Research in Engineering Education Symposium-2024
Jan 4-6, 2024 - Hubballi, India

Expanding Horizons: The Transformative Influence of Interdisciplinary Education on Engineering Students

Sakethreddy Narsareddygari, Madhu Pathlavath, Nishanthreddy Samala , Santosh Madeva Naik
Hyderabad Institute of Technology and Management
sakethreddy2903@gmail.com

Abstract

Context

This paper aims to fill the knowledge gap by highlighting the specific advantages of Interdisciplinary engineering education. This approach improves engineering student abilities to communicate, collaborate, and solve problems by incorporating ideas and techniques from various fields. Interdisciplinary education involves crucial abilities like teamwork and good thinking power, which are vital for engineering projects, in addition to improving problem-solving abilities**.**

Purpose or Goal

Through this research we would like to give a clear insight on how, multidisciplinary education improves engineering student job opportunities by providing them with a diverse skill set. As a result, they have greater capabilities to handle a wider range of problems and significantly improve society through their job. Through their various skills and expertise, they have the capacity to improve society and explore a wider range of career possibilities

Methods

For engineering students, interdisciplinary education approaches include integrated education systems, team-based projects, chances for interdisciplinary research, and cross-disciplinary courses and workshops. Engineering students gain greatly from these methodologies because they broaden their perspectives, improve their ability to communicate and collaborate, encourage innovation and adaptability, address complex problems, provide a variety of career options, and encourage ethical and societal considerations. Engineering students gain a complete skill set that equips them for the multifaceted challenges of the modern world by integrating interdisciplinary approaches into their curriculum.

Outcomes

Future through this research we will examine particular strategies and approaches that maximise the advantages of this pedagogical approach in order to progress the subject of interdisciplinary education in engineering. Educators may continue to improve the learning process and outcomes for engineering students by developing a greater grasp of how to successfully utilise interdisciplinary learning.

Conclusion

In conclusion, interdisciplinary education has several benefits for engineering students. They become more well-rounded professionals with better problem-solving skills, creative thinking, and stronger interpersonal and collaboration skills as a result. Interdisciplinary approaches are included in engineering curricula to better prepare students for complex problems in the real world. This method of instruction provides individuals with the knowledge and abilities they need to succeed in their vocations and have a beneficial influence on society.

Keywords—Cross-disciplinary courses, multifaceted challenges.

I. INTRODUCTION

The state of engineering education has seen an important transition from an interdisciplinary perspective as a result of the constantly changing global environment. This change is motivated by the realisation that conventional, siloed educational models could not effectively prepare engineering students to handle the complexity of contemporary situations. The necessity for education that spans these barriers is critical as the distinctions between engineering and several other fields become more hazy. This essay explores the enormous impact interdisciplinary education has on engineering students, demonstrating how this strategy broadens their perspectives and develops their skills.

Long-standing associations exist between technical aptitude, subject-specific knowledge, and engineering education. The requirements of today's interconnected and complex world still call for a broader knowledge base that includes efficient communication, teamwork ability, and creative thinking. A knowledge gap caused by the difference between technical competence and the development of all aspects of one's skills has led to the investigation of interdisciplinary engineering education as a potential remedy. This pedagogical change aims to improve students' capacity to engage with many ideas, methodologies, and viewpoints from a range of fields in addition to helping them solve challenging engineering challenges.

This paper's main objective is to clarify the particular advantages of a multifaceted engineering education. This methodology enables engineering students to manage the complexity of contemporary situations with improved problem-solving skills by merging concepts and approaches from other fields. This shift is being driven by the incorporation of crucial abilities like cooperation and strong analytical thinking, both of which are essential for the efficient completion of engineering

https://doi.org/10.52202/073963-0005

projects. Additionally, interdisciplinary education's diverse character gives students a comprehensive skill set and promotes flexibility and creative thinking that go beyond traditional disciplinary boundaries.

The value of engineering graduates in the workplace goes beyond their technical proficiency. It is necessary to have the capacity for effective cross-disciplinary communication, fluid teamwork with experts from various backgrounds, and creative problem-solving. This essay aims to investigate if multidisciplinary education gives students a competitive edge, advancing them towards a wider range of employment choices and enabling them to have a greater impact on society. Engineering students can better prepare themselves to tackle a wider range of problems by embracing interdisciplinary approaches and making a significant contribution to society.

