

## CRITERIA FOR EVALUATING THE QUALITY OF A QUESTION PAPER

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### ***ABSTRACT***

*The quality of engineering education is directly the outcome of knowledge implanted and evaluated through formal examination. But there is no such method to evaluate the quality of evaluation through the question paper. This paper proposes the method of such evaluation and present result based on examining few of the question papers. The method so developed can be expanded as per the perception and uniform code of quality can be awarded. The ICTNOS (I see T nos) can be uniformly accepted as the qualitative criteria for the awarding the rating to a question paper.*

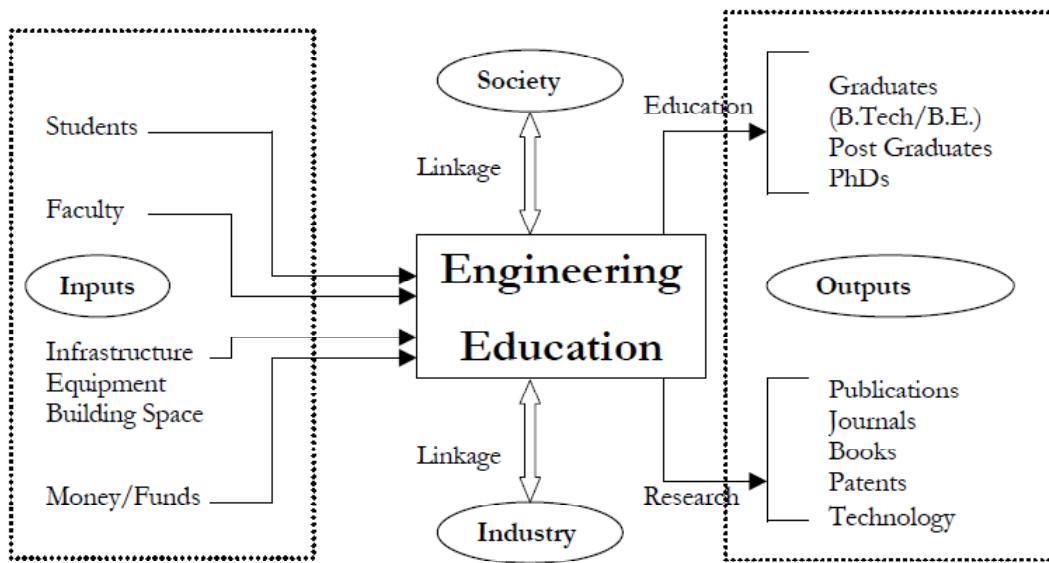
**Keywords:** *Evaluation, quality, type, theoretical, numerical, objective, subjective, innovative, creativity*

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# 1. Introduction

India has the potential to be a global technology leader. The Indian economy has been growing at the rate of 9 percent per year. The Indian industry has also become globally competitive in several sectors and can increase its global market share. A critical factor in this will be the success of the technical education system in India. Hence, there has been a significant increase in the number of engineering institutions and in student output. Engineering is a preferred career choice for a large number of students at the 10 + 2 level in India. Many of the reputed engineering colleges (IITs and NITs) are highly selective in their admission process with the number of available seats being only 1-2 percent of the number applying. A large number of private engineering colleges have been set up. Though there is a mechanism for accreditation (National Board of Accreditation) and an umbrella agency, the All India Council of Technical Education (AICTE) set up to monitor and control engineering education, the quality of engineering education in many institutions is suspect.

Has the engineering education system been able to provide the engineers required for the growth of the Indian economy? Has the engineering education system provided the research and development leadership required for our industry? In the context of globalisation, is there a need to modify the higher engineering education system in India? There are no clear-cut answers to these questions. It is clear that since Independence, India has produced a large number of competent, qualified engineers who have contributed to the success of many Indian companies and industries. A large number of our engineering graduates have also made an impact in the corporate world internationally. Figure 1 on Schematic of Inputs and Outputs for Engineering Education provides us with an insight of the role of engineering education in India, Despite these positive outcomes, a critical analysis of trends is required before we can attempt to make any recommendations for the future.



**Figure 1. Schematic of Inputs and Outputs for Engineering Education**  
*(Adopted from Banerjee R. and Muley PV. (2007) Engineering Education In India. Energy Systems Engineering, IIT BombayPowai, Mumbai.)*

The suggested reforms, when implemented, could help towards achieving the Government’s vision for technical/engineering education:

*“ To develop and nurture a Technical Education System in the country which would produce skilled manpower of the highest quality comparable to the very best in the world and in adequate numbers to meet the complex technological needs of the economy; and*

would provide the nation a comparative advantage in the creation and propagation of innovative technological solutions and in the development of a technological capacity of the highest order, both for its application in economic development of the country and for becoming a major supplier of technology and technological services in the world”.

