

Article

Humanities Education for Engineering Students: Enhancing Soft Skills Development

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Abstract: Engineering is a vital profession in our society as it provides innovative and creative solutions to problems faced by humanity to improve the quality of life. Engineering decisions and designs affect not only humans but they also affect the entire planet. While solving global problems around the world, engineers work with and for diverse people in varied contexts. That is why, in addition to their technical expertise, engineers need knowledge of the humanities. They need soft skills. Soft skills enable engineers to function effectively in teams and to design solutions considering the human perspective. While academics and professionals have acknowledged the importance of soft skills alike, the incorporation of these skills in engineering programmes has been slow. The aim of this study was to enhance the development of soft skills by incorporating literature in the form of a novel, *Lord of the Flies*, as part of a communication module for engineering undergraduates. The main research question was whether a novel can be useful in promoting soft skills among engineering students. Qualitative and quantitative data, in the form of interviews and a questionnaire, were collected from the students about the value of this novel in enhancing their soft skills. It was found that, as a result of this intervention, they became more aware of these skills and the application of said skills in their daily lives. This study argues for the inclusion of humanities education for engineering students to develop their soft skills and to inspire human values in them.

Keywords: humanities education; engineering; use of literature for engineering students; engineering students; soft skills; *Lord of the Flies*



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1. Introduction

The engineering profession has always played a crucial role in the advancement of humankind in various disciplines, and it meets the needs of society. While working in complex contexts, engineers are required to demonstrate the strength of their personal attributes with skills in communication, critical analysis and ethical judgement [1]. In other words, in addition to their hard or technical skills, engineers are required to display soft skills while working with people [2].

The engineering industry and manufacturing enterprises are characterised by continuous change and increasing complexity, which requires engineering companies to provide flexible technical solutions in addition to managing multifaceted socio-technical systems which influence humans and their surroundings [3]. Therefore, in an increasingly competitive global and social work environment, professional engineers are expected to possess social skills that will add value to their specialised professional skills. Indisputably, technical proficiency is vital for all engineering professionals; however, “the importance of the engineer in the society is such that we cannot limit his role to the technical competences” [4] (p. 2).

The competencies that engineers are required to develop and strengthen are referred to as soft skills and should serve as the competitive edge, which “distinguishes them from other candidates with similar qualifications” [5] (p. 150). While hard skills are the technical expertise and knowledge needed for a job, soft skills are personal attributes that one possesses [6]. Soft skills are behavioural competencies or “personality traits, goals, motivation, and preferences that are valued in the labour market, in school and in many other domains” [7] (p. 2).

The description of soft skills varies widely in different contexts [5]. However, a review of the literature reveals the following soft skills most relevant to the engineering profession: leadership and management skills [8–10], interpersonal skills and teamwork [8,11–14], communication skills [5,8,12,15], decision-making and problem-solving skills [12,16,17], conflict management–negotiation skills [10,18], and accountability for economic, ethical, cultural and environmental issues [9,19,20].

These soft skills not only enable engineers to work cooperatively with others, but they are also fundamental to the communication of ideas, suggestions and innovations to others to achieve personal and organisational success [21]. At the same time, engineers need these skills in the context of their sociocultural milieu to act as responsible and active citizens [14,17]. These soft skills can separate engineers who are considered suitable for prominent and leadership positions from those who might fall prey to the dreaded restructuring or downsizing exercises [14].

May and Strong [22] (p. 204) argue that “for some time, surveys have suggested that employers find engineering graduates to be weak in the field of engineering design, innovation, communication and associated professional skills”. In addition, many engineering programmes have ignored the development of “this very important, competitive aspect of their programs. Instead, they have chosen to continue to focus only on hard technical skills” [23] (p. 1).

Da Silva and Tribolet [24] (p. 1) found in their study that “employers of the graduates would typically say that they have very good scientific and technical skills but weak soft skills, namely: writing and oral communication, teamwork, capacity to dialogue with non-technical co-workers, understanding of organisations, management and leadership, international awareness, and so on”.

In their study, Heckman and Kautz [7] (p. 1) demonstrate the importance of personality traits in professional and social lives. They assert that “soft skills predict success in life” and “causally produce that success”.

While soft skills are vital for professional success, the lack thereof can affect employment and promotion opportunities [14,25]. Engineering projects require multidisciplinary collaboration across cultures and countries, and the deficiency of these skills can hinder the successful execution of tasks.

Two historic engineering disasters, which can be attributed to miscommunication and problematic decision making, include the 1986 Space Shuttle Challenger disaster and the collapse of the Hyatt Regency Hotel walkway in 1981 [26,27].

While technology can benefit humans by improving their living conditions, it can become our master if we become too dependent on it. “Engineers must be humanists in order to exercise their vocation responsibly” [28] (p. 137).

Even though one can find research on the importance of soft skills education [5,9,15], very little is written on how to provide such education, especially to engineering students. In the current engineering curricula, there is little emphasis on the building of interpersonal competence, valuing diversity, working in teams, managing conflict and being accountable for the economic, ethical, cultural and environmental impact of engineering decisions.

Hence, it would be pertinent to look at ways in which cognisance of these skills and values can be promoted in the education of future engineering professionals.

While many university professors and administrators realise the importance of an education that includes engineering fundamentals as well as the soft skills required in the engineering profession, they are “unsure of what the alternatives are to the traditional methods, and even those who know about alternatives fear that transforming the way they teach will require a full-time commitment that will leave them with insufficient time to pursue their research” [29] (p. 17).

