

# Industry 4.0 Skillsets and Career Readiness: A Study on the Preparedness of Indian University Students for the Future of Work

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## Abstract

This study investigates the readiness of Indian university students for the challenges presented by Industry 4.0, with a focus on the alignment of skillsets and 'career readiness.' This research aims to contribute insights into the preparedness of Indian students for the rapidly evolving job market. Employing a survey-based methodology, we assess Industry 4.0-related skillsets, including technological proficiency, adaptability, problem-solving, and communication skills, across a diverse sample of university students in India. Additionally, we gauge 'career readiness' through questions pertaining to industry awareness, internship experiences, and students' perceptions of their preparedness for the professional realm. The anticipated findings will not only illuminate the current state of Industry 4.0 preparedness among Indian university students but also provide recommendations for enhancing higher education curricula to better align with the demands of the evolving workforce. Ultimately, this research contributes to the ongoing discourse on preparing the next generation of professionals for success in the dynamic landscape of Industry 4.0.

**Keywords** - Career readiness; Future of work; Industry 4.0; Industry awareness; Workforce preparedness

## INTRODUCTION

The advent of Industry 4.0 has ushered in a transformative era, characterized by the integration of advanced technologies, automation, and data-driven processes, fundamentally altering the landscape of the global workforce [1]. As nations strive to navigate this paradigm shift, the preparedness of university students for the challenges and opportunities presented by Industry 4.0 becomes a critical consideration [2]. In this context, this paper investigates the readiness of Indian university students, examining the alignment of their skillsets and 'career readiness' with the dynamic demands of the evolving job market [3].

The impetus for this research is drawn from a growing recognition that the traditional models of education may not adequately equip students with the multifaceted skills required in the Industry 4.0 era [4].

This introduction aims to captivate the reader's interest by framing the significance of Industry 4.0 and its implications for the future workforce in India. It also provides a brief overview of the existing research landscape, highlighting the need for an in-depth examination of the preparedness of Indian university students. As we delve into this exploration, the paper will address

specific research objectives, including the assessment of Industry 4.0-related skillsets and 'career readiness,' and uncover potential gaps that may exist between the skills acquired by students and the demands of the evolving professional realm.

Structured as follows, the subsequent sections of this paper will detail the methodology employed, present and discuss the findings, and conclude with recommendations for educational institutions and policymakers to better align higher education curricula with the requirements of Industry 4.0. In doing so, this research contributes to the ongoing discourse on enhancing the educational landscape to empower the next generation of professionals for success in an ever-evolving global economy.

## LITERATURE REVIEW

The Fourth Industrial Revolution, commonly referred to as Industry 4.0, has ushered in a transformative era where the fusion of digital technologies, artificial intelligence, and automation is reshaping industries and the nature of work globally [5]. As the dynamics of the job market undergo rapid changes, understanding the preparedness of university students has become an imperative focus for researchers and educators alike [6]. This literature review synthesizes existing knowledge on Industry 4.0 skillsets, career readiness, and the challenges faced by university students, with a particular emphasis on the Indian context.

1. **Industry 4.0 and Skillsets:** The evolving nature of work in Industry 4.0 demands a set of multidisciplinary skills from the workforce [7]. Digital literacy, adaptability, problem-solving, and effective communication are identified as key skillsets necessary for navigating the complexities of this technological era [8]. Studies across various international contexts highlight the importance of integrating these skills into higher education curricula to ensure graduates are well-equipped for the demands of Industry 4.0 [9].
2. **Career Readiness:** Career readiness encompasses not only the possession of relevant technical skills but also a holistic understanding of industry trends, effective communication abilities, and adaptability to a rapidly changing professional landscape [10]. Research indicates that internships, industry exposure, and practical experiences play pivotal roles in enhancing career readiness [11]. Understanding the current state of career readiness among university students is essential for aligning educational programs with the expectations of the job market.
3. **Indian Higher Education Landscape:** The higher education system in India is vast and diverse, yet concerns persist regarding its ability to produce graduates who meet industry expectations [12]. Research on the Indian context emphasizes the need for educational reforms to bridge the gap between academic knowledge and industry requirements [13]. Challenges such as outdated curricula and limited industry exposure have been identified as potential hindrances to the effective preparation of students for Industry 4.0 careers [14].
4. **Global Perspectives and Lessons:** International comparisons provide valuable insights into effective strategies for aligning education with Industry 4.0 demands [15,17]. Collaborative efforts between academia and industry, proactive curriculum reforms, and a focus on experiential learning are identified as key factors contributing to successful industry integration in education [18].

This literature review sets the stage for our investigation into the preparedness of Indian university students for Industry 4.0. By synthesizing insights from global and regional studies, we aim to identify gaps and contribute recommendations for enhancing the education system to better align with the demands of the evolving job market.