This study explores the approaches used to integrate interdisciplinary education into engineering courses in the parts that follow. Students are exposed to the transformative impact of multidisciplinary learning through integrated educational systems, teamwork assignments, chances for interdisciplinary research, cross-disciplinary courses, and workshops. This study tries to identify tactics that maximise the advantages of interdisciplinary education by looking at the concrete results of such an approach, furthering the conversation about this pedagogical revolution.

In the end, a new approach to engineering education is now necessary due to the interaction between engineering and several other disciplines. Interdisciplinary techniques open the door to a new generation of engineers—those who are not only technically proficient but also have the insight to tackle complex problems and have a positive impact on society. Interdisciplinary education integrates engineering curricula with the needs of the modern world by producing well-rounded professionals with better collaboration abilities, problem-solving skills, and creative thinking. Through the prism of this study, we set out on a journey to understand the true meaning of multidisciplinary education and its enormous ramifications for engineering students and society at large.

(Costa et al., 2019)The impact of an interdisciplinary project on students' skill development is the main topic of this paper's discussion of an engineering school project. The project aims to cognitively challenge students by removing disciplinary borders and fusing knowledge to address challenging issues. After the project was finished, two focus groups (n = 16) were used in a qualitative study to better understand how students felt about the project, the skills they thought they had learned from it, and its significance in general. The findings show that students understood the importance of the project for their learning and skill improvement. They were also able to pinpoint the precise skills that the project aimed to target and develop.

(Van Den Beemt et al., 2020)In this abstract, interdisciplinary engineering education (IEE) research from 2005 to 2016 is reviewed. IEE seeks to give engineering students the abilities to combine knowledge from several fields in order to address societal concerns. 99 empirical studies are analysed in the review, which highlights the difficulties in emphasising collaborative effort in pedagogy (teaching) and creating explicit learning objectives. It draws attention to the necessity of strong pedagogy and immersive team-based learning experiences to nurture interdisciplinary abilities (teaching), as well as the lack of knowledge of resources impeding the development of IEE programmes (support).

(Gero, 2017)In order to introduce undergraduate students to interdisciplinary education, the "Science and Engineering Education: Interdisciplinary Aspects" course was developed and is now being taught. Each student in the class is expected to instruct their other classmates in an interdisciplinary lesson. Participants included sixteen advanced-stage students, and attitudes towards transdisciplinary science and engineering teaching and learning were assessed using qualitative methodologies. Despite the difficulties of teaching interdisciplinary courses, the results indicate a marked rise in the proportion of students who would be willing to do so in the future as the course went on.

(Spelt et al., 2017)Specifically in the context of a master's course on food quality management, this abstract covers a study that sought to prepare scientific and engineering students for interdisciplinary interaction. The study uses Illeris' learning theory to analyse 615 student experiences in order to understand the cognitive, emotional, and social aspects of learning. The results show that students often (214 times), cognitively (194 times), and socially (207 times) communicated their experiences. The emotional, cognitive, and social obstacles of applying discipline knowledge to complicated problems, as well as interacting with peers to uncover shared thoughts and experiences, were among the key interdisciplinary learning experiences. It's noteworthy that students valued the cognitive dimension more highly than the emotional and social dimensions.

(Zeidmane & Cernajeva, 2011)In order to improve the competencies of aspiring engineers and their market competitiveness, this abstract emphasises the importance of using an interdisciplinary approach in engineering education. It emphasises the value of general competencies, such as computer literacy, fluency in a professional language, and suggestions from educational psychology. A unified e-learning environment is thought essential for improving information literacy abilities, while the integration of CLIL (Content and Language Integrated Learning) methodologies is advised to increase foreign language proficiency. The abstract also highlights the importance of academic staff in curriculum

https://doi.org/10.52202/073963-0005

design and promotes a harmony between theoretical understanding, real-world application, and the use of contemporary technologies. The Latvia University of Agriculture (LUA) and Riga Technical University (RTU) are two universities that use multidisciplinary methods as examples.

II. METHODOLOGY

A. Research Design

Type of Study: The mixed-methods technique used in this study combines the collecting of quantitative survey data with qualitative analysis. This strategy enables a thorough analysis of the influence of interdisciplinary education on engineering education.

Research Methodology: In order to investigate the relationships between multidisciplinary education and various outcomes within the framework of engineering education, this study employs an explanatory research technique.

