Active Learning Approaches To Teach Intellectual Property Rights

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Abstract— **Student centered active learning methodology of teaching is proved to be an effective method of teaching the millennial students. Intellectual property is critical to nurturing innovation in engineering domain and hence is a part of the engineering education curriculum. The course on Intellectual Property Rights (IPR) was traditionally taught with a teacher centered technique. Through this paper an attempt is made to teach IPR through different active learning techniques and analyze the outcomes. The results include the attainment of Program Outcome (POs) through the Course Outcomes (COs). The comparison of the attainment before and after adopting active learning techniques substantiates that the active learning methodology has catered the students in enhancing their ideas with respect to the nuances of IPR.**

Keywords—active learning; OBE; IPR; Course Outcomes; Program Outcomes;

I. INTRODUCTION

Traditionally the engineering education system has orbited around the teacher – centered teaching methodology which is also known as the input based education. In this system the instructor teaches the curriculum to the students without actually verifying whether the student has 'learnt' the same. The second method of teaching involves the Outcome Based Education (OBE) which deals with student – centered learning philosophy. OBE focuses on measuring the student performance, which are called outcomes [4]. One of the popular methods to implement OBE is through active learning technique.

Intellectual Property Rights (IPR) is defined as a non-tangible property that results from the original creative thought of the human intellect. IPRs are of different forms such as Patents, Copyrights and Trademarks. The course on IPR deals with the different IPs, the process of obtaining an IP, different laws related to IP, different IP infringement scenarios etc. The IPRs play a pivotal in today's technological world and a company's strength is deduced based on its IP repository. Hence the course on IPR is essential to an engineering graduate. The course on IPR was generally taught through the input based education. The paper is an attempt to teach the course through OBE methods.

One of the key features of the OBE method is the verification of attainment of different outcomes. The National Board of Accreditation, (NBA), has provided guidelines through the Graduate Attributes (GAs), which are the abilities every engineering graduate needs to acquire during the learning process [3].

II. PROGRAM OUTCOMES AND COURSE OUTCOMES

Program Outcomes (POs), are attributes acquired by the student immediately at the end of the program, i.e, at the time of graduation [3]. The POs are aligned to the GAs and thereby all the GAs are addressed in the program on Telecommunication. The POs defined for the Telecommunication program is as given below in Table I [5].

TABLE I. POS OF TELECOMMUNICATION ENGINEERING

PO1	Ability to apply knowledge of mathematics, science and engineering fundamentals appropriate to the discipline of Electronics and Telecommunication Engineering
PO2	Ability to identify, formulate and analyze Electronics and Telecommunication Engineering problems
PO3	Ability to design solutions for Electronics and Telecommunication Engineering systems/sub-systems that meet desired specifications
PO4	Ability to analyze, synthesize and interpret results to arrive at valid conclusions in Electronics and Telecommunication Engineering systems/sub-systems
PO5	Ability to design, formulate and conduct experiments using electronic components, electronic instruments and/or modern engineering tools to demonstrate concepts in Electronics & Telecommunication Engineering
PO6	Ability to understand the impact of Electronics & Telecommunication Engineering solutions on health, safety, legal and cultural issues
PO7	Ability to understand the impact of Electronics & Telecommunication Engineering solutions for societal needs and environment
PO8	Ability to commit to professional ethics of engineering practice
PO9	Ability to function effectively as an individual, and as a member/ leader in a team
PO10	Ability to communicate effectively, write reports and make effective presentation using ICT
PO11	Ability to apply the knowledge and understanding of project management and finance while implementing projects
PO12	Ability to engage in independent learning and continuously upgrade skills/knowledge

The POs aligned to the Graduate attributes are attainted solely though the attainment of the Course Outcomes (COs), and every course contributes to the overall PO attainment. The COs constitutes the basic building block of a program and represents the student learning outcomes at the end of the course. The COs for the IPR course is defined in Table II below [6].

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TABLE II. COs OF IPR COURSE

CO1: Ability to work in teams to understand Patents, Rights conferred on a Patentee, Copy right and Trademarks leading to improvement in team work and leadership qualities.	PO8 PO9
CO2: Ability to identify and analyze Patent law, the legislative provisions regulating patents, principles and procedure for obtaining patent.	PO8 PO9
CO3: Ability to apply technical concepts of IP related technology to give an insight into IP management, Licensing, Valuation, Audit and other aspects of IP	PO8 PO9
CO4: Ability to demonstrate and develop awareness of relevance and impact of intellectual property law on academic and professional lives	PO2
CO5: Ability to engage in independent learning, submit a report and use ICT for effective presentation of the study on assigned topics related to cyber law and security/ National and International Policies on Patent law/ trademark/ Copyright / impact on environment/ impact of society	PO6 PO7 PO8 PO10 PO11 PO12

III. ASSESSMENT TOOLS

The assessment tools used include two components i.e. Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). The CIE component in a traditional method would typically consist of three internal evaluation tests and MCQ based quizzes [10]. The graphical representation of the same is shown in Fig.1 below.