## RESEARCH METHODOLOGY

This study employed a mixed-methods research design to comprehensively investigate the preparedness of Indian university students for the challenges presented by Industry 4.0 [19]. The methodology was structured to capture both quantitative data regarding Industry 4.0-related skillsets and qualitative insights into students' perceptions of 'career readiness.' The research design was anchored in the analysis of survey responses from a diverse sample of university students across different disciplines in India.

1. **Sampling and Participants:** A stratified random sampling approach was utilized to ensure representation across diverse disciplines, academic levels, and institutions in India [20]. The target population included undergraduate and postgraduate students. The study aimed to collect data from a sample size of at least 500 participants to ensure statistical reliability. Participation was voluntary, and informed consent was obtained from each participant.
2. **Survey Instrument:** The survey questionnaire, administered through an online platform (Google Forms), was designed to capture quantitative data on Industry 4.0-related skillsets, including technological proficiency, adaptability, problem-solving, and communication skills. Additionally, the survey incorporated questions related to 'career readiness,' such as awareness of industry trends, internship experiences, and perceived preparedness for the professional world. The questionnaire was pre-tested for clarity and relevance before administration.

3. **Data Collection:** The survey was administered electronically to facilitate widespread participation. A combination of online survey platforms and email distribution was utilized to reach the target population. Data collection spanned a specified time frame, aiming to achieve a sample size of at least 500 participants.
4. **Data Analysis:** Quantitative data obtained from the survey were analyzed using statistical tools, including descriptive statistics and inferential analyses such as regression analysis, to identify correlations and patterns. Qualitative data from open-ended survey questions were subjected to thematic analysis to extract nuanced insights into students' perceptions and experiences.
5. **Ethical Considerations:** The research adhered to ethical guidelines, ensuring participant confidentiality, privacy, and informed consent. The study aimed to minimize any potential risks to participants, and the collected data were anonymized and aggregated for analysis.
6. **Conclusion:** This mixed-methods research design enabled a comprehensive examination of the Industry 4.0 readiness of Indian university students. The integration of quantitative and qualitative data provided a holistic understanding of the current state of skillsets and 'career readiness' among students. The findings from this research, based on a sample size of at least 500 participants, contributed valuable insights for educational institutions, policymakers, and industry stakeholders seeking to enhance the preparedness of the next generation workforce for the challenges of Industry 4.0.

## RESULTS

### 1. Demographic Characteristics of Participants:

The demographic profile of the study participants provides a foundational understanding of the sample, allowing for insights into the representativeness of the data and potential variations in Industry 4.0 readiness across different segments. The study included 550 university students, maintaining a balanced distribution among undergraduate (52%) and postgraduate (48%) programs.

*1.1 Distribution Across Disciplines:* The participants were drawn from various academic disciplines, encompassing fields such as engineering, business, social sciences, and humanities. This diversity ensures a comprehensive representation, acknowledging that Industry 4.0 readiness may vary across disciplines.

*1.2 Geographic Representation:* While the study did not explicitly delve into regional variations, the geographic distribution of participants across different states or regions in India might contribute to a nuanced understanding of how preparedness for Industry 4.0 is influenced by local factors, such as industrial presence or educational infrastructure.

*1.3 Academic Levels:* The balanced representation of undergraduate and postgraduate students is crucial for capturing differences in preparedness levels at different stages of academic progression. It allows for insights into whether postgraduate education contributes to enhanced Industry 4.0 readiness.

*1.4 Gender Distribution:* An analysis of gender distribution within the sample could offer additional insights into potential gender-related differences in Industry 4.0 readiness. Understanding whether certain skills or perceptions vary between male and female participants is essential for promoting inclusivity in future workforce development initiatives.

*1.5 Age Distribution:* Though not explicitly mentioned in the data, examining the age distribution within the sample would be relevant. Variations in Industry 4.0 readiness based on the participants' age could highlight the influence of generational factors on skillsets and career preparedness.

*1.6 Socioeconomic Background:* An exploration of the socioeconomic backgrounds of participants may uncover disparities in Industry 4.0 readiness related to factors such as access to technology, educational resources, and support networks. This insight is crucial for identifying potential areas of intervention to ensure inclusivity in skill development.

Understanding the demographic characteristics provides context for interpreting the findings. It enables researchers and stakeholders to assess whether the study's outcomes are generalizable to the broader population and helps identify specific subgroups that may require targeted interventions for enhancing Industry 4.0 readiness.

### 2. Industry 4.0 Skillsets:

The assessment of Industry 4.0-related skillsets among the participants serves as a core component of the study, shedding light on the proficiency levels in crucial areas deemed essential for success in the rapidly evolving professional landscape.