B. Research Questions and Hypotheses:

Research Questions: This study addresses the following research questions:

1) How familiar are you with the concept of interdisciplinary education?
2) Have you participated in any interdisciplinary courses during your engineering education?
3) In your opinion, how does interdisciplinary education contribute to a well-rounded skillset?
4) How comfortable are you with collaborating with students from different disciplines?
5) Do you believe interdisciplinary education should be integrated into all engineering curricula?
6) How have interdisciplinary courses impacted your problem-solving approaches?
7) To what extent do interdisciplinary courses contribute to your overall academic experience?
8) In your opinion, should interdisciplinary education be integrated into professional development progsrams for engineers?
9) Would you recommend interdisciplinary education to future engineering students?
10) What challenges, if any, have you encountered while engaging in interdisciplinary coursework?

Hypotheses: Based on the literature that is currently available, we hypothesise that students who take part in multidisciplinary courses will perform better academically and have better problem-solving skills than those who do not.

C. Data Collection:

Data Sources: Through the use of Google Forms, data was gathered through a structured online survey. The selection of an online survey platform made it possible to gather data from a variety of engineering students effectively.

Sampling: Participants from diverse engineering courses were chosen using the random stratification technique to ensure representation across fields.

Participants: 50 engineering students from varied backgrounds, including undergraduate and graduate students, who represented different engineering specialties, received the survey.

D. Data Analysis:

Quantitative Analysis: To get a general sense of survey participants' perceptions, survey results were analysed using descriptive statistics, including means and standard deviations.

Qualitative Analysis: Following a comprehensive coding procedure, thematic content analysis was applied to open-ended survey replies. Using this method, we were able to systematically identify patterns and themes relating to student perception.

Data Validation: Inter-rater reliability tests were carried out for the qualitative data coding process in order to confirm the validity and reliability of our findings.

E. Interdisciplinary Education Metrics:

Multiple criteria, such as GPA improvement, course ratings, and self-reported skill development scores, were used to evaluate the impact of interdisciplinary education. This multifaceted strategy offers a comprehensive understanding of the effect.

F. Control Variables:

Participants' prior academic standing, course load, and demographics served as control factors. To account for the possibility of confounding factors and isolate the effect of interdisciplinary education, these variables were added.

G. Ethical Considerations:

All participants gave their informed consent after being informed of the study's objectives and the voluntariness of their participation. According to ethical research norms, which protected confidentiality and anonymity, data was gathered and preserved.

H. Data Presentation:

Quantitative data will be displayed using charts, while qualitative data will be displayed using thematic summaries. The results will be more understandable thanks to the verbal and graphic display.

I. Limitations:

Limitations include the possibility of response bias brought on by self-reporting and the fact that the study's scope was

https://doi.org/10.52202/073963-0005

restricted to one institution. There may be limitations on generalizability to different engineering education situations.

J. Data Interpretation:

The context of the study questions and hypotheses will be used to interpret data. To give a detailed knowledge of the influence of multidisciplinary education on engineering education, insights from both quantitative and qualitative data will be gathered.

K. Conclusion and Validation:

The methodology is created to be in line with the goals of the study, guaranteeing a thorough and robust approach to evaluating the influence of multidisciplinary education on engineering education. The study's validity is boosted by the use of mixed techniques, meticulous variable control, and ethical considerations.

The survey procedure includes examining how teachers and students perceive or have used interdisciplinary techniques, as well as determining the effects these methodologies may have on students' capacity for learning, critical-thinking abilities, problem-solving abilities, and other abilities. Basic information on the students, such as their name, the school they attend, their experience, and their area of specialization, were collected in the survey questionnaire.

We have asked the students to express their opinions through our questions, which include: Do they believe that interdisciplinary education can foster critical thinking skills among engineering students? How do interdisciplinary education methodologies contribute to increasing student participation? Do they agree that interdisciplinary techniques can prepare engineering students for the changing requirements of the industry? Interdisciplinary education approaches aim to give students a more thorough knowledge of scientific and technology ideas. All of these inquiries assisted us in analyzing their response.

III. RESULTS AND DISCUSSIONS

Let's examine the results of the analysis of each and every section of the questionnaire.

How familiar are you with the concept of interdisciplinary education?

This analysis provides a breakdown of respondents' familiarity with the concept of interdisciplinary education. The majority of respondents indicated that they are either "Somewhat familiar" (48%) or "Very familiar" (32%) with the concept. Only a smaller percentage mentioned being "Not very familiar" (12%), and "Not at all familiar" (8%).

