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Holistic Learning Aided With Digital Platform for Outcome Based Engineering Education

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ABSTRACT

The engineering Education in recent years is facing several challenges out of the way despite emerging shortage of skilled engineering manpower in an increasing number of sectors. The manifold factors which has contributed to this decline includes: Unparalleled curriculum with employability, The inadequate allurement of employment opening for engineering graduates, New challenges due to globalization and the need to uplift in innovation. This paper aims at making engineering more attractive to bright students by overcoming challenges faced by institutions, employers and government policy to address the issues effectively by adapting disruption in student centred learning. Here we take a comprehensive look at the various facets of improving engineering education. It adopts a systematic approach by enabling Disruptions in traditional learning by adopting flip-the class technology where a separate digital platform-Student Centric Learning is created for education system which would indeed improve the quality of teaching, learning, Research and Encourage innovation Entrepreneurship. The evaluation from Digital platform, shows a significant improvement in students Key Proficiency

1. Introduction

In the Era of global transformation towards sustainable development, budding engineers should have a hunch about the sustainability challenges and prepare themselves as an effective person to perform better in a dynamic, intercultural global environment. This paper aims at developing a separate digital domain - Web portal which enables an individual student's database where the lectures are based online with different pedagogy such as flip-the class technology. Transparency in assessment methodology which maintains a record of assessments, projects, internships. Classroom based cutting edge research training according to industry demands by industrial collaboration. Discover new scientific knowledge and technological potential through research and drive high end sophisticated technology in a rapid pace. The drift from primary input based assessment to output based assessment requires the use of different methodologies to evaluate the efficacy of learning and more importantly a different mind-set on the part of mentors and learners alike. The increasingly globalized nature of engineering services and the work of engineers require a different skill set with more emphasis on commercial knowledge, leadership skills, out of box thinking and the ability to work in teams which will be imparted in a long term training from second year till final year of engineering module which can be achieved by live class room training by experts rather than giving lectures on syllabus. The goal of this methodology is to open up more productive employment opportunities and eradicate the problems arising from the unwieldy affiliating system, inflexible academic structure and uneven capacity across various subjects and ultimately the growth of the engineering sector which in turn will contribute to the growth of the economy worldwide. At the outset to achieve this objective the complete schema should be clearly visible so that the educators and students can work towards the defined productive Outcomes.

2. Background

In the recent years, defalcation in engineering education has created a negative impact on the professional's ability to contribute impeccably to global economic and social development [1]. Engineers play a crucial role in all emerging sectors and, demandingly, engineering expertise is the major factor for the technological development. Engineering practice is streamlined by a wide range of discrete global elements, and it is imperative for the institutions to transform engineering education in a sound and discerning way to endow students for the challenges ahead [2].Due to prompt changes in industrial development, Engineering education systems should be periodically

investigated to keep track with the changes and prepare students with relevant skills [3]. The major reasons for the requirement of change in engineering education are the need for multitudinous engineering personnel, and the effects of rapid technological development and globalization. Future engineers should be bestowed with critical thinking and problem solving skills, and in addition must have the creativity and out of box thinking to innovate for the sustainable requirement [4]. The future quality engineer should be as follows: technically challenging, diversely knowledgeable, thirst for learning, demonstrates entrepreneurship quality, innovative, professionally ethical and flexible[5].As emerging technology paves new ways to construct the way of teaching and learning methodology, this initiative fortify technical institutions to design and practise digital models to help tutors and students implement digital learning strategies and manoeuvre the potential of state-of-art technology [6]. To transform the current education system towards more innovative structures, other studies showed the need for higher modernization of education, proposing useful methods to inculcate digital teaching and learning [7, 8]. *"The European Framework for Digitally-Competent Educational Organizations"* addressed the processes required for an educational institution to integrate and effectively use digital technologies in teaching and learning frameworks. This framework covers seven thematic elements needed to clinch new opportunities derived by digital technologies and content in the world of education and training: leadership and governance practices; teaching and learning practices; professional development; assessment practices; content and curriculum; collaboration and networking; and infrastructure. These cross-sector thematic elements act as innovation enablers in any educational organization, and imply a process of planning changes along all three basic educational dimensions: pedagogical, technological and organizational [9].

