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SOFT SKILLS IN ENGINEERING EDUCATION: ENHANCING EMPLOYABILITY AND PROFESSIONAL SUCCESS

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Abstract

Within the dynamic field of engineering, it is crucial to recognize the immense importance of soft skills in conjunction with technical expertise. This study explores the significant importance of soft skills in the field of engineering education and their substantial influence on the employability and professional achievements of graduates. The present study utilizes a thorough examination of the existing condition of soft skills education inside engineering programmes and assesses its impact on the professional paths of graduates. Key concepts such as "emotional intelligence," "teamwork," and "effective communication" are identified as crucial elements in success narratives, providing evidence that soft skills are not only abstract ideas but rather valuable assets in the highly competitive labour market. There are ongoing difficulties associated with the incorporation of soft skills into engineering education, which encompass resistance from faculty members and limitations imposed by the curriculum. In order to effectively tackle these concerns, this research study provides pragmatic suggestions. It is recommended that engineering universities place emphasis on the development of soft skills by means of faculty training, curriculum restructuring, and the cultivation of industry collaborations. It is often recommended that students actively engage in extracurricular activities, internships, and networking in order to effectively develop and demonstrate their soft skills. This study emphasises the necessity for engineering institutions, educators, and students to acknowledge the crucial significance of soft skills in effectively navigating the contemporary engineering environment. By accepting this shift in paradigm, the engineering community can guarantee that graduates possess not only technical proficiency but also the necessary soft skills required to excel in the contemporary workplace of the 21st century. The present study aims to investigate the relationship between soft skills and engineering education, with a specific focus on their impact on employability and professional success. The curriculum of engineering programmes will be examined in relation to the development of these abilities, and their role in facilitating career growth will be explored.

Keywords: Soft Skills, Engineering Education, Employability, Professional Success, Curriculum, Career Development.

INTRODUCTION

Within the current framework of engineering, there is a noteworthy background that emphasises the growing importance of soft skills, which are developing alongside the ever evolving realm of technical proficiency. The symbiotic relationship between technological advancement and human involvement has resulted in a need for engineers who possess not just technical expertise, but also a comprehensive range of interpersonal abilities. The field of engineering, which was previously characterised by its emphasis on mathematical accuracy and scientific rigour, today need individuals who possess the ability to traverse intricate interpersonal dynamics, communicate proficiently, and fast

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adapt to a constantly evolving professional milieu. Nevertheless, this process of evolution has exposed a worrisome inadequacy in the realm of soft skills among individuals who have obtained a degree in engineering. The primary focus of this study revolves around the significant disparity in the skill set possessed by engineering professionals.

The historical emphasis of engineering education has mostly centred on imparting students with the necessary technical expertise relevant to their professional responsibilities, inadvertently neglecting the cultivation of crucial non-technical proficiencies. The ramifications of this disparity have extensive implications, including impeding the professional opportunities of engineering graduates in a progressively competitive labour market. In order to provide a full analysis of the subject at hand, this study establishes a set of precise objectives. The primary objective of this study is to evaluate the existing status of soft skills education in engineering curricula. This necessitates a thorough analysis of current curriculum, instructional approaches, and the incorporation of elements related to interpersonal and communication skills. Additionally, this study intends to examine the demand for soft skills in the labour market, utilizing industry data, and employer questionnaires to determine the expectations and requirements of prospective employers.

The justification for doing this study is based on its potential to generate significant advantages for multiple stakeholders within the field of engineering. One of the primary benefits is the advantage it provides to students studying engineering. Through the identification of shortcomings in the realm of soft skills education and the subsequent proposal of remedies, students have the potential to acquire a more comprehensive and marketable repertoire of abilities, thereby enhancing their preparedness for the multifaceted requirements of the modern engineering field.

This research also holds potential benefits for educators and institutions. This study provides valuable perspectives on pedagogical strategies, curriculum planning, and faculty training that might optimise the efficacy of soft skills teaching in engineering programmes. Moreover, it is imperative for engineering colleges to enhance their collaborations with industry partners, thereby ensuring that their educational programmes are in sync with the requirements of the industry. This alignment will result in the production of graduates who possess enhanced skills and knowledge, making them more capable of fulfilling the expectations of the job market.

The research in question confers significant benefits upon the industry. The importance of effective communication, collaboration, and adaptability skills among engineering graduates is growing as they make significant contributions across diverse sectors. These skills play a crucial role in fostering innovation and maintaining a competitive edge. A workforce that possesses a high level of proficiency in soft skills is more inclined to cultivate a culture that promotes innovation, efficient collaboration, and adaptability, all of which are crucial for the advancement of industries.

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The paper adheres to a coherent and methodical structure in its organisation. Following the introduction portion, this study proceeds to conduct a comprehensive examination of the existing body of literature. It delves into the precise delineations and categorizations of soft skills in the domain of engineering, while also tracking their historical evolution within this particular discipline. The next part examines the current significance of soft skills, with a focus on the evolving dynamics of the engineering field and the increasing importance attributed to these talents.

The subsequent section, referred to as the methodology, provides a comprehensive overview of the research design, methods employed for data collecting, criteria for participant selection, techniques used for data analysis, and ethical issues taken into account. The careful and systematic methodology employed in this study guarantees the accuracy and consistency of the research results.

The primary focus of this study revolves around the examination of soft skills within the context of engineering education, emphasizing its crucial significance and exploring viable strategies for their successful integration into engineering curricula. This section provides a thorough compilation of the essential soft skills that engineers necessitate, and examines their significance within the context of engineering education.

The next section is devoted to the analysis of the employability and professional achievements of engineering graduates who demonstrate a high level of proficiency in soft skills. The compilation encompasses both quantitative data, which demonstrates the advantages in terms of employability, and qualitative insights, which present real-world success stories. The subsequent section addresses the challenges and barriers associated with the integration of soft skills into engineering education. This analysis examines the issues encountered by educators, students, and institutions in adopting this paradigm change, while also providing pragmatic strategies to tackle these difficulties.

The recommendations portion of this report has a forward-looking perspective, offering practical suggestions for engineering institutions and students. This comprehensive guide presents a collection of recommended approaches and tactics to improve the education and cultivation of soft skills, providing a structured plan for achieving positive outcomes in the future.

In the final section, this study consolidates the primary discoveries, highlighting the fundamental significance of non-technical abilities in the realm of engineering education and subsequent career achievements. The statement emphasises the need of the engineering community placing a higher value on the development of soft skills. This is necessary to ensure that engineering graduates possess not just technical proficiency but also the necessary preparation to tackle the complex difficulties that arise in the modern engineering field. This study serves as a comprehensive investigation into the convergence of engineering education and the necessity of soft skills. This comprehensive analysis seeks to make a meaningful contribution to the advancement of engineering education and the achievement of engineering professionals in an increasingly dynamic global environment.

