



Knowledgeable Research (KR)

ISSN: 2583-6633 | CODEN: KRABAU

International Open-Access Peer-Reviewed Refereed Multidisciplinary Journal

<https://knowledgeableresearch.com>

Vol. 5, Issue 04, April, 2026

Received: 10/03/2026 | Accepted: 22/04/2026 | Published: 30/04/2026

The Integration of English Language as a Course in the Curriculum in Engineering Institutes across India to Foster Effective Collaboration in a Multicultural and Globalised Workforce Environment

Rochna Roy

Dayananda Sagar University, Bengaluru

Abstract

The aim of this study was to analyse the significance of the English language as a medium of communication among scientists, researchers, and academics in interdisciplinary branches at engineering colleges in India, particularly for students enrolled in the Computer Science Department. We assessed the academic English language needs of the students using a 5-point Likert scale questionnaire. Additionally, interviews were conducted with three faculty members from various branches, and the results were analysed qualitatively. Thus, a mixed-methods approach was employed for data collection and analysis. The questionnaire and interviews reveal that academic contexts frequently employ the four language skills—listening, speaking, reading, and writing—including coding. However, students struggle with writing and accurately interpreting English words, which hinders their ability to recall terminology commonly used in coding and other subjects. Furthermore, students are finding it increasingly challenging to communicate their application ideas, participate in competitions, develop research papers and conduct laboratory research. Implementing 'constructivist theory' as a new pedagogical approach will improve students' proficiency and empower them with communication ability. Therefore, establishing dedicated English departments in engineering colleges should be a priority in the current education curriculum.

Keywords: English Proficiency; Demands; Curriculum Integration; Language and Coding; Scientific Learning; Experimental Sciences

*Corresponding Author:

Rochna Roy

Email: rochna-english@dsu.edu.in

Introduction

English, as a global means of communication, has become increasingly important in various fields in recent times. The need for fluent English proficiency extends to discourses such as various engineering subjects, technological advances, and cross-disciplinary research. The importance of a

language in the worldview is closely related to the people who own and speak the language and the influence of its people on the world. As an international language, English has become a significant tool for communication among scientists, researchers, and academics from all

parts of the world. Leading scientific literature, journals, and conferences generally use English as a communication medium. English proficiency is critical to accessing the latest knowledge and participating in global scholarly discussions (Zaitun & Hadma, 2024). English language teaching has gone through a whirlwind of transitions in its methodology, from grammar translation to direct method, to audiolingualism, to cognitive code, and a host of variations in each. Other methods, their range of implementation much smaller in scope, have also been introduced (Pica, 2000). Learning English should be regarded as a powerful tool for maximising one's potential and contributing to the global scientific community, enabling collaboration with researchers from diverse regions worldwide. All institutions need to adopt a supportive approach that emphasises English learning in order to increase career opportunities. Many companies and research institutions highly value candidates who possess strong English proficiency, as it enables them to thrive in a multicultural environment and effectively collaborate with global teams. There are numerous situations in which one requires proficiency in English, such as when wishing to articulate thoughts, deliver a presentation, write a book or research paper, participate in an interview, understand technical documents, conduct lab experiments, or code. A strong command of this language is essential. In the era of rapid technological advancement, English has emerged as the lingua franca of the

globalised world, impacting various professional domains, including Computer Engineering. As the language of international academia, research, and technical documentation, English is essential for students in technical fields, facilitating access to knowledge and fostering professional growth. For Computer Engineering students, proficiency in English serves not only as a means of communication but also as a crucial skill in comprehending and applying complex technical concepts. Students frequently face challenges in understanding programming resources, documentation, and error messages, which are primarily available in English. Additionally, programming languages such as Python, Java, and C++ are based on English syntax, rendering language proficiency indispensable for effective coding (Veerasingam & Shillabeer, 2014). Identifying the connection between language skills and coding abilities can enable institutions to offer targeted support, thereby assisting students in overcoming language barriers in technical education more effectively (Batubara, 2025). The significance and necessity of technical translation in basic sciences, which underpin new technologies, is evident, as a substantial portion of scientific breakthroughs arises from advancements in these fundamental areas. Students should be able to utilise the most common scientific texts and resources by comprehending the vocabulary and terminology prevalent in their respective fields of study (Azamat; Khodadust & Bahrami Maddah, 2024).

