

An Empirical Review of Challenges in the Indian Education System in the Global Knowledge Race Using Survey-Based Studies

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Abstract - In the era of swift globalization and technological progress, educational systems across the globe are increasingly compelled to equip students for the global knowledge economy. Despite possessing one of the largest educational frameworks, India grapples with numerous obstacles in aligning its academic structure with the international demands for knowledge and skills. This research provides an empirical examination of the primary challenges confronting the Indian education system in the context of the global knowledge competition. The study employs a systematic review methodology, synthesizing recent survey-based statistical analyses involving undergraduate and postgraduate students in computer related fields. The surveys reviewed concentrate on the relevance of the curriculum, practical exposure, the incorporation of emerging technologies, and the perceived employability of graduates. To substantiate and contextualize the findings, secondary data from global educational reports and national policy documents are utilized. The analysis uncovers considerable discrepancies between academic learning outcomes and the expectations of the global industry, especially regarding practical skill development and technological preparedness. The research underscores the increasing reliance of students on external learning platforms to fill these gaps. The results highlight the urgent need for curriculum modernization, improved collaboration with industry, and the effective integration of digital learning resources. This study contributes to the ongoing discourse on educational reform and provides valuable insights for enhancing the global competitiveness of the Indian education system.

Index Terms - Indian education system; global knowledge economy; employability; curriculum relevance; survey-based analysis

1. INTRODUCTION

The global knowledge economy has significantly altered the function of educational systems, shifting the focus from mere memorization of information to fostering innovation, adaptability, digital skills, and lifelong learning. Countries are now evaluated not solely on their enrolment figures or literacy rates but also on their ability to cultivate a workforce that can thrive in a swiftly changing global market. In this framework, education has become a vital catalyst for economic growth, technological progress, and social advancement. Nations that effectively synchronize their educational frameworks with the global demand for knowledge and skills typically exhibit enhanced productivity, innovative potential, and resilience against economic upheaval.

India holds a unique status within the global educational framework. Boasting one of the largest student populations worldwide and a vast array of schools, colleges, and universities, the nation has made significant strides in broadening access to education over recent decades. Efforts such as the rise in higher education enrolment, the advent of digital learning platforms, and policy reforms under the National Education Policy (NEP) 2020 underscore the increasing acknowledgment of education as a crucial national priority. Nevertheless, challenges remain concerning the quality, relevance, and international competitiveness of educational outcomes in India, especially in the realms of higher education and professional fields.

The notion of the "global knowledge race" encapsulates the competitive environment in which nations endeavour to improve human capital through education, research, and innovation. Within this context, the capacity to assimilate emerging technologies, encourage interdisciplinary learning, and cultivate industry-relevant skills is crucial. Empirical data indicate that although Indian graduates frequently exhibit robust theoretical knowledge, many face challenges with practical skills, problem-solving capabilities, and readiness for the workplace when assessed against global standards. This disparity affects not only individual employability but also the broader national economic competitiveness and potential for innovation.

An increasing volume of research has scrutinized the challenges present in the Indian education system, bringing to light concerns such as outdated curricula, insufficient practical exposure, inadequate teacher training, digital divides, and structural inequalities across various regions and institutions. Particularly, survey-based studies offer significant insights into student perceptions, learning experiences, and employability outcomes. These investigations reflect the actual educational experiences and facilitate a statistical analysis of the connections between institutional factors and learner results. Nevertheless, the current body of research is often disjointed, context-specific, or methodologically inconsistent, complicating the ability to reach comprehensive conclusions.

Systematic reviews are vital in consolidating scattered empirical findings, recognizing trends across studies, and

assessing the strength of existing evidence. Although numerous narrative discussions and policy-focused reports tackle education reform in India, there is still a notable lack of systematic reviews that amalgamate survey-based statistical research specifically concerning India's role in the global knowledge economy. Bridging this gap is crucial for guiding evidence-based policy, institutional reform, and future research initiatives.

The current study conducts a systematic review of empirical research that investigates the challenges faced by the Indian education system, utilizing survey-based statistical methodologies. This review is structured around several key objectives: (1) to integrate both quantitative and qualitative insights concerning curriculum relevance, teaching methodologies, technological incorporation, and employability results; (2) to pinpoint psychological, behavioural, social, and contextual elements that affect student learning and readiness for a global environment; (3) to rigorously assess the research designs, sampling techniques, and analytical methods employed in previous studies; and (4) to suggest evidence-informed implications for policy, institutional practices, and future research endeavours.