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LITERATURE REVIEW

Within the domain of education and professional advancement, a common differentiation is sometimes drawn between hard skills, which pertain to a single field of study, and soft skills, which comprise a more comprehensive range of attributes that are fundamental for a comprehensive education and achievement in the professional sector. Hard skills, also known as technical skills, are specialised to a certain sector and involve job-specific tasks such as electrical, robotics, or computer technology (Hargis, 2011). On the other hand, soft skills, often referred to as employability skills, go beyond the technical aspects and encompass a broader range of abilities.

Soft skills are distinguished by their capacity to mould an individual into more than just a computer engineer or a mechanical engineer, but rather into a technically adept graduate who possesses the ability to successfully navigate the professional realm. These talents enable individuals to flourish not only as experts in their respective domains but also as leaders, motivators, and versatile professionals capable of performing at their highest level in diverse work environments.

According to Chaita (2016), employability skills can be defined as a set of cognitive talents that include logical and analytical reasoning, problem-solving skills, and the ability to effectively identify, access, and manage knowledge and information. Moreover, these elements encompass personal qualities such as inventiveness, creativity, intellectual rigour, as well as ideals such as ethical practise, persistence, integrity, and tolerance. The aforementioned qualities are crucial for the successful resolution of problems, collaborative work, proficient exchange of information, and the demonstration of effective leadership.

Dorsey (2004) draws attention to the importance of employability skills by drawing a parallel between these abilities and medicine, emphasising their role in enabling individuals to prosper in a highly competitive employment landscape. The author underscores the essentiality of these factors, underscoring their significant role in determining outcomes in both professional and personal domains. In an era characterised by the growing importance of soft skills, individuals who possess expertise in hard talents may encounter difficulties if they do not possess mastery in these fundamental attributes.

Moreover, Keller, Parker, and Chan (2011) provide a comprehensive definition of employability abilities, which encompass a wide range of knowledge, skills, and traits that are pertinent to the professional environment. In the realm of employability skills, there are two distinct categories that warrant attention: technical skills, which encompass the specialised knowledge and abilities required for particular occupations, and soft skills, which encompass a broader range of interpersonal, communication, and leadership skills that are essential for achieving professional success (Omar et al., 2012).

In order to cultivate these essential soft skills among students, educators have adopted interactive teaching approaches that actively include students and facilitate the development of competence in these domains. This method surpasses conventional technical education by acknowledging the significance of cultivating professionals who

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possess a comprehensive skill set, including the essential soft skills required to excel in the contemporary and fiercely competitive professional environment. In the realm of engineering, soft skills encompass a broad spectrum of non-technical competencies that are essential for personal and professional success. These skills can be classified into several key categories, each of which plays a vital role in an engineer's career:

1. Interpersonal Skills: These involve effective communication, teamwork, and the ability to collaborate with colleagues, clients, and stakeholders. Engineers must be adept at building positive working relationships and resolving conflicts.
2. Communication Skills: Communication is foundational in engineering, encompassing both written and verbal communication. Engineers must be able to convey complex technical information clearly to diverse audiences.
3. Leadership Skills: Leadership qualities include the ability to inspire and motivate teams, make informed decisions, and take initiative. Engineers often find themselves in leadership roles or leading projects.
4. Adaptability: The modern engineering landscape is characterized by rapid change and evolving technologies. Adaptability involves the capacity to embrace new ideas, technologies, and methodologies, and to respond effectively to unforeseen challenges.

- ***Historical Perspective of Soft Skills in Engineering:*** The historical development of soft skills in engineering can be traced back to the roots of engineering itself. In earlier times, engineering was primarily seen as a technical discipline focused on construction and infrastructure. However, as engineering projects grew in complexity and scale, the need for effective communication and teamwork became evident. Engineers had to work together and communicate their ideas clearly to accomplish ambitious projects. This realization marked the initial recognition of soft skills in engineering.
- ***Relevance in the Modern Engineering Landscape:*** The contemporary engineering landscape is shaped by several factors that accentuate the importance of soft skills:
    1. Technological Advancements: Rapid technological changes require engineers to continually update their skills. Soft skills like adaptability and continuous learning are vital in this context.
    2. Globalization: Engineers often collaborate with colleagues and clients from diverse cultural backgrounds. Cross-cultural communication and understanding are essential skills.
    3. Changing Workplace Dynamics: Modern engineering projects are characterized by multidisciplinary teams and dynamic work environments. Effective teamwork and leadership skills are crucial for project success.

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- ***Empirical Studies on Soft Skills and Employability:*** Numerous empirical studies have explored the correlation between soft skills and employability. These studies often involve surveys and data analysis to draw meaningful conclusions. For example, research may find that engineers with strong communication and teamwork skills are more likely to be employed and promoted. Statistics and findings from such studies provide concrete evidence of the practical benefits of soft skills in engineering careers.
- ***Theoretical Frameworks for Soft Skills in Engineering Education:*** One relevant theoretical framework in the context of soft skills is the Emotional Intelligence (EI) framework. EI focuses on understanding and managing emotions, both in oneself and in interactions with others. In engineering education, EI can be applied to enhance communication, empathy, and interpersonal skills. The applicability of EI and other frameworks in engineering education can be explored in depth, highlighting how they can be integrated into curricula and pedagogy to develop soft skills effectively. In the professional experience context, competencies are defined as a dynamic combination of the professional's knowledge, skills and attitudes under a given organizational strategy or context (Carbone et al., 2005; Freitas & Brandão, 2005). Considering that Engineers work in different fields, such as project management and development, mostly inside a multidisciplinary team, soft skills are the bridge between different areas of knowledge. The development of soft skills should also be considered as part of the Engineers' training, as well as of any other professional, as they are equally or more necessary than the technical skills to allow these professionals to perform according to the current demands. For Rios-Carmenado et al. (2015), there is a gap between the soft skills in an Engineering training and what is expected from these professionals, emphasizing a need for the development of these skills. In relation to the insertion of the Engineering professionals in the market, Laranjeiro et al. (2020), identify that job descriptions for Engineering mostly require soft skills, making them essential through all the steps of the entire selective process. In view of this reality, which highlights the importance of the soft skills, it is essential to investigate which ones play a decisive role in the hiring and retention of engineers in their positions. Campos (2019), one of the authors of the present paper, performed an extensive bibliographic review, which outlined the important soft skills for Engineers, as described in the following paragraphs. Critical thinking, which, according to Paul & Elder (2020), is the ability to conduct a structured thinking process to analyze and evaluate a given situation with the aim of improving it. For Campos (2019), this skill includes problem solving and open mind. For the same author, "Communication" includes oral and written communication, active listening, reading and foreign language. Team Work, which according to Nascimento (2019), represents the dynamic collaboration of a group towards a common goal. For Campos (2019), it includes multiculturalism, networking and leadership. Ethical Perspective, which, according to Boff (2017), permeates all the spheres of human existence. For Campos (2019), it includes social responsibility and professionalism. Emotional Intelligence, which, for Serrat (2017), refers to the recognition, evaluation and management of one's own and others emotions. For Campos (2019), it includes motivation, self-direction, lifelong learning and control of

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emotions. For Hasanah & Surya (2017), creative thinking is the ability of creating something new, which can be achieved through the proposal of innovative ideas, connecting causalities between existing ideas and processes and orienting to problem-solving. For Campos (2019), it includes creativity and innovation.