These findings suggest that a significant portion of the respondents have at least some level of familiarity with interdisciplinary education, which may influence their perspectives on its impact on engineering education.

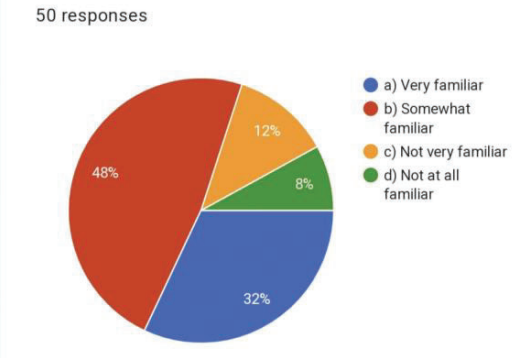

Fig. 1. Pie-chart describing familiarity of interdisciplinary learning.

Fig. 1 And Fig. 2 Describes about the familiarity about the interdisciplinary learning and to know better results initially we have asked the participants whether they are a part of any course or not.

Have you participated in any interdisciplinary courses during your engineering education?

This analysis presents the distribution of respondents' experiences with interdisciplinary courses during their engineering education. The majority of respondents have participated in interdisciplinary courses, with 38% indicating that they have done so frequently and 36% occasionally. A smaller portion (26%) reported that they have never participated in interdisciplinary courses during their engineering education.

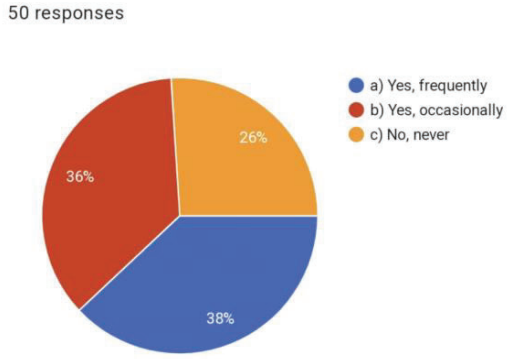

Fig. 2. Pie-chart describing about participating of any interdisciplinary education course.

In your opinion, how does interdisciplinary education contribute to a well-rounded skillset?

Interdisciplinary education is seen as a valuable contributor to a well-rounded skillset, with several key points of impact:

Broadened Perspective: A significant portion of respondents (32%) mentioned that interdisciplinary education provides a broader perspective. This suggests that exposure to multiple disciplines helps students develop a more comprehensive understanding of complex issues, which is crucial in engineering, where solutions often require considering various factors.

Proceedings of REES 2024 KLE Technological University, Hubli, India, Copyright © Sakethreddy Narsareddygari; Madhu Pathlavath, Nishanthreddy Samala and Santosh Madeva Naik, < Expanding Horizons: The Transformative Influence of Interdisciplinary Education on Engineering Students>

https://doi.org/10.52202/073963-0005

Enhanced Problem-Solving: An equally substantial percentage of respondents (32%) stated that interdisciplinary education enhances problem-solving abilities. This aligns with the expectation that tackling real-world engineering challenges often demands creative and multifaceted problem-solving approaches.

Fostered Creativity and Innovation: While a smaller percentage (14%) pointed out that interdisciplinary education fosters creativity and innovation, this aspect is still significant. Engineering students need to think creatively and innovate to address evolving technological and societal needs.

Improved Communication Skills: Another 14% of respondents mentioned that interdisciplinary education improves communication skills. This is particularly relevant since effective communication is crucial in interdisciplinary collaborations, allowing engineers to convey complex ideas to non-technical stakeholders.

No Noticeable Impact: A minority (8%) expressed that they did not notice any impact on their well-rounded skillset. This perspective highlights the need to ensure that interdisciplinary courses are designed effectively to achieve the desired outcomes.

Overall, these responses demonstrate that interdisciplinary education is generally seen as a valuable asset for engineering students, contributing to a well-rounded skillset by fostering a broader perspective, enhancing problem-solving abilities, nurturing creativity, and improving communication skills. These skills are essential for engineers to excel in their roles and adapt to the evolving demands of their field.

How comfortable are you with collaborating with students from different disciplines?