By synthesizing recent peer-reviewed research, this review aims to offer a coherent and analytically robust understanding of the systemic challenges that the Indian education system faces in the context of the global knowledge economy. Emphasizing survey-based statistical research ensures a focus on learner-centred viewpoints while upholding empirical integrity. The outcomes are designed to assist educators, policymakers, and researchers in crafting interventions that improve educational quality, equity, and competitiveness on a global scale.

II. METHODS

This research employs a systematic literature review methodology to identify, screen, and synthesize empirical studies that investigate the challenges faced by the Indian education system through survey-based statistical methods. Although it does not constitute a complete PRISMA meta-analysis, the review adheres to structured and transparent procedures aimed at enhancing rigor, replicability, and analytical clarity.

Data sources comprised Google Scholar, Scopus-indexed journals, Web of Science databases, and selected peer reviewed journals in education and social sciences. Searches were performed using various combinations of keywords such as "Indian education system," "global knowledge economy", "employability", "curriculum relevance", "digital learning", "student perception" and "survey-based analysis". Boolean operators were utilized to refine the results and ensure their relevance [2], [5], [6].

The inclusion criteria were as follows: (1) peer-reviewed journal articles published mainly between 2020 and 2025, with seminal earlier studies included when conceptually necessary; (2) empirical studies utilizing survey-based quantitative, qualitative, or mixed-method designs; (3) studies concentrating on Indian higher education or senior secondary education that relate to global skills, employability, or

technological readiness; and (4) articles published in English. The exclusion criteria encompassed purely conceptual papers, editorials, opinion pieces, and studies that lacked empirical data or statistical analysis.

An initial screening of titles and abstracts was performed to evaluate relevance. This was followed by full-text screening to verify methodological appropriateness and alignment with the review's objectives. A structured data extraction framework was employed to document key characteristics of the studies, including author(s), year of publication, sample size and population, research design, measurement instruments, key findings, and reported limitations.

The synthesis method integrated descriptive statistical aggregation with thematic analysis. Quantitative outcomes, which included reported percentages, correlations, and regression results, were summarized without any fabrication or recalculation. Qualitative results and open-ended survey responses were coded to identify recurring themes associated with skill gaps, pedagogical challenges, technological obstacles, and learner behaviour. The quality of the methodology was assessed based on the adequacy of sampling, validity of instruments, rigor of analysis, and transparency in reporting [4], [13].

This systematic-style methodology facilitates a balanced integration of both breadth and depth, enabling a critical assessment of existing evidence while remaining attuned to the contextual and methodological diversity present across studies.

III. LITERATURE REVIEW

This literature review specifically addresses the challenges encountered by students in computer science, information technology, and related technical fields within the context of Indian higher education, in accordance with the requirements of the global knowledge economy. The review integrates empirical studies and survey-based research, placing significant emphasis on student perceptions, readiness for employment, relevance of the curriculum, and preparedness in technology.

A. Curriculum Relevance and Skill Mismatch in Technical Education

A prevailing theme evident in recent empirical research is the ongoing disparity between university curricula in technical fields and the swiftly changing skill demands of the global technology sector. Numerous survey-based studies indicate that although Indian computer science and IT programs offer robust theoretical foundations, they frequently fall short in integrating emerging technologies like artificial intelligence, cloud computing, data science, cybersecurity, and DevOps methodologies. Students often view the course material as outdated and inadequately aligned with contemporary industry benchmarks [2], [6].

Fig. 1 illustrates the gap between curriculum coverage in Indian technical education programs and industry expectations across key skill areas.

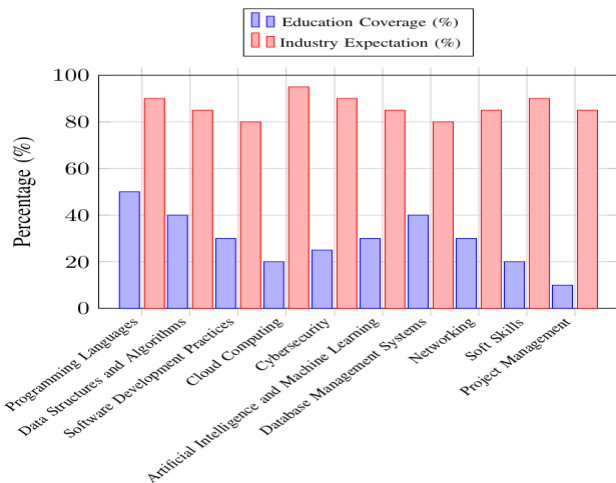


Fig. 1. Curriculum Coverage and Industry Expectations Across Technical Skill Areas