Basic sciences serve as the foundation for various disciplines; without a solid understanding of them, comprehending other fields can prove to be a considerable challenge. Numerous domains, including biology, chemistry, cellular and molecular sciences, microbiology, graphics, clinical psychology, visual arts, physics, language education, political science, visual communication, and social communication sciences, exemplify basic science disciplines that are crucial for the progression of diverse fields of study. Students, graduates, professors, and researchers within these areas must engage with and translate foreign texts to remain abreast of the latest developments in basic sciences. Technical texts often contain a plethora of specialised terminology, which requires the expertise of a professional translator for an accurate understanding of the concepts. Failure to do so may result in potential translation errors (Azamat; Khodadust; Bahrami Maddah, 2024). Each domain presents its challenges. The recent shift in teaching methods is crucial for creating a more meaningful and interactive learning experience. The growing demand for the English language signifies a thoughtful transformation that addresses the needs of the current generation (Roy, Rochna, et al, 2025). Studies show that around 70% of tech industry hiring managers prioritize spoken and written English skills, often associating language competence with leadership potential, even for roles based in non-English-speaking regions (Gonzalez & Browne, 2019). For instance, an

engineer in Bengaluru from a reputed institution with strong coding skills was passed over for a promotion due to insufficient English writing abilities that impacted his technical reports. In contrast, a colleague with similar expertise but better English proficiency was promoted within six months. The increase in remote work and outsourcing, particularly accelerated by the COVID-19 pandemic, has heightened the demand for English fluency, with numerous positions stipulating minimum scores on standardised tests, such as IELTS or TOEFL. Consequently, non-native English speakers who lack strong language skills face the risk of being marginalised, despite their technical capabilities. Despite advances in machine translation and AI-assisted communication tools, these technologies have yet to fully replace the nuanced understanding required for effective collaboration and leadership in global tech teams. English proficiency remains an indispensable complement to technical expertise, enabling professionals to access timely information, engage fully in multinational projects, and pursue career progression in an increasingly interconnected and competitive industry (Iyappan; Rose & Kumar, 2025). This research focuses on the gaps in understanding how English proficiency affects coding skills, comprehension of foundation courses, and overall academic performance among engineering students. The objective is to emphasise the value of integrating strong English language support into technical curricula to enhance students'

competencies. This research is crucial for educators and policymakers aiming to enhance the global competitiveness of students in technical fields. In this research paper, the researcher will explore several significant challenges related to the establishment of English departments in engineering institutions. Despite the importance of teaching thinking skills, integrating thinking in language teaching has been peripheral. The practice of teaching thinking takes many forms, and in second language research critical thinking and metacognition have been dominant areas of inquiry (Li, Li, 2016). The need to establish and promote the English language within these engineering institutes is increasingly important in today's context. Recognising the significance of English proficiency within an educational institution allows for the reform of curriculum development and ensures that students are adequately prepared for a multicultural, globalised workforce.

Statement of the Problem:

To develop a comprehensive understanding of the research problem, the researchers undertook several steps that enabled them to concentrate on the issue and identify a potential solution, as follows: (1) Observing students' complaints and difficulties reveals a clear need to identify the language skills necessary for their studies; (2) exchanging views with teaching staff from all engineering disciplines to confirm the existence of the problem; (3) consulting subject experts from the department of Computer Science and Basic

Sciences, to understand how crucial it is to possess a strong command of the English language for coding, as well as for scientific learning and research; (4) collection of technical vocabulary used assertively in scientific literature and coding. The problem of the study can be summarized in the following statement: English proficiency within an educational institution allows for the reform of curriculum development and ensures that students are adequately prepared for a multicultural, globalised workforce. To enable the need for English language proficiency in coding skills, foundational courses, and academic performance among engineering students across India, engineering institutes must ensure a functional department with experts for current generation students. This research addresses a significant gap and underscores the importance of integrating the Department of English, not solely as a second language or merely as a medium of communication. Technical English is either integrated into the curriculum as a 1-2 credit course or offered as a certification course at various institutions across India. However, the English language cannot be confined within these limited objectives. It is crucial to establish a dedicated department staffed with qualified educators to ensure effective language instruction. The researchers have conducted an analysis of the current requirements and challenges faced by students, with the aim of promoting English departments in engineering institutes. This initiative seeks to assist these institutions in

addressing the challenges presented by the global workforce.