This analysis illustrates the distribution of respondents' comfort levels with collaborating with students from different disciplines. The majority of respondents either feel "Very comfortable" (34%) or "Somewhat comfortable" (30%) with interdisciplinary collaboration. A smaller percentage of respondents expressed "Neutral" feelings (20%). A minority reported feeling "Somewhat uncomfortable" (6%), while a similar percentage indicated being "Very uncomfortable" (10%) with interdisciplinary collaboration. Fig.3 describes the How at ease they are working with students from various academic fields.

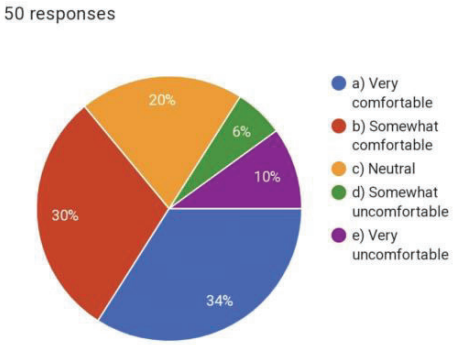

Fig. 3. Pie-chart describing about collaborating with students from different disciplines.

Do you believe interdisciplinary education should be integrated into all engineering curricula?

This analysis presents the distribution of respondents' opinions on whether interdisciplinary education should be integrated into all engineering curricula. A significant portion, 38%, believed that it should be integrated "Yes, definitely," while an additional 38% thought it should be integrated "Yes, to some extent." A smaller percentage of respondents (10%) felt that it should be optional, and 14% believed it is not necessary to integrate interdisciplinary education into all engineering curricula. Fig. 4 describes about the findings that interdisciplinary education should be part of the engineering curriculum or not.

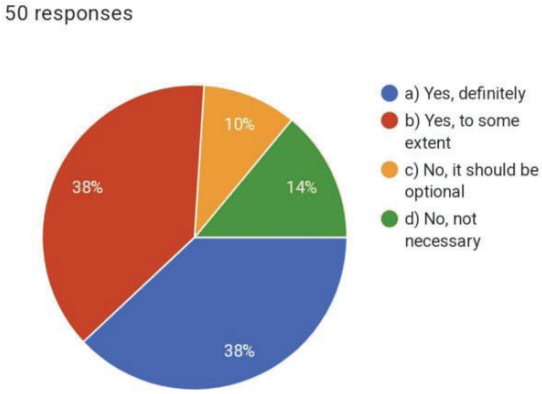

Fig. 4. Pie-chart describing about interdisciplinary education should be integrated into all engineering curricula.

How have interdisciplinary courses impacted your problem-solving approaches?

This analysis demonstrates the distribution of respondents' perceptions of how interdisciplinary courses have impacted their problem-solving approaches. The most common response was that interdisciplinary courses have helped identify multiple solutions to complex problems (42%). A significant portion of respondents also indicated that these courses encouraged thinking beyond traditional boundaries (36%). A smaller percentage reported no noticeable impact (10%), while 12% felt that interdisciplinary courses had hindered their problem-

https://doi.org/10.52202/073963-0005

solving abilities. Fig. 5 describes about the findings of interdisciplinary education impacted on problem solving approaches.

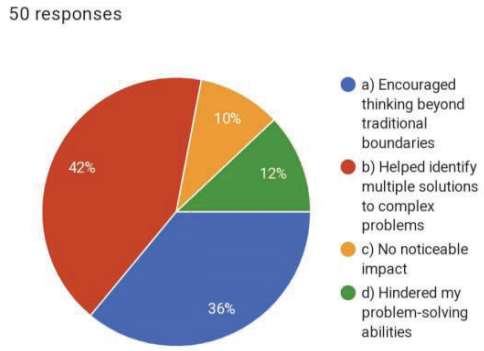

Fig. 5. Pie-chart describing about impact of problem-solving approaches

To what extent do interdisciplinary courses contribute to your overall academic experience?

This analysis presents the distribution of respondents' perceptions of the extent to which interdisciplinary courses contribute to their overall academic experience. The most common response was that interdisciplinary courses are considered a "Valuable addition to my education" (36%). A significant portion of respondents also considered them an "Essential part of my education" (34%). A smaller percentage expressed "Neutral impact" (12%), "Minor impact" (6%), or "Negligible impact" (12%) on their overall academic experience. Fig. 6 describes that about their experiences that interdisciplinary course contribute to their academics.