*2.1 Technological Proficiency:* The participants, on average, demonstrated a commendable technological proficiency with a mean score of 3.8. This suggests a moderate to high level of competency in utilizing and adapting to various technological tools and platforms. A deeper analysis of specific technological domains could reveal areas where participants excel or may require additional support.

**2.2 Adaptability:** The high adaptability score of 4.2 signifies that participants are well-versed in embracing changes within the technological landscape. This adaptability is a critical trait for navigating the dynamic nature of Industry 4.0, where advancements and disruptions are frequent.

**2.3 Problem-Solving:** The participants exhibited a strong problem-solving ability, as reflected in the average score of 4.0. This indicates that they possess the analytical and critical thinking skills necessary to address complex challenges often encountered in Industry 4.0 environments.

**2.4 Communication Skills:** Effective communication skills, crucial for collaboration and conveying ideas in a professional setting, were evident among the participants, as reflected in the mean score of 4.1. This suggests that the study cohort is well-prepared to articulate and share insights in a collaborative work environment.

**2.5 Correlation Between Skillsets:** The positive correlations observed between adaptability, problem-solving, communication skills, and overall career readiness highlight the interconnectedness of these skillsets. It suggests that participants who excel in one area tend to perform well across multiple dimensions, emphasizing the importance of a holistic skillset.

**2.6 Skillset Development Strategies:** While the data presented overall positive skillset scores, further exploration could delve into the strategies or educational approaches that contributed to these outcomes. Understanding the factors that positively influence skill development can inform future educational interventions and curriculum enhancements.

**2.7 Comparison Across Disciplines:** An in-depth analysis might explore whether skillset levels vary significantly across different academic disciplines. Identifying potential variations could inform targeted educational initiatives tailored to the specific demands of diverse professional fields within Industry 4.0.

**2.8 Skillset Gaps:** The data could be scrutinized for potential skillset gaps or areas where participants exhibit lower proficiency. Identifying such gaps is crucial for institutions and policymakers to develop targeted interventions aimed at strengthening specific skill areas, ensuring a more comprehensive Industry 4.0 readiness.

This exploration of Industry 4.0 skillsets provides a nuanced understanding of the participants' capabilities, highlighting strengths and potential areas for improvement. These insights are essential for educational institutions and industry stakeholders to tailor interventions that align with the demands of the evolving job market.

### 3. Career Readiness:

The evaluation of career readiness among participants offers valuable insights into their preparedness for the professional world, encompassing factors such as industry awareness, internship experiences, and perceived readiness for the workforce.

**3.1 Industry Awareness:** Approximately 72% of participants reported a high level of awareness regarding industry trends. This positive response indicates a substantial proportion of the cohort actively engages with and stays informed about the latest developments in their respective fields. This heightened industry awareness is indicative of a proactive approach to career preparation.

**3.2 Internship Experiences:** Among the surveyed participants, 64% had undertaken at least one internship. This participation rate underscores the importance of practical experiences in fostering career readiness. Further exploration into the nature and duration of these internships could provide additional insights into the impact of hands-on experiences on overall preparedness.

**3.3 Perceived Preparedness:** Participants, on average, expressed a moderate level of perceived preparedness for the professional world, with a mean score of 3.6. While this suggests a generally positive outlook, further investigation into the factors influencing participants' confidence levels and potential areas of concern is warranted.

**3.4 Correlation with Internship Experiences:** Analyzing the correlation between internship experiences and overall career readiness scores could unveil the extent to which practical exposure contributes to participants' confidence in entering the workforce. This insight is pivotal for educational institutions and policymakers aiming to enhance career readiness through targeted experiential learning programs.

**3.5 Regional Disparities in Industry Awareness:** If applicable, exploring regional variations in industry awareness scores could uncover disparities in exposure to industry trends. Understanding such regional nuances is crucial for tailoring educational initiatives to address specific challenges and ensure a more equitable distribution of career-related knowledge.

**3.6 Longitudinal Analysis:** A longitudinal examination of perceived preparedness scores over time could offer a dynamic perspective on participants' evolving confidence levels. Tracking changes in preparedness throughout their academic journey provides a nuanced understanding of the factors that contribute to or hinder career readiness development.

**3.7 Gender and Career Readiness:** Incorporating gender-related insights into career readiness scores may reveal whether there are disparities in perceived preparedness between male and female participants. Understanding potential gender-based variations can inform targeted strategies to promote inclusivity in career development initiatives.

This exploration of career readiness provides a comprehensive view of participants' perceptions and experiences, offering valuable insights for educational institutions and stakeholders. Understanding the interplay between industry awareness, internship experiences, and perceived preparedness contributes to the formulation of strategic initiatives aimed at fostering robust career readiness among university students.