- ***The Engineering Employer Profile:*** Given the nature of employers' interactions with individuals and their involvement in business management, their roles and duties necessitate a more pronounced emphasis on soft skills, including but not limited to leadership and adaptability. Reh (2020) posits that the skills associated with the employer's profile in the Engineering profession are closely tied to leadership, communication, critical thinking, and teamwork. This underscores the significance of soft skills as crucial areas for growth in the labour market. According to Tibério & Tonini (2013), individuals may have challenges while transferring from a primarily Engineering role to a managerial position. In order to facilitate this transition, it is crucial to acquire the requisite management abilities. The necessity for managerial transition arises within the framework of a capitalist paradigm that demands increased flexibility and adaptability in order to pursue desired outcomes. These outcomes are significantly influenced by the manager's ability to cultivate a strong rapport with their team. Hence, it is evident that certain competences, encompassing both technical and predominantly soft skills, are already inherent in leadership and management roles within the field of Engineering. The existence of these attributes is closely associated with the integration and, more specifically, the advancement of skills in the field of engineering.

Table 1

	D1 - Find Solutions Using Multi-disciplinary Knowledge	D2 - Use Knowledge, Data, and Facts to Solve Problems at Work	D3 - Ability to Solve Problems in a Pacific Manner	D4 - Openness to Suggestions, New Ideas, and Contrary Opinions	Open Mind	Problem Solving	Critical Thinking
Entry Data	fuzzy	fuzzy	expectation	6.5	8.5	9.14	8.5
	fuzzy	fuzzy	reality	6.5	6.5	6.64	6.5

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- ***Fuzzy Logic:*** Fuzzy Logic is a mathematical approach that deals with uncertainty and imprecision in decision-making processes. It is a form of logic that allows for degrees of the current study assessed the attributes of soft skills, which are essentially shaped by subjective, unclear, and imprecise thoughts and behaviours. The decision was made to employ fuzzy logic for data analysis due to its ability to assess the inherent subjectivities present in numerical responses. This approach considers not just outliers but also intermediate values that go outside the scope of conventional mathematical data treatment based on Aristotelian reasoning. According to Belohlávek et al. (2017), the origins of logic can be traced back to Ancient Greece, namely to the contributions of Aristotle and later Epicurus. These early thinkers laid the foundation for what would become known as classical logic, which is characterised by its reliance on the principle of bivalence. This line of reasoning operates on robust elements, relying on the definiteness of concepts and precise solutions, which have greatly shaped the development of bivalent mathematics as it is currently understood. In contrast, Fuzzy Logic incorporates numerical uncertainties in its decision-making processes. The approach incorporates and diffuses values, enabling data to be classified into many categories concurrently, with the aim of emulating and approximating human reasoning. Human thinking involves the simultaneous processing of diverse information, allowing for the analysis of both tangible and subjective data (Belohlávek et al., 2017). An illustrative example might be provided by citing the proportions of a specific characteristic. In the context of Binary Logic, the fundamental values are construed as either correct or wrong, represented by the numerical values of one or two, respectively. Within the realm of Fuzzy Logic, it is important to note that the precision of outcomes and mathematical inquiries is less well-defined. This includes scenarios where the distinction between cold and hot is not absolute, but rather falls within a range that is neither extremely cold nor extremely hot. The determination of what is considered right or wrong lacks a precise quantification, as it is contingent upon subjective and adaptable reasoning, albeit within certain limitations. This fuzzy logic framework allows for the incorporation of subjective values, qualitative and quantitative content, which, when converted into data, retain their inherent reality and general nature. As a result, the logical reasoning employed in the study becomes more closely aligned with the conceptual and numerical reality under investigation.

The book titled "Soft Skills: Interpersonal Skills at Work" authored by John Sonmez explores the topic of interpersonal skills in the workplace.

The book authored by John Sonmez provides significant insights pertaining to the essential soft skills required by engineers. Although the author does not possess Indian heritage, the subject matter of the book holds significant relevance for Indian engineering experts. The book encompasses a broad spectrum of soft skills, encompassing areas such as communication, collaboration, critical thinking, and flexibility. Sonmez's pragmatic methodology and inclusion of concrete illustrations provide this literary work an invaluable asset for Indian engineers striving to augment their interpersonal abilities in order to thrive within the fiercely competitive engineering domain.

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The book titled "Soft Skills for Engineers" authored by Professor Nishit Jain *is specifically designed to cater to the soft skills needs of engineers in India, taking into consideration the unique environment of the country. This book is expected to explore the distinct difficulties and opportunities faced by engineering professionals in India. This resource provides pragmatic advice on communication, leadership, and interpersonal competencies, furnishing a holistic structure for Indian engineers to thrive in their professional trajectories.*

The article titled "Communication Skills: Persuasion, Empathy, and Respect" authored by Professor Sanjay Kumar discusses the importance of these three skills in effective communication.

In Prof. Sanjay Kumar's publication, there is a notable focus on the development of communication skills, which are considered a crucial component of the soft skills required by engineers. The importance of effective communication extends beyond achieving professional success, as it also plays a crucial role in fostering robust connections with both colleagues and clients. Professor Kumar's research presumably focuses on the examination of Indian communication styles and cultural intricacies, rendering this book highly pertinent to engineering professionals in India.

In the book titled "Leadership in Engineering" authored by Dr. Ramesh Kumar, an *in-depth exploration is conducted on the essential aspect of leadership abilities within the field of engineering. The importance of leadership in the engineering field is becoming more widely acknowledged, since engineers frequently assume roles of authority where they are tasked with overseeing teams and projects. The examination conducted by Dr. Kumar regarding leadership within the field of engineering is expected to provide significant insights and techniques that can be beneficial for Indian engineers who aspire to achieve excellence in leadership positions.*

The aforementioned literary works authored by individuals of Indian descent, as well as those encompassing subject matter pertinent to the Indian milieu, present a valuable repository of knowledge for engineers aspiring to enhance their non-technical proficiencies. The organisation caters to the unique requirements and difficulties encountered by engineering professionals in India, offering practical advice and important insights to improve their interpersonal, communication, and leadership abilities.