1.1. Need for Humanities Education

The ever-increasing unemployment and rising education fees compel students across the globe to enrol in courses in science, technology, engineering and mathematics (STEM) in an attempt to secure their futures. Students and their parents are questioning the value of the humanities in today’s technology-driven world. In this context, it is important to understand the relevance of humanities education [30].

While science and technology can give us the tools to perform complicated tasks, it is humans who decide which tasks are important to perform. It is humans who imagine, create and operate the machines that are meant to improve human lives. Humans are emotional, imaginative, creative and intelligent beings. Technology is not sufficient to address the humanistic aspects of professions [2]. In order to grow healthy economies and develop sustainable societies, we require knowledge of the humanities [31].

Being a successful leader does not necessarily require a focus on technological knowledge but rather a focus on humans [32]. Uniquely human skills are required to control and utilise technological and scientific power. Human-centric companies are demonstrating how humans and machines can complement each other to create a thriving workforce and deliver satisfactory solutions to human problems.

Humans are not machines; they need to be acknowledged as distinct individuals with their own nuances. Klugman [33] argues that the perceived difference between the humanities and the sciences is untrue. The humanities inspire contextualisation, reflection, critical thinking and empathy, which are essential to providing human care. Interdisciplinary education can make us better humans and professionals. A humanities experience transforms lives, opens doors and gives individuals a glimpse of how they can create a better future [34].

Industry requires engineers with leadership and interdisciplinary skills who can think, innovate, and work in multicultural environments [35]. Often, students consider the humanities courses to be a waste of time. They need to realise that strong communication and interpersonal skills increase the value of their education and improve their chances of success in their professional lives.

The humanities courses help students to connect with human culture, opening their minds to creative ideas [1]. Through the humanities, they are able to understand the impact of their decisions and solutions on the society of which they are a part [3]. Knowledge of the humanities, such as history, literature, philosophy, art and music, can help them serve humankind better and impart essential soft skills [2,36,37].

Strauss [38] supports this view by noting that administrators, politicians and parents alike stress the importance of STEM fields while disparaging humanities studies and advising students to avoid them. However, knowledge of liberal arts empowers students to be productive and responsible members of their communities who appreciate others and are lifelong learners. With the rising automation of products and services and the extensive spread of digital connectivity, it is essential not to lose touch with human judgement. STEM subjects are valuable, but the humanities provide diverse perspectives for considering

solutions to global issues [39]. Soft skills education is not impractical. Graduates with strong interpersonal skills are securing thousands of jobs worldwide. Creativity, empathy and interpersonal skills are necessary for the complex world of high-technology environments. Humanities education is especially needed for contexts where professionals from various cultures and backgrounds operate as team members to serve diverse communities.

Grinsfelder [40] shares Strauss's [38] view that the technical aspects of an engineering curriculum alone are insufficient for enabling students to think critically about the impact of their designs. They need knowledge of larger social issues, current affairs and social injustices to prepare them for the world they are about to enter. Moral consciousness and concepts of social justice cannot be learnt in an engineering laboratory.

Several studies report on the introduction of humanities education into engineering courses:

Sjursen [28] discusses an experimental course offered in collaboration with engineering and humanities faculties, which helped engineering students incorporate cultural and aesthetic elements into their design.

Jahan et al. [3] report on a curriculum intervention integrating humanities with engineering principles to encourage students to pursue sustainable solutions for real-world engineering challenges.

Caeiro-Rodríguez et al. [41] review the teaching of soft skills to engineering students in higher education institutions across Europe. The selected best practices utilise problem-based learning, project-based methodology or some form of active learning approach.

Davis et al. [39] report on their Humanities-Informed Engineering Projects course, where the students analysed engineering case studies from the perspective of the humanities.

Furthermore, some studies have also reported on the use of literature in engineering education. Londoño-Proañó and Pérez [42] and Segall [43] report on the use of science fiction films and literature to teach engineering concepts. Manià, Mabin and Liebenberg [44] use literature to develop competence in critical literacy and communication skills. Whereas Sleezer and Bates [45] use Michael Crichton's novel, *Prey*, to reflect on ethical issues in engineering design projects.

The current study is similar to the above studies as it incorporates humanities education into an engineering curriculum; however, it is unique in its approach as it utilises a novel as a context for enhancing soft skills among engineering students.

1.2. Rationale Behind the Use of *Lord of the Flies*

"By studying the Humanities—philosophy, literature, religion, art, music, history and language—we broaden our intellectual foundation" and "see the interconnectedness of all areas of knowledge and how the Humanities and STEM subjects all fit together and complement each other" [31] (pp. 8–10). Donald et al. [36] report on the need for multidisciplinary courses in order to simulate professional group conditions where students can train in moral, financial and social issues similar to those in their engineering workplace.

Fein [46] (p. 206) holds the view that literature can motivate introspection. "In examining the foibles and circumstances of fictive human beings in a concrete, yet undemonstrative way, it can inspire emotional reactions that are then available to be analysed . . . in the end, this sort of activity can make a significant contribution to a student's self-knowledge".

Through reflecting on the problems faced by imaginary characters, individuals can recognise similar challenges in their own lives. Humanities education affords exploration of human identity, vulnerability and motivation. Hynes and Swenson [1] also argue that fictional texts and the characters in them can be used to design solutions.

Studying the humanities enables students to understand themselves and others around them and how they all fit into the larger society.

The aim of this study was to enhance the development of soft skills among engineering students. For this purpose, the research introduced a novel, *Lord of the Flies*, as a part of the undergraduate engineering communication module. There is insufficient evidence of the use of literature in the development of soft skills for engineering students. Thus, by including this novel, the objective was to sensitise the students to the significance of these skills as being relevant to their engineering professions and their individual lives as responsible citizens and to provide a context for relevant critical discussion.

