

Communication Skills: The Life Line of Engineers

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Abstract - Communication skills are the key to success in professional courses like engineering. Communication skills help students establish themselves and achieve their desired goals during the course and in their career. The study's objectives are: a) to understand the importance of LSRW skills for engineering students. b) to find if communication skills are given adequate importance in engineering courses. A survey was conducted with 150 First-year students of a private engineering college to understand the level of communication skills of these students. The data from the survey offers insights into how engineering students perceive communication skills, their self-assessment of these skills and the challenges they encounter. The study also interviewed fifty students to understand what they learnt in communication skills. The data from the survey shows that the students are good at communication skills and are given ample practice in their first year, but the skills are ignored in higher semesters, and the students tend to lose interest and focus on these skills.

Index terms- Communication skills, language, LSRW, non-verbal

I. INTRODUCTION

Communication is the heart of any interaction, the basis of civilisation itself. The importance of communication cannot be denied in this 21st century, as these skills are needed by students irrespective of the level they are studying [1]. Communication helps build a network, negotiate and above all, express clearly. Communication skills are life skills which help us in social processes and life itself. Efficient and Effective Communication helps the students to share information, trust feelings and solve problems [2]. The corporate world, where most engineering students work, depends on media relations, online communication, marketing, special events, product and brand communications, and crisis management. Sound communication skills are very much needed [3]. Despite the consensus on the importance of communication skills, there seems to be a lacuna in these skills among entry-level students in every field.

Today's Organisations always seek candidates with sound technical expertise and strong communication abilities. Those who struggle with communication will be

disadvantaged since their accomplishments are not appropriately recognised. Therefore, excellent communication is essential to persuade and make a long-lasting impression. Unfortunately, several engineering students lack those necessary abilities, which prevents them from being offered lucrative jobs. Every year, billions are spent on Training employees in various communication skills, including written communication. Studies confirm recent graduates' ineptness in oral communication skills [4]. Mastering communication skills helps students understand, create, manage, and communicate effectively.

The gap in the teaching-learning process fails to rise to the occasion and equip engineering students with the best communication skills. There might be many reasons for this gap and disconnect between the academic and theoretical knowledge imparted at engineering colleges and the demand for jobs. One such disconnect may be because of the overemphasis on theories and impractical teaching. The focus to improve communication skills should be on applying skills and not just on theory or abstract knowledge [5].

According to Pittenger, Miller, and Mott, the curriculum must stress real-world problems and operations. There is also a wide gap between the thinking and attitude of the prospective employers and the faculty who teach these skills [6]. The current engineering curriculum stresses that undergraduate students become good at engineering skills, but the most needed verbal, non-verbal and written communication skills are somehow left out. As a result, researchers have students who are proficient in their core theoretical knowledge but lack communication skills. The curriculum today pays the least attention to developing these skills.

In many professions, communication skills become more important than technical skills. Verbal communication skills are considered more important for entry-level jobs. The industry reports many cases each year where, despite the stress on communication skills, very few engineers are competent. Beyond doubt, communication skills are necessary for engineers and other professions.

Communication skills are not only language skills but also nonverbal skills like paralinguistics and body language. It has various elements, such as speaking, listening, cultural skills, etc. Language skills are also a prime communication element and can be divided into grammar, vocabulary,

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fluency, comprehension and pronunciation. Incorrect grammar leads to miscommunication and multiple meanings of a sentence that might be flawed. Uncertainty of grammar can impact fluency, and the speaker becomes hesitant. [7] Without grammar, students won't be able to communicate effectively. It is not grammar or communication. It must be grammar and communication if the latter is to be strengthened. While communicating, it becomes pertinent to keep the rules of a particular language for modifying words and linking them together, and grammar makes it possible [8]. According to research by Meenakshi, grammar is the building block of communication. Grammar also helps in making the meaning of a communication much more straightforward.[9] For English language learners, it is crucial to develop grammar skills to enable them to become good communicators. [10] The research by Zam Zam suggested that there is a definite association between grammar and speaking ability. [11] A rich vocabulary helps develop better language skills, and better skills help in better communication. Vocabulary links listening, speaking, reading and writing, which are the core of any language. It adds to the correct expression and significance of the whole communication. Without grammar, correct vocabulary can also help in communication. Vocabulary testing is essential in IELTS, TOEFL, and other examinations. According to Cameron, vocabulary plays a vital role in acquiring a language. [12] Vocabulary development leads to the enrichment of a language. [13] Vocabulary and language use are complementary to each other. (Nation) Adequate vocabulary enhances second language use, and it helps in structures and functions that are a part of communication. [14] When talking about English for Specific Purposes, vocabulary is considered one of the most essential elements. Learning vocabulary becomes unavoidable for engineering students as they must communicate with people from different backgrounds and cultures at work. In this decade, communication is a much-needed cause of globalisation.

