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Crafting a Framework for Engineering Education Aligned with NEP-2020 Goals in the Context of Industry 5.0

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Abstract*—In the past two decades, our society has experienced significant technological advancements in software and hardware, leading to a phenomenon known as digital transformation. This convergence of information, communication, and artificial intelligence has brought about profound changes. Furthermore, the emergence of Industry 5.0, the fifth industrial revolution, goes beyond conventional profit-driven production by integrating various concepts. This necessitates a shift in the mindset and behavior of all stakeholders. While discussions on implementing intelligent systems in Industry 4.0, the fourth industrial revolution, persist, the distinctive characteristics of Industry 5.0 demand a comprehensive reassessment. This convergence has blurred the traditional boundaries between disciplines, prompting a thorough examination of the future of engineering education. This article offers a concise review of engineering education and explores recent paradigm shifts. These shifts highlight the importance of prioritizing skills over degrees to address the challenges posed by the trends of the fifth industrial revolution. In the present scenario, acquiring skills becomes crucial in meeting the demands of the evolving industrial landscape. Therefore, transformation in engineering education holds paramount importance for inculcating skills in learners. With a strong emphasis on enhancing quality and fostering the comprehensive growth of students, advancements in engineering education and research are unfolding on a global scale. The review introduces a set of strategies, and a comprehensive frame-work intended to improve engineering education. The implementation of these strategies is anticipated to enable engineering education to line up with the needs of Industry 5.0, safeguarding that students are sufficiently trained to be absorbed in the industry. In the review's discussion section, potential advantages for students, educators, and hiring managers are explained. Preceding to concluding the review, the section also lists the challenges confronted by engineering education while endeavoring to integrate industry requirements into their curriculum.

***Keywords*—Education, Engineering Education, Industry 5.0, literature review.**

I. INTRODUCTION

Engineering education has a significant role in societal development and steering technological advancements. Engineering education has evolved over the centuries, with its roots traced back to ancient civilizations. Nonetheless, the engineering education system prevalent in today's era started to take shape in the Industrial Revolution in the 18th and 19th centuries.

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There was a growing need for skilled professionals with the expansion of industries to design, build, and maintain complex machinery and infrastructure. Engineering education fosters technological advancements and provides learners with the expertise and skills needed to innovate, design, and develop new technologies and solutions for diverse sectors such as transportation, energy, telecommunications, healthcare, manufacturing, and environmental sustainability. In addition, engineering education facilitates economic development by driving innovation and creating job opportunities. This leads to better productivity, efficiency, and competitiveness in various domains, directing economic growth and prosperity.

In the last two decades, intense technological changes have supported new disruptive advances, both in the software and hardware areas. A blend of information, communication, and artificial intelligence (AI) is taking place, as well as the cross-fertilization of a wide range of concepts is leading to digital transformation. To thrive in an ever more competitive and global market of Industry 5.0, enterprises need graduates who have the competencies to navigate the dynamic changes they face. Engineering school graduates must exhibit the competence to flawlessly transition from technology to solutions and from solutions to operational implementation. Meeting these demands necessitates a diverse skill set that extends beyond technical expertise. Industry 4.0 (Chen, 2017; Xu et al., 2018) is generally understood as the amalgamation of the Internet and emerging technologies that fundamentally transform industrial production, Industry 5.0 (Romero et al., 2016) builds upon this concept by emphasizing research and innovation as means to enable the change towards a sustainable, human-centric, and resilient industry that requires engineering graduates having cross-disciplinary education and research to address the challenges posed by the "megatrends" of the industrial revolution. The present review on "Engineering Education and Industry 5.0" serves the purpose of understanding the principles and impact of Industry 5.0 on engineering education, bridging the gap between academia and industry, addressing challenges and opportunities, and aligning educational objectives with the needs of the future workforce and society at large. The Government of India promoted significant changes to the country's educational system in the National Education Policy 2020. It gave special attention to the development of interdisciplinary engineering programs with a range of graduation alternatives. This study recommends that engineering programs adopt an inclusive curriculum that includes a variety of course types from many academic fields. This study suggests the implementation of an inclusive curriculum for undergraduate engineering programs, encompassing diverse skills from multiple disciplines. It articulates how this framework is pertinent for nurturing holistic development among students.

The present study is structured as: Section 2 briefs about the background for the study, section 3 presents an overview of education and industry jobs in this century. Later section 4 discusses the impact of the Fifth Industrial Revolution and provides insights on variations essential for existing skills and the new skills required. Section 5 presents the required future strategies followed by challenges in section 6. Section 7 concludes the study.