The novel revolves around themes of leadership, teamwork, interpersonal skills, problem solving, conflict of personalities and civilisation versus anarchy. These aspects correlate with the soft skills that speak to the practice of engineering professionals.

The Nobel Laureate, William Golding, wrote *Lord of the Flies* in 1954, some years after World War II. The story is based on the experiences of a group of British boys of different ages, with the oldest being 12, who are stranded on an uninhabited island when the aeroplane that was evacuating them during an imaginary nuclear war crashes. All the adults in the plane are killed, leaving the boys to create a society of their own. Their attempts at setting up a congruent social order descend into savagery and murder.

This novel is considered to be an allegory where symbolism is used to depict similarities with the real world. An allegory is “a story, play, poem, picture, or other work in which the characters and events represent particular qualities or ideas, related to morals, religion, or politics” [47]. The story of the novel draws similarities between the small society that the boys attempted to create on the island and our society in real life.

Golding wants to establish that man, if not controlled by law and morality, will eventually give in to his primal instincts of savagery and that evil is present in all of us and will flourish if it is allowed the opportunity.

This story is relevant to us even in our current circumstances. The COVID-19 pandemic exposed vulnerabilities as well as strengths in humankind. In many places in the world, acute inequities and corruption have grown at the expense of the defenceless [48,49].

At the same time, the human spirit prevailed in the face of devastation and danger. Sacrifice and compassion helped to inspire a sense of community for many in need. Acts of goodwill by the caring drowned the malicious acts of many selfish individuals [50].

The novel allows us to study how different individuals can choose to behave in society and how their choices will affect the welfare of society. The novel demonstrates this through a variety of characters with their strengths and weaknesses, symbolising members of a real-life society. The novel depicts the conflict between the personalities and leadership styles of two main characters, Ralph and Jack. In doing so, it helps us to discover the difference between those who possess soft skills and those who do not and the effect of these characteristics on the society in which they live.

Ralph represents virtue and morality. He is shown to have common sense and integrity, and he works hard to maintain the semblance of a civil society with the other boys. Initially, he is democratically elected as the leader of the group of stranded boys. The boys, especially the young ones, realise that he is fair, sensible and protective in nature.

“Ralph is a believer in the rule of law and is convinced that their only hope for long-term survival is to be rescued.” [51] (p. 2):

“And another thing. We can’t have everybody talking at once. We’ll have to have ‘Hands up’ like at school. Then I’ll give him the conch.” [52] (p. 45).

He is optimistic that the adults will one day come to rescue them. For this purpose, he recommends the burning of a small fire with green branches at all times so that they can generate smoke for any passing ships to see:

“There’s another thing. We can help them to find us. If a ship comes near the island they may not notice us. So we must make smoke on top of the mountain. We must make a fire.” [52] (p. 51).

He is not afraid to set an example for the others. When the boys feel threatened by the presence of a beast, he volunteers to go and look for it. In addition, he supports the building of shelters for themselves to make their lives comfortable while on the island. The shelters were meant to provide safety from the weather and to maintain a feeling of security on the island, as indicated in a statement by Bruns [53]: “Having something that the boys can call a home also helps them overcome their fears” (p. 2).

He is not as intelligent as Piggy, and therefore, he is grateful for Piggy’s intellectual support.

In contrast, Jack represents evil, anarchy and immorality. He is shown to be ruthless and power-hungry. He would follow the rules only if they favoured him. He wanted to be the leader when Ralph was selected by the group:

“‘I ought to be chief,’ said Jack with simple arrogance, ‘because I’m chapter chorister and head boy. I can sing C sharp.’” [52] (p. 28).

This is why he broke away from Ralph’s civilised community and formed a separate group of similarly sadistic boys who liked to hunt and inflict cruelty on others. He mistreated Piggy and the small boys:

“Jack: ‘Who cares what you believe—Fatty!’ [52] (p. 127).

‘Then,’ went on Piggy, ‘that boy—I forget—’

‘You’re talking too much,’ said Jack Merridew. ‘Shut up, Fatty.’

He took a step, and able at last to hit someone, stuck his fist into Piggy’s stomach” [52] (p. 27).

“‘Let’s be moving,’ said Jack relentlessly, ‘we’re wasting time.’

‘No we’re not. What about the littluns?’

‘Sucks to the littluns!’” [52] (p. 144).

Jack, as opposed to Ralph, does not prioritise being rescued from the island. He prefers to hunt for pigs with the group of boys allocated to the task of finding food. Hunting and killing become more than survival for him; he uses them to exert power over the boys and forms his own tribe, which keeps him away from the conservative leadership of Ralph.

Piggy, although intelligent, is considered an outcast among the boys, as he is physically not as fit as the others are. He is overweight, has asthma and wears spectacles. He is also not from a distinguished background, as are some of the others. This results in boys like Jack considering him to be beneath them and mistreating him badly. This situation further deteriorates into more savagery and leads to the killing of Piggy.

Piggy symbolises a problem-solving, critical and creative mind—three soft skills that this study aims to inspire among the participating students. He uses his insight to guide Ralph and the other boys. He understands Jack’s intentions and does not want their microcosm of society to fall victim to his selfish plans. At the same time, one can learn from Piggy’s law-abiding nature even when confronted with Jack’s bullying.

Simon is another character who is misunderstood, like Piggy. He also becomes Ralph’s friend because of his morality. He is a boy who is shown to be a Christ-like figure, deeply spiritual and self-sacrificing, which helps him to realise that it is the inherent evil in the boys or humans that is the real beast.

