

KEY ATTRIBUTES OF A GOOD TEACHER IN AN ENGINEERING COLLEGE

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Abstract

India being a nation that enjoys a demographic dividend of having higher percentage of younger aged population, also has a challenge to develop the students with proper education, thereby the young generation contribute to the growth of the nation. In this context, the Higher education becomes an important focus among the government policy makers. Further, more focus is given on the engineering education since the students qualify to be engineers are expected to be the next generation employees and entrepreneurs. They are expected to have abilities for innovation aimed at higher growth and potential for creating more opportunities. While India has a huge number of engineering colleges with several lakhs of students pursue engineering courses, the quality of the faculty members have always been a concern. While there are several researches studied on the quality aspects of an engineering teacher, this paper attempts to find the top 10 attributes of a great engineering teacher. This study is made based on the inputs from both engineering college teachers themselves and the students pursuing engineering courses. While the top 10 attributes are identified in the perspective of students and teachers independently, the commonly agreed top 10 attributes of a great engineering teacher are identified through this paper.

Keywords:

Attributes, Students, Teachers, Engineering Curriculum

1. INTRODUCTION

Higher education endows people with an opportunity to reflect on the important social, economic, cultural, moral and spiritual issues faced by humanity. It adds to the nation's growth through dissemination of specific knowledge and skills. It is thus, a vital aspect for survival. Being at the top of the educational pyramid, it has also an important role in creating teachers for the education ecosystem. Higher education must become vibrant in an environment that has exceptional knowledge explosion, and constantly enter uncharted areas. The fact that our universities produce millions of unemployed graduates reflects the necessity of improving the quality of education in India. In this paper, an effort has been taken to figure out the perception of teachers and students on parameters which are top 10 in judging the quality of teachers in the existent system of higher education in India.

The quality of teaching is a function of the quality of teachers. For teachers to impart knowledge to students, they must have extensive knowledge of their subject, the core curriculum and educational standards as well as the passion and an aspiration for learning all through their career.

Here, TSR Subramanian has made some very serious comments and recommendations in the National Education Policy Draft Report. According to the report, the "quality of many universities and colleges and the standard of education they provide are far from satisfactory".

A planned 40% of faculty members are an ad-hoc resource and mainly temporary, contractual or invited lecturers. This has created a grave problem in terms of the quality of the produced students [1]. Furthermore, the system of values and the features of such teachers is highly dubious as they tend to take the role for granted.

For the development of the country, it is extremely vital to have high-quality teachers and high-quality teachers can be created only if we have an excellent system of teacher education and dedicated and efficient teacher-educators.

Teachers are a key tool for building nations. Teachers show us the right path through perseverance, love, and sacrifice in which big people build our country. Teachers shaping younger generations' character and it shows them the right way to their final goal.

Teachers are striving to develop a wealthy nation and a truly knowledgeable society. That is why teachers need to be very committed to their responsibilities. A teacher is a social representative who instills moral precepts. Education, learning and morality must be given more emphasis to a country's development and none of them is more appropriate than the humble teacher for helping in this process. Without teachers, wisdom and morality would suffer [2].

Likewise, teachers should focus on career development and show that many factors must be taken into account in their career development. Students are instructed to learn and learn what they want in education, in careers and in the future by their teachers. You can build the confidence with a teacher that somebody shares your ideas, feelings and concerns regarding work and education.

To objectively evaluate the interests, skills and talents and how they are related to career decisions.

1.1 CAREER RESOURCE EVALUATION SUPPORT

Develop a plan for your training or career. Financial assistance can be provided for the selection of a career.

Teachers shouldn't say what to do and follow after high school. What to do? They should assist the students to decide on their career plans, in accordance with their skills, interests, employment opportunities and finances.

Moreover, teachers must be trained or instructed to play the role of a coach. An individual who gives advice or guidance is just a mentor, whereas, coaching is an active journey. A trainer gives you special instructions on what to do and how to do it. But, a mentor is more reactive. A mentor gives you feedback, answers your questions and tells you about your experiences to guide your decisions.

