



Integrating employability skills in engineering education

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Abstract

Aim: This paper examines the curricula and pedagogical practices of Gujarat colleges associated with the Gujarat Technical University and the National Institute of Technology, Surat, concerning the instruction of communication skills. This encompasses the vast majority of Gujarat's engineering schools.

Method: To better understand the challenges of instructing engineering students, a qualitative study was conducted in which eight English teachers from different engineering colleges in and around Surat were interviewed. To complete the research, eight English professors at different engineering schools in and around Surat, Gujarat, were contacted. These educators were chosen to represent a range of ages, levels of experience and education, and specialisations.

Findings: This paper uses the study's findings to argue that engineering curricula should incorporate several activities aimed at improving engineers' employability. From this, we can infer that the chalk-and-talk approach to teaching engineers communication skills is ineffective. Furthermore, industry standards have increased rapidly.

Implications/Novel Contribution: This research contributes to the body of literature by providing empirical evidence for the importance of fostering employability skills in one's communication repertoire. While generalisations from this study are obviously not possible, it is safe to assume that English instructors in India's engineering colleges face similar difficulties to those identified in this study's sample. Second, despite efforts to improve the situation, recent engineering graduates' lack of employability skills continues to trouble both Indian employers and graduates alike.

Keywords: Skills, Employability Skills, Communication Skills, Engineers, Team Spirit, Interpersonal Skills

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INTRODUCTION

Gaining employability is a primary focus in all professional education programmes. Students in India who study hard and pass a competitive national exam to gain entry into a professional programme like engineering hope to find gainful employment upon graduation. While industry requirements are always evolving, academic institutions need to catch up. The discord stems from the widespread belief that newly graduated engineers lack the skills necessary to find work. Employers "have increasingly acknowledged that this traditional preparation of engineering students' is inadequate," citing (Achaleke, 2018; Destiwati, 2015; Missingham, 2006; Kongmanus, 2016). This is because "graduates lack the wide range of written and spoken communications skills required to engage with the members of other professional groups and the broader community."

This paper investigates the case of engineering education in the city of Surat, Gujarat, India, in light of the issues that have arisen because of the disconnect between the classroom and the workplace. Over 14 million Indian high schoolers take the IIT Joint Entrance Examination (IIT JEE) each year to gain admission to one of the country's elite engineering schools, such as the Indian Institute of Technology (IIT), the National Institute of Technology (NIT), or the Indian Institute of Science and Technology (IISC). Despite the competition, only about 40,000 students were accepted into one of the 16 IITs, 31 NITs, or other government-funded colleges. However, these are just some colleges in the state's technical system. The World Bank's Technical Education Quality Improvement Programme (TEQIP) Phase I and Phase II have been working to boost the standard of technical education across

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the country of INDIA. They have picked 127 top engineering schools, including the researcher's institute, and given each of them money to improve engineering education. "Many employers give concrete examples of the lack of skills of the newly graduated hires, which the employers link to shortcomings in the education system," according to a study conducted under TEQIP and funded by the World Bank (Joonlaoun, 2017; Saeki, 2016; Sutthipornphalangkoon, 2016). Reports indicate that little has changed despite the severity of the problem: "little research has been conducted in (India) to identify the kinds of skills demanded by employers and measure in which skills graduates meet employers' expectation" (Saeki, 2016; Silva & Madushani, 2017).

Significance of the Study The significance of the study stems from the following factors:-

1. It attempts to analyse the shortfalls in training engineers per industry expectations.
2. This study aims to understand the problems faced by English teachers in engineering classrooms so that some solutions to change language learning can be made.
3. This study will address the teachers' and employers' expectations and provide specific activities that can be used in the classroom to enhance communication and employability skills.
4. The research, although conducted at a small scale, highlights the weaknesses of the existing English language curriculum and its teaching methods in the engineering colleges of a section of India. It envisages a paradigm shift for preparing global engineers with skills like team spirit, leadership, interpersonal skills and adaptability, and communication skills in English.
5. It presents a way to blend activities in the communication skills curriculum, which will have the dual benefit of enhancing language and developing skills.