Leadership, communication, interpersonal skills, and conflict management can be studied by focusing on the interpersonal dynamics between the different characters in the

novel. Teamwork, problem-solving, and decision-making can be explored by looking at how the boys tried to solve their problems on the island and the impact that their decisions had on their personal well-being. Respect for diversity can be highlighted by focusing on the bullying of Piggy at the hands of Jack and his tribe. Respect for the weak can be understood when we look at how Ralph and Jack treated the little children and Simon. While Ralph was mindful of how his decisions influenced the others, Jack was arrogant and thought of his own selfish endeavours to hold power over others.

The lack of soft skills can be emphasised by the corruption and violence shown by Jack. He used the fun of hunting and the desire for meat as tokens for corrupting boys in order for them to break away from Ralph's world of rules. He used violence to stimulate his group to make them hunt and kill and to silence dissent. He had no qualms about stealing Piggy's glasses to make fire in order to wield control over the others. In other words, he showed what could happen if there is no accountability in a group and no regard for the well-being of others. Jack's style of leadership is evident in this extract of a conversation between Roger and Robert, who were part of his tribe:

"He's going to beat Wilfred."

'What for?'

Robert shook his head doubtfully.

'I don't know. He didn't say. He got angry and made us tie Wilfred up.

He's been'- he giggled excitedly- 'he's been tied for hours, waiting'

'But didn't the chief say why?'

'I never heard him.'" [52] (p. 229).

The island represents our society through various roles portrayed by the characters.

"Ralph symbolizes civilization and order. He shows the sophisticated side of man and holds the position of a democratic leader. Jack shows the power-hungry and savage end of society" [54] (p. 2).

So many behavioural issues and the consequences that arose were depicted in this novel. Hence, it was selected as a means to raise awareness of soft skills among engineering undergraduates and to let them understand how the lack or presence of soft skills like ethical leadership and interpersonal skills can have an impact on the members of a community and their way of life.

1.3. Vygotsky's Theory of Social Constructivism

This study is underpinned by Vygotsky's theory of social constructivism. Social constructivism is based on the notion that reality is socially constructed. This theory supports the subjective creation of meaning [55].

Constructivist learning theory argues that learners construct their own understanding of the world based on their existing knowledge and experience [56]. They arrive at this understanding by interpreting new information grounded on their current experience. Vygotsky's social constructivist learning theory focuses on the role of our social interactions with others while constructing knowledge and understanding [57]. This theory contends that learning is not a passive process; it occurs in social interactions with others.

Constructivism considers consensus between participants of social interaction as vital to judging knowledge. Truth or the reality of constructions is established when the different subjects agree on their interpretations [58]. The focus is not on the wrongness or rightness of performance but on the appreciation of thought process, interpretation and validity in terms of socially recognised and appropriate structures. The purpose of learning is to become cognisant of the realities of others and their relationship to one's own [59].

In social constructivist pedagogy, learners construct knowledge when they interact with others. Communication mediates the process of learning. Instead of aiming for favourable test results, knowledge is built by the negotiation of meaning and understanding in a social space [59].

Similarly, in this study, the theory of social constructivism was used to create learning experiences for the students. The aim was to help them recognise the importance of soft skills in the functioning of a congenial society by analysing the soft skills demonstrated by the characters of the novel.

This study allowed students to work individually and in groups to discuss important themes and characters of the novel, and the students were able to relate the findings of their analyses to their personal and social lives as engineers and responsible citizens. By working cooperatively in the achievement of tasks, they were able to help one another and apply the soft skills about which they were learning. While interpreting the novel and analysing the soft skills of different characters, they were able to negotiate meaning to answer the questions posed. They had the opportunity to present diverse ideas and to share their strengths with others. In this way, they were able to guide each other through the tasks. Without mutual understanding and effective teamwork, they would not have been able to complete the assigned tasks.

2. Materials and Methods

This research is based on a case study of 65 undergraduate engineering students studying at a South African university. Since the author teaches at the university, the sampling employed in the study is convenience sampling. The communication module class had 65 students who consented to participate in the study. The students came from diverse backgrounds and contexts, including international students.

Case study research is used to study a contemporary phenomenon in a real-life context. A case study is suitable when the purpose of the research is to answer “why” and “how” questions [60] (p. 1). A case is clearly defined by place and time, and the study of such a case involves an in-depth investigation of an individual, a small group, an occurrence, a situation, an organisation, or a social unit [61,62].

To study a phenomenon in detail, a case study depends on various data sources for evidence. Different forms of data could include interviews, documents, observations, surveys and more. Research questions determine the kind of data to be collected to answer those questions. Although case study research can be qualitative and quantitative, the types of questions it aims to answer are usually qualitative. Focus is usually on the exploration, explanation or description of a phenomenon.

A case study enables researchers to understand the selected unit comprehensively. In turn, this understanding can help in applying the principles and the lessons learnt to other cases. This means that even if a case study includes data from a single social unit, it can be used as an example for application in similar settings [55,60,62].

The current study aimed to highlight the importance of soft skills and explore the introduction of a novel to enhance the development of these skills among engineering students. Living and working in a multicultural and diverse context, it is important for today’s engineers to understand differences and to use them in beneficial ways. Thus, soft skills are essential for the personal and professional growth of engineering professionals. The engineering education curricula need to focus on the development of these skills. Lecturers of these students have to find ways to incorporate soft skills into their teaching. The current study presents one way in which it can be achieved by including humanities education in the curriculum. This has been achieved through the introduction of a novel

as a backdrop to stimulate critical thinking and contemplation of the role of soft skills in creating harmonious spaces.