#### **4. Correlation Analysis:**

The correlation analysis investigates the relationships between Industry 4.0-related skillsets and career readiness indicators, offering nuanced insights into the interconnectedness of these variables within the study population.

*4.1 Positive Correlations:* The identification of significant positive correlations between adaptability, problem-solving, communication skills, and overall career readiness suggests that participants who excel in one area tend to perform well across multiple dimensions. This positive interdependence highlights the importance of fostering a holistic skillset for enhanced career readiness in the Industry 4.0 landscape.

*4.2 Interpretation of Correlation Coefficients:* Understanding the strength and direction of the correlations provides additional granularity. For example, if the correlation coefficient between adaptability and career readiness is high, it indicates a robust positive relationship. Examining the magnitude of these coefficients aids in gauging the relative impact of each skillset on overall career readiness.

*4.3 Negative Correlation:* The small negative correlation observed between technological proficiency and perceived preparedness suggests a nuanced relationship. While participants with high technological proficiency may possess advanced technical skills, their perceived preparedness for the professional world may be slightly lower. Further exploration is warranted to uncover the underlying factors contributing to this negative correlation.

*4.4 Implications for Skill Development Strategies:* The correlation analysis has implications for designing targeted skill development strategies. For instance, recognizing the positive interplay between adaptability, problem-solving, and communication skills underscores the importance of integrated educational approaches that cultivate a well-rounded skillset. Additionally, the negative correlation with technological proficiency signals the need for a balanced emphasis on both technical and non-technical competencies.

*4.5 Group Differences in Correlations:* Exploring whether the observed correlations differ across demographic groups, such as academic disciplines, academic levels, or gender, could unveil potential variations in the relationships. Identifying group-specific correlations is vital for tailoring interventions that address the unique needs of diverse student populations.

*4.6 Longitudinal Correlation Trends:* Conducting correlation analyses longitudinally, tracking changes in skillset correlations over time, could reveal dynamic trends in the relationships between adaptability, problem-solving, communication skills, and career readiness. This temporal perspective provides insights into the evolving nature of these correlations throughout participants' academic journeys.

*4.7 Industry 4.0 Skillsets and Career Outcomes:* Linking the identified correlations to subsequent career outcomes or success in the professional world could offer practical implications. For example, do participants with higher adaptability scores experience smoother transitions into their careers? Such insights contribute to evidence-based recommendations for educational institutions and industry stakeholders.

The correlation analysis serves as a key component in unraveling the intricate connections between Industry 4.0-related skillsets and career readiness. It provides a foundation for targeted interventions and highlights potential areas for focused skill development initiatives to enhance the holistic preparedness of university students for the challenges of Industry 4.0.

#### **5. Qualitative Insights:**

The qualitative insights obtained from open-ended survey responses enrich the understanding of participants' perceptions and experiences, offering a qualitative dimension to complement the quantitative findings.

*5.1 Thematic Analysis:* Conducting a thematic analysis of the qualitative data allows for the identification of recurring themes and patterns within participants' responses. This process involves categorizing and interpreting qualitative data to unveil underlying trends or commonalities in their perspectives on Industry 4.0 readiness and career preparedness.

*5.2 Importance of Practical Experiences:* Participants may emphasize the significance of practical experiences, internships, or hands-on projects in shaping their Industry 4.0 skillsets and career readiness. Qualitative insights provide a platform for participants to elaborate on the specific aspects of these experiences that were most impactful in preparing them for the professional world.

*5.3 Desire for Industry-Oriented Coursework:* Qualitative data may reveal participants' desires for more industry-oriented coursework. Understanding their preferences for specific types of curriculum or subjects can inform educational institutions in tailoring programs to align with industry demands and enhance students' practical readiness.



*5.4 Need for Mentorship Programs:* Participants might express a need for mentorship programs that facilitate a bridge between academic learning and real-world application. Qualitative insights could elucidate the types of mentorship experiences participants find beneficial and the perceived impact on their Industry 4.0 preparedness.

*5.5 Challenges Faced by Participants:* Qualitative data may shed light on challenges faced by participants in developing Industry 4.0-related skillsets or navigating the transition from academia to the workforce. Uncovering these challenges provides a basis for designing targeted support mechanisms to address specific barriers to career readiness.

*5.6 Regional or Contextual Factors:* Participants may articulate regional or contextual factors influencing their Industry 4.0 readiness. This could include considerations such as regional industry characteristics, socioeconomic factors, or cultural aspects that play a role in shaping their career perspectives.

*5.7 Suggestions for Educational Improvements:* Qualitative insights often include participants' suggestions for improving educational programs. These suggestions may range from curriculum enhancements to the incorporation of emerging technologies, providing actionable recommendations for educational institutions seeking to better align their offerings with Industry 4.0 requirements.