While teaching is considered hectic, it is also one of the most rewarding professions. Check out some useful skills to see if

teachers need to work in areas before they become one. The main skills needed for teacher to inspire the students to lead themselves to success in their own lives are patience, adaptability, imagination, teamwork, risk management, constant learning, communication, mentoring and leadership [3].

Given the characteristics required for large teachers, a study is necessary to demonstrate that teachers with these characteristics are perfect and successful. We thus studied a sample of the characteristics of the successful teachers which included students and teachers from different areas of the state. This study seeks to show the characteristics of an excellent teacher.

2. REVIEW OF LITERATURE

Teaching is a multidimensional process that involves different essential factors for good teaching, leading to meaningful learning results. There can be several dimensions to the learning or learning process of any discipline. But when you think about the high-quality education, you think first of all of certain features of a good teacher or a certain classroom environment [10].

Lumpkin [7] outlines three essential elements of the teacher leadership: the emphasis on student learning, empowerment, relationships and collaboration. Teacher leaders may lead their employees to optimal levels of performance based on a shared commitment to student training, empowerment, relationships and cooperation. This clearly shows that a group blended approach among teachers and ability to collaborate as a team and serve students are critical traits.

Blanchard et al. [8] describe as high-performing teams as important aspect of effective teaching. Increased morale, professional status, and work satisfaction are recognized and appreciated by academic administrators, parents, and students. Leadership such as integrity, dedication, communication, expertise, courage, discernment, focus, generosity, initiative, passion, positive attitudes, problem-solving capabilities, and responsibility are consistent with Maxwell's characteristics [9]. The academia needs teachers as leaders who demonstrate these qualities. However the teachers are also expected to adopt to the attitude of the new generation students, who have access to digital technologies.

In [1], the author finds that the major component for improving the teaching quality is the professional development of the teacher. It is seen that the need for a strong professional development program for teachers is required to improve the learnings. The professional development manifests itself as a support from the teacher's employer, campus level administering or self-study.

In [2], the author reviews that there is enough evidence to support that high motivation and adequate personality traits influences mostly the cognitive and non-cognitive skills that contributes to the economic growth. Personality traits or non-cognitive skills are intertwined closely with at least three of the eight key lifelong learning competences discussed under the European framework. These also relate closely with the transversal skills, which are considered increasingly necessary for current technological developments, labor organization, social and communication skills, learning to learn and problem solving.

In [3], the author examine whether the five personality traits and expected student grades relate to teacher and college student assessments.

Extraversion, openness [4], agreeableness and conscientiousness [4] have been found favorite personality traits of an instructor, but not neuroticism. There was an important correlation between the expected grades of the students and the student assessments of the course, not the instructor's evaluations. No significant effect of grades on the teacher ratings has been found when the impact of perceived student learning amounts is taken into account. The individuality explained differences over and above grades and perceived learning in teacher and course assessments.

In [5], the author examines the magnitude of the relationship between psychological characteristics of self-efficacy (is related to job satisfaction), personality of teachers and other external measures (e.g., student achievement or evaluations of teaching performance) of teaching effectiveness. The aim of the study was to analyze the research systematically, which explores two psychological and educational efficacy measurements. The psychological features of teachers are associated with teaching efficiency, depending on the assumption. The evidence for this supposition is however limited: most research on the subject has been limited to investigating the connections between the self-reporting properties of teachers and other self-reporting results within teachers.

In [6], the author learns what distinguishes professors from less-skilled teachers. Recent information suggests that personality is a fundamental factor in the performance of teachers. This study examined the literature of expert student teachers with behavioral difficulties on personalities. The studies selected report their key thoughts, feelings, and behaviors, which according to trait theory stem from personality. Two independent researchers classified the personality variables according to the dimensions of the Five Factor Model of personality: Extraversion; Agreeableness; Conscientiousness; Neuroticism; and Openness to Experience. Evidence suggests that a teacher is increasing in four of the five personality factors by his or her ability to teach pupils with behavioral problems.

From the above studies, it is seen that the researchers from across the globe have studied and reported a list of traits and attributed as the required traits of a good teacher. These traits are often considered necessary to improve the students' education and these are identified as a permeating factor in high-performing schools and colleges. Most of the studies are generic in nature and not specific to the engineering teachers.