A case study methodology was considered appropriate for this study. It enabled the researcher to focus in detail on a single class of undergraduate engineering students.

Several types of data were collected from these students to establish their grasp of soft skills. These data included tasks to discuss the novel, a questionnaire to evaluate the intervention and reflective interview questions to ponder over the application of these skills in their real lives. In addition, the students engaged in collaborative group work to complete their tasks. This served to help them exercise interpersonal skills in the attainment of their mutual goals.

Both qualitative and quantitative research methods were used to collect student data. Qualitative data included students' responses to questions about soft skills and reflective questions in the form of interviews, whereas quantitative data consisted of a questionnaire that the students completed to evaluate the intervention. A description of the process of the intervention is given in Figure 1.

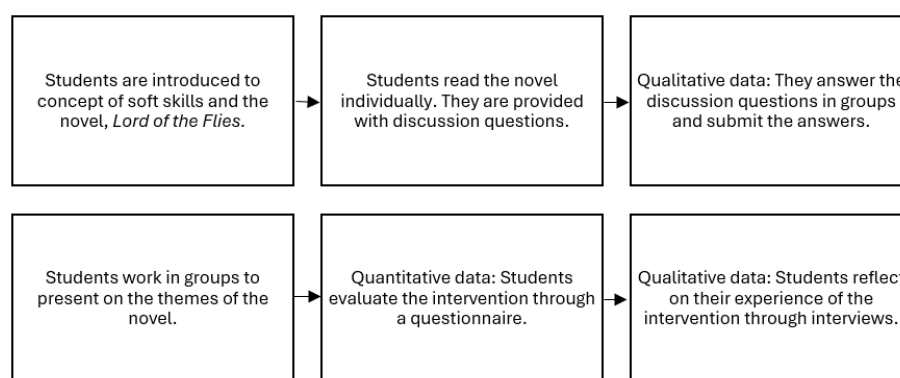


Figure 1. Description of the process of the intervention.

The aim of this study was to promote soft skills among engineering students. For this purpose, the students were introduced to the concept of soft skills needed for engineering professionals. They were divided into groups of five students each. First, they were asked to read the novel individually and were provided with questions based on the novel that they were required to answer in groups. It is important to note that the groups were formed alphabetically by the researcher so that the students would not necessarily only work with their friends. This would be similar to real-life interactions in their professions where they need to work with people who are not of their own choice.

The objective of working in groups was to encourage the development of the students' own soft skills while evaluating the soft skills of the different characters portrayed in the novel.

For qualitative data, they were asked to analyse the soft skills of the characters in the novel, specifically the two main characters, Ralph and Jack. They were further encouraged to reflect on how they would apply the knowledge of these skills in their own lives.

Thereafter, the students presented in groups on different themes of the novel, including diversity, leadership, teamwork, interpersonal skills, conflict management and bullying.

By working in groups or teams, they were able to practise teamwork, interpersonal communication, critical thinking, problem solving and decision-making skills.

Subsequently, the students were asked to complete a quantitative questionnaire. The questionnaire was meant to determine the effectiveness of the intervention in raising their awareness of soft skills. They were then requested to reflect on their experience and on whether they had learnt any lessons from engaging with the novel and from working

with one another in answering the novel-based questions and in preparing and giving the oral presentations.

The study data were collected after the institutional ethics committee had given the necessary approval. Informed consent from the participants was obtained in written form. Students' data were analysed by means of thematic content analysis.

The process followed for the study is indicated below:

- Sixty-five (65) undergraduate engineering students were divided into groups of five.
- Students read the novel individually;
- They answered analytical questions based on the soft skills of the characters in the novel (in groups);
- They reflected on how they would apply soft skills in their own lives (answered individually);
- They presented on the themes of the novel in groups;
- They were able to practise their own soft skills by working in groups to execute the tasks listed above;
- They reflected on the experience to evaluate the intervention (answered individually through a questionnaire and interviews).

3. Results

3.1. Qualitative Data

The students analysed the leadership and other soft skills of the two main characters in the novel. Examples of their responses are given in Tables 1–5:

Table 1. Leadership skills of Ralph and Jack.

Ralph	Jack
The boys on the island elect Ralph to be their leader. Therefore, he is their democratic leader. He leads the boys by example. He is concerned about all of them (Response 1).	Jack wants to be the leader of the boys. He thinks he is superior compared to other boys. He rules by force (Response 1).
He has a vision for them to be rescued. To achieve this [he] uses the strategy of lighting a signal fire to attract the attention of any passing ships (Response 2).	He is a dictator and does not include anyone in decision-making. He does not follow any rules. He has a short-term vision of hunting and enjoying on the island (Response 2).
He allows others to speak and share their ideas. He motivates others with the assurance of being rescued (Response 3).	He is not interested in building shelters to make their lives comfortable on the island or to keeping the signal fire going in order to be rescued (Response 3).
Ralph shows integrity through his moral values of being fair and by being disciplined (Response 4).	Jack does not show any moral values. He does not have any qualms about killing others to impose his power (Response 4).

Table 1 shows students' analysis of the leadership skills of Ralph and Jack. The students can identify the contrast between their personalities. While Ralph is the elected leader of the group through a democratic approach, Jack is dictatorial as he imposes his will on others. He considers that he ought to be the leader because he is superior to others. Democracy is a form of government where members of a community elect a leader to represent them, whereas dictatorship is an exercise of absolute power with little or no say from the members of a society.

Table 2. Communication skills of Ralph and Jack.