II. Background

The revision of the educational approach for engineering graduates has long been known to both academia and industry and it dates to early 1918 by U.S. Engineering education (Mann, 1918). Prof. Mann emphasized the inconsistent focus in engineering education on sciences and mathematics, often sidelining social sciences, design, and practical aspects—an observation that maintains relevance even in contemporary times.

Another historical study (Seely, 1999) explores the state of engineering education in the late 19th century and emphasizes the significant influence of European-born and trained engineers like Harald Westergaard, Theodore von Karmán, and Stephen Timoshenko. It highlights how these "European Ecole" engineers helped pave the way for later changes to engineering courses. A more recent study (Froyd et al., 2012), conducted in honor of IEEE's (Institute of Electrical and Electronics Engineers) 100th anniversary, offers in-depth information. The following report lists important changes in engineering education during the last century:

- a shift in emphasis from a practical, hands-on approach to one that emphasizes engineering sci-ence and rigorous analysis.
- a focus on accreditation and education with an outcome-based approach.
- curriculum with a concentration on engineering design.
- the incorporation of educational research

A. Evaluation of Current Engineering Education Practices and identification of strengths and weaknesses

In the present scenario, despite rapid advancements in the world, the state of education continues to have the same patterns for teaching and learning. When a university or college is mentioned, the image that flashes in everyone's mind is a brick-and-mortar classroom where a faculty member is delivering a lecture, and students are listening. However, the youth of today are tech-savvy and are well acquainted with video games, computers, cell phones, and diverse gadgets of today's era (Prensky, 2001). Thus, they can easily access knowledge using these gadgets and enhance their learning. Various online learning repositories are available to learners with few clicks and are great facilitators in the learning process, for instance, learners have access to Massive open online courses (MOOCs) and Open Educational Resources (OERs). Much has been spoken about the evolving pedagogies that include think-pair and share, question formulation techniques, flipped classrooms, etc. that ensure better learner engagement and time utilization. The studies in the literature (McCaig et al., 2007) have emphasized the significance of technological progress and asynchronous learning as an addendum to existing programs to offer more learning options to committed, mature, and motivated learners. This in turn will reduce the program completion time thus making existing programs available to more learners and improving the economy as learners participate in the job market at a young age. Miranda et al. (2021) propose competencies, learning methods, information and communication technologies, and infrastructure as core components for the design of new projects and have also ap-plied in three case studies (Miranda et al., 2021). M.A. Qureshi et. al. have clearly stated the need for alignment of education with the industry's needs. The roadmap also stresses the significance of integrating developing technologies such as artificial intelligence, robotics, and virtual reality into the curriculum. The authors mention that by following the roadmap universities can produce job-ready engineers who can adapt to the dynamic technological landscape and contribute to the development of society (M. A. Qureshi, 2021).

B. Industry Expectations and Requirements from Engineering Graduates

The rapidly evolving and technologically advanced industrial landscape requires engineering graduates to exhibit a diverse range of skills, a strong technical foundation, and more aligned to customized goals and requirements.

- Technical Competence: Technical knowledge about the theories and principles of engineering has always been considered critical for engineering graduates. The graduates are expected to practi-cally implement the fundamental concepts of engineering to real-world applications (Gafney & Varma-Nelson, 2008).
- Interdisciplinary Proficiency: Engineers who can incorporate knowledge of diverse domains and can work congenially in interdisciplinary teams to design innovative solutions are valued more in the industry (Pereira Pessôa & Jauregui Becker, 2020).
- Problem-solving and critical thinking are among the most sought-after abilities in engineering graduates that enable them to design optimized solutions for complex problems employing strong analytical skills (Hernandez-de-Menendez et al., 2020).
- Communication skills: Graduates with effective communication and interpersonal skills can con-vey technical concepts to stakeholders (technical and non-technical) (Ingre & Basil, 2016).
- Lifelong Learning and Adaptability: Graduates have adaptability for novel technologies and continuous learning is always sought after as they can cope with the evolving engineering landscape (Martínez-Mediano & Lord, 2012).
- Leadership and Teamwork: The ability to manage projects and teams is highly desirable as the industry needs personnel who can be team leaders and collaborate efficiently (Schuhmann, 2010).
- Ethical and Social Responsibility: Engineering graduates are required to advocate ethical standards and realize the comprehensive societal effects of their jobs. Familiarity with safety policies, environmental concerns, and ethical concerns is critical (Davis, 2018).
- Global Perspective: Engineering graduates should be able to comprehend global market trends as various industries operate globally.
- Innovation and Entrepreneurship: Engineering graduates should have the ability to contribute to entrepreneurship and new product development. Also, one must be able to develop innovative solutions from concepts or ideas (Andalibi, 2019).
- Digital Literacy and Data Analytics: The digital era insists on the adaptation of digital technologies, data analysis, and interpretation. Competence in programming languages, data manipulation, and utilizing data for decision-making is increasingly important (Krauss & Prottsman, 2016).