The importance of LSRW skills in communication cannot be negated. Listening and Writing are active skills needed to enrich communication. All four skills have a symbiotic relationship.

The importance of listening has increased over time owing to the increase in listening in every aspect of communication. Right from text messages to video conferences, textbooks in audio format need listening. Globally, communication depends mostly on listening. Listening has also become a survival skill and a life skill. Listening is an active process of receiving, constructing meaning from, and responding to spoken and non-verbal messages [15]. Listening is listening to words and the non-verbal messages passed during the conversation and inferring. Listening, unlike what was thought earlier, is an active skill as the listener actively participates in listening and clubs his linguistics with non-linguistic knowledge to comprehend the message and then completes the conversation by answering it based on his listening. [16].

Understanding does not come independently, as the listener needs to connect his listening and previous knowledge [17]. The input given by speaking becomes more manageable when received through listening. Listening helps in the inner workings of language systems and ultimately helps in fluent, productive skills, which are speaking and writing [18]. Listening leads to astounding achievements, even in an unfamiliar listening environment. Speaking and writing are not enough to know a language; efficient listening skills are also necessary to communicate effectively. 50% of the time is spent listening while learning a foreign language. [19] Listening is also crucial for learning since students get newer knowledge and perceptions.[20] Listening skills are essential for communication but are not taught to engineers. Poor listening skills are the reason why engineers are not hired, which is the first reason for interview failure. Speaking is an essential skill in a language. It is a necessary skill for communication, and the impression is usually created depending on how well one speaks. Speaking is something that one is judged upon in real situations. [21] But it is one of the most challenging skills. It needs confidence, modulation, pronunciation, correct pitch, accent, pause and many other para-linguistic skills. Speaking skills have gained importance as oral communication and presentation skills are considered career enhancers and the key factor in making or breaking a student's career. [22] Spoken skills are desirable in engineering students as they help them be effective team players and lead, negotiate and resolve workplace conflicts.[23]

Writing skills are essential skills for any engineer. Companies spend a lot of time and money training their engineers in written communication, as poor writing skills lead to them losing funds, impressions or both. Poorly written communication may also lead to loss of life, as an inaccurately worded user manual may lead to loss of life or injuries. Above all, it may seem unprofessional and unproductive. [24] Written communication needs to keep the purpose and audience in mind. And engineers should be taught to write to build trust and persuade. Multicultural audiences pose another set of challenges.

TABLE I
IMPORTANCE OF LSRW

Listening	Speaking	Reading	Writing
10%	15%	30%	45%

Writing becomes challenging for engineering students because they focus on mathematical and practical work rather than written work. For this reason, students give less importance to writing skills, which leads to their loss of interest in them. This also leads to less confidence and avoidance of writing tasks, which directly impacts their practice of improving these skills. Problems with writing skills often lead to loss of time, customers, and lives.

Different researchers and the industry have continuously given evidence that the backbone of any industry, communication skills, is often lacking in engineers. [25] The ineffective communication skills lead to ineffective task forces in the industry and leave a poor image of the engineering industry. This directly affects the recruitment and, later on, the retention of engineers. Communication skills must be fostered in engineers as the industry needs these skills, and hence, they should be made a part of the engineering curriculum [26]. The information is given in TABLE I.

With globalisation, the workforce must be proficient in English, which is accepted as the universal and most widely spoken language. This also causes hurdles in communication for engineering graduates, as many study in their regional language until the school level, and picking up English language skills in college becomes a herculean task.

II. THE DIFFICULTIES ENCOUNTERED BY THE LANGUAGE TEACHERS

Engineering students pay more attention to their core courses than language courses. This leads to them being deficient in fundamental language abilities, particularly vocabulary, oral communication and grammar. This directly transforms the challenges a language teacher needs to put in teaching, mentoring and assessing engineering students. Lack of interest in learning the language leads to demotivation and indiscipline in the language classes, which the language faculty must constantly deal with. The weakness in language also results in failing in the pre-interview tasks of Group Discussion and Presentations.