Ralph	Jack
Ralph not only asks the other boys to work towards common goals but also listens to their views (Response 1).	Jack delegates orders and is not willing to listen (Response 1).
He uses the conch to enable fair and equal say within the society, making it a democratic environment or society (Response 2).	There is no equality; he controls the group, thus making it a dictatorship as opposed to a democracy. He manipulates others to do his bidding by offering them meat (Response 2).

Table 3. Interpersonal and teamwork skills of Ralph and Jack.

Ralph	Jack
Ralph respects each of the members in the group including the little children (Response 1).	Jack does not maintain a relationship with any group members because he wants to be in power all the time (Response 1).
He is very considerate and sympathetic, especially when Piggy was insulted (Response 2).	He does not consider any other member, nor their opinions (Response 2).
He promotes teamwork to build shelters for themselves and to keep the signal fire going so that they can be rescued (Response 3).	There is no sense of team spirit for Jack. He is looking for blind followers (Response 3).

Table 4. Problem-solving skills of Ralph and Jack.

Ralph	Jack
Ralph is better at problem solving than Jack, especially with Piggy at his side. He respects others' views (Response 1).	He uses his intelligence to make decisions for his own benefit without consulting others (Response 1).
He is able to make fair decisions that are beneficial to all (Response 2).	He makes rash decisions without thinking of their consequences (Response 2).

Table 5. Responsibility and accountability shown by Ralph and Jack.

Ralph	Jack
Ralph shows responsibility towards all boys. He is courageous when he confronts the beast and is assertive by making rules to ensure order (Response 1).	Jack manipulates others and persuades them to forget rules and join him in his bloodthirst on the island (Response 1).
He motivates others and provides them with assurance of being rescued (Response 2).	He is very aggressive and does not want to follow any rules or help others. He is concerned about himself only (Response 2).

Table 2 presents the students' analysis of the difference between the communication skills of Ralph and Jack. The students seem to realise that effective communication requires one to be able to listen to others' views. However, if someone refuses to listen to others and just wants others to follow orders, they cannot be termed a good communicator. Ralph encourages others to share their opinion, while Jack wants others to do what he wants. He behaves unethically and wants to have his own way.

Table 3 presents the interpersonal and teamwork skills of Ralph and Jack. Ralph shows respect and care for all the boys and wants them to work together to be rescued or to live comfortably on the island. However, Jack wants the boys to join him in hunting and killing as a sport. Interpersonal skills are important for a team to succeed. Lack of empathy or consideration for others may result in conflict and a breakdown of trust.

Table 4 shows an analysis of the problem-solving skills of Ralph and Jack. Students can identify that Ralph's decisions are for the benefit of all boys on the island, whereas Jack makes decisions based on self-interest. While problem solving, it is important to consider multiple perspectives so that a suitable decision can be made. Thus, one needs to respect others while working in a team.

Table 5 shows a comparison of the responsibility and accountability displayed by Ralph and Jack in the novel. Ralph takes responsibility as the leader of the group very seriously. To protect the boys, especially the little ones, he is not afraid of confronting the beast. However, Jack does not show responsibility for contributing to the tasks assigned to him by Ralph. He and his "tribe" are ruthless and violent towards most of the boys on the island. Leadership is a position of responsibility. Effective leaders take responsibility, motivate others to work towards a vision and lead by example. Accountability is critical to building trust among team members.

3.2. Problem Solving and Decision-Making by the Boys

"The boys made a signal fire to address the problem of being stranded on the island after their plane crashed. They collected rotten wood, placed it in a heap and used Piggy's spectacles to light it up. However, they rushed to do it without first thinking it through. They did not consider the options available to them and the possible consequences of their decision" (Response 1).

"Instead of burning on small scale and producing smoke for an extended period, the fire grew larger, spread to a vast area and destroyed a huge part of the island including trees and food sources" (Response 2).

"After the fire had burned out, a little boy could not be seen anymore, probably burnt in the fire. Their impulsive decision did not solve any problem; instead it gave rise to more problems for them" (Response 3).

3.3. Conflict Between Ralph and Jack

"Ralph and Jack have a conflict around following the rules they set up to live harmoniously and be rescued. Ralph is frustrated about the minimal progress made towards the completion of shelters and because a ship passed when the signal fire had gone out. He confronts Jack and expresses his concerns" (Response 1).

"Jack is obsessed with hunting and disregards Ralph's worries. He also resents Ralph as the chosen leader of the group because he wanted to be the leader himself. This resulted in conflict between the two" (Response 2).

"Instead of quarrelling, they should have approached the situation calmly and discussed what their concerns were" (Response 3).

"Both were clinging to their own perspective and did not stop to listen to each other. Jack should have taken responsibility for not helping with the shelters and both could have explored alternative solutions instead of blaming one another" (Response 4).

3.4. *The Treatment of Piggy*

“Piggy was intelligent with many creative ideas but he was not appreciated” (Response 1).

“Jack treated Piggy differently because Piggy was different. He was different as he was overweight, he wore spectacles and he had asthma. He was also poor background compared to others. He used those differences to pick on Piggy” (Response 2).

“Jack and his like-minded boys despised Piggy from the beginning. Jack was violent and abusive towards him and frequently called him ‘Fatty’” (Response 3).

“The lesson for us is that we should not mistreat those who are different or vulnerable. Everyone is unique and should be respected” (Response 4).

3.5. *How Will I Apply Leadership and Other Soft Skills in My Life?*

(Students’ responses to the application of soft skills in their lives)

“I will try to lead like Ralph. I want to lead people with a clear vision and mission, and I want to have mutual relationship with all my team members even though we might not see eye to eye on some issues. I want to be an open leader so that others would not be scared to share their ideas and I would want them to contribute to decision making” (Response 1).