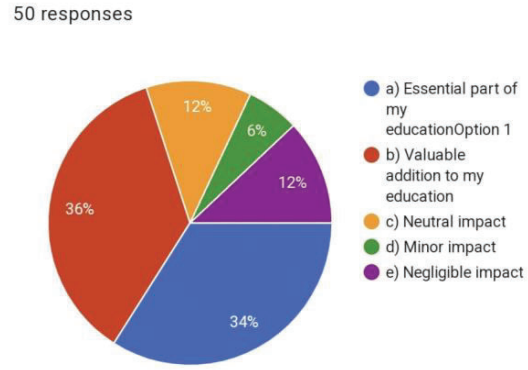

Fig. 6. Pie-chart describing about contribution of interdisciplinary course to overall academic experience.

In your opinion, should interdisciplinary education be integrated into professional development programs for engineers?

This analysis illustrates the distribution of respondents' opinions regarding the integration of interdisciplinary education into professional development programs for engineers. The majority, 54%, believed that interdisciplinary education should be integrated "Yes, definitely," while 34% thought it should be integrated "Yes, to some extent." A smaller percentage (12%) expressed that it is not necessary to integrate interdisciplinary education into professional development programs for engineers. Fig. 7 describes that interdisciplinary education be integrated into professional development programs or not.

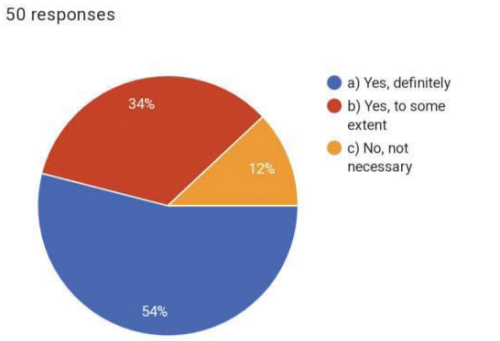

Fig. 7. Pie-chart describing about interdisciplinary education be integrated into professional development programs for engineers.

Would you recommend interdisciplinary education to future engineering students?

This analysis presents the distribution of respondents' recommendations regarding interdisciplinary education to future engineering students. The most common response was "Strongly recommend" (36%), followed by "Recommend" (36%). A smaller percentage expressed a "Neutral" stance (12%), while 6% "Do not recommend" and 10% "Strongly do not recommend" interdisciplinary education to future engineering student. Fig. 8 describes that they recommend interdisciplinary courses to future students or not.

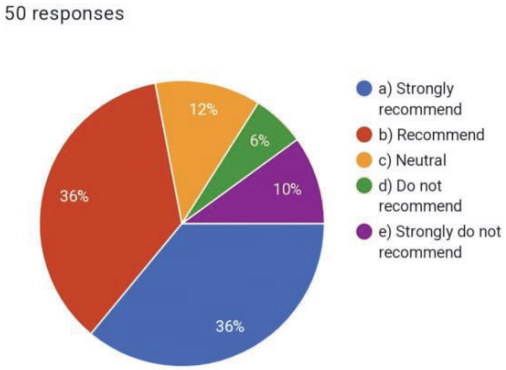

Fig. 8. Pie-chart describing about recommending interdisciplinary education to future engineering students.

What challenges, if any, have you encountered while engaging in interdisciplinary coursework?

1). Communication Issues: Many students mentioned difficulties in communicating effectively with peers from

https://doi.org/10.52202/073963-0005

different disciplines, including understanding technical jargon and terminology.

2). Differences in Academic Backgrounds: Respondents highlighted varying levels of knowledge and skills among interdisciplinary team members, making it challenging to align academic backgrounds.

3). Integration of Knowledge: Some students struggled with integrating knowledge from multiple fields, finding it challenging to bridge the gap between different subject areas.

4). Time Management: Time management emerged as a concern, especially when juggling coursework from different disciplines simultaneously.

5). Group Work Challenges: Collaborative projects were often cited as a source of challenges, with some students noting issues with teamwork, leadership, and coordination.

6). Assessment and Grading: Concerns about how interdisciplinary coursework was assessed and graded were mentioned, with students seeking clarity in evaluation criteria.

7). Lack of Clear Structure: A few respondents pointed out a lack of clear structure or guidance in interdisciplinary courses, which made it difficult to navigate the curriculum.