LITERATURE REVIEW

In India, since last two-decade communication skills are taught in all engineering colleges as it was perceived to be a shortcoming in the engineers. As is realised, "Communication Skills are essential for an engineer who aspires to carry out his/her professional practice in the global arena" (Jacolbia, 2016; Riemer, 2002). And in order to sustain in the global competitive world engineers need to develop their English language and communication skills the most. Inclusion of written and oral communication in engineering education has sparked theoretical and empirical studies on role of communication in engineering classroom and changes in curriculum design. But "in order for our students to view communication and engineering processes and products, we as engineering and communication educators, must be committed to including communication instruction in our thinking, our planning, and ultimately, in our classrooms" (Ford & Riley, 2003; Niamhom, Srisuantang, & Tanpichai, 2018; Taher, Shrestha, Rahman, & Khalid, 2016). Research and studies have successfully brought out various methods of improving communication skills of engineers, some have recommended the project based learning, while others recommend CALL (computer aided language learning) or 'experience-led' engineering education by inviting lectures by experts from the industry or encouraging students to participate in industrial trainings (Arlett, Lamb, Dales, Willis, & Hurdle, 2010). But the end result remains the same as most research from academia as well as from the industry report the lack of employability skills in the engineering graduates. On July 15, 2014 a popular daily The Times of India published an article saying, "Only 18% engineering graduates are employable, says survey" emphasising the declining condition of the engineering education in India (The Times of India, 2014). Another popular periodical, India Today reported similar alarming situation which shows industry dissatisfaction with the quality of engineering education India as it reports only 7% of engineering graduates in India are employable (Chakrabarty, 2016). In addition similar concerns have been raised by the academia, "Engineering students need to be able to think critically, solve problems, communicate clearly, be creative and work in a team in order to get placed in a reputed company" (Chetia, 2015).

In spite of the awareness, the fact remains, "Today's engineering graduates need to have strong communication and teamwork skills, but they don't. They need to have a broader perspective of the issues that concern their profession such as social, environmental and economic issues, but they haven't. Finally, they are graduating with good knowledge of fundamental engineering science and computer literacy, but they don't know how to apply that in practice" (Mills & Treagust, 2003). One reason for this lacuna could be a complete lack of connecting between the academia and the industry. As one study interestingly reported that many academicians in engineering

colleges had no contact with the people outside academia (Magnell, Geschwind, & Kolmos, 2017). This lack of coordination leads to theoretical knowledge without understanding the practical needs.

This paper argues that if English and communication skills are taught in isolation in the engineering curriculum, the students and teachers often fail to understand its significance. It is observed that traditional language teaching was basically to improve grammar competence and followed the lecture and writing practice. But communication skills for engineers can be developed "with special practical activities designed to foster communicative performance" (Danilova & Pudlowski, 2007). A recent study emphasised that workplace activities such as group discussion, seminars, presentations and role-plays conducted in the classroom helped students develop professional skills which further enabled them in placement (Bass, McDermott, & Lalchandani, 2015).

Section 1

Thinking on these lines this qualitative study was conducted to understand the teaching process of English and communication skills to engineers in engineering colleges in and around Surat. The aim of this study was to understand the limitations of the present teaching methods which were not able to yield the expected results and was also to come up with interesting solutions to inculcate employability skills in the engineers.

METHODOLOGY

For this qualitative study method was adopted keeping in mind "Quantitative results are limited in that they provide numerical descriptions rather than detailed accounts and generally provide less elaborate accounts of human perceptions or motivations than do qualitative findings" (Leydens, Moskal, & Pavelich, 2004). The fact that the qualitative research method aims at understanding the "human perception" and provides detailed descriptions of a given topic was the major reason for its adoption. It has also been stated that qualitative methods may be less familiar to most engineering educators but "in many cases they are more appropriate for conducting research with human subjects" (Guba, 1985).