It is also expected the attributes and traits of the teacher would vary based on demographic conditions. There was no enough study made specific to the engineering teachers in India on this topic. Hence this study attempts to identify the attributes of great teachers in the perception of teachers as well as students in specific to the engineering educators.

3. STUDY METHODOLOGY

Research methodology consists of various stages for reaching the solutions and intended findings to all the research objectives through employing appropriate research tools and scientific

measures. This part of the study deals with the research framework and the methods for conducting this study.

This study deals with identification of the top traits and attributes expected out of a good teacher in among the engineering college teachers in India. While there are several studies made globally by the researchers around the area of attributes and skills needed by a good teacher, this study will specifically identify the difference between the thinking of students and teachers in terms of attributes of the great teacher, specific to the engineering colleges.

The literature review details out that there is no specific study on the attributes of a good teacher with respect to the engineering college teachers. Hence an exploratory study has been attempted in this context.

On the data sources, both primary and secondary sources are used. In order to identify and confirm on the study problem, more number of secondary sources are used. The Secondary data is used to identify the broad list of attributes that are studied and reported by various researchers about teachers. The primary data is collected from both Teachers and students of Engineering Colleges in India.

There are around 3225 Engineering colleges across India with 8,18,787 students studying various engineering courses. Overall, there are around 4,06,917 teachers who are teaching the engineering students in these colleges. (AICTE, 2018). Considering the scale of this population, the study is based on a sample representing the population. Hence a part of population is considered as a sample from whom the study input has been obtained. The Judgment sampling method is adopted in this study to identify the sample.

Table.1. Study Population

Population	Sample Size
Students studying in Engineering Colleges	1464
Faculty members teaching in Engineering Colleges	541

The data for this study was collected through a structured questionnaire. In order to obtain their input, two teachers and students were given two separate questionnaires. In order to obtain the input of both the parties involved by giving direct and indirect questions, the questionnaire was carefully designed. The questions include important parameters around knowledge, access, mentoring, interest, motivational, humility, taking ownership, using humor, integrity and ethics of the teachers. In both the questionnaires initially their basic demographic details are captured. Secondly, based on the literature review 25 specific skills were asked to be rated by both teachers and students through indirect questions. They are expected to answer in a Likert scale ratings of “Very Important”, “Important”, “Can’t Say”, “Less Important” or “Unimportant” against each of the 25 questions related to the attributes of a teacher.

The sample was collected from 1464 engineering students and 541 teachers, which was then put into statistical analysis for bringing out meaningful analysis from the study. The percentage and descriptive analysis was made to arrive at the weighted score against each of the 25 questions leading to the attribute of a good teacher. Then the scores were ranked separately for teachers and

students. The overall ranking was also done by aggregating the scores to identify the top attributes of the teachers. The data was also put into SPSS to find if there is a significant difference among the two stakeholders through ANOVA.

4. DATA ANALYSIS AND INTERPRETATION

The data obtained though the questionnaire for students and educators are analyzed through various statistical techniques and presented in this section.

4.1 PERCENTAGE AND DESCRIPTIVE ANALYSIS

The data was gathered from teachers and students of engineering colleges. The following percentage analysis is made on the sample distribution.

4.1.1 Students - Gender Wise Distribution of Samples:

Engineering is a very prominent higher education choice among the young students in India across India. Engineering has seen as a choice of career by both male and female students.

Table.2. Gender Wise Distribution of Samples

Gender	Count	Percentage
Female	651	44%
Male	813	56%
Grand Total	1464	100%

The sample of students represented 813 male students and 651 female students from the engineering colleges, thereby giving nearly equal opportunity for both genders to participate in the sample population.

4.1.2 Students - Department Wise Distribution of Samples:

As per the reports of AICTE, around 90% the students across India enroll into the core and traditional engineering branches including Civil Engineering, Mechanical Engineering, Computer Science Engineering, Electronics Communications Engineering, Electrical and Electronics Engineering, and Information Technology.