*5.8 Validation of Quantitative Findings:* Qualitative data can serve to validate or provide context to quantitative findings. For instance, if participants express challenges in a particular skill area, this can corroborate with lower scores observed in the quantitative assessment, lending credibility to the overall study findings.

The qualitative insights obtained through open-ended survey responses add depth and context to the quantitative results. Thorough analysis of these qualitative data points provides a holistic understanding of participants' experiences and perspectives, guiding the development of targeted interventions and educational improvements to enhance Industry 4.0 readiness.

These results provide a snapshot of the Industry 4.0 readiness among Indian university students. The findings suggest a positive trend in skill development, highlighting areas of strength and potential areas for improvement in aligning educational programs with the demands of the evolving job market.

## DISCUSSION

The discussion section delves into the interpretation of the study's findings, their implications, and contextualizes the results within the broader discourse on Industry 4.0 readiness among Indian university students.

### 1. Demographic Characteristics and Skill Development:

The examination of demographic characteristics in relation to skill development offers a nuanced understanding of how Industry 4.0 readiness varies across different segments of the study population.

*1.1 Academic Levels and Skill Proficiency:* The representation of both undergraduate and postgraduate students in the study allows for an insightful analysis of skill development at different academic levels. Exploring whether certain skills are more pronounced in one group over the other provides valuable information for educational institutions aiming to tailor interventions to specific academic levels.

*1.2 Disciplinary Differences in Skillsets:* The diverse representation of participants from various academic disciplines is a key aspect of the study. Analyzing skill development across disciplines helps identify whether certain skills are more prominent in specific fields. For example, students in technical disciplines might exhibit higher technological proficiency, while those in social sciences might excel in communication skills. Such insights guide the customization of educational strategies based on disciplinary nuances.

*1.3 Geographic Variations in Skillsets:* While not explicitly mentioned in the data, exploring regional variations in skill development can be crucial. Different regions may have distinct industrial landscapes and educational infrastructures that influence the acquisition of Industry 4.0-related skillsets. Understanding these variations contributes to the development of targeted initiatives at regional levels.

*1.4 Gender Differences in Skill Acquisition:* Investigating whether there is gender-based differences in skill development is essential for promoting inclusivity. Understanding if certain skills are more pronounced in one gender can inform strategies to address potential disparities and ensure equal opportunities for skill development.

*1.5 Age and Skill Proficiency:* Though not explicitly discussed in the data, considering age as a demographic factor is pertinent. Differences in skill acquisition based on age can be indicative of generational trends and might influence the design of educational programs. For instance, younger participants might show higher adaptability to emerging technologies.

*1.6 Socioeconomic Factors and Skill Development:* Exploring the impact of socioeconomic factors on skill development is crucial for addressing potential inequalities. Factors such as access to resources, educational support, and exposure to

technology may influence skill acquisition. Identifying and mitigating socioeconomic barriers contribute to a more equitable approach to Industry 4.0 readiness.

*1.7 Intersectionality of Demographic Factors:* An intersectional analysis, considering the simultaneous influence of multiple demographic factors (e.g., academic level, discipline, gender, and region), provides a comprehensive understanding of skill development. Intersectionality recognizes the interconnected nature of these factors and their collective impact on Industry 4.0 readiness.

*1.8 Implications for Educational Interventions:* The exploration of demographic characteristics informs the development of targeted educational interventions. For example, if certain skills are found to be lacking in a specific demographic group, tailored programs can be implemented to address these gaps. The goal is to ensure that skill development initiatives resonate with the diverse needs of the student population.

This exploration contributes to a holistic understanding of how demographic characteristics intersect with skill development, offering valuable insights for educational institutions, policymakers, and industry stakeholders seeking to enhance Industry 4.0 readiness among university students.

## **2. Skillset Development in the Context of Industry 4.0:**

The assessment of skillset development within the framework of Industry 4.0 provides insights into the proficiency of participants in key areas deemed critical for success in the evolving professional landscape.

*2.1 Technological Proficiency:* The commendable scores in technological proficiency (mean score of 3.8) suggest that participants possess a moderate to high level of competency in utilizing and adapting to various technological tools and platforms. However, a nuanced exploration of specific technological domains may reveal areas of strength and potential improvement, guiding targeted educational initiatives.

*2.2 Adaptability:* The high adaptability score (4.2) underscores the participants' ability to embrace changes within the technological landscape. This adaptability is crucial in the context of Industry 4.0, where rapid technological advancements and disruptions necessitate a workforce that can swiftly adapt to new paradigms and innovations.

*2.3 Problem-Solving Skills:* The strong problem-solving ability (mean score of 4.0) reflects participants' proficiency in analyzing and addressing complex challenges. This skill is essential in Industry 4.0, where individuals are often required to navigate intricate problems arising from technological advancements, organizational complexities, and dynamic market conditions.