Constructivism has deep historical roots. The learning theory of Constructivism evolved from the extensive study of cognitive development by Swiss psychologist Jean Piaget (1896–1980) and the Russian psychologist Lev Vygotsky (1896–1934). Their study of development provided the foundation for the psychological theory of constructivism. Constructivists believe that children develop knowledge through active participation in their learning (Sharma & Gupta, 2016). Constructivism is widely toned as an approach in a diverse English language classroom. It is a way of learning and thinking and constructing new knowledge with the help of the existing. The students make sense of the material and how they can be used most efficiently. Constructivism is an innovative strategy in which the language learners construct their knowledge themselves through interaction with each-other on the basis of previous experiences. It is basically a learner-centered approach and the teacher acts as a facilitator in language learning. Constructivism has launched a reflective improvement in the field of English language teaching. Under the guidance of constructivist theory, teachers must abandon the old teaching methods, converting from the traditional teaching style in which teachers impart knowledge into students' heads, to the new teaching mode in which students construct meaning initiatively. Teachers' roles change from expert and knowledge teller into the coordinator of

activities and facilitator of meaning construction. Constructivism reflects that knowledge is not a "thing" that can simply be given by the teacher to the students (Pandya, 2018). The integration of virtual learning environments, blogging, media technology, course management systems, useful websites and certain computer programmes into English language teaching helps create optimum learning conditions from the constructivist perspective (Haldun, 2015). To effectively incorporate this theory into teaching and learning, it is essential to grant complete freedom. Language teaching can enhance understanding and enable students to apply it efficiently.

Research Questions:

The problem addressed by this research can be comprehended with the following primary questions:

- (1) In what ways can the establishment of an English department in engineering institutions prepare students for international academia, research, and technical documentation?
- (2) How can this integration assist students in technical fields by enhancing their access to knowledge and promoting professional development?
- (3) How can the fundamentals of language and coding be effectively integrated?
- (4) How can students incorporate hands-on experiments to better understand scientific concepts?

(5) Which learning theory of ELT can be applied within the system to enhance the students' abilities?

Methods:

The method employed in this study is library research. This research aims to collect and analyse existing knowledge to provide a coherent explanation of the necessity of a department of English in engineering institutions. It is essential for students to understand the objectives and demands of companies to cater professionally and meet their research capabilities. This method gathers primary data, which refers to original and firsthand information obtained directly from source material within the library setting (George, 2008). Technology has meaningfully facilitated and integrated a focus on learner-centric pedagogy. English Language Teaching (ELT) has adopted new approaches to teaching and learning, particularly with the integration of Artificial Intelligence, which offers significant advantages within the current education system. The implementation of cognitive and constructivist methodologies seeks to enhance learner engagement. The constructivist learning approach enables learners to understand language use in diverse contexts. Furthermore, the personalised learning approach to ELT has allowed the education system to transcend traditional curricular patterns. Understanding the challenges posed by industrialisation and tailoring courses accordingly can yield substantial benefits for learners. 'Constructivism' also highlights the

social aspect of knowledge construction (Dewey, 1938). Learning is both an individual and a collaborative endeavor. According to constructivism, students actively create knowledge through social interactions and interactions with their surroundings. The Zone of Proximal Development (ZPD) and the importance of social interaction in learning are at the center of Vygotsky's theories. These ideas emphasize the value of cooperative learning environments and scaffolding. that develops critical thinking, grammatical precision, vocabulary richness, and language proficiency through group interaction. This theory has paved the way for more dynamic, interactive approaches in language education. Encouraging students to engage with language actively through authentic, meaningful contexts. This theory strategy stimulates active engagement, problem-solving, and critical thinking, which are crucial for functional and communicative mastery of a language (Guo, 2024). This research is descriptive as it applies a mixed method, combining both quantitative and qualitative methods (Mukama & Nkusi, 2019; Ronen, 2020) as convenient approaches that allow the researchers to effectively collect and analyze its data.

