

# *Enhancing Learning and Critical thinking through Poster Presentation (integrating course concepts)*

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**Abstract** — Critical thinking is an important aspect of engineering profession. Critical thinking is considered important in the academic fields because it enables students to analyze, evaluate, explain, and restructure their thinking. Preparing poster for given topic is a good opportunity to enhance critical thinking. Critical thinking skills will be developed in a better way if students are given the real time situations. One of the pedagogical ways to overcome this obscurity is Poster Presentation. An attempt was made to enhance Critical thinking skills in Automotive Materials and Manufacturing course, which focuses on Materials and the processes used for manufacturing automotive components. The students in a group took one automotive component and prepared a poster which includes the material and manufacturing process used for that component, the reasons for using them, the alternative materials and processes for that component and the economic analysis by considering different manufacturers of the same component. This led to better learning process in the form of practical exposure, self directed learning, creative thinking, and development of professional skills.

**Keywords**— *Critical thinking, Pedagogy, Materials, Manufacturing*

## I. INTRODUCTION

The list of core critical thinking skills includes observation, interpretation, analysis, inference, evaluation, explanation, and metacognition. According to Reynolds (2011). For students to learn content, intellectual engagement is crucial. All students must do their own thinking, their own construction of knowledge. Expressed most generally, critical thinking is "a way of taking up the problems of life." Irrespective of the sphere of thought, "a well cultivated critical thinker": raises important questions and problems, formulating them clearly and precisely; gathers and assesses relevant information, using abstract ideas to interpret it, effectively comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards; thinks open-mindedly within alternative systems of thought. Critical thinking (CT) and English communication are recognized as two essential 21st century competencies [1].

Ethical decisions are influenced by thought processes. If ways of thinking and knowing contain assumptions, biases, or errors, these variables can influence having an accurate thinking process and also learning outcomes [2]. Posters have

become a major format for communicating at scientific meetings. Presenting a poster is a good opportunity to build reputation as a confident, knowledgeable, and articulate scientist while exhibiting an attractive, informative display, and maintaining a professional demeanor. Posters offer advantages both for meeting arrangements and for communication efficiency.

Over the last twenty years, the engineering profession has been experiencing important changes. These changes have required engineers to become more efficient in thinking and problem solving. More specifically, they demand engineers to resolve problems quickly, to consider open-ended problems, as well as to cope well under uncertainty and information overload [3]. The central point of education is to teach people to think, to use their rational powers, to become better problem solvers. The future engineering curricula should be built around developing skills and not around teaching available knowledge. Engineering educators must teach methods and not solutions. The focus must be on shaping analytic skills, design skills and problem-solving skills [4]. As we grow and mature we evolve from students in the classroom to students of the world, where learning never ceases, but changes in kind and emphasis. As educators, we need to recognize this evolution in our students and design our engineering curricula to not only be academically challenging, but also personally motivational for the diverse student population that will become the engineers of tomorrow. Engineering education must delicately balance the learning process between the understanding of facts (e.g., scientific), with their interrelationships and the desire to understand these facts [5].

## II. OBJECTIVES

- To enhance Creative thinking skills and analytical skills;
- To improve the learning process through the real time methods, that enable students to understand the utilization of theory for practice;
- To explain the importance materials selection this plays a major role on product cost and environmental performance throughout its life cycle.
- To describe the importance of manufacturing process selection satisfying overarching technological, economic and functional issues.

- To learn and develop professional skills - to work in a team, to collect necessary technical information and present a poster.

### III. METHODOLOGY

In conventional way of writing assignment students reproduce the textbook matter which limits the scope of learning, thereby reducing the ability to think beyond the curriculum. Evaluation scheme also plays a vital role in educational institutions, which is not fully addressed in conventional assignment writing system. In the present methodology students' work in a group with the following planned activities. (III Year, Automotive Materials and Manufacturing Course).