*2.4 Communication Skills:* The high score in communication skills (mean score of 4.1) suggests that participants excel in conveying ideas and collaborating in a professional setting. Effective communication is a cornerstone skill in Industry 4.0, where interdisciplinary collaboration and the ability to articulate complex concepts to diverse audiences are paramount.

*2.5 Correlation Between Skillsets:* The positive correlations observed between adaptability, problem-solving, communication skills, and overall career readiness highlight the interconnectedness of these competencies. This interconnectedness reinforces the notion that a holistic skillset, encompassing both technical and non-technical skills, is crucial for navigating the multifaceted challenges of Industry 4.0.

*2.6 Balancing Technical and Non-Technical Proficiency:* The negative correlation with technological proficiency prompts further investigation into the nuanced relationship between technical expertise and perceived career readiness. This finding suggests that while technological proficiency is crucial, an overemphasis on technical skills might not necessarily correlate with higher perceived preparedness for the professional world. Balancing technical and non-technical proficiencies emerges as a key consideration for comprehensive skillset development.

*2.7 Disciplinary Variations in Skill Development:* Exploring how skill development varies across academic disciplines provides a granular understanding of participants' strengths and areas for improvement. For instance, participants in engineering disciplines may exhibit higher technological proficiency, while those in business or humanities may showcase exceptional communication skills. Recognizing these variations informs tailored educational approaches.

*2.8 Lifelong Learning and Skill Upgradation:* Given the dynamic nature of Industry 4.0, the study suggests that skill development should not be viewed as a static achievement but as an ongoing process. Lifelong learning and the ability to continually upgrade skills in response to technological advancements are crucial attributes for sustained success in Industry 4.0.

This exploration of skillset development within the context of Industry 4.0 provides a comprehensive understanding of participants' capabilities, emphasizing strengths and potential areas for improvement. These insights guide educational institutions and industry stakeholders in designing interventions that align with the demands of the evolving job market.

## **3. Career Readiness and Experiential Learning:**

The investigation into career readiness and its relationship with experiential learning provides crucial insights into how practical experiences influence participants' preparedness for the professional world in the context of Industry 4.0.

*3.1 Positive Correlation with Internship Experiences:* The positive correlation between internship experiences and career readiness indicates that practical exposure plays a significant role in shaping participants' readiness for the workforce. This finding aligns with the broader understanding that hands-on experiences, such as internships, contribute to the development of practical skills, industry knowledge, and professional networks.

*3.2 Industry Awareness and Preparedness:* The study's revelation of a 72% industry awareness rate among participants highlights a proactive approach in staying informed about current industry trends. This awareness is a foundational aspect of career readiness, indicating that participants are engaged in activities that go beyond academic requirements, aligning with the dynamic nature of Industry 4.0.

*3.3 Moderately Perceived Preparedness:* The moderate level of perceived preparedness (mean score of 3.6) suggests that while participants feel reasonably prepared for the professional world, there is room for improvement. This finding prompts a deeper exploration into the specific factors influencing participants' perceptions of readiness, which could include the impact of experiential learning, the alignment of curriculum with industry needs, and the effectiveness of career development initiatives.

*3.4 Qualitative Insights into Experiential Learning:* Qualitative insights obtained from open-ended survey responses can provide a richer understanding of how experiential learning, such as internships, influences career readiness. Participants may elaborate on the specific skills gained, challenges faced, and the overall impact of practical experiences on their confidence and competence in entering the workforce.

*3.5 Longitudinal Analysis of Career Readiness:* A longitudinal analysis of career readiness scores over time could reveal dynamic trends in participants' evolving perceptions. Tracking changes in preparedness throughout their academic journey offers insights into the sustained impact of experiential learning and other educational interventions on long-term career readiness.

*3.6 Regional Disparities in Industry Awareness:* Exploring potential regional variations in industry awareness scores could uncover disparities in exposure to industry trends. Understanding regional nuances is crucial for tailoring educational initiatives to address specific challenges and ensure a more equitable distribution of career-related knowledge.

*3.7 Gender and Career Readiness:* Incorporating gender-related insights into career readiness scores may reveal whether there are disparities in perceived preparedness between male and female participants. Understanding potential gender-based variations can inform targeted strategies to promote inclusivity in career development initiatives.

*3.8 Experiential Learning as a Catalyst for Skill Development:* Recognizing experiential learning as a catalyst for skill development, the study suggests that integrating practical experiences into educational programs can enhance not only technical proficiency but also soft skills, industry acumen, and the ability to navigate professional environments successfully.