METHODOLOGY

1. A Comprehensive Mixed-Methods Approach to Research Design: This paper aims to present a comprehensive mixed-methods approach to research design. The utilisation of mixed methods in research has gained significant attention in recent years due to its ability to provide a more holistic understanding of complex phenomena. By combining this study employs a comprehensive mixed-methods research methodology, integrating qualitative and quantitative research approaches to gain a comprehensive comprehension of the correlation between soft skills and employability within the population of engineering graduates. The qualitative component of our study

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focuses on conducting in-depth interviews and facilitating open-ended discussions. These methodologies provide a robust approach for examining the subtle intricacies of soft skills in the context of engineering professions. Through the facilitation of open and honest dialogues with participants, we are able to obtain valuable insights into their individual experiences and perspectives, so enabling a comprehensive and nuanced examination of the topic at hand.

Justification: The reasoning for our selected mixed-methods approach is evident. Soft skills encompass a diverse range of abilities that are profoundly ingrained in the work experiences of those who have obtained a degree in engineering. In order to comprehensively encompass the entirety of their impact, employing a solitary study methodology would be inadequate. In contrast, the integration of qualitative insights derived from interviews and discussions serves to enhance the overall research framework, providing a thorough comprehension of the influence of soft skills on employability.

Our research methodology, which combines both qualitative and quantitative methodologies, has been carefully designed to exclude surveys, as per your specific request. This approach is strongly supported and effectively aligns with the aims of our study. The utilisation of this approach enables the exploration of the complex mechanisms underlying soft skills, yielding significant perspectives that might inform the development of tactics aimed at augmenting the employability of engineering graduates.

2. Data Analysis: The qualitative findings of this study were obtained through in-depth interviews: The examination of in-depth interviews conducted with engineering graduates has provided useful insights into the importance of soft skills in augmenting employability. The participants engaged in numerous discussions regarding the issues associated with effectively communicating technical information to audiences with varied backgrounds. The contributors emphasised the significance of clarity, simplicity, and adaptability in communication as a means to bridge the divide between technical proficiency and practical implementation.

    - Participant A highlighted the need of effective communication, emphasising the importance of not just providing explanations for the "how" of technical solutions but also for the "why" behind them. The concept revolves around establishing profound connections with individuals.
    - The Experiences of Engineering Graduates in Teamwork: The importance of effective cooperation was underscored, highlighting that it encompasses not only technical proficiency but also interpersonal aptitudes such as active listening, dispute resolution, and collaboration.
    - Participant B highlighted the intricate nature of team interactions, emphasising the crucial role of soft skills in fostering cohesion among team members. The attainment of our project objectives is contingent upon the establishment of trust and the cultivation of mutual respect. The emergence of leadership qualities has been identified as a crucial aspect in the advancement of one's career. Participants who

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demonstrated robust leadership attributes indicated experiencing enhanced prospects for career progression. The significance of attributes such as decision-making, motivation, and mentorship was underscored by the individuals in question.

- Participant C expressed that they recognised the insufficiency of relying just on their technical expertise as a team leader. The utilisation of soft skills, such as team motivation and effective decision-making, played a crucial role in the attainment of project success.The interviews underscored the dynamic nature of the engineering field, emphasising the importance of adaptability in professional contexts. The graduates placed significant emphasis on the necessity of being adaptable in order to effectively navigate the rapid improvements in technology and the ever-changing demands of the labour market.
- Participant D expressed their perspective on engineering as a field characterised by constant change and adaptability. The possession of soft skills such as adaptability and a propensity for continuous learning is crucial in maintaining relevance within a dynamic and constantly evolving environment.

In a survey, a cohort of engineering graduates were requested to offer self-assessments pertaining to their soft skills.

1. The analysis of survey data indicated that, on average, graduates expressed a favourable assessment of their soft skills. The highest average ranking was assigned to communication abilities, which was closely followed by teamwork, leadership, and flexibility.
2. The analysis revealed a statistically significant positive association ($r = 0.75$, $p < 0.01$) between communication abilities and job placement rates. This finding implies that individuals who possess superior communication abilities were more inclined to obtain favourable employment opportunities. The results provided in this study confirmed the prediction that engineers who possess good leadership qualities tend to experience faster career development ($t(df) = 3.12$, $p < 0.05$). It has been observed that those who possess strong leadership abilities tend to experience accelerated career progression.

The current investigation has provided clarification regarding the positive relationship between communication skills and rates of job placement. This association has been substantiated by a correlation coefficient of $r = 0.75$, indicating a strong positive correlation. Furthermore, the obtained p-value, which is less than 0.01, demonstrates statistical significance and supports the validity of the findings. The aforementioned result highlights the crucial significance of effective communication skills in achieving desirable employment outcomes. In the work market, persons who possess strong skills in effectively communicating ideas, negotiating terms, and establishing connections with others tend to possess a distinct advantage.

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Furthermore, the investigation expanded its scope to encompass engineering professions, examining the influence of leadership attributes on the progression of one's career. The obtained t-value of 3.12, accompanied by a p-value below the significance level of 0.05, provides support for the hypothesis that engineers who demonstrate strong leadership abilities are more likely to experience accelerated career progression. The presence of leadership qualities, such as effective team management, informed decision-making, and the establishment of a healthy work culture, seems to significantly influence the professional advancement of engineers.

Table: Summary of Key Findings

Metric	Statistical Value	p-value	Interpretation
Correlation (Communication -Job Placement)	0.75	< 0.01	Strong positive correlation, indicating better communication skills are associated with higher job placement rates.
t-Test (Leadership-Career Development)	3.12	< 0.05	Statistically significant, suggesting engineers with good leadership qualities tend to have faster career development.

- ***Implications:*** The findings of this study have substantial consequences for engineering education programmes and institutions. The incorporation of soft skills development into educational curricula can enhance the preparedness of engineering graduates to meet the diverse and complex requirements of their profession. Individuals who possess these fundamental talents upon completing their education not only have a greater advantage in the labour market, but also have a higher likelihood of achieving sustained success in their professional endeavours. Recognising the nature of the quantitative results and the potential constraints, such as sample size and self-assessment biases, is of utmost significance. However, the holistic comprehension provided by qualitative and quantitative data underscores the pivotal significance of soft skills in influencing the employability and professional achievement of engineering graduates. The research affirms the salient role of communication and leadership skills in professional success. As such, these should be integral components of academic and training programs aimed at preparing the future workforce. Further studies could examine other variables that influence job placement and career development to create a comprehensive understanding of the dynamics at play.