3. Research Methodology

The implementation of the proposed methodology aims to transform the traditional method of teaching in engineering in such a way that it will enhance the development of creativity, boosting the capability of innovation in technological area and also the enhancement of producing technically sound graduates according to industry demand.

The methodology consists of several steps:

- Implementation of Flip-the class technology.
- Industry specific Training.
- Discover new scientific knowledge through international exposure.
- Opportunities for Entrepreneurship with the help of education stake holders.

3.1 Flip-The Class Technology

The digital platform is implemented with the following frameworks: 1. the design of learning that includes evaluation instruments, design instructional media, content sequencing. 2. Managing Learning through Syllabus setting and scheduling activities such as assessments, exams online.3. Forms communications through E-mails and open threads for discussion.4. Facility to track performance profile by evaluating and giving feedbacks.

The design of digital platform is explained in the figure.1 which shows the system design, system delivery and system outcomes.

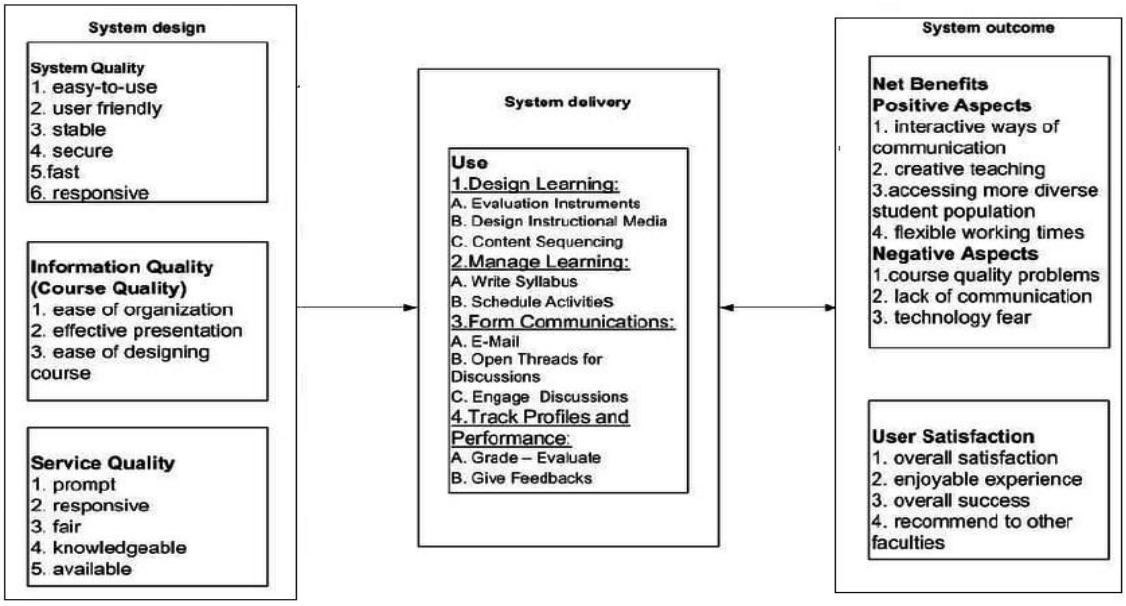

Fig. 1. Block Diagram showing the schema of digital platform- student centric learning

The implementation of this proposed methodology has several advantages which is shown in the following Fig.2

FACTORS	POSITIVE OUTCOMES
Student Related	• Accessing more diverse student population • More interactive ways of communication.
Faculty Related	• Intellectual Challenge and opportunity to teach in more creative ways with technology. • Interest in using technology. • Flexible working times. • Self-gratifications.