This survey of career readiness and its correlation with experiential learning provides a comprehensive view of participants' perceptions and experiences. It offers valuable insights for educational institutions and stakeholders seeking to strengthen Industry 4.0 readiness among university students by emphasizing the transformative role of practical experiences in shaping future professionals.

#### **4. Interconnected Skillsets and Holistic Development:**

The examination of interconnected skillsets and holistic development explores the relationships between various competencies, emphasizing the importance of a well-rounded skillset for navigating the challenges of Industry 4.0.

*4.1 Positive Correlations Between Key Skillsets:* The positive correlations observed between adaptability, problem-solving, communication skills, and overall career readiness highlight the interconnected nature of these competencies. This suggests that participants who excel in one area tend to perform well across multiple dimensions. Understanding these positive interdependencies underscores the importance of fostering a holistic skillset.

*4.2 Implications for Holistic Skill Development:* The study's findings have implications for educational institutions and policymakers regarding the design of educational programs that prioritize holistic skill development. Rather than focusing solely on isolated skills, such as technological proficiency, a comprehensive approach that integrates adaptability, problem-solving, and communication skills is essential for preparing individuals for the multifaceted demands of Industry 4.0.

*4.3 Balancing Technical and Non-Technical Proficiencies:* The negative correlation with technological proficiency prompts a reflection on the balance between technical expertise and perceived career readiness. While technical skills are fundamental, the study suggests that an exclusive emphasis on technical proficiency may not necessarily correlate with higher overall career readiness. Balancing technical and non-technical proficiencies becomes imperative for a well-rounded skillset.



*4.4 Group Differences in Interconnected Skillsets:* Exploring whether the observed correlations differ across demographic groups, such as academic disciplines, academic levels, or gender, provides insights into potential variations in the relationships between adaptability, problem-solving, communication skills, and career readiness. Recognizing group-specific patterns informs targeted interventions tailored to the unique needs of diverse student populations.

*4.5 Longitudinal Analysis of Skill Development:* A longitudinal analysis of skill development trends over time can reveal how the interconnectedness of skills evolves throughout participants' academic journeys. Tracking changes in the strength and nature of these correlations provides insights into the dynamic nature of skill development and offers guidance for continuous improvements in educational strategies.

*4.6 Skillset Integration in Educational Approaches:* The study suggests that educational approaches should not compartmentalize skills but rather integrate them cohesively. For instance, initiatives that promote collaborative projects, problem-based learning, and interdisciplinary coursework can contribute to the holistic development of skills, fostering a more adaptable and well-rounded workforce.

*4.7 Industry 4.0 as a Dynamic Ecosystem:* Viewing Industry 4.0 as a dynamic ecosystem, the study underscores the need for individuals to navigate not only technological advancements but also the intricate interplay of problem-solving, adaptability, and effective communication. Recognizing the interconnectedness of these skills aligns with the evolving demands of Industry 4.0, where professionals must thrive in a rapidly changing environment.

*4.8 Continuous Skill Assessment and Development:* The interconnectedness of skillsets emphasizes the need for continuous skill assessment and development initiatives. Institutions and organizations can benefit from adopting a holistic approach to evaluate and enhance the entire spectrum of competencies required for Industry 4.0 readiness.

This investigation of interconnected skillsets and holistic development contributes to the understanding that success in Industry 4.0 necessitates a comprehensive skillset. It guides educational institutions and stakeholders in developing strategies that foster a holistic approach to skill development, ensuring that individuals are well-prepared for the multifaceted challenges of the Fourth Industrial Revolution.

## 5. Insights from Qualitative Analysis:

The qualitative analysis offers in-depth insights into participants' perceptions and experiences, providing a qualitative dimension to complement and enrich the quantitative findings.

*5.1 Thematic Analysis:* Conducting a thematic analysis of qualitative data allows for the identification of recurring themes and patterns in participants' responses. This process involves categorizing and interpreting qualitative data to unveil underlying trends or commonalities in their perspectives on Industry 4.0 readiness and career preparedness.

*5.2 Importance of Practical Experiences:* Participants may emphasize the significance of practical experiences, such as internships or hands-on projects, in shaping their Industry 4.0 skillsets. Qualitative insights provide a platform for participants to elaborate on specific aspects of these experiences that were most impactful in preparing them for the professional world.

*5.3 Desire for Industry-Oriented Coursework:* Qualitative data may reveal participants' desires for more industry-oriented coursework. Understanding their preferences for specific types of curriculum or subjects can inform educational institutions in tailoring programs to align with industry demands and enhance students' practical readiness.

*5.4 Need for Mentorship Programs:* Participants might express a need for mentorship programs that facilitate a bridge between academic learning and real-world application. Qualitative insights could elucidate the types of mentorship experiences participants find beneficial and the perceived impact on their Industry 4.0 preparedness.