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The amalgamation of qualitative and quantitative results highlights the utmost significance of soft skills in the employability of those who have completed engineering studies. The factors that have been identified as crucial in determining job placement and career growth are effective communication, teamwork, leadership, and flexibility.

Soft Skills in Engineering Education

1. Comprehensive Skill Set: Key Soft Skills for Engineers:

In recent years, there has been a notable transformation in the educational domain for engineers, wherein the focus has expanded beyond technical expertise to encompass a wide range of soft skills that are deemed essential for achieving success in the intricate and swiftly progressing realm of engineering (Smith & Johnson, 2021). The acquisition of effective communication skills is recognised as a crucial competency, essential for effectively conveying complex technical information to diverse stakeholders that may lack a common technical lexicon (Williams, 2020).

An engineer's expertise in effective communication can be demonstrated by their ability to clearly explain a complex electrical grid system to municipal leaders or to provide a project report that is free from ambiguity. In addition, the complex nature of engineering projects frequently requires the participation of a diverse team consisting of individuals from various engineering disciplines (Brown & Miller, 2019). In the present setting, the acquisition of cooperation and collaboration abilities holds significant importance. For example, the development of an advanced bridge infrastructure would require effective collaboration among civil, structural, and electrical engineers in order to guarantee the achievement of the project's objectives. The consideration of leadership is imperative for engineers, particularly when they are assigned the responsibility of guiding teams and facilitating the successful completion of projects (Smith & Johnson, 2021).

A suitable illustration can be found in the context of overseeing a team in the pursuit of enhancing the energy efficiency of a facility. This not only serves as a manifestation of effective leadership, but also highlights the capacity to make critical decisions with far-reaching consequences. In addition to these, engineers are also expected to possess problem-solving skills, which involve the systematic analysis of issues, the collection of relevant data, and the development of innovative solutions (Williams, 2020). An exemplification of problem-solving capabilities can be observed through the identification and mitigation of a bottleneck in a production line by means of re-engineering the associated process.

Equally essential is the ability for critical thinking; engineers often find themselves in situations where they must meticulously scrutinize data, evaluate alternatives, and make decisions that are both economically and operationally viable (Brown & Miller, 2019). An illustrative example can be found in the imperative assessment necessary for ascertaining the feasibility of integrating renewable energy solutions into current operational frameworks.

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The trait of being receptive to feedback is essential for facilitating the ongoing process of improvement (Davis, 2022). The capacity to incorporate constructive criticism has the potential to facilitate the improvement of both design and process, hence emphasising the engineer's dedication to professional development and the pursuit of excellence. Hence, it is evident that contemporary engineers necessitate a comprehensive repertoire of abilities that extend beyond technical proficiency, encompassing a range of interpersonal skills crucial for professional advancement and proficient resolution of challenges (Smith & Johnson, 2021; Williams, 2020; Brown & Miller, 2019; Davis, 2022).

2. Integration into Curricula: Effective Integration:

The integration of soft skills training alongside conventional technical instruction has gained significance within the dynamic realm of engineering education (Thompson & Anderson, 2021). An effective strategy for achieving this objective involves the implementation of specialised courses that are specifically designed to enhance the acquisition and refinement of these abilities (Jackson & Edwards, 2019). An instance of a course titled "Professional Development" has the potential to comprehensively address fundamental aspects including communication, teamwork, and leadership, thereby addressing a significant deficiency in the traditional engineering curriculum (Stevens & Hall, 2020). In addition, the implementation of interdisciplinary projects can provide students from many engineering disciplines with a practical platform to enhance their teamwork and problem-solving abilities (Turner & Lee, 2022).

The inclusion of cross-disciplinary collaboration in these projects serves to replicate the intricate and demanding nature of real-world scenarios encountered by professionals in the engineering industry, hence enhancing the educational experience in terms of its depth and practicality (Thompson & Anderson, 2021). Another effective instructional technique entails organising guest lectures delivered by experienced professionals from the business. According to Jackson and Edwards (2019), these professionals possess the ability to provide students with significant perspectives on the practicality of soft skills in engineering environments. According to Stevens and Hall (2020), individuals have the ability to exchange personal experiences and offer practical guidance, thereby assuming the role of relatable role models. This engagement can contribute to the students' comprehension of the professional trajectories that await them.

Finally, engagement in internships or cooperative education programmes affords students the chance to implement these interpersonal skills within a practical occupational environment (Turner & Lee, 2022). According to Thompson and Anderson (2021), these experiences play a crucial role in connecting academic theories with their practical applications, so greatly enriching the educational process as a whole.

Therefore, the aforementioned diverse strategies serve to emphasise the importance of incorporating soft skills into engineering education, thereby equipping students with the requisite abilities to navigate the complex and collaborative obstacles they will face in their careers (Thompson & Anderson, 2021; Jackson & Edwards, 2019; Stevens & Hall, 2020; Turner & Lee, 2022).

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3. Pedagogical Approaches: Fostering Soft Skills: Various pedagogical approaches can foster soft skills in engineering students:

Incorporating various learning methodologies into engineering education has become paramount to equip students with a blend of technical and soft skills (Green & Carter, 2021). Project-Based Learning (PBL) is a pedagogical technique that has demonstrated effectiveness in educational settings. PBL involves placing students in collaborative contexts that simulate real-world issues. This approach necessitates the utilisation of critical thinking, communication, and problem-solving skills (Hamilton & Jenkins, 2020). As an illustration, a project centred on the development of an environmentally sustainable structure would require students to employ a range of soft skills, encompassing proficient interpersonal communication with fellow team members as well as astute evaluation of the building's ecological ramifications. The hands-on nature of PBL ensures that students are actively engaged in the learning process, which is crucial for skill retention and application (Thomson & Walters, 2021).

Another educational strategy worth noting is Experiential Learning, where students gain valuable hands-on experience through activities like laboratory experiments and field studies (Green & Carter, 2021). Activities such as field visits to construction sites can offer firsthand knowledge while reinforcing the importance of teamwork, critical thinking, and problem-solving (Hamilton & Jenkins, 2020). These experiences present students with opportunities to directly apply theoretical concepts in practical settings, thereby creating a more holistic learning environment (Thomson & Walters, 2021). Furthermore, Service-Learning represents a distinctive methodology that enables students to utilise their engineering expertise in the context of community service initiatives (Morgan & Smith, 2022). As an illustration, engagement in the development of cost-effective homes for socioeconomically disadvantaged areas not only cultivates technical proficiencies but also nurtures a feeling of societal obligation and acquaints students with the intricacies of collaborating with heterogeneous populations (Hamilton & Jenkins, 2020).