Findings and Discussion:

The research in programming languages and software engineering focuses on computer programs: their construction processes, which encompass both social and technical aspects; the

methods of expression used; the assurances we can provide regarding their behaviour; and their interactions with supplementary artefacts, such as comments, design documents, and natural language specifications. It also explores how individuals understand these programs, the shared characteristics of the languages employed in their creation—whether these characteristics are currently present or could be designed into them—and how these traits influence what a program communicates as a computational solution. Linguistics examines analogous concepts related to human languages, rather than programming. It explores questions such as what are the commonalities across languages? How do these differences interact with language use? What limitations can be identified regarding how languages may evolve to express (or leave implicit) specific information? How might language use vary according to different contexts or social situations? Additionally, can natural languages be systematically and precisely modelled? Despite the clear distinctions between the two fields—particularly the study of engineered languages versus naturally evolving languages—linguistics provides a rich array of ideas, perspectives, and established analytical tools (both formal and informal)(Gordon, 2024). The field of chemistry is a vital branch of the experimental sciences. It explores the properties of matter and its production, concentrating on atoms and molecules. The word 'chemistry' is derived from the Greek term 'Khemia', which translates to

'to mix' (Taber, 2015). The scholarly contributions have highlighted the role of communication and language proficiency in enhancing employability and professional development among engineering students. The researchers have explored how public speaking skills directly contribute to improved job prospects in multinational corporations, highlighting the demand for effective oral communication in global settings. Similarly, others have argued that communication skills function as a critical human resource for career growth in technical disciplines. Some focus on creative communication strategies, including storytelling and anthropomorphism, demonstrating their pedagogical potential in enhancing language acquisition and engagement. These insights align with the present study's emphasis on English proficiency as a multidimensional skill set—encompassing speaking, listening, and cultural literacy—crucial for navigating the complexities of globalised, English-dominated tech environments. Despite this progress, significant gaps remain. Few integrative studies holistically address the intersection of language proficiency with technical competence in shaping career trajectories and team effectiveness, especially in increasingly hybrid and distributed work environments. Future research is required to investigate how evolving remote collaboration tools and AI-driven language support technologies can alleviate linguistic challenges(Iyappan; Rose & Kumar, 2025). Interpretation is an act of verbal communication in which information is conveyed

from one language into another (Pöchhacker, 2016). It is indispensable to the communications and exchanges between people who speak different languages. As globalization accelerates and countries have closer contacts with one another, interpretation plays a more important role and the need of good interpreters is growing faster than ever (Lu, 2019). In foreign language didactics, errors are usually defined as a deviation from a system of norms and rules related to the structure of the foreign language. Respectively, in a generalized approach, a translation error could be considered as a deviation of a norm in a certain

language communication situation (Saridaki, 2023). Customising specific subjects based on current requirements has become a common phenomenon across all domains. Translation is an art because, in addition to understanding words and sentences, the translator also needs artistic sensibility. Translation plays a crucial role in disseminating knowledge globally, making it accessible to everyone. Thus, it can be regarded as one of the primary requirements of scientific and academic communities (Azamat; Khodadust & Maddah, 2024).

Type of Translation & Description
(I) Communicative Translation: In this category, the translator focuses on not only the correspondence of the translated text with the original text but also to the arrangement of words in the sentence in a way that it fits the target language.
(II) Word-for-word or Literal Translation: The text is translated word for word without considering the combination of words and their placement in the sentence. Suitable for small and simple sentences, but not useful for large and complex texts.
(III) Free Translation: The translator can make changes based on the general theme of the text and is not limited in word choice. Also known as paragraph-based translation.