Table.3. Department wise Distribution of Students

Department	Count of Student	Percentage
Information Technology	226	15%
Computer Science and Engineering	265	18%
Electronics and Communication Engineering	246	17%
Electrical and Electronics Engineering	103	7%
Mechanical Engineering	216	15%
Civil Engineering	338	23%
Other Department	70	5%
Grand Total	1464	100%

Considering this trend, this study focused on the 94% sample being collected from these core engineering branches while around 6% are from other engineering disciplines.

4.1.3 Educators - Department Wise Distribution of Samples:

As stated in the above section with the student sample, the educator population is being mostly from the teachers teaching the core engineering branches. Around 92% of educators are covered from the six traditional engineering branches and around 8% represented the other engineering branches.

Table.4. Department wise Distribution of Educators

Department	Count of Educators	Percentage
Information Technology	87	16%
Computer Science and Engineering	129	24%
Electronics and Communication Engineering	75	14%
Electrical and Electronics Engineering	68	13%
Mechanical Engineering	61	14%
Civil Engineering	53	11%
Other Departments	68	8%
Grand Total	541	100%

4.2 ATTRIBUTES OF A GOOD TEACHER: WEIGHTED AVERAGE OF STUDENTS AND TEACHERS PERCEPTION

From the sample of 1462 engineering students, data was collected by administering the questionnaire and the top 10 ranking of the attributes are given in Table.5, which was identified through the weighted average method.

Table.5. Ranking of attributes based on Students perception of a good teacher

Attribute	Rank
Time discipline	1
Encourages self-learning by students	2
Student questioning encouraged	3
Creates interest in learning	4
Gives examples	5
Motivates students	6
Thorough knowledge	7
Pedagogy encouraging Logical thinking	8
Clear learning objectives	9
Walk the talk	10

The above ranking was arrived using weighted average method of the perceptual rating by the students. Weights used were the perception scale itself and adjusted for average of weights. It may be observed that students have ranked behavioral

traits like faculty discipline towards time sense; ability to create a congenial learning environment; faculty ability to demonstrate what one preaches and thorough learning on what one teaches.

It may be useful to see how educators see attributes of a good teacher. Educators include Trustees of colleges, administrators and senior faculty like Head of departments. We had collected responses from 562 educators. The top ten ranking of attributes as perceived by the educators is as shown in Table.6.

Table.6. Ranking of attributes by Educators perception of a good teacher

Attribute	Rank
Motivates students	1
Creates interest in learning	2
Student questioning encouraged	3
Time discipline	4
Thorough knowledge	5
Gives examples	6
Clear learning objectives	7
Open and free interaction	8
Classroom discipline	9
Pedagogy encouraging Logical thinking	10

It may be observed that educators have ranked behavioral traits like faculty discipline towards time sense; student involvement and congenial learning environment as key drivers. Students in their ranks included: go through teachers' talks and encourage students to self-learn who are not among the top ten attributes of teachers. Similarly, educators have included: open and free interaction between students and teachers and maintaining classroom discipline among top ten attributes which students have not considered in their rating.

Obviously, such differences show bias in their rating based on their priorities. It does not mean that they lack objectivity. Considering this, all the twenty-six identified attributes are ranked on a weighted average score. Rank correlation was attempted. Annexure I show rank of attributes as perceived by students and educators. The rank correlation calculated is -0.20 which shows low correlation of negative in nature. Though the correlation coefficient was found to be statistically significant, it is important to note that in this study two set of population namely are independent.

4.3 FACTOR ANALYSIS AND ARRIVING AT KEY COMPONENTS OF ATTRIBUTES

Commonly used data reduction and grouping through principal component analysis was done to see if data set helped to arrive at grouping of factors based on rating within a group namely: students and educators. When students' data set was run using Principal Component Analysis (PCA), KMO showed sampling adequacy and Bartlett's test showed significance of the tool as shown in Table.7.

Table.7. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.970
Bartlett's Test of Sphericity	Approx. Chi-Square	16344.239
	df	325
	Sig.	.000

The rotated matrix which shows grouping of attributes are as in Table.8.