1. Selection of Automotive Component.
2. Literature survey regarding material/s and manufacturing process selection, materials relationship with the component/s functionality.
3. Impact of material and the process used for manufacturing on the environment.
4. Manufacturers of the selected automotive component (through literature survey and field work)
5. Economic analysis of the selected automotive component ( materials and manufacturing process)
6. Preparation of Poster and Presentation.

### IV. RESULTS AND DISCUSSIONS

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A questionnaire was designed that involved a set of criteria to measure the effectiveness of PP and the same was circulated to students to receive their feedback about the process (new methodology used for assignment component). The collected feedback was analysed and percentage of distribution perception was plotted (Fig 1.1a,b). The questionnaire as well as the analysis has been shown below.

#### Questionnaire

This survey is intended to measure the effectiveness of PP assignment on "teaching & learning" process in BVBCET. Based on your personal experience, kindly give your valuable feedback by ticking (✓) in the relevant box (□) on Likert five-point scale.

TABLE I

Sl.No	CRITERIA	SA (5)	A (4)	N (3)	D (2)	SD (1)
1	The PP has helped in clarifying the concepts of Selection of materials and Manufacturing Processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	The PP has improved our skills in integrating the concepts learned in this course.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The PP assignment has given us an opportunity to learn beyond the curriculum.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	The PP has positive impact on learning of the course.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Any other comments:

Name	Program	Semester

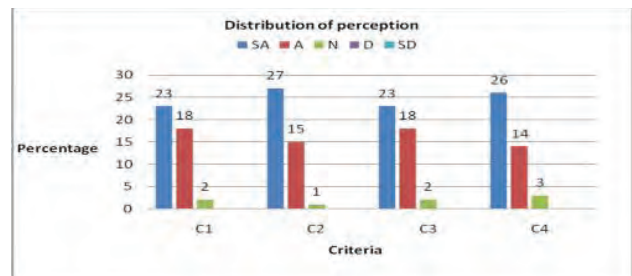


Figure 1.1(a): Bar charts showing the percentage Student's distribution of perception

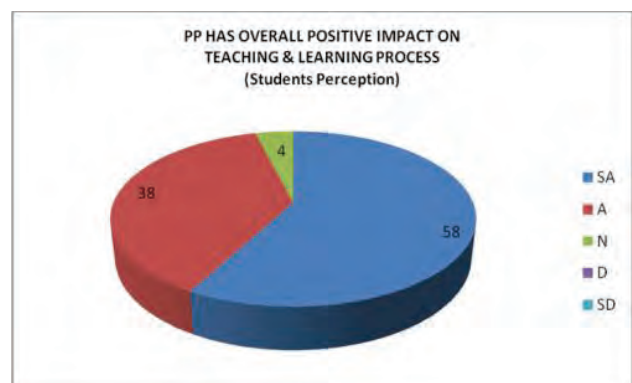


Figure 1.1(b): Pie chart showing the percentage of perception taking all criteria into consideration

## V. EVIDENCES AND EXPERIENCES

The following figure (1.2 a) presents the snapshot of posters for the automotive components and figure (1.2 b) presents the comments given by students about the activity. Different Automotive Components selected for Poster Presentation: Propeller shaft, exhaust manifold, Air filters, Wind shield, Ball bearings, Crankshaft, spark plug, piston rings etc



Figure 1.1(b): Posters for the automotive components.



Figure 1.1(b): Comments given by students about the activity.

## VI. CONCLUSIONS

- It has been observed that Poster Presentation work resulted in relatively better learning process by the students.
- This extended tangible benefits like practical exposure to students, enhanced creative thinking about that subject and many intangible benefits like professional skills enhancement to interact with people, improve the

student's ability to work in a team, making students to start preparing for their career at an early stage.

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## ABBREVIATIONS

PP-Poster Presentation  
SA-Strongly Agree  
A- Agree  
N-Neutral  
D-Disagree  
SD-Strongly Disagree