The industry-relevant attributes of the engineering graduates mentioned here are not derived from anecdotal observations, these are also favored by the studies in literature. Johnson et. al. (2007), the report by the National Academy of Engineering have mentioned teamwork, communication, problem-solving, lifelong learning, ethics, social responsibility, and innovative thinking in engineering education to be required skills (Engineering, 2005; Johnson et al., 2007). Thus, present-day engineering graduates should have a comprehensive skill set that extends beyond technical expertise.

C. Strategies for incorporating industry-relevant content and skills in the curriculum aligned with NEP 2020

In industry replica concept implementation, it is intended that the diverse aspects of 'teaching' and 'learning' are aligned with real-world settings. This includes curriculum design, course content development, laboratory planning and management, pedagogies, and learning approach selection to emulate real environments. Employing the industry replica concept facilitates creating an educational environment where learners are exposed to real-world settings. This simply does not result in knowledge acquisition but also enables learners to apply knowledge to provide solutions to practical engineering problems. The aim is to have engineers who along with contemporary technical knowledge also possess the practical skills that are required for effective functioning in the industry surpassing topographical barriers and teaming up across the different professional realms (Engineer, 2012). This approach represents a comprehensive engineering education model that facilitates a seamless transition from university to industry. In engineering education, a thin line exists between the balance of theoretical concepts and practical application. Traditionally, practical aspects were emphasized more when compared to theoretical concepts. However, a gradual shift showed more emphasis on theory than practice. Therefore, rebalancing is required to rebuild the focus on the right essence of engineering, which includes systematic approaches, practical application, and more. The strategies for incorporating industry-relevant concepts include:

- Systematic Engineering learning: The focus must be on comprehensive domain knowledge associations to create linkages among the different courses in the curriculum. The fundamentals of Engineering must be introduced at initiation to support students in understanding the program scope and foster their identity as engineers.
- Engineering Hands-on-Experience: Hands-on exposure is an integral component of active learning in a university course. In the words of Benjamin Franklin: "Tell me and I forget. Teach me and I remember. Involve me and I learn. "Project-based learning fosters simulating real-world scenarios and enhances problem-solving abilities and interpersonal skills such as communication, planning, teamwork leadership, and organization.
- Customized Teaching: The teaching approach must follow a shift from teacher-centered to student-centered pedagogy. This facilitates active learning over passive learning, acknowledging the value of maintaining equilibrium between knowledge distribution with skill advancement.

Thus, the industry-replica approach intends to overcome the academia-industry gap by incorporating practical aspects. The students are exposed to industry-like scenarios while pursuing graduation, this imparts technical knowledge with practical skills that are required as engineers in the dynamic contemporary land-scape.

III. Framework and Recommendations for Improving Engineering Education

As shown in Figure 1 the framework from bottom to top can be explained as:

- Infrastructure: the fundamental setting or foundation of the model, which aids in broadening students' global perspective.
- Methodology: the underlying components or pillars that make the model possible.
- Philosophy: The model's core principles or precepts.
- Strategy: a "middle-of-the-road" philosophy that strikes a balance between theory and practice.
- Objective: The emphasis of the curriculum structure is on the linkages between theory and application to build a comprehensive practical teaching system and the connections between different courses and modules to help students build comprehensive knowledge networks.

A thorough discussion of the methods used to get engineering graduates ready for the workforce right away is given in the methodology section.

A. Experiential Learning Integration

When utilized in conjunction with an industry-replica strategy, project-based learning (PBL) is crucial to the overall educational process. Project-Based Learning (PBL) is comparable to PEL in contrast to Project-Enhanced Learning (PEL), which is seamlessly integrated into regular classroom instruction to aid students in understanding complex concepts and theories. These assignments can be collaborative or individual and frequently provide students with a lot of creative attitudes. A PBL approach known as Project as Instruction (PAI) involves carefully defining and structuring the project's parameters to make it resemble a serious homework assignment. Students are required to complete their PAI projects on their own time outside of regular class periods. These educational initiatives provide students with a platform to develop their talents and cross-academic fields by investigating and solving real-world challenges. In addition to Project-Based Learning (PBL), internships and co-op programs offer additional opportunities for experiential learning, enhancing the engineering educational experience and supporting NEP 2020's guiding principles.