III. SEMI-STRUCTURED INTERVIEWS

In a semi-structured interview, 50 students from different branches of engineering in their 6th semester participated and were asked eight questions related to English teaching and Learning. These students were selected through random sampling from 1000 students in the 6th semester from different branches of engineering. The sixth-semester students were chosen as they started their interview process for internships and projects. The authors conducted these interviews; the questions are in the appendix. The summary of the answers is concluded in Table II.

IV. LITERATURE REVIEW

The LSRW skills are interrelated, and to improve the overall communication, you must improve and develop each one of them. There is an intricate relationship between various language skills, which are crucial for reading growth [27]. Each skill individually plays an important role, but most learners ignore listening skills. It is one of the most essential skills for language acquisition [28]. Earlier, listening was thought to be a passive skill, and language teachers paid more attention to reading and grammar, and teaching listening was not accepted as a significant feature of language teaching [29]. Fortunately, the importance of listening is growing very fast.

Many surveys showed the importance of listening as the skill required for the foundation of a language, and people with good listening skills have a better chance of promotion in their profession [30]. Taking the same thing further, it is beyond doubt that LSRW skills are necessary to improve communication, which helps to acquire better jobs [31]. Speaking is also detrimental to doing better in the world, and most people fear speaking. English language learners must understand that by speaking, they can become good communicators, and it is an important skill to conquer the world [32]. But speaking is a difficult skill to learn as it involves many other skills like vocabulary, accent, tone, intonation and above all, pronunciation. Rivers [33] studied the use of language. Maybe because of these problems, speaking has been ignored in schools and universities for different reasons, such as emphasis on grammar and unfavourable teacher-student proportions. Speaking is ignored in testing because of the problem of assessing it objectively and the time it takes to carry out speaking tests [34]. Speaking is more substantial for engineers than mathematics or technical skills [35]. This skill is not given any importance even in engineering studies, and the textbooks used for engineering studies do not care for communication skills, explicitly speaking skills.[36]. Reading and writing are critical communication skills for engineers that are ignored, and one of the main reasons is that teaching is teacher-centric [37]. Mark Reimer [38] furthers this thought and stresses the need to make teaching communication more inclusive and student-centric. The literature review points clearly to a gap in the teaching and learning of engineering students and the fact that communication skills that are so important to engineers are ignored.

This paper aims to a) understand the importance of LSRW skills for engineering students and b) determine whether they are given adequate importance in engineering courses.

V. METHODOLOGY

A survey questionnaire was created to assess the LSRW skills of 1st year engineering students at a private university. The students were of mixed language ability as there was a judicious mix of students with English as a first and second language. There were 20 questions made based on a 4-point Likert scale. Of the 150 students who were sent the questionnaire, 102 responded. A non-structured interview was also conducted with 50 students, who were again from the same subset. After the survey, the interview and the survey results were analysed.

The answers from the interview make it crystal clear that ample efforts are not put where the curriculum is concerned. All the students indicated that although in their 1st semester, the language faculty put in a lot of effort and trained them, as it is not continued and the results are not sustained, the students feel a lack of their spoken and written skills. The same is true with presentations; the moment they start feeling confident, the semester ends, and again, in the burden of the next semester, they forget their presentation skills.

TABLE II
SUMMARY OF STUDENTS' INTERVIEW

Listening	Speaking	Reading	Writing
Though Listening is taught, the types of exercises must be increased. Only a few speeches are included.	Presentation and GD is part of lab classes. The first-year students get good practice with them, which they use during their internships and campus interviews.	Not enough training is given in comprehension and reading.	No training is imparted except in the first year.

The faculty also fails to adapt to their students' technical and language demands. They constantly struggle with adjustment between language classes in degree and engineering colleges. Lack of training to adjust to technical students, mixed capability classrooms, more importance on technical and core subjects, and unmotivated students can be a few of the challenges an English teacher faces in engineering colleges. Another constraint is the use of mobile or computers for teaching. Most students are interested in using digital devices, but the rules of the colleges do not allow the faculty to use them. This leads to boring classes. Students would be more interested in doing tasks or activities using digital devices.