(Source: Technical/Engineering Education Quality Improvement Program Report; 2002, National Project Implementation Unit, Uttar Pradesh, India).

The concept of quality questions papers assurance is very common in industrial production, where the quality of output products is tested or measured. The quality of engineering and technology education is complex and challenging due to various reasons, and can be analogous to industry, as illustrated in Figure 2. Any standard engineering activity includes three different stages, such as the input, the process and the output, where feedback closes the loop (Banerjee and Muley, 2007). In this process, feedback gained from the output can be utilised to improve the quality of the process. This model has also been adopted for the quality assessment of education structures. The three stages of an educational process cycle are further elaborated on below.

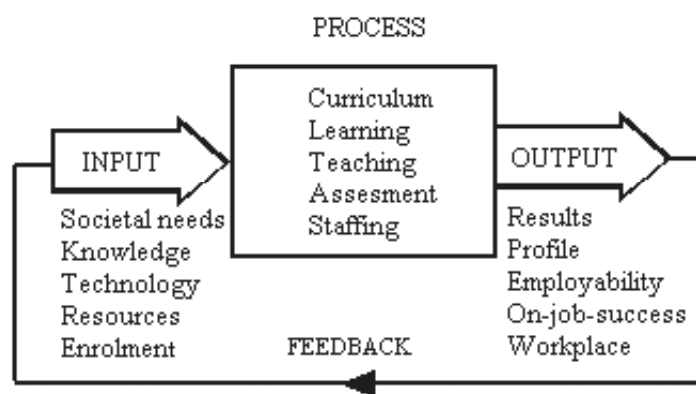


Figure 2 : The block diagram of an educational cycle.

The benefits of the quality questions papers for engineering and technology can be divided into two parts; namely academic (student) and administrative (institutional). From the students prospective the type of questions paper becomes very important as the outcome of that is considered as the indicator of students learning. The NPSE (2004) lays down the code of ethics for the engineers and ABET (2003) lays down the engineering criteria for accreditation board of engineering and technology.

The ABET Code of Ethics of Engineers (2003), clearly clarify that engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

- using their knowledge and skill for the enhancement of human welfare;
- being honest and impartial, and serving with fidelity the public, their employers and clients;
- striving to increase the competence and prestige of the engineering profession; and
- supporting the professional and technical societies of their disciplines.

In Indian context it is becoming very important as more and more engineering education patrons are opening there venture with foreign participation. It is also important from the faculty side as it reflects the rigorous and delivery potential. The normal questions students ask about the question paper are about style of the question. What will be weighted of theoretical and numerical portion? As if something they will able to reproduce being theoretical while for numerical portion it is being considered requires application of knowledge and concept. The other question which students are concerned about the style of question is content requiring subjective and objective type of questions. The NSB (2004) has presented the outcome through the list of question which is considered as indicator of science and engineering. This is needed to be developed for each subject as the learning outcome. Here it is being considered that objectives are short answer type of questions having unique or close ended answers while subjective question requires elaborate answering turning out to be long answer type may be with multiple or specials answers. The other part which

is generally not consider for evaluation is application of knowledge outlining the creative and innovating thinking of students. The paper considers these aspects as the measure of quality of question paper wherein the presence and absence is relatively marked. Such five parameters are considered here for qualitative grading a question paper in line with building the attribute for the engineers as outlined IEEE (2002).

## 2. Methodology

The rating methodology consider for grading the question are the presence or absence of the quality parameters. The levels of presences are graded from 0 to 2 which are qualitative measure rated as low, medium or high (LMH) category. Here, such five parameters are considered which are: *innovations, creativity, theoretical, numerical, objectivities and subjective*. These are called as “I see T nos” abbreviating the first letter of the quality parameters. Innovation and creativity are grouped together so that there should be little difficulty in distinguishing between them. To all these parameters maximum two grade point are awarded making the total count as 10. The same is shown in the Table 1. In a particular subject matter more such parameters can be recognized. The total can be normalized to 10 base points making this technique versatile. A higher score means presence of composite quality parameters while lower means absence of it. It is being considered here that all the parameters which are quizzed in the question paper are dealt in the lectures, practical and tutorial. Therefore it can be considered to raise the level of learning of the students. Then the average class performance can be indicator students learning and delivery method.