“The key is good communication. I would like to be able communicate what my vision is and discuss it with my peers in terms of how to achieve it by valuing their ideas as well. I will foster mutual respect where others’ ideas are welcomed.”

“I would begin with setting an example to show that I am not serious in words only” (Response 2).

“I will apply the leadership skills I have learnt from the novel. I will remember that good leaders do not think about themselves only but think about everyone’s benefit. I will try to lead by example and encourage others to also work hard to make our vision a reality. I will listen to and respect others. I will lead with humility and treat my team members equally and fairly and will not discriminate against any ‘Piggies’” (Response 3).

“I would like to become a leader that possess[es] the leadership qualities Ralph has. I believe we need each other in order to succeed in life, even if a contribution seems useless, it will have some impact in the long run and that’s why Ralph considers everyone’s opinion. Leading with integrity is one of the best traits. A leader is a leader even when their followers aren’t around.”

“If my group has a conflict, I will call everyone for a meeting and we will discuss our mutual concerns. I will not focus on people but the problem. If I start blaming someone, the conflict will only escalate. We will deal with problems responsibly and change the strategy if it does not work” (Response 4).

3.6. *Evaluation of the Intervention—Quantitative Data*

Students were also asked to complete a quantitative questionnaire. The aim of this activity was to evaluate the intervention.

Table 6 shows that, after the soft skills intervention, all the students of the experimental group came to know about soft skills. They became familiar with the concepts of leadership, effective communication and working in diverse teams. They believed that such interventions should be encouraged in an engineering curriculum.

Table 6. Students' responses after the soft skills intervention.

No.	Statement/Question	Disagree	Not Sure	Agree
Before the soft skills intervention				
1	I knew engineers needed soft skills.	84%	8%	8%
2	I was taught soft skills.	79%	13%	8%
After the soft skills intervention				
3	I have learnt what soft skills are.			100%
4	I have learnt to communicate better.			100%
5	I have learnt what a good leader should be like.			100%
6	I have learnt how to work in a diverse team.			99%
7	I have learnt how to manage conflict if I face one.		4%	96%
8	A novel cannot teach me what I need for my profession.	88%	8%	4%
9	I have found this intervention useful.			100%
10	Such interventions should be encouraged in engineering courses.			100%

3.7. Evaluation of the Intervention—Qualitative Data (Reflection on the Experience of the Intervention)

The students were also asked to reflect on the value of the experience of studying *Lord of the Flies* and collaborating in groups to complete the different tasks. Some of the responses obtained are given below:

“I thought the novel was about flies and would have no impact on my life whatsoever. However, I was able to learn soft skills like interpersonal relations, leadership and problem solving from the novel. I have learnt what kind of leader I would like to be in my life. I would like to be honest and humble like Ralph and lead with example” (Response 1).

“Truthfully, I didn’t know we would be able to learn anything useful about engineering from a novel. But I was able to learn about soft skills by interpreting how the boys behaved towards one another. We can find similar people and situations in our society. Not following rules and not caring for others can lead to disaster” (Response 2).

“Piggy influenced me the most because I could relate to his situation the most and was able to see how many people did not appreciate his ideas and his voice was not heard in their small community. Many ‘Piggies’ bring forth ideas that can help a community, but these ideas are seen as unimportant because rather than being fat, some ‘Piggies’ may be shy or just regarded as people who cannot bring anything beneficial to a community as with Piggy in the book. In my future, I would like to make sure that no one is undermined like he was” (Response 3).

“Working with others made our work easier and we were able to help one another in doing all the tasks. It was awkward at first working with people who are not my friends, but it helped me make new friends and now I ask for their help with my other modules also. I learnt what it means to be a good leader and what can happen if you don’t communicate well with the people around you” (Response 4).

4. Discussion

A case study methodology was used to conduct a detailed investigation of an intervention to enhance the development of soft skills in a real-life context. The study introduced a novel as a context to affirm the importance of soft skills in a diverse society. The participants of the research were undergraduate engineering students who were assigned several tasks, including reading, group discussions and oral presentations. Therefore, they were not only able to deliberate on the value of soft skills, but they were also able to practise them in their interactions with their peers. Data were collected in the form of both open-ended and close-ended questions. Case study methodology was useful in understanding different aspects of the intervention, and this understanding can be valuable while applying the findings to other contexts [62].

Social constructivism was used as a theoretical lens for this study. In social constructivist pedagogy, learning is considered to be a social process through which individuals are able to communicate their unique perspectives and negotiate understanding. Instead of involving learners only in pre-set summative assessments created to award marks, social spaces were designed for them to co-construct knowledge [59].

Students' responses show that they are able to understand the qualities of a good leader by analysing the leadership skills of Ralph and Jack. They recognise the importance of soft skills while working as a group. They realise that good leaders possess strong interpersonal skills and that they lead by example to achieve their vision. Their vision is not egocentric but for everyone's advantage. They are able to set aside short-term indulgences for long-term goals.

One can identify knowledge of leadership and other soft skills in the students' responses. It is also clear from their responses that the students understand that effective decision-making takes place when everyone can participate.

The students' responses show that communication between people can fail if they do not discuss their problems mutually in an open manner. They realise it is important to take responsibility for their actions and statements.

Carey [8] is of a similar view: that leadership is about addressing challenges bravely while gaining the trust of subordinates. People look up to the leaders for guidance and structure. Ralph possesses these skills. He is courageous and clear in his purpose. Leadership qualities are not necessarily innate and can be developed over time. Leaders who are able to make use of diverse ideas are better at solving problems [38].