The study was conducted by contacting a group of 8 English teachers from various engineering colleges in and around Surat city of Gujarat. These teachers were selected in order to provide a sample that was varied in terms of age, position, experience and qualification. After a literature review and successful results of pilot interviews the final interview was conducted. The interviews were transcribed as field notes were maintained during the interviews. The documents used for research was the syllabi and the following issues were explored:-

- a) Syllabus- The participants were asked to bring a copy of their syllabi, in order to discuss and understand the various topics taught in the engineering classroom. It was found that most of the syllabi were designed keeping in mind the listening, reading, writing and speaking skills.
- b) The contact time Most of the participants added that 3 hours per week was the common scheme allotted for the communication skills class. Some colleges followed only 2 lecture and 1 tutorial scheme, while one teacher even reported that she had only 2 contact hours per week with her class.
- c) The strength of the class- The participants gave different numbers which ranged from 60-120 students to define the strength of their class.
- d) Methods or pedagogy- Interestingly, lecture mode was reported as the most common method used for teaching communication skills. On further questioning they gave various reasons for relying on lectures to teach communication. But the most popular reasons were- number of students in the classroom, mixed lingual ability of students, shortage of time and lengthy syllabus.

RESULTS AND DISCUSSION

Hence it can be concluded that the subject is taught as a theory subject with some activities included, only if the teacher makes some extra efforts. On reviewing the syllabi, it was understood that most of the contact time was allotted to the theory of communication and very little activity or discussion, interaction time was reserved. Teachers reported their inability to incorporate activities due to shortage of time and often unmanageable number of pupil in the class. They also find the students with mixed ability in terms of language competence an impediment. They felt that some students who had their school education in English medium often outperformed the other students in any activity. They felt the purpose of conducting activities was defeated if only few students participated

and the others sat passively in a communication skills class.

These are some of the challenges that the English teachers face in engineering colleges. However, what cannot be overlooked is the aim of teaching communication skills to engineering students. The aim was to make them employable. Yet, the lectures and examination methods are unable to deliver the expected result, hence the process needs to be reviewed. It mainly reaffirms the opinion, "Engineering education has until now been strongly contents driven, social skills being a relatively recent notion in educational offerings" (Lappalainen, 2009).

Integrating Employability skills in Engineering Teaching

Understanding the need to inculcate some skills that will enhance the chances of employment of engineers, this paper suggests some changes in the methodology of teaching communication skills to engineering students. The recommendations made can be easily repeated in other such institutions. This paper argues that instead of aiming to teach communication skills mainly for the purpose of language learning, communication skills can be taught to engineering classes by insisting on developing their employability skills. The syllabus can to be modified so that some skills like team work, interpersonal skills, adaptability, emotional intelligence can be inculcated in the students. This will help in solving a number of purposes. It can be seen that by encouraging students to participate in team based activities, their confidence and communication skills, can be developed. Further participating in activities will give them clarity of their weakness or their area of improvement. It might also inculcate a bonding in the students and enhance their ability to understand each other and respond accordingly. By bringing activities in the classroom the teacher can develop employability skills like problem solving skills, flexibility, decision making skills, leadership skills at the same time also help in building communication skills. Talking about the importance of oral communication Pia Lappalainen remarks, "today's university education supply ought to help engineering graduates perceive communication as an operations enhancing asset, by bringing together academic research knowledge with the corporate reality and attempting to match the quality and content of the course supply with industrial needs" (Lappalainen, 2009). The oral communication unit of the syllabus can be substantiated by some team based activities like making a group presentation or a group discussion on some challenging topic. One such activity can be.

Table 1: For developing team spirit

Time	30 min
Preparation	Divide the class into four groups
Purpose	To develop thinking and speaking skills along with team spirit in the students.
Resources	Handout with case studies related to college life
Activity	Give handout copies to each group and ask them to come with solutions to the problem given to their group. Ask one member of the group to present the solutions discussed and finalised by the group.