Institution Related	• High quality support structure and infrastructure. • Positive institutional culture and norms on participation into e-learning and recognition of work. • Providing training for faculty. • Increase in payment.

Fig. 2.Positive aspects of the flip-the class methodology

3.2 Industry specific Training

The new trend towards knowledge-based economy along with the globalization defines the training needs of engineers in industry as the main differential element in such a way that they can apply the knowledge what they are learning in real-time situations in industry as a continuous process. This in turn, enables the Professional to fulfil the requirements of workplace in future deployment .The domain specific training of the engineering graduates by industrial collaboration would lead to the growth of the sustainable technological innovation.

The outcomes of industry specific training: supports engineering students to build rapport and network with future employers which open up employability at ease, develop awareness regarding the workplace culture, to understand code of ethics that engineers should uphold, fine exposure to industrial practises followed in beforehand. By doing so we develop an industry ready-engineering professional who can directly be deployed on the projects without investment of time for domain training.“Sustainable development results from effective utilization of available resources to obtain the desired effect.”

3.3 Discover new scientific knowledge through international exposure.

This part provides insight of collaboration of universities across the globe for International exposure to benefit student-faculty-university as a whole for the development of economy of constituting countries participating in the collaboration. Certain course modules can be designed by the collaborated partners as per the demand of innovation challenges and technological needs. Employability opportunities can be extensible across the globe by overcoming the boundaries.

3.4 Opportunities for Entrepreneurship with the help of education stake holders.

The Multiple studies have shown that different interpretations for the engineering education to respond to Emerging challenges by providing a responsible and sustainable education which is needed to adapt and Apply innovative knowledge and advancements. Through a process-based engagement strategy, the Entrepreneurial-education providers may link the academic, research, and business and society pillars to Successfully deal with the constantly changing globalization, integrating the practices of sustainable

development into all aspects of education and learning [10, 11].The development of technological entrepreneurship plays a major role in determining the technology-based innovation. Therefore, an authentic approach is required where faculty-student-industry triangular collaboration is essential to develop an Entrepreneur. This area plays a major in the transformation of engineering education as a viable one.

4. Results and Discussions

The study was conducted by enrolling 60 students of Electrical engineering domain in Digital platform – disruption in student-centric learning to envisage the proposed vision. The structure is actively implemented for a period of 3 months which includes assessments, mock tests, periodic reviews and Research activities were carried in classroom- lab environment. The complete schema is dissimilated in to 2major domains for understanding.

- Tutor Module

Tutors will be provided with set of students for mentoring them by enabling assessment creation and reviewing, student Record maintenance, test creation and scheduling. These are carried out in a virtual phase. On class training on research projects and implementation of ideas proposed by the student is to be supported and monitored by the assigned mentor.

- Student Module

Student's database is created and credentials are provided. In this platform the students should attend online courses where their attempt is monitored by tutor and study materials are available as digital data. Periodical assessments and test are scheduled which will be notified to the students through e-mail and SMS communication and as notification in their login. The updating of his/her research work on weekly basis in the provided research sub-domain is essential as this will also be evaluated. This methodology enables transparency in assessment methodology which results in sustainable engineering education.

From the study it is observed that, the involvement of students in learning has tremendously increased because of the transparency in the assessment methodology. Out of 60 students almost 40 students were shown an appreciable change in performance as compared with the traditional methodology. Research activities were carried out in an effective way which further proved to contribute at par the industrial demands.

A survey conducted from students revealed that this methodology has helped them for self-development both as a technological advancement and industry specific learning.

5. Conclusion

This paper presented a method to improve sustainability in engineering education by creating a digital domain-student centric learning and adopting certain disruptions in learning such as flip-the class technology, industry specific training, opportunities for entrepreneurship. The results and findings of case study presents an drastic improvement in students' performance according to the business engineering education and tackled the challenges faced due to changing globalization Thereby, innovation through the adoption of digital platform for teaching and learning can help improve learning outcomes of graduates to engage positively and dexterously in the digital environment.

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