conditions* they learn best. It also measures their progress as students. In my class, I used checklists to assess the student performance. After I had learned the rubric from training and started to use rubric, found that standardized and faired. I used rubric for group assignment and POL activity in the class room. Rubrics have benefited the students to increase responsibility of their own work, was a tool for assessment measure and student-centered assessment.

Blended Learning
Blended learning **is** about finding better ways to support learners in achieving the learning objectives and providing them with the best possible learning and teaching experiences. Blended learning is any instruction that blends some digital content or instruction and some face-to-face content or instruction.

Learning objects such as audio, multimedia, and video can supplement textbooks and lectures. In the case of flipped learning, they can replace textbooks and lectures. Blended learning can be used to facilitate discussion and participation. Some learners are more comfortable participating in online discussions than in classroom discussions. Writing, versus speaking, gives learners time to formulate and organize their thoughts [6].

As teachers plan lessons that incorporate Internet resources, teachers keep in our mind that the reliability and strength of Internet access in the classroom and in computer labs.

Applying Online Resources in Classrooms
The author used a learning-management system (LMS) to embed videos and set up online quizzes and student forums. The aim was to engage students with the subject, and draw their attention to the content through innovative learning strategies such as interaction in the forums. By using the LMS, the author managed to significantly reduce student-accessibility problems, as now students could access the notes and assessments and participate from anywhere and at any time. In doing so, instructors could teach online course in offline in parallel and learners can learn more detail and understand.

At the heart of the ICT engineer in higher education lie defining and enabling capabilities. ICT Engineering students are not only students of the subject matter of engineering, but also of problems and solutions that may very well go beyond their own expert domain. In their education teachers have to prepare them for basically three different roles that they may play in their future careers [3]. Firstly, teachers have to enable our graduate students to develop into a technical expert of world-class standing. Secondly, graduate students should be able to develop as an integrator who can synthesize, operate and manage across boundaries, be they technical or organizational, in a complex environment. Thirdly, the graduate students should be able to take on the role of the creativity, innovation, and leadership that is needed to guide research and industry to a successful future. During their study they must learn how to link science and engineering to the needs of society, and communicate that to the public.

8. CONCLUSION
Teaching design strategies in higher education have been recommended to help teachers meet the needs of the full spectrum of learning styles. It induces students to adopt a deep approach to learning, and promote students' intellectual development. The better students understand the strengths and weaknesses associated with their attitudes and preferences based on their education level, the more likely they will be to learn effectively while they are in university and throughout their careers. So, teachers should apply the instructional toolkits in their class room coming academic semester and ready to transform from traditional learning to student-centered learning.

Students become active participants in the learning process, is an important means for development of student skills. In the process of active learning, students move from being passive recipients of knowledge to being participants in activities that encompass analysis, synthesis. Active learning can allow for greater communication between students to do meaningful learning activities and think about what they are doing. Adoption of students-centered approaches is essential to improving learning outcomes, better recruitment and retention in engineering. It also helps meet accreditation requirements. The best practice on teaching design strategies and learning in higher education such as project-oriented learning, learner-centered instruction and blended learning for not only the instructors but also for their students thinking in order to practice higher-level thinking

skills. Higher education has no alternative but to follow and take advantage of these teaching strategies to benefit the quality of students to offer. This is a major shift in focus from the current teacher-oriented imparting of engineering education to a project-based and student-oriented educational experience.

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