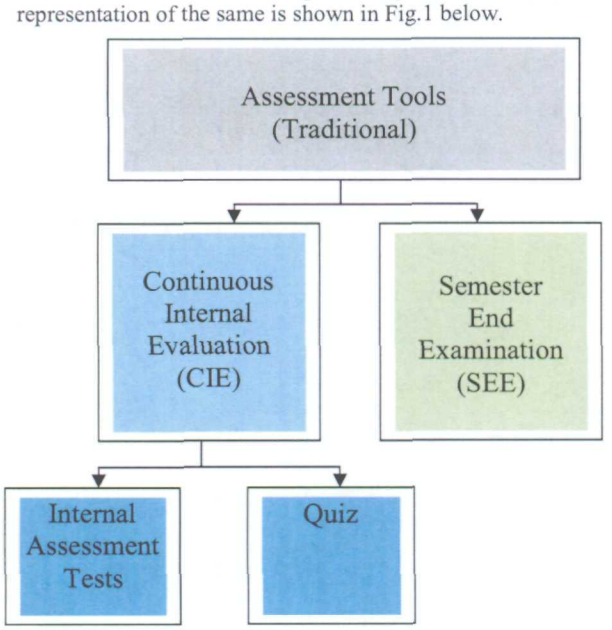

Fig. 1. Assessment Tools used in Traditional method

The OBE structure when introduced initially also had the same structure however with an OBE approach towards the Teaching Learning Process (TLP). The revision that was adopted from past year was to include Alternate Assessment Tools (AAT) as a part of the CIE component. The AAT gave the course instructors the option to adopt any innovative method to improve the TLP. It may however be noticed that the other assessment tools like internal assessment tests were mandatory and hence adhered to the same. The graphical representation of the modified assessment tool set is as shown in Fig.2 below.

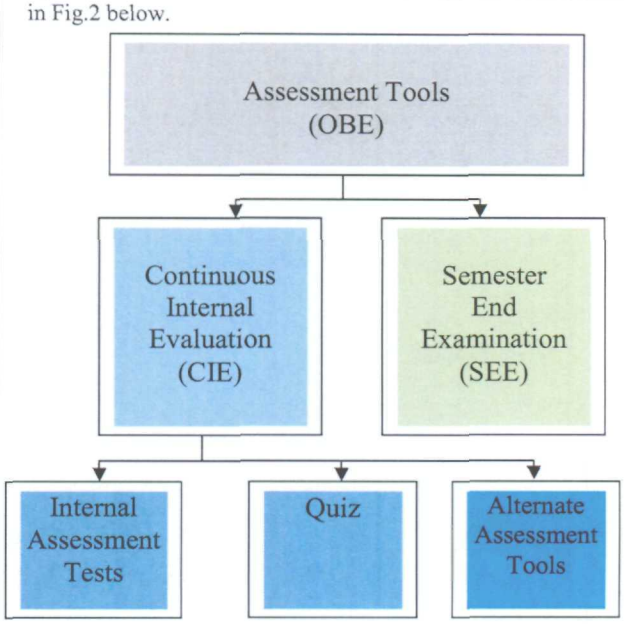

Fig. 2. Assessment Tools used in OBE method

The active learning and the collaborative learning methodologies implemented in this course were accomplished as a part of the AAT.

IV. METHODOLOGY

The different active learning methodologies adopted with their outcomes are as follows:

The first activity was in class brainstorming on Patent Infringements. The class was divided into 12 teams with each team consisting of 5 students in it. 12 Different scenarios related to possible patent infringement were discussed by the student groups. The team was formed by asking the students to quote a number from 1 to 5 and all number 1s were grouped together and so on. The teams had an almost equal proportion of good and average students in it. Each team was given 3 minutes duration for expressing their views and another 2 minutes was spent on debate over the expressed opinion.