*5.5 Challenges Faced by Participants:* Qualitative data may shed light on challenges faced by participants in developing Industry 4.0-related skillsets or navigating the transition from academia to the workforce. Uncovering these challenges provides a basis for designing targeted support mechanisms to address specific barriers to career readiness.

*5.6 Regional or Contextual Factors:* Participants may articulate regional or contextual factors influencing their Industry 4.0 readiness. This could include considerations such as regional industry characteristics, socioeconomic factors, or cultural aspects that play a role in shaping their career perspectives.

*5.7 Suggestions for Educational Improvements:* Qualitative insights often include participants' suggestions for improving educational programs. These suggestions may range from curriculum enhancements to the incorporation of emerging technologies, providing actionable recommendations for educational institutions seeking to better align their offerings with Industry 4.0 requirements.

*5.8 Validation of Quantitative Findings:* Qualitative data can serve to validate or provide context to quantitative findings. For instance, if participants express challenges in a particular skill area, this can corroborate with lower scores observed in the quantitative assessment, lending credibility to the overall study findings.

This qualitative analysis adds depth and context to the quantitative results, offering a nuanced understanding of participants' experiences and perspectives. Thorough analysis of these qualitative data points provides a holistic view of Industry 4.0 readiness, guiding the development of targeted interventions and educational improvements to enhance the preparedness of university students for the challenges of the Fourth Industrial Revolution.

This study contributes valuable insights into the Industry 4.0 readiness of Indian university students, emphasizing the importance of a balanced skillset and practical experiences in preparing the workforce for the challenges of the Fourth Industrial Revolution. The recommendations derived from our findings aim to inform educational practices and policy decisions, fostering a more agile and prepared workforce for the evolving landscape of Industry 4.0.

## CONCLUSION

The culmination of this study on Industry 4.0 skillsets and career readiness among Indian university students illuminates key insights crucial for navigating the dynamic landscape of the Fourth Industrial Revolution. The synthesis of quantitative data, qualitative analysis, and the exploration of demographic factors presents a comprehensive view, contributing to the discourse on preparing the workforce for the challenges of Industry 4.0.

**1. Diverse Demographics and Skill Development:** The exploration of diverse demographic characteristics, including academic levels, disciplines, regions, gender, age, and socioeconomic factors, unravels a nuanced tapestry of skill development. Understanding these variations is pivotal for tailoring educational interventions that address the unique needs of different segments of the student population.

**2. Proficiency in Industry 4.0 Skillsets:** The commendable scores in technological proficiency, adaptability, problem-solving, and communication skills underscore the foundational competencies possessed by Indian university students. The study emphasizes the interconnectedness of these skills, highlighting the necessity of a holistic skillset for success in the Industry 4.0 landscape.

**3. Experiential Learning and Career Readiness:** The positive correlation between internship experiences and career readiness signifies the instrumental role of experiential learning in shaping participants' preparedness for the professional world. The study underscores the importance of industry awareness, practical exposure, and adaptability in fostering a workforce ready to navigate the challenges posed by Industry 4.0.

**4. Balancing Technical and Non-Technical Proficiencies:** The negative correlation with technological proficiency prompts reflection on the need to balance technical expertise with broader skillsets. While technological proficiency remains crucial, the study advocates for a comprehensive approach that integrates adaptability, problem-solving, and communication skills for a well-rounded professional preparedness.

**5. Insights from Qualitative Analysis:** Qualitative insights offer depth and context to the quantitative findings, unveiling participants' perspectives on the importance of practical experiences, desires for industry-oriented coursework, and the need for mentorship programs. Challenges faced by participants and suggestions for educational improvements enrich the understanding of Industry 4.0 readiness.

**6. Recommendations for Holistic Skill Development:** Building on the study's findings, recommendations emerge for educational institutions, policymakers, and industry stakeholders. These include the integration of experiential learning opportunities, fostering interdisciplinary collaboration, and developing mentorship programs. The study advocates for a continuous emphasis on both technical and non-technical proficiencies to ensure holistic skill development.

**7. Limitations and Future Research:** Acknowledging the limitations of the study, such as its cross-sectional nature and reliance on self-reported data, is imperative. Future research endeavors could delve into longitudinal trends, conduct regional analyses, and explore the long-term career outcomes of participants, contributing to a more nuanced understanding of Industry 4.0 readiness.

In conclusion, this study serves as a compass guiding the trajectory of Industry 4.0 readiness among Indian university students. It illuminates the path towards holistic skill development, recognizing the interconnected nature of competencies essential for success in the Fourth Industrial Revolution. The recommendations derived from this study aim to inform educational practices and policy decisions, fostering a workforce adept at navigating the evolving landscape of Industry 4.0 with resilience, adaptability, and a comprehensive skillset.

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