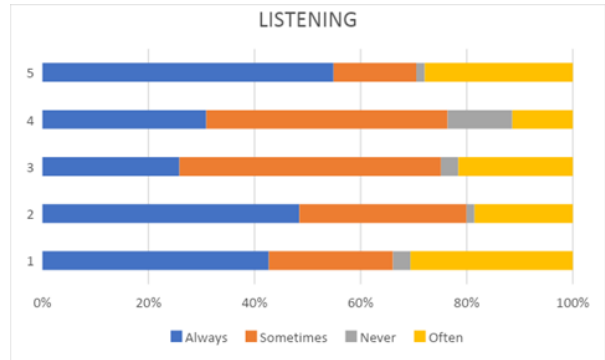
VI. RESULTS ANALYSIS

The answers of students indicated that many students are proficient in most of the language skills, especially in writing and speaking. Most students answered 'always' in the listening questions, opposite to what is often expected in real-time listening or communication scenarios. In daily conversations, people usually do not listen, wait for others to complete, or even try to comprehend the speakers. They try to put their ideas forward. This indicates that the respondents know listening etiquette and how to use listening skills properly. However, they do not apply the same in their day-to-day listening as it is difficult to follow. The same results are expressed graphically in the figure1 and tabulated in the table III.

TABLE III
THE SURVEY RESULT OF LISTENING SKILLS

Always	Sometimes	Never	Often	
42.7	23.4	3.3	30.6	
48.4	31.5	1.5	18.5	
26	49.6	3.3	21.7	
30.9	45.5	12.2	11.4	
54.9	15.6	1.6	27.9	
40.58	33.12	4.38	22.02	Mean

Fig. 1 Listening



The Speaking Skills survey also consisted of five questions; the respondents answered 'always' the most. Never was the minimum, as the mean was only 7.78. This indicates that most students speak well and use the nuances while speaking. One of the questions that asked, 'While speaking, you fidget with things,' was answered 'never' by most of the students (59.7). So, most respondents incorporate new vocabulary, regulate their speaking speed and avoid long pauses. The same result is represented in the fig 2 and Table 5.

TABLE IV
THE SURVEY RESULT OF SPEAKING SKILLS

Always	Sometimes	Never	Often	
48.4	23	0.6	27	
11.5	41.8	33.6	13.1	
43.9	22.8	3.3	30.9	
7.08	25	59.7	14.5	
41.8	23	0.6	33.6	
39.7	25.92	7.78	26.38	Mean

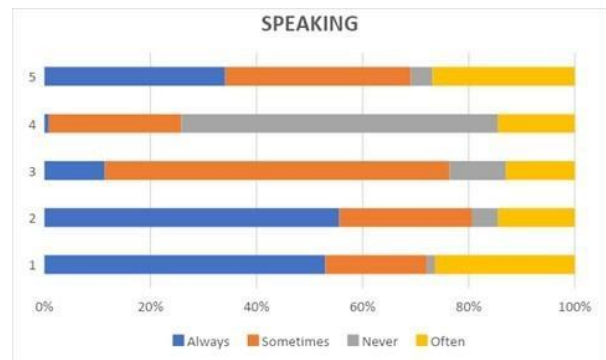


Fig. 2 Speaking

The survey results of five questions on reading skills show that most students answer the reading questions as sometimes. It indicates that the students know the correct reading procedure and how to analyse, summarise, and make notes. There is a minuscule difference between 'always' and 'sometimes' because many respondents know the skills but do not apply them while speaking. Also, one interesting observation is that many respondents do not have summarising skills, one of the most essential facets of speaking. A quick summary of the speaker helps understand

and gives an appropriate reaction. Hence, more exercises and training in reading are necessary as they are essential communication skills. Reading is attributed to better communication and success in workplaces. Refer to Fig 3 and Table V.