Table 2: For developing interpersonal skills

Time	50 min
Preparation	Divide the class into two big groups
Purpose	To make students interact with each other and develop interpersonal skills using listening and speaking skills.
Resources	None required
Activity	Ask the students to interact with as many people in their group in 15 minutes to find out who shares similar interest as them. Next, ask them to make groups of common interest and ask each group how their interests are common and what have they learnt about each other.

Exercises like these will inculcate collaboration, leadership skill, openness and respect for others and will increase the competitive spirit of the students.

Secondly, for interpersonal skills, which is based on effective communication skills like listening and expressing, other activities can be conducted in the class.

This activity will help them interact with as many people as possible in limited time which they may not do in their day to day life. Secondly, along with interpersonal skills their effort to listen and speak to a huge crowd will help in making them confident and better communicators.

Table 3: For developing emotional intelligence

Time	50 min
Preparation	Make groups of 10
Purpose	To enhance discussion and overcome inhibition
Resources	None required
Activity	Ask each member to share his worst experience during school life The other members should listen carefully And in the end they should discuss and rate whose experience was the worst

This activity will not just help in developing speaking, listening, interpersonal skills and communication skills but will also generate empathy towards each other.

Flexibility is an integral part of employability. With the ever evolving job responsibilities one has to continuously adapt to workplace culture, people, style and tools. Activities related to adaptability can be used in communication skills class to develop other integral skill.

Table 4: For developing adaptability

Time	50 min
Preparation	Make groups of 20
Purpose	To encourage discussion and encourage adaptability
Resources	Handout with case studies related to workplace
Activity	Ask each group to come up with at least three potential solutions to the problem in the case in 10 minutes. When they present their solutions, say that you are removing the first solution. Ask them to re-think and re- discuss and bring other solutions. Then again remove the most popular idea but keep a watch on the students who accept the challenge and change instantly.

This exercise can develop adaptability in the students as they will become flexible and ready to accept changes. Similar activities can be used in the communication skills class and through it the students will develop employability skills and also learn to interact and communicate with each other. Keeping in mind the findings of the previous study these activities have been devised to inculcate employability skills in engineering students along with language learning in the communication skills class.

CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

The above activities have been suggested to simply state how teaching methods can be modified in the communication skills class. This paper does not aim to challenge the syllabus but keeping in mind oral communication topics like public speaking, group discussions and presentation skills these recommendations have been made so that new methods can be used in the class instead of lectures only. If such changes are adopted they will fulfil dual purpose as they will develop employability skills and along with communication skills.

In conclusion, we can say that communication skills which are mostly taught to engineers through the 'chalk and talk method', as reported, has failed to yield results. Moreover, the expectations of the industry have grown at a fast pace. The graduating engineers need to acquire some employability skills to fit in the fast changing engineering world. As suggested in this paper, communication skills class can be used to conduct various activities which

can help solve two major problems. It will develop employability skills along with communication skills. Hence, employability skills can be integrated in the engineering education by making pedagogical changes in the teaching of communication skills.

Limitations

This study is based on English teaching for engineers. The study is limited to a small area and the sample for interviews were selected on the basis of deliberate sampling. The instrument of the study was limited to interviews and syllabi. The findings of the study are based on the ground situations prevailing in the engineering colleges in and around Surat city of India. Although they can be true in case of engineering colleges based in other parts of the country, they cannot be generalised fully.

Recommendations

This study adds to the current field of knowledge by presenting an empirical study on integrating employability skills in communication skills class. Though the findings cannot be generalised, it can be assumed that English teachers in engineering colleges across India face similar challenges as the sample studied in section 1. Secondly, the discontent of the employers and graduating engineers' lack of employability skills remains a problem across India. However, this study was the first stage to understand the teachers' perspective and find simple solutions to integrate the industry expectations with academic initiatives. A larger sample size with more teachers from different parts of the country may have undoubtedly added more insight into the challenges faced. Also the empirical study of using activities in communication skills class can be repudiated in engineering class to enhance employability skills along with communication skills.

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