Table.8. Rotated Component Matrix

Variables	Component		
	1	2	3
Motivates students	.779		
Students encouraged to solve	.756		
Thorough knowledge	.710		
Available to students	.644		
Classroom discipline	.599		
Lively atmosphere	.567	.455	
Confidentiality	.553	.402	
Creates interest	.541		
Contemporary knowledge	.513		
Responsibility to performance	.485	.408	
Answer questions	.482		
Relate to media		.733	
Online presence		.643	
Sense of humor		.622	
Walk the talk	.452	.553	
Technology tools	.402	.540	
Logical pedagogy	.459	.539	
Impacts ethics and values	.426	.534	
Humility	.416	.533	
Good communicator	.459	.526	
Gives examples	.428	.521	
Encourages self-learning by students		.511	
Clear learning objectives	.442	.477	
Mentor to students		.475	
Time discipline			.877
Student question	.483		.529

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

^aRotation converged in 5 iterations.

Looking at the factors which formed into Component, the latter are termed as in below:

- Component 1: Student orientation skills and relevance
- Component 2: Teacher communication and behavioral traits
- Component 3: Discipline and engagement

Thus, a good teacher may have to focus on attributes relating to the above three groups and make it appropriate for the student group. Similarly, data set of educators was taken up for data reduction through PCA. KMO showed sampling adequacy and Bartlett's test showed significance of the tool as shown in Table.9.

Table.9. Rotated Component Matrix

Variables	Component				
	1	2	3	4	5
Motivates student	.688				
Creates interest	.657				
Gives examples	.624				
Student question	.616				
Logical pedagogy	.592				
Thorough knowledge	.563				
Clear learning objectives	.501				
Lively atmosphere	.476	.400			
Mentor to students	.400				
Contemporary knowledge					
Confidentiality		.655			
Humility		.647			
Impacts ethics and values		.623			
Walk the talk		.586			
Good communicator		.469			.451
Relate to media			.763		
Sense of humor			.675		
Online presence			.610		
Encourages self-learning by students			.517		
Responsibility to performance				.665	
Class room discipline				.649	
Time discipline				.605	
Available to students				.418	.401
Answer questions					.763
Technology tools					.431
Students encouraged to solve					.431

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

^aRotation converged in 7 iterations.

Looking at the factors which formed into Component, the latter are termed as in below:

- Component 1: Student orientation skills and relevance
- Component 2: Teacher competencies and behavioral traits
- Component 3: Student performance related
- Component 4: Discipline and engagement
- Component 5: Student support

It may be observed that educators scoring was grouped under five components instead of three based on students scoring. Hence it may be useful for educators to focus on broad categories what is relevant for each of the student community. This study can be used for educators while recruiting, evaluating and guiding performance management of teachers for making education more effective. It clearly emerges that teacher's competency, behavioral traits and soft skills like listening and motivating are critical for becoming a good teacher.

Table.10. Ranking of various attributes by Students and educators for a good teacher

Attributes	Rank by Students	Rank by Educators
Time discipline	1	4
Student question	3	3
Answer questions	26	25
Motivates students	6	1
Students encouraged to solve	17	18
Thorough knowledge	7	5
Contemporary knowledge	13	15
Creates interest	4	2
Mentor to students	11	13
Responsibility to performance	18	16
Answer questions	21	19
Classroom discipline	15	9
Confidentiality	16	11
Clear learning objectives	9	7
Technology tools	20	21
Good communicator	14	17
Walk the talk	10	12
Humility	22	22
Impacts ethics and values	24	14
Lively atmosphere	12	8
Online presence	19	24
Sense of humor	23	23
Logical pedagogy	8	10
Gives examples	5	6
Relate to media	25	26
Encourages self-learning by students	2	20

5. CONCLUSIONS AND SUGGESTIONS

It is concluded that the study focused on attributes for a good teacher. It is commonly found in both the groups: on time to class; encouraging students question; creating interest in learning;

providing examples; motivating students; having thorough knowledge; enabling logical thinking while learning and setting up a good example by behavioral aspects are important.

Teachers are suggested to incorporate such attributes as they become a good and relevant professor into their professional skills and competences. Students also need to understand that their expectations for their learning are objective. Further educators may also set up proper performance management system wherein the teachers are mentored appropriately to achieve good standard of engineering education. Educators may also compare with quality standards and guidelines of statutory bodies in these attributes.

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