The second activity was on visible quiz on Product Patent vs. Process Patent. For this activity, the class was divided into 5 groups of 10 to 12 students each. As this was multiple choice question based activity, the team had more students in it. The emphasis was given to not only the solution to the question but also to the student discussion on why the given scenario would be under the purview of product patent or process patent. The time limit was same as that of the first activity.

The third activity was on using video lecture after a brief introduction to the topic on IPR. An expert video [1] by the Department of Information Technology, Ministry of

Communication and Information Technology, Government of India, was played in the class. The students were really excited about the video lecture and it also gave them an opportunity to learn through a different medium. The video dealt with the various concepts of Intellectual Property Rights (IPR). This was followed with a brief quiz paper that was circulated to the students. The quiz was on the video content and it also helped in enhancing our knowledge about the sensory and visual learners in the class. The IPR course is a non – technical course as far as the engineering students are concerned and generally the class would be in the form of lectures with some discussion of practical case studies.

The fourth activity was on providing concrete examples through handouts which was aimed at intuitive and verbal learners. The handout [2] gave the example of various issues related to designs and its registration by the Controller General of Patents Designs and Trademarks; Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, was distributed in the class. The students were asked to go through the handout for a period of 15 minutes. The handout also dealt with the various practical concepts related to designs and copyrights. This was followed with a brief questionnaire that was circulated to the students. The questionnaire was on the contents present in the handout and it also helped in enhancing our knowledge about the intuitive and verbal learners in the class.

Other activities like Think-Pair-Share (TPS) and Student-Team-Achievement-Divisions (STAD, Slavin,1994) were also implemented in the class.

V. Results and Conclusion

The initial response to these activities were not encouraging in the sense that the students thought that it would be an additional burden on them. But once the activities started, the students started appreciating it and hence the activities yielded results in the form of their understanding of the course.

The responses from the students towards the first activity was good and some of the answers were exceptional and it was a good learning experience for the author as well. One of the challenges was to control the cross-talk between different teams. Also the maintaining the time limit for each team was an issue. This activity created lot of interest towards the Patent scenario; although sometimes the students were asked to control their enthusiasm so that it does not disturb the other classes.

The second activity was a good one in terms of the discussion towards different scenarios but the activity took more time to be completed than anticipated. Also lesser number of students in a team would be beneficial for this activity although the time management would be more challenging in that scenario.

For the third activity response from the students was really good and it had a huge impact on the class as the video lecture was something different when compared to the general class.

For the fourth activity, the student response was average. This can probably be improved by including more real time design and patent cases compared to the theoretical aspect.

The POs attainment through COs considering only the continuous internal evaluation for the previous year without inclusion of above activities is shown in Fig.3 and for the present semester course which includes all the above activities is shown in Fig.4.

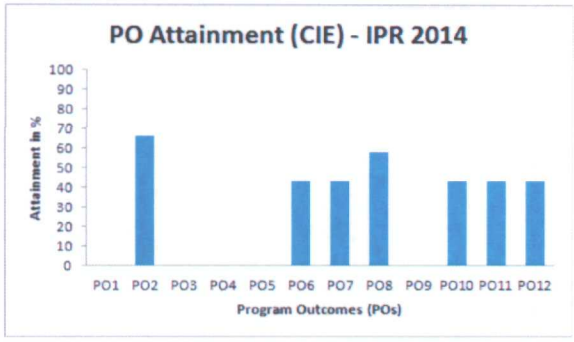

Fig. 3. Graphical analysis of PO attainment of IPR before Active Learning

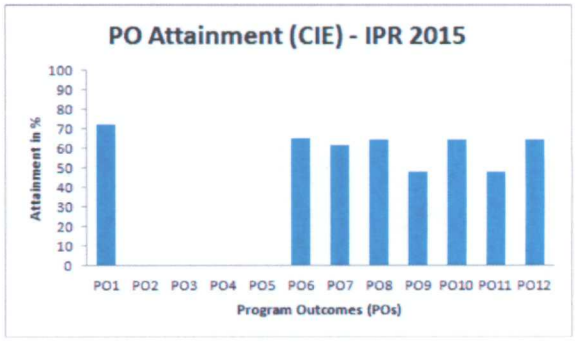

Fig. 4. Graphical analysis of PO attainment of IPR after Active Learning

From the above figures it can be noticed that the active learning methodologies has resulted in better attainment of the POs through the COs. One of the observations from the above is that additional POs are attained which is a positive impact on the student and another observation from the graph is that the POs that were previously addresses have also been addressed with an increase in their respective attainments. The PO2 is the only PO which has not been addressed when compared to the previous year's attainment.

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