B. Sustainable and human-centric design-based Education.

Throughout history, the introduction of novel technology and systems has frequently resulted in unanticipated side effects and rebound effects. As they actively participate in the current development known as the fifth industrial revolution, the engineers of the next generation must have a thorough awareness of these unanticipated results and their implications for sustainability and resilience.

As stated by Dignum (Dignum, 2020), knowing and controlling how AI will affect society goes beyond simply understanding its technical complexity. Data ethics, faith in technology, automation, and data itself are all tightly intertwined, and this nexus, when paired with other technical developments, has the potential to spark significant societal changes. Consequently, current educational programs must integrate factors relating to these systems' ethics and society. Students must also be exposed to the necessary techniques and procedures for creating human-centric cyber-physical systems.

C. Industrial best-practices-based labs and management courses.

Effective laboratory design should reflect an organization's best practices and support the growth of students' real-world problem-solving abilities. It must include:

- Select Industry-Relevant Facilities
- Prioritize Real-world Devices
- Focus on System Integration rather than confining it to a single technology.
- Leverage Cutting-Edge Software
- To acquire access to cutting-edge technologies and insightful market knowledge and establish part-nerships or joint laboratories with top-tier businesses.
- Ensure that venues with enough space are accessible for project-based learning and innovation ac-tivities.
- Periodically evaluate and improve the university's hardware and software tools to conform with in-dustry best practices to the greatest degree practicable given the diverse industrial landscape.

Learner-centric System: An integrated approach should be used for the comprehensive practical teaching system, which should cover levels from freshman to seniors. It covers everything from basic laboratory exercises to sophisticated open experiments, flowing naturally from laboratory settings to real-world ap-plications and from basic principles to sophisticated ones. This technique is intended to gradually improve students' practical skills.

Computer/Robot/Human-agent-based interactions: The success of engineering education in the era of Industry 5.0 depends on the idea of "mutual learning" between intelligent machines and people. Mutual learning is a two-way process that involves reciprocal trade, interdependence, actions, or influence within collaborative efforts between humans and robots (Ansari et al., 2018). Through this collaborative process, new meanings or concepts are created, current knowledge is enriched, and both parties' skills and abilities are improved. People need to have expertise in this type of learning if we are to properly prepare the work-force of the future. They must be able to recognize and understand when a task calls for only human work, only machine engagement, or a collaborative effort between the two. Future engineers will design these collaborative work processes as well.

Industry-Academia Collaboration: Fostering strong ties with industry is crucial in the Industry-replica model. For the engineering discipline to remain technically relevant in its continual state of change, these industry ties are essential. Therefore, under our paradigm, the importance of university-industry collabora-tion cannot be emphasized. All parties involved in this cooperative partnership—the university, the indus-try, and the students—gain significant advantages from it. These crucial alliances are promoted through several well-established channels, such as:

- Scholarships for educators and students
- Possibilities for bachelor's students to gain internships and practical experience.
- Industry experts give lectures to students to provide them with viewpoints and real-world experiences.
- Meetings of the Industry Advisory Board to enable a deeper comprehension of the needs and priorities of the industry.
- Student projects funded by industry offer genuine difficulties that let students use their knowledge in real-world situations.
- Joint Research Initiatives encourage innovation and information sharing between academia and industry.
- Cutting-edge technology Training by Industry professionals improves their technical aptitude.

Prompt Engineering: Prompt engineering, both in academia and industry, is overwhelming and significant. It incorporates the agile and efficient approach to addressing challenges, innovating solutions, and adapting to the rapid pace of technological advancements. Prompt engineering education trains students with the latest knowledge and skills that are in demand in the industry. This guarantees that graduates are ready to instantly contribute to real-world projects upon entering the workforce. Also, adapting academic curricula to incorporate prompt engineering principles keeps educational programs aligned with emerging trends and technologies. This ensures that students remain engaged and motivated by relevant content and learn to tackle complex challenges systematically enhancing their critical thinking and analytical skills. The students equipped with prompt engineering skills can contribute to the industry by providing short development cycles and releasing products sooner.