**Table 1: Quality parameters and level of presence**

S.N	1	2	3	4	5
Quality Parameters	Innovation creativity	Theoretical	Numerical	Objective	Subjective
Grade point	2	2	2	2	2
Level	Low: 0	Medium:1	High:2		

### 2.1. Case study

In the present study such four question paper were collected, investigated by the author and the result is produced in Table 2.

**Table 2: Authors grading of question paper**

Paper	Quality Parameters	Innovation creativity	Theoretical	Numerical	Objective	Subjective	Grade
P1		2	2	2	2	2	10
P2		1	2	2	1	2	8
P3		1	2	0	0	2	5
P4		0	2	2	2	2	8

### 2.2. Student’s response

The same set of question paper when were evaluated by 11 different group of students looking into the same quality aspects and the results are presented in Table 3.

**Table 3: Students’ grading of question paper**

Student Group Paper	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	Grade
P1	6	6	5	5	5	4	6	6	5	4	6	6
P2	2	5	6	6	4	4	6	6	5	5	5	5
P3	5	5	6	5	5	5	5	5	5	4	5	5
P4	3	6	5	4	5	4	6	6	4	4	4	4

### 2.3. Interpretation

The paper one (P1) can be considered as the ideal one which is having all the parameters of quality paper as per the author's grading. As against to this paper two and four have same composite quality number but it differs in quality parameter as one having ~~ICTNOS~~ while other is having TNOS. The strikethrough letter represents the lack in that abbreviated quality parameters. There are other possibilities of arriving at the same composite number but complementing with strikethrough & un-strikethrough parameter making it a versatile demonstration technique. For example, P3 is having score of 5 with letter code as ~~ICTS~~ signifying the absence of NO.

When the same set of question paper were evaluated by 11 different groups of students in a tutorial class, the perception was very different as shown in Table 3. The students and author nearly graded the same set of question paper as higher and lower with great anomaly for one set of question paper (P3). Probably this can be accrued to the faithfulness of the group and the sequence of taking the sample data. To do away with biasness, the composition of student group is reported in terms of its scholastic performance reflected as cumulative performance index of students as given in the Table 4. To check this aspect further the safety compliance and behavior modification in terms of safety compliance is found that out of 12 students commuting toward school none of them use safety headgears. This confirms that students have the knowledge of risk but compliance is missing none the less there were truthful in admitting it. In general students' grading mostly under estimated or equal the grading by the author. This method of awarding rating to question paper may enhance the quality of education and connect the students with the final outcome of the learning. While evaluating the question paper it was made clear that it is not an attempt on the style of the examiner but just an academic exercise to better appreciate the questioning style and augment it.

**Table 4: Composition of student group**

Cumulative Performance Index	10-9	9-8	8-6	6-4	<4
Number of students	0	2	25	5	15

### 3. Conclusion

The technique so developed here can be easily applied for evaluating the quality of question paper. It is subjected to personal qualify error for the rating of the quality parameters into LMH categories. The template so developed can be used to prepare composite better quality of question paper and ensuring intended quality parameters. The technique can be used to enhance and accommodate other quality parameters useful for other branch of study. The paper does not look into the quantitative analysis of question paper looking into the variety and frequency of type of the question asked.

However, there are many issues that are interesting to the organisation and its stakeholders, and an

organisation can seek to measure lots of things. It's essential to develop processes that help one to understand why things happen in a certain way and provide more free-form feedback. As a complement to these, it's important to choose indicators of performance, quality, or outcomes that are within the educational scope to measure and use. Four criteria for choosing indicators are summarised by the acronym AIMS:

- Action focused. Does knowing about this issue help your organisation or its key stakeholders to do things better or more effectively? Is it within your organisation's power to influence it?
- Important. Is it relevant to your organisation? Is it a priority for a core stakeholder or group of stakeholders?
- Measurable. Can you get information that tells you something about the effects you've had?
- Simple. Is it clear and direct enough to be understood by all stakeholders? Is it easy enough to get information without expert assistance if none is available?

#### **4. Acknowledgment**

The technique presented here is the result of author creative thinking and can be used for public good with information to author. Author gratefully acknowledges the participation of 2008 batch students of Pandit Deendayal Petroleum University in the program of study of under graduate Petroleum Engineering.

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