The students also understand that interpersonal relationships are healthy when built with an open mind and a positive attitude. Communication is important to achieve success as a team [15,21]. Engineers have to present the complex technical details of their projects in a simple way while keeping their clients' perspectives in mind [11]. Communicating complicated technical solutions in a way that clients understand is becoming increasingly critical [3].

Managing engineering projects also means managing conflict because the engineering workplace of the 21st century is characterised by the presence of diverse cultures and personalities [18]. Unmanaged conflict can result in anxiety and aggression, leading to a breakdown in communication and interpersonal relationships. This could prove detrimental to the success of an engineering project. Hence, it is important for engineers to learn how to manage conflict while working with others.

One can observe that the students are applying their knowledge of teamwork and conflict management. In a professional environment where conflict is common, especially in a multicultural society, it is not right to think that good ideas cannot come from people with whom you do not get along. In addition, when making a decision, consensus is

considered to be a good option because then everyone can feel valued and not be afraid to contribute.

The quantitative data about the evaluation of the intervention show that the research project was successful not only in creating an appreciation of soft skills among the students but also in providing a setting for them to practise these soft skills.

Of the students who took part in the project, 84% did not know that engineers needed soft skills, and 79% disagreed that they had been taught soft skills in the past. All students agreed that, after the intervention, they came to know what soft skills were. They had learnt to communicate better and were also able to practise other soft skills such as teamwork and personal accountability. They had learnt about ethical leadership, problem solving and conflict management. They agreed that the soft skills intervention was useful and that literature can be helpful in learning about their profession. The study was able to answer the research question about whether a novel can be helpful in enhancing soft skills. All of the participants agreed that similar interventions should be encouraged in engineering curricula.

Students' qualitative data about the evaluation of the intervention revealed that some students had a negative attitude towards including literature in an engineering curriculum [35]. The common perception of humanities education is one of limited contribution to one's professional life.

However, this attitude of the students was transformed after they underwent the intervention. They came to know how members of a community depend on one another to realise their common goals and how the absence of soft skills can hinder the achievement of these goals. The students were able to understand that they need to value difference and utilise it to solve problems creatively. While answering the different novel-based questions and preparing and presenting oral presentations on the themes of the novel, the students were able to collaborate within their groups. By doing this, they were able to learn from each other. They had the opportunity to share their perspectives and to reach a consensus to complete their tasks. These tasks enriched their understanding of soft skills and their applicability in their personal and professional lives. This is in line with Vygotsky's theory of social constructivism [56], which posits the concept of learning through interactions.

The author acknowledges that the participating students might have had prior exposure to humanities or might have interpreted the novel differently. However, the students were in their first year of studying engineering and had not previously experienced humanities education in the context of engineering. The results show they found the intervention useful in enhancing their soft skills development.

Through studying the humanities, one is able to understand oneself and others at a deeper level [38]. The humanities encourage one to deal with moral aspects of one's life. One is made aware that understanding diverse perspectives in relationships is important. This knowledge leads to greater empathy and appreciation for others [2]. Being more cognisant of the thoughts of others can be useful in addressing complex situations at work and in one's personal life. Knowledge of other humans can help us to become better humans.

5. Conclusions

In the globalised workplace of the 21st century, engineering organisations require engineers with proficiency in both technical and soft skills [63]. Engineering graduates are expected to combine their engineering knowledge with the personal attributes of soft skills [3]. Engineering projects across the world are not carried out by single individuals in seclusion. These projects require the collaboration of a huge number of engineering professionals working in multidisciplinary teams, developing systems and structures for the

society of which they are a part [64]. A lack of soft skills could result in a lack of effectiveness and fewer growth opportunities. The current highly automated and technology-oriented environment calls for more focus on the personal development of future engineers. These professionals have to work with other humans in diverse societies. Therefore, the human aspect of their education cannot be ignored [1]. What is required is a renewed passion for humanities education so that engineering graduates will possess the qualities that will empower them to work congruously with others for the achievement of common goals and shared objectives.

The limited focus on soft skills education in engineering training institutions means their graduates are deficient in soft skills. Therefore, it is necessary for higher education institutions to include soft skills in their training programmes so that engineers can meet the demands of the labour market [65].

This study has provided one way in which we can explore the promotion of soft skills among engineering students. It successfully included literature in the form of the novel *Lord of the Flies* in their engineering communication module. This humanities intervention helped to raise the consciousness of soft skills among students as members of society. The majority of them confirmed that they had not been taught soft skills in the past. However, after receiving the intervention, students not only showed cognisance of soft skills, but they also realised the relevance thereof in their individual and professional lives. The current engineering workplace is predominantly characterised by people from diverse linguistic and cultural backgrounds. To succeed professionally and function harmoniously in a varied setting, interpersonal skills are critical. Similarly, the social constructivist experience enabled the students to work with others from different contexts and to learn from one another. They were able to appreciate diversity of opinion as a resource instead of it being an obstacle. It is anticipated that this knowledge will empower them to be better global citizens and engineers in the future. It is recommended that humanities education should be incorporated into the training of engineering graduates. Knowledge of technical aspects should be blended with complementary soft skills so that our engineering professionals will understand what it means to be human among other humans.

This study took place in a context characterised by diversity. The novel *Lord of the Flies* holds much relevance for this context as it addresses themes of diversity and interpersonal skills. Against the backdrop of globalisation, diversity in society is a reality. Engineering solves problems and serves people across the globe. Engineers are humans working with humans for humans. Engineering cannot be separated from the humanities. Innovative solutions to today's problems require multidisciplinary approaches. Further research can focus on greater collaboration between the humanities and engineering disciplines.

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