Continuous Assessment and Feedback: There are numerous crucial aspects involved in establishing a strong system for continuous assessment with an emphasis on encouraging consistent feedback loops. The first requirement is the precise formulation of the learning objectives and competencies to be evaluated, ensuring that they are directly related to the stated objectives of the course or program. To achieve the goals mentioned in NEP 2020, it is essential to diversify assessment techniques, including exams, projects, presentations, and peer assessments. To increase student involvement and promote reflective learning, it is essential to incorporate a variety of assessment methods, including formative, summative, self-, and peer assessments. Additionally, a methodical procedure for the routine examination of assessment results should be devised, allowing curricular modifications based on the priceless feedback gathered. Leveraging technology as a supportive tool for the assessment process is also vital, requiring the exploration of suita-ble technology platforms for efficient online assessments and streamlined data collection.

IV. Discussion

Benefits for hiring managers: A review paper on engineering education and Industry 5.0 can offer sub-stantial benefits to hiring managers in industries that are rapidly evolving and becoming more technology-driven. The comprehensive review provides insights to the managers on the necessary skills needed by engineering graduates to thrive in the industry 5.0 workplaces and advanced technologies. In addition, the review sheds light on the overview of recent developments and challenges in academia and its alignment with Industry 5.0. In addition, the managers can Identify Skill Gaps in technical and soft skills (communi-cation, collaboration, and problem-solving) by investigating current educational practices and Industry 5.0 demands. This facilitates hiring criteria customization, conducting training programs, and introducing dif-ferent initiatives for professional development to bridge the identified gaps. A well-explored review paper can assess the alignment of engineering curriculum and Industry 5.0 demands. Hiring managers can evalu-ate the need for curriculum content refinement with educational institutions to make sure that the engi-neering graduates are industry-ready. The review paper can help in the analysis of the talent pool by which hiring managers can know about the quality of graduates entering the job market. Also, using the review study, managers can compare engineering practices in different educational settings and regions to evaluate the strengths and weaknesses of candidates from different educational experiences. To identify the candidates who can participate and contribute to diverse team requirements, the hiring managers can gain comprehension from the review paper about the role of engineering education in fostering diversity and inclusion. The well-structured review can help hiring managers comprehend the evolving landscape of engineering education and recognize the expertise that is required in the workforce in the long term to plan their hiring strategies and workforce development initiatives. The hiring managers, when integrating in-sights from a thorough review can utilize it for better candidate selection, decreased onboarding time, and a more pliable workforce that's well-resourced to excel in the era of Industry 5.0.

Benefits for students: Engineering aspirants or students reading the review can get insights into the evolv-ing technological landscape. They come to know about the developments and challenges in engineering education and Industry 5.0 to align their education and develop competencies as per the requirements of the prospective job market. In addition, the students are also facilitated when making choices for courses, specializations, and projects in their academic journey. The review comprehensively presents the skillsets required for Industry 5.0 thus drawing the conclusions they can more strategically plan their career paths and decide about the research prospects, internships, and co-curricular activities that support their career paths. The competencies listed here in the review as problem-solving, teamwork, adaptability, and inter-disciplinary collaborations are greatly required by Industry 5.0 employers. This awareness encourages them to proactively develop these skills and enhance their learning trajectories. To develop and advance the skillset it is vital to make the right choices about online courses, workshops, and seminars to be attend-ed and the review thus assists in informed professional development to enhance the expertise. Industry 5.0 involves a global perspective due to technological advancements and interconnectedness. Students can learn about the importance of cultural sensitivity and crosscultural communication skills, enhancing their readiness for international roles. The review emphasizes the dynamic and unpredictable needs of Industry 5.0 and hence promotes that students must adopt an approach of continuous learning to cope with the technological advancements throughout their careers. Hence, the review enables the students to customize their education and career planning to shine in the dynamic and technology-driven environments of Indus-try 5.0.