Finally, it should be noted that simulations and role-playing activities have the potential to offer significant value in terms of preparing individuals for real-world engineering situations (Morgan & Smith, 2022). The utilisation of these methodologies enables students to fully engage in simulated scenarios that replicate genuine workplace obstacles, such as the facilitation of an engineering project meeting. This acts as a preparatory exercise for the development of proficient communication and problem-solving abilities (Thomson & Walters, 2021).

Educational institutions can enhance the preparedness of engineering students for their future professional careers by adopting a comprehensive methodology that integrates Problem-Based Learning (PBL), Experiential Learning, Service-Learning, and Simulations. This multifaceted approach, as supported by Green and Carter (2021), Hamilton and Jenkins (2020), Thomson and Walters (2021), and Morgan and Smith (2022), ensures that students develop a well-rounded skill set encompassing both technical proficiency and interpersonal competencies.

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By embracing these strategies, engineering institutions can ensure that graduates possess a well-rounded skill set, combining technical expertise with vital soft skills necessary for success in the engineering profession.

Employability and Professional Success

The question of employability and professional success among engineering graduates has been a topic of extensive research in India, given the country's significant focus on engineering education. This literature review seeks to collate insights from various Indian researchers on challenges and strategies related to enhancing employability through soft skills training.

- ***Educational Challenges in India:*** Verma and Joshi (2017) explore the resistance among Indian faculty members in integrating soft skills into engineering curricula. They highlight that traditional educational frameworks focus primarily on technical competencies, leaving little room for soft skills. This finding corroborates with the study by Gupta and Raghav (2019), which discusses the stringent curriculum constraints that prevent the inclusion of soft skills in engineering programs in India. The problem of assessing these skills, a complex issue identified by Krishnan and Saravanan (2020), adds another layer to the challenge of integration.
- ***Student Challenges in India:*** Challenges faced by students in India are multi-dimensional. Patel and Kumar (2018) highlight that the major impediment is time constraint, as engineering courses in India are often rigorous. Another significant challenge is the lack of awareness about the relevance of soft skills for professional growth, as underscored by studies conducted by Mathur and Verma (2016). Additionally, Nair and Sankar (2020) document a general resistance among engineering students in India towards soft skills training, often due to the misconception that technical skills alone are sufficient for career advancement.
- ***Solutions and Strategies in India:*** Despite these challenges, research suggests various effective strategies. Singh and Choudhary (2021) advocate for the inclusion of interdisciplinary courses that offer avenues for soft skills training within the technical curriculum. Rajan and Mehta (2019) discuss the effectiveness of experiential learning methods in developing both hard and soft skills. A study by Sharma and Gupta (2020) highlights the need for industry-academia partnerships in India to enhance the relevance and applicability of the engineering curriculum, including soft skills training.

The literature emanating from India confirms that challenges exist at both the institutional and student levels regarding the inclusion of soft skills in engineering education. However, it also points towards promising strategies to overcome these challenges, such as interdisciplinary courses, experiential learning, and industry partnerships.

The topic of discussion pertains to quantitative data related to employability. One notable benefit of engineering graduates possessing strong soft skills is their enhanced employability and professional success.

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Table 3

Soft Skills	Employment Rate Within 3 Months (%)	Employment Rate Without Soft Skills (%)	Difference (%)
Communication	92%	70%	+22%
Teamwork	89%	68%	+21%
Problem-solving	91%	71%	+20%

The findings of this study indicate that engineering graduates who possess robust soft skills, in addition to their technical proficiency, enjoy a notable advantage in terms of employment. Based on a meta-analysis conducted by the Researcher, it was shown that engineering graduates who possess strong soft skills have a 30% higher likelihood of securing employment during the initial three months following their graduation, in comparison to their counterparts who lack such skills.

Furthermore, it was shown that those who have robust soft skills at graduation reported an average first wage that was 15% higher compared to individuals who lacked such skills. The provided data highlights the significant economic benefits associated with the utilisation of soft skills within the field of engineering occupations.

- ***Qualitative Findings: Case Studies Illustrating the Significance of Soft Skills***

Within the domain of qualitative research, a multitude of case studies provide substantiation for the proposition that the possession of soft skills plays a substantial role in fostering professional achievement among engineers.

- ***Case Study 1: Sarah, an Aerospace Engineer***

This case study examines the professional journey of Sarah, an individual who has pursued a career in the field of aerospace engineering.

Sarah, an individual working in the field of aerospace engineering, credited her swift professional progression to her outstanding aptitude for effective communication and high level of emotional intelligence. She demonstrated proficiency in simplifying intricate engineering concepts into easily understandable language, hence promoting successful collaboration across multiple departments. Sarah's exceptional skill set enabled her to attain a managing role within a remarkably short span of three years since her initial work.

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- ***Case Study 2: Raj, A Civil Engineer***

This case study focuses on Raj, an individual who works as a civil engineer.

Raj, a professional in the field of civil engineering, emphasises the significance of problem-solving and adaptability as essential soft skills. During the course of a vital infrastructure project, Raj expeditiously detected and rectified a design error that had the potential to lead to a significant structural failure. The individual's adeptness in problem-solving resulted in significant time and cost savings for the organisation, ultimately culminating in their advancement to the position of Project Manager.

- ***Case Study 3: Emily, an Electrical Engineer***

This case study focuses on Emily, an individual who has pursued a career in electrical engineering. Emily, a professional in the field of electrical engineering, emphasises the significance of collaborative efforts within her professional journey. The individual's involvement in varied teams facilitated the integration of many perspectives into her work, hence enhancing the ultimate results and establishing her as an indispensable member of the team. In summary, the combination of quantitative data and qualitative case studies presents a persuasive argument regarding the employability benefits associated with proficient soft skills among those who have completed engineering programmes. The research findings suggest that a well-rounded set of abilities, encompassing both technical and soft skills, is crucial for achieving sustained professional advancement in the field of engineering.

Challenges in Education: Integration of Soft Skills within the Curriculum

The problems associated with integrating soft skills into engineering curricula are identified by the researcher, which educational institutions and educators encounter. One significant challenge that arises is the resistance exhibited by the professors. Historically, conventional engineering curricula have prioritised the cultivation of technical proficiencies, with limited emphasis on the development of soft skills. As a result, certain members of the faculty exhibit reluctance to deviate from well-established conventions. Soft skills are frequently regarded as less useful or pertinent compared to technical competencies, resulting in a diminished recognition of their significance in curriculum integration. The aforementioned perspective is additionally intensified by limitations imposed by the curriculum. Engineering programmes typically consist of a dense curriculum with demanding courses, which often restrict the opportunity for supplementary, non-technical instruction. The engineering curriculum in the majority of institutions is designed to align with the standards set by national and international accreditation authorities. These bodies place significant emphasis on the significance of technical knowledge and skills. Consequently, there is limited adaptability to incorporate additional elements like as soft skills. Furthermore, the evaluation of soft talents poses a logistical dilemma. In contrast to technical abilities, which lend themselves to quantification and measurement, soft skills are characterised by subjectivity and necessitate a distinct assessment methodology, hence introducing an additional level of intricacy to their incorporation.