Table 1. Different Categories of Translation with the description (Azamat; Khodadust & Maddah, 2024)

To effectively implement or break down scientific explanations or coding, one must be proficient in the English language. The internet, a wide variety of web-based tools, and specially designed

computer programs have opened up new possibilities for teaching and learning the English language. Today, the shift from language ‘analysis’ to language ‘use’ allows a greater

emphasis on interaction. Communication is no longer regarded as an end in itself but as a tool for participating in socially meaningful activities. It should be emphasised that technology is merely one approach to supporting teachers. “Focus must be placed on learning with the technology rather than learning from or about the technology” (Haldun, 2015). Without functional English departments in engineering colleges, it is difficult to meet students' expectations. This is especially apparent for the English language classroom, to which learners and teachers bring multiple goals, across academic and community contexts, and require a high level of proficiency for their success (Pica, 2000). Proficiency in English enables students to express complex ideas, engage in meaningful discussions, and confidently deliver their research findings. It is the need of the hour to acquire competence in the English language to cope up with the real challenges of the modern era. In some countries, English is the medium of instruction at a higher level, and the Universities are no exception. Students need to learn English in most of the academic tasks, for example, to give presentations, to prepare assignments, to participate in class and other academic related tasks. Since the students of the computer science department have to design software installation guides, software manuals for project presentations, their learning demands of English are different from the students of other departments (Irshad & Anwar, 2018). Constructivist learning has emerged as a

compelling approach to teaching. According to Vygotsky, learning occurs through interactions with the environment and the people within it. In constructivism, ‘knowledge’ is actively constructed by learners as they endeavour to make sense of their experiences. The constructivist approach also emphasises the importance of context in learning and stresses that the acquisition of knowledge can only be achieved by engaging in meaningful activities. Furthermore, learning is viewed as a continuous, lifelong process resulting from acting within various situations. English language teaching should be cognisant of the fact that learning is a process where individuals contribute the most and that the most effective learning often occurs when teacher involvement is at an optimum level, i.e., at the minimum level necessary. Without this condition, learning cannot be considered to have been entirely successful. In the process of learning a foreign language and applying it, one needs to take risks, communicate with others, engage in higher-order thinking skills, and present written or oral output as evidence of learning. This approach aligns with several concepts frequently lauded in the current ELT environment, such as ‘learning-centred’, ‘reflective practice’, ‘learning by doing’, and especially the ‘constructivist approach’. The integration of virtual learning environments, blogging, media technology, course management systems, useful websites, and specific computer programmes into English language teaching fosters optimal learning conditions from a

constructivist perspective (Haldun, 2015). Incorporating innovative teaching methods and pedagogical approaches enhances students' proficiency. In a recent interview with several students from the Department of Computer Science and Technology, it became evident that their primary issue is a lack of understanding of the terminology associated with coding. Additionally, they find it challenging to articulate the applications they have developed and their usage when applying for internships.

The primary concern of these colleges is that students struggle to secure jobs, despite having acquired a range of skills and impressive CGPAs. Industry experts provide only one month of professional and soft skills training at the institutes, which offers minimal benefit to the students. However, these experts often overlook the fundamental issues that need immediate attention. The argument that the “constructivist approach is promising in promoting learners’ language and communicative skills, as well as fostering their autonomy and social and interactive skills, contributes to their development into more confident, proactive, and responsible individuals by supporting incentives across diverse media in language learning and teaching” (Can, 2009). Language learning is a creative, imaginative, exploratory, and collaborative endeavour (Haldun, 2015). To address the concerning issues raised by various departments and students from

engineering backgrounds, the institutes should establish a functional department of English language. This initiative could facilitate the effective communication of research outcomes and enhance students' performance in the job market. The study synthesises various sources to construct a comprehensive argument for the effective integration of technology within a constructivist framework for English language teaching (ELT). It demonstrates how different tools and theories contribute to creating a dynamic, student-centred learning environment (Haldun, 2015).

Conclusion:

This study employs a survey to determine the need for English language proficiency in coding skills, foundational courses, and academic performance among engineering students across India. Learning includes being creative, using your imagination, exploring, and working together. Allowing educators to implement a contextual and social learning approach would benefit students.

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