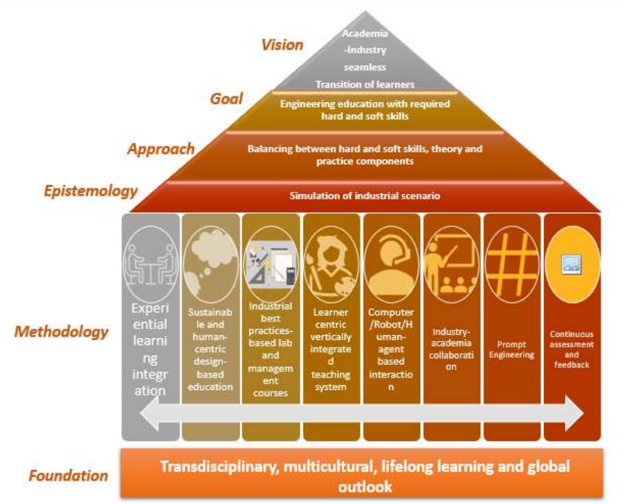

Fig. 1. Framework for Engineering Education

A. Challenges faced in aligning engineering education with industry needs.

The challenges in aligning engineering education with industry demands have been an argument bub-bling in the community for more than a decade. These challenges influence the program's effectiveness in preparing undergraduates to cater to the needs of the rapidly changing industry. Rugarcia et al. (Rugarcia et al., 2021) have mentioned the challenges faced by engineers at the beginning of the century as 1) the proliferation of information; 2) the need for multidisciplinary. For technological development; 3) the globalization of markets; 4) the endangered environment; 5) the emergence of social responsibility; 6) the need to participate in corporate cultures and 7) the need for rapid change in educational adaptation. In addition, the ways by which critical skills can be taught and learned are also discussed (Felder et al., 2021). A report from UNESCO emphasizes the role of engineers in society and education in training young engineers. The report also highlights the impacts of cuts in funds because of the economic crisis (Wall, 2010). The challenges faced in aligning engineering education with industry needs include: Industry 5.0 has an evolving landscape and diverse enabling technologies (Maddikunta et al., 2022) and methodologies. The engineering curriculum struggles to keep up with these rapid changes, resulting in a gap between what is taught in classrooms and what is relevant in the workplace. Traditional engineering courses emphasized theoretical concepts more than real-world applications and practical abilities. Hence, the graduates might not have the practical experience and problem-solving skills required in contemporary workplaces. The industry needs both specialized knowledge and broad-based talents. In curricula, it can be difficult to strike the ideal balance between specialization and generality. As technology advances, a different facet of social and ethical issues becomes increasingly important. Including ethical considerations, environmental difficulties, and societal repercussions in technical programs may be challenging. In addition, Industry 5.0 demands inter-disciplinary collaboration, yet many engineering programs still take a siloed approach to teaching. Due to the diverse teaching styles, terminologies, and cultural differences, integrating several disciplines can be difficult.

Another challenging situation is when the traditional academic structures, faculty, and institutional policies may oppose the implementation of curriculum reforms. This may make it more difficult to incorporate cutting-edge technology and fresh instructional strategies. The implementation of new resources and infrastructure involves a significant financial investment to bring laboratory equipment, software, and hardware up to industry standards. The use of current tools and technology may be hampered by a lack of resources.

Addressing these challenges requires collaborative efforts from educational institutions, industry partners, accrediting bodies, and policymakers. To close the gap between engineering education and the requirements of

Industry 5.0, a comprehensive strategy that includes faculty development, curriculum de-sign, industry relationships, and continuing assessment is necessary. Education institutions, business partners, and accreditation organizations must work together to address these challenges.

V. Conclusion

In conclusion, the review paper sheds light on the significance of the alignment of engineering education and the dynamic needs of Industry 5.0. The evolving landscape of industries has profound implications for engineering education to transition from the conventional approach to innovation that requires curriculum revision and innovative pedagogies, to achieve the overarching goals of engineering education. In the review, it is evident that engineering graduates can overcome the challenges of Industry 5.0 with forward-thinking plans and proactive strategies. Engineering education in the transformative era of Indus-try 5.0 focuses on the integration of technical proficiency, interdisciplinary collaboration, practical application, and soft skills along with domain expertise thus presenting a holistic approach to create graduates who are capable of developing solutions for complex problems incorporating the perspectives from the globalized and interconnected world. The transformative academia-industry partnership supports bridging the gap between classroom theory and real-world practice resulting in a cycle of continuous learning, adaptation, and progress. Although, this metamorphosis poses challenges that can be faced with the collaborative effort from academia and industry drawing upon each other's strengths and insights to navigate the uncharted waters of Industry 5.0. The future of both academia and industry lies in being collaborative, dynamic, and crowded with learning possibilities from where engineering graduates acquire knowledge and skills to emerge as torchbearers of progress. This review paper, about only a segment of the huge land-scape, intends to detonate further discussion, investigation, and action—to encourage educators, practitioners, policymakers, and stakeholders to cooperatively form the course of engineering education and its synergetic association with Industry 5.0.

VI. References

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