TABLE V
THE SURVEY RESULT OF READING SKILLS

Always	Sometimes	Never	Often	
53.7	23.6	4.8	17.9	
38	36.4	8.3	17.4	
45.5	26	3.3	25.2	
43.4	30.3	0.9	25.4	
9	69.7	15.6	5.7	
37.92	37.2	6.58	18.32	Mean

TABLE VI
THE SURVEY RESULT OF WRITING SKILLS

Always	Sometimes	Never	Often	
48.4	23	0.6	27	
11.5	41.8	33.6	13.1	
43.9	22.8	3.3	30.9	
52.9	19	0.8	27.3	
41.8	23	0.6	33.6	
39.7	25.92	7.78	26.38	Mean

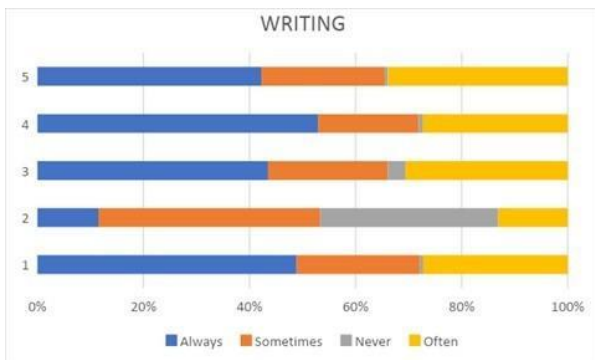


Fig. 4 Writing

The survey result of Writing also gives a clear direction that most respondents are good at writing skills. But many are at often and never stages. The careful analysis also indicates that the respondents are not so good at punctuating, as only 11.5 gave 'always' as the response and 'sometimes' as the highest. Refer to Fig 4 and Table VII. The correlation coefficient of Listening and Speaking is positive, indicating that if listening is done efficiently, then speaking becomes efficient. The correlation coefficient of writing and reading is also positive, indicating that the better the reading, the better the writing. So, it can be asserted that the respondents should be given more exercises and training in all the skills as they are interdependent positively. Communication teachers can use this finding to improve LSRW skills further. The survey sample was limited to 102

students of a private engineering college where the students were given ample training in their communication skills, so the result may not be a direct indication of the entire picture of the communication efficiency of engineering students. The survey can be extended to other regional engineering colleges and the whole country to get an accurate picture.

TABLE VII
CORRELATION COEFFICIENT OF LSRW

Always	Sometimes	Never	Often
0.717182	0.5079852	0.977962	0.836234
0.159519	0.0217634	0.141371	-0.16363

TABLE VIII
IMPLICATIONS OF SKILLS

What is written	No. of respondents
Manuals	33%
Letters	47%
Memos	67%
Reports	80%
Proposals	57%
Minutes	54%
E-mail	76%
Fax	70%
Online Help	7%
Webpages	7%

VII. CONCLUSION

Communication is an inseparable part of both professional and personal life. Although technical know-how forms a significant portion of how an individual's personality is perceived, communication skills cannot be ignored for the efficient expression of ideas. According to the survey conducted, students showcase good communication skills. The institutions that have implemented communication skills as an essential part of their curriculum can provide the best engineers to the industry. The institutions that have not yet incorporated their curriculum communication skills their students would suffer in the global world. Also, they would find recruiting in the best places difficult.

Communication skills, also recognised as one of the life skills by UNSECO, reinforce its importance. (Understanding life-skills, UNESCO Digital Library). The students and the institutes alike need to understand the significance of LSRW and make it an essential element of their curricula. According to a survey given in the paper written by Anne Keane in Communication Trends in Engineering Firms: Implications for Undergraduate Engineering Courses, the following elements are written in any organisation.

The semi-structured interview focuses on and establishes the importance of communication for engineers and all its aspects, namely LSRW. It has also been established that the students get ample focus in the first year and are proficient in them. But to continue the momentum, communication skills

must be included in other semesters as they are the backbone for success in the professional world. It also establishes that the students are good at the basic skills but need practice and the right direction to get a professional touch.

The present study focuses on only a single private engineering college and a few students in the First and Sixth semesters. Thus, further study can be conducted in the future, considering more engineering colleges and students of other engineering departments.

The study recommends giving importance to communication skills and making it a part of the curriculum not only in the first year but every semester, especially in the sixth and seventh semesters when the students appear for campus interviews and take internships. According to Marc J Riemer, who worked for UNESCO's International Centre for Engineering Education as an assistant editor for their publications, in his report titled 'Communication Skills for the 21st Century Engineer' writes "There is ample evidence that graduate engineers lack the required standard of communication skills, particularly when compared to the needs of the industry internationally". Each engineering college must incorporate communication skills into its curricula. The study concludes that communication skills, as mentioned by the students, are of utmost importance, and the teaching of it must continue in higher semesters, too.

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