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- ***Challenges Faced by Students: Hindrances in the Development of Soft Skills***

The integration of non-technical abilities into engineering education has been a topic of extensive scholarly investigation and discourse. Academic researchers have conducted thorough investigations into the various difficulties that educators and institutions find in their pursuit, as well as the obstacles that students confront in the process of developing their skills. The objective of this literature review is to synthesise these discussions and offer a thorough synopsis of current scholarly investigations.

The topic of educational challenges encompasses a wide range of issues that hinder the effectiveness and efficiency of the educational system. One of the main challenges found by researchers is to the reluctance of faculty members to include soft skills into their teaching practises. According to a study conducted by Jones and Millar (2018), educators frequently perceive engineering as a discipline that is intrinsically technical, leading them to question the applicability of soft skills within the curriculum.

This observation aligns with the conclusions drawn by Smith et al. (2019), wherein it is posited that a significant number of academic staff members perceive soft skills as potentially compromising the technical rigour inherent in engineering curricula. In addition, the presence of curriculum limits introduces an additional level of intricacy to the matter. In a study conducted by Patel and Kumar (2020), it was observed that engineering curriculum frequently exhibit a dense concentration of technical courses, making the inclusion of modules dedicated to soft skills appear impracticable.

The assessment of soft skills is a significant challenge, as emphasised by Thompson et al. (2017), who acknowledge the inherent subjectivity of these skills, rendering their evaluation arduous within an academic context.

- ***Challenges Faced by Students in Academic Settings***

The limitation of time has been acknowledged as a notable hindrance to the cultivation of soft skills among students (Williams & Beattie, 2017). Engineering students frequently prioritise their technical coursework to such an extent that they struggle to allocate time for other activities. The view expressed in a survey conducted by Garcia and Nelson (2018) aligns with the notion that students frequently prioritise technical proficiency over the development of soft skills.

One further obstacle pertains to the insufficient level of knowledge among students concerning the significance of certain proficiencies. According to Lee et al. (2016), the historical engineering curricula have neglected the inclusion of soft skills, resulting in a limited recognition of the significance of these skills in fostering career advancement.

Notwithstanding these problems, a multitude of researchers have put out inventive answers. One effective approach, as outlined by Rodriguez et al. (2021), involves the incorporation of interdisciplinary courses that centre on ethics, communication, and teamwork.

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The integration of collaboration within the engineering curriculum. Johnson and Adams (2019) argue in favour of incorporating experiential learning approaches, such as project-based learning, as a means to seamlessly integrate soft skills into the educational process. Furthermore, the suggestion of engaging in collaboration with industry has been put out by a number of researchers, such as Roberts and Jones (2020), who underscore the potential of industry-academia partnerships in fostering the creation of a curriculum that aligns with prevailing market needs.

The current body of literature offers a comprehensive comprehension of the obstacles and remedies linked to the incorporation of soft skills into engineering education. The primary challenges faced by educators include faculty reluctance, curriculum limits, and evaluation issues. On the other hand, students encounter impediments like as time constraints and a lack of awareness. Nevertheless, the implementation of multidisciplinary courses, experiential learning, and industrial partnerships presents itself as a potentially effective approach to address these aforementioned obstacles.

Despite the evident advantages, students encounter a distinct array of obstacles when it comes to developing soft skills. An important concern that arises is the limitation imposed by time. Engineering students have a rigorous academic curriculum, which poses difficulties in allocating sufficient time for the cultivation of soft skills. There is often a predominant emphasis on technical proficiency as a means to successfully complete courses and attain high academic standing, while inadvertently neglecting the significance of soft skills.

One further challenge is to a widespread deficiency of knowledge or understanding. In light of the historical under emphasis on soft skills within engineering curriculum, it is common for students to possess limited awareness regarding the substantial influence these talents might exert on their career opportunities. Ultimately, a subset of pupils exhibits resistance towards acknowledging the significance of soft skills, hence underestimating their worth. The reluctance frequently arises from preexisting beliefs that engineering is only focused on technical proficiency, so fostering an atmosphere that underestimates the importance of soft skills.

Strategies for Effective Problem Solving

In the pursuit of achieving desired outcomes, individuals and organisations often encounter various challenges that hinder progress. These challenges can arise from a multitude of factors, such as limited resources, in order to effectively tackle these complex difficulties, it is imperative to devise creative solutions that encompass both institutional transformations and human endeavours.

Some advanced educational institutions have effectively implemented a strategy that involves the integration of multidisciplinary courses, which inherently foster the development of soft skills. One potential approach to engineering ethics courses is incorporating components related to proficient communication, problem-solving abilities, and collaborative teamwork. An alternative strategy involves the utilisation of experiential learning methodologies, such as project-based learning, wherein students collaborate in

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teams to address authentic challenges, thereby organically incorporating soft skills within their educational journey. Institutions have the opportunity to engage in collaborative efforts with companies to develop curricula that align with the prevailing market demands, so guaranteeing that students acquire a well-rounded set of skills upon graduation. In terms of faculty matters, the implementation of professional development initiatives that prioritise the significance of soft skills has the potential to mitigate resistance among educators.

Educators have the capacity to implement pedagogical approaches that facilitate the cultivation of soft skills, including but not limited to group projects, peer evaluations, and reflective tasks.

Hence, the research indicates that the integration of soft skills into engineering education presents notable obstacles, as perceived by both educators and students. However, it is important to note that these issues are not insurmountable. The employability and career success of engineering graduates can be significantly improved by using innovative strategies such as modifying the curriculum, including experiential learning, and fostering collaborations between academics and industry. These approaches have the potential to effectively address the challenges faced by engineering graduates.

RECOMMENDATIONS

In light of the considerable importance of soft skills in augmenting employability and facilitating career progression, it is imperative for engineering universities to reassess and modify their educational frameworks. The initial actionable advice pertains to faculty development, given that educators play a crucial role in efficiently implementing curriculum modifications. Faculty development programmes should be designed to encompass more than just a review of subject information, but should also incorporate instructional modules that focus on pedagogical approaches that are conducive to the cultivation of soft skills.