Interdisciplinary education plays a pivotal role in shaping the educational experiences of engineering students, as evidenced by the survey responses. First, the data reveals that a significant portion of the respondents have some familiarity with interdisciplinary education (32% "Very familiar" and 48% "Somewhat familiar"). This suggests that interdisciplinary education is not an entirely foreign concept to engineering students, and there is an existing level of awareness. Moreover, the majority of respondents have participated in interdisciplinary courses during their engineering education (38% "Yes, frequently" and 36% "Yes, occasionally"). This demonstrates that interdisciplinary education is already an integral part of their academic journey. Respondents strongly believe in the benefits of interdisciplinary education. A substantial proportion recommends its integration into all engineering curricula (38% "Yes, definitely" and 38% "Yes, to some extent"). This reflects a consensus among students that interdisciplinary education can enhance their skillsets and contribute to a more holistic academic experience.

Furthermore, when asked about the impact of interdisciplinary courses on their problem-solving approaches, respondents largely felt that these courses have been beneficial. The majority mentioned that interdisciplinary courses encouraged thinking beyond traditional boundaries (36%) and helped identify multiple solutions to complex problems (42%). This highlights the role of interdisciplinary education in fostering critical thinking and creativity. In terms of comfort levels with collaborating across disciplines, the data suggests that a significant portion of students (34% "Very comfortable" and 30% "Somewhat comfortable") are open to and comfortable with such collaboration. This indicates that interdisciplinary coursework may contribute to developing important collaborative skills among engineering students.

Overall, the findings from the survey indicate that interdisciplinary education has a positive impact on engineering education. It enhances problem-solving abilities, encourages creative thinking, and prepares students for collaborative work in diverse environments. As engineering fields increasingly intersect with other disciplines, these skills and experiences become increasingly valuable for the next generation of engineers. Therefore, integrating interdisciplinary education into engineering curricula and professional development programs can further enhance the well-roundedness and adaptability of future engineers.

IV. CONCLUSIONS

Our survey, encompassing 50 engineering students from diverse backgrounds, aimed to explore the impact of interdisciplinary coursework on skill development. While our findings align with previous studies highlighting the benefits of interdisciplinary education in broadening perspectives and enhancing problem-solving skills (Costa et al., 2019; Van Den Beemt et al., 2020), our research delves deeper into the practical implications for engineering education. By uncovering students' perceptions of interdisciplinary coursework and their comfort levels in cross-disciplinary collaborations, our study provides empirical evidence that supplements existing theoretical frameworks. Moreover, while existing literature underscores the importance of interdisciplinary approaches, our results showcase nuanced insights into specific challenges faced by students, shedding light on potential areas for pedagogical enhancement. Incorporating demographic data, such as academic year, engineering specializations, and age range of the surveyed students, would further enrich the depth of our analysis, enhancing the contextual understanding of our findings

REFERENCES

Costa, A. R., Ferreira, M., Barata, A., Viterbo, C., Rodrigues, J. S., & Magalhães, J. (2019). Impact of interdisciplinary learning on the development of engineering students' skills. *European Journal of Engineering Education*, *44*(4), 589–601. https://doi.org/10.1080/03043797.2018.1523135

Gero, A. (2017). Students' attitudes towards interdisciplinary education: A course on interdisciplinary aspects of science and engineering education. *European Journal of Engineering Education*, *42*(3), 260–270. https://doi.org/10.1080/03043797.2016.1158789

Spelt, E. J. H., Luning, P. A., Van Boekel, M. A. J. S., & Mulder, M. (2017). A multidimensional approach to examine student interdisciplinary learning in science and engineering in higher education. *European Journal of Engineering Education*, *42*(6), 761–774. https://doi.org/10.1080/03043797.2016.1224228

Van Den Beemt, A., MacLeod, M., Van Der Veen, J., Van De Ven, A., Van Baalen, S., Klaassen, R., & Boon, M. (2020). Interdisciplinary engineering education: A review of vision, teaching, and support. *Journal of Engineering Education*, *109*(3), 508–555. https://doi.org/10.1002/jee.20347

Zeidmane, A., & Cernajeva, S. (2011). Interdisciplinary approach in engineering education. *2011 IEEE Global Engineering Education Conference (EDUCON)*, 1096–1101. https://doi.org/10.1109/EDUCON.2011.5773284

Proceedings of REES 2024 KLE Technological University, Hubli, India, Copyright © Sakethreddy Narsareddygari; Madhu Pathlavath, Nishanthreddy Samala and Santosh Madeva Naik, < Expanding Horizons: The Transformative Influence of Interdisciplinary Education on Engineering Students>

https://doi.org/10.52202/073963-0005