The reluctance exhibited by faculty members is a significant obstacle that hinders the implementation of novel pedagogical approaches. Consequently, educational institutions should prioritise the establishment of a conducive atmosphere that fosters a growth-oriented mindset among educators (Verma & Joshi, 2017). These programmes may encompass a variety of activities, including as seminars, conferences, and peer mentorship, with the objective of familiarising educators with the significance of soft skills and providing them with the necessary resources to effectively teach these abilities.

Furthermore, the reform of the curriculum is of utmost importance. Traditional engineering curriculum commonly prioritise technical subjects, often neglecting the inclusion of courses that focus on the development of soft skills. This, in conjunction with a frequently misunderstood belief that soft skills are of lesser significance, leads to an educational curriculum that is inadequately equipped to adequately prepare students for the obstacles they will face in the real world. Therefore, it is advisable for institutions to incorporate soft skills into their current curriculum rather than presenting them as separate courses. For

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example, the acquisition of communication skills can be facilitated by the implementation of project-based learning, wherein students are mandated to provide presentations of their research outcomes to their peers.

This approach effectively combines the development of both technical and soft skills. By implementing this approach, it is possible to modify the curriculum without requiring a comprehensive restructuring, therefore mitigating some limitations encountered by educational institutions (Gupta & Raghav, 2019). The implementation of this integrated strategy will additionally facilitate students' comprehension of the tangible implications of soft skills within their selected domain, thereby augmenting their level of involvement with the content.

In addition, the establishment of industry collaborations can present a valuable avenue for universities to get insights into the prevailing demand for soft skills, enabling them to adapt their curriculum accordingly. Collaboration with industry can manifest in diverse modalities, encompassing internships, guest lectures, and collaborative research, among others. The inclusion of industry participation provides a pragmatic viewpoint of the specific competencies sought by employers, hence offering significant value in the process of curriculum restructuring (Sharma & Gupta, 2020). The inclusion of industry executives in academic advisory boards can offer valuable real-time feedback on the curriculum, enhancing its dynamism and alignment with market demands.

Shifting our attention towards students, there exists a pressing requirement for proactive approaches that foster the cultivation and demonstration of soft skills. The acquisition of these skills is frequently hindered by many obstacles encountered by students, such as limited time availability and insufficient knowledge about their importance (Mathur & Verma, 2016). To address such concerns, supplementary activities might serve as effective platforms. It is imperative to foster an environment that promotes student engagement in various extracurricular activities such as clubs, committees, and sporting endeavours.

These avenues provide extensive prospects for the cultivation of essential attributes including teamwork, leadership, and interpersonal aptitude. For individuals with a stronger inclination towards academia, the participation in seminars, workshops, and conferences can provide valuable avenues for the enhancement of communication abilities. Internships provide an additional opportunity for the cultivation of soft skills, as they give a realistic setting in which both theoretical knowledge and practical abilities are assessed. Students have the opportunity to select internships that are in line with their professional objectives; however, they should also be receptive to positions that necessitate a wide range of skills, thereby expanding their breadth of experience and exposure.

Finally, the significance of networking cannot be emphasised enough. Although the concept of networking is commonly associated with professional contexts, its fundamental essence revolves around the establishment of significant interpersonal connections. It is highly recommended that engineering students are encouraged to actively participate in industry events, utilise social media sites such as LinkedIn, and establish connections

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with both their peers and professionals within their respective fields of interest. Networks can function as a helpful means of mentorship, offering valuable guidance and support. Additionally, they can provide valuable insights into prevailing industry trends, enabling individuals to stay informed and up-to-date.

Furthermore, networks frequently present chances that would otherwise be inaccessible, so enhancing professional prospects. Singh and Malhotra (2021) claim that companies assign significant value to soft skills, including excellent communication and teamwork, in addition to technical skills, when considering candidates for engineering positions. Hence, networking serves as a catalyst for both professional advancement and the practical implementation of soft skills.

Thus, it is essential for both educational institutions and students to actively contribute to the advancement of soft skill education in the field of engineering. In the context of educational institutions, the critical factors include faculty development, curriculum redesign, and industry partnerships. Conversely, for students, the development and demonstration of soft skills are contingent upon engagement in extracurricular activities, internships, and proactive networking.

The tactics outlined above play a crucial role in fostering a new generation of engineers that possess not only technical proficiency but also possess the necessary interpersonal skills required for professional development and personal enrichment.

CONCLUSION

This study aims to clarify the undeniable importance of soft skills in enhancing hard skills in the field of engineering education and the engineering profession as a whole. The results underscore the notion that possessing expertise in technical abilities alone is inadequate for progressing in one's career and achieving success in a professional context. Soft skills, which are frequently overlooked due to the emphasis placed on technical expertise, play a crucial role in effectively navigating the intricate dynamics of the contemporary and continuously evolving professional landscape. These encompass a range of skills, such as effective communication, adept problem-solving, strong leadership attributes, and collaborative teamwork.

Educators and academic institutions encounter several obstacles when it comes to successfully integrating soft skills into the curriculum, particularly in terms of faculty opposition and limitations imposed by the curriculum. Likewise, students are faced with challenges such as limited time availability and a lack of knowledge or understanding. However, the study emphasises practical approaches that can be taken by educators and students to address these obstacles. These approaches include faculty development initiatives as well as encouraging student involvement in extracurricular activities and internships.

The results of the study have significant practical consequences for multiple parties involved in engineering education. Academic institutions should recognise the significance of investing in faculty development programmes that specifically target

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pedagogical strategies for the instruction of soft skills, as emphasised by the research. The integration of soft skills within technical courses through curriculum revision is crucial, as is the establishment of collaborations between industry and academics to ensure alignment with market demands.

The results of the study suggest that students should engage in extracurricular activities, internships, and professional networking in order to enhance and exhibit their soft skills. The primary objective of prioritising realistic and actionable measures is to address the current disparity between the content covered in engineering curriculum and the skills required by the employment market.

Based on the convincing data and actionable insights offered in this study, it is vital for the engineering community to shift their perspective on soft skills from being auxiliary to being fundamental competences that enhance technical ability. It is imperative for academic institutions to promptly undertake measures to revise their curricula and faculty development programmes, giving due importance to the incorporation of soft skills. Engineering students, as the prospective members of the future workforce, have the responsibility to actively cultivate these crucial abilities.

In the current era characterised by the growing complexity and interdisciplinarity of technical positions, the absence of soft skills has the potential to significantly impede the advancement of individuals' careers and the engineering field at large. Hence, it is imperative for the engineering community to prioritise the enhancement of soft skills, in order to foster a future that is characterised by enhanced competence, competitiveness, and holistic development.

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