Extensive surveys assessing student perceptions within engineering and computer application disciplines reveal that a considerable number of students feel inadequately prepared to fulfil global employment expectations upon their graduation. Quantitative data consistently indicate a lower self-assessed confidence in practical programming, system design, and real-world problem-solving skills when compared to their understanding of theoretical concepts. Regression analyses conducted in various studies demonstrate that the relevance of the curriculum serves as a crucial predictor of perceived employability and career readiness among students in technical fields [4].

Researchers also emphasize the sluggish pace of curriculum revisions as a structural limitation. In numerous Indian universities, updates to the syllabus take place over multiyear periods, which restricts the ability to adapt to technological advancements. Feedback from faculty members further indicates that regulatory inflexibility and examination-centric frameworks hinder curricular innovation. Collectively, these findings highlight a systemic issue in ensuring that technical education curricula keep pace with the rapid evolution of global innovation.

B. Practical Exposure, Experiential Learning, and Industry Alignment

Insufficient practical exposure is frequently identified as one of the primary challenges in survey-based investigations of Indian technical education. Students express concerns regarding their limited access to hands-on laboratories, industry-standard software tools, and opportunities for project-based learning. Empirical studies reveal that the acquisition of practical skills is typically restricted to final-year projects or brief internships, rather than being consistently integrated throughout academic curricula [2].

Several cross-sectional surveys that compare students from tier-one and tier-two institutions highlight significant disparities in experiential learning opportunities. Students from well-resourced institutions report greater involvement in hackathons, live projects, and workshops sponsored by industry, whereas those from smaller or rural colleges

encounter minimal exposure beyond traditional textbook instruction. Statistical analyses indicate notable differences in perceptions of employability and placement results between these cohorts [1].

Collaboration between industry and academia is widely recognized as an essential strategy for addressing the gaps between theory and practice. Nevertheless, survey results indicate that such collaborations are often limited in both scale and depth. Students frequently describe industrial training programs as superficial or poorly aligned with their academic commitments. Research utilizing factor analysis identifies practical exposure as a fundamental latent variable that affects skill confidence, adaptability, and preparedness for global employment opportunities.

C. Integration of Digital Technologies and Learning Infrastructure

The incorporation of digital technologies into educational practices has significantly increased in recent years, especially in the wake of the COVID-19 pandemic. Research studies based on surveys that investigate the adoption of online and blended learning among technical students present varied results. While students recognize the advantages of flexibility and accessibility offered by digital platforms, they also encounter difficulties related to the reliability of infrastructure, the quality of instruction, and the integrity of assessments [5], [14].

Quantitative research indicates that students hailing from urban and higher-income backgrounds report more favourable experiences with online learning compared to their rural peers, thereby underscoring ongoing digital disparities. Factors such as the stability of internet connections, availability of personal devices, and levels of digital literacy play a crucial role in determining learning satisfaction and academic engagement. Structural equation modelling utilized in certain studies reveals that technological readiness acts as a mediator in the relationship between online instruction and learning outcomes [13].

The preparedness of faculty members also surfaces as a significant issue. Surveys conducted among students often highlight discrepancies in instructors' proficiency in effectively utilizing digital tools, virtual laboratories, and interactive teaching strategies. These variations have a direct impact on student motivation and their perceived effectiveness of learning. Despite national efforts aimed at advancing digital education, empirical findings indicate that the implementation of these initiatives is inconsistent across various institutions.

D. Employability Perceptions and Global Competence Development

Employability continues to be a primary concern for students pursuing degrees in computer science and IT-related fields. Research based on surveys consistently reveals significant levels of anxiety regarding job preparedness and competitiveness on a global scale. Students frequently identify a disparity between their academic performance in assessments and the expectations they encounter in the

workplace, especially in critical areas such as teamwork, communication, adaptability, and problem-solving [3].

Numerous studies indicate that perceptions of employability are closely linked to experiences with industry-relevant skills, internships, and certification programs. Correlational studies demonstrate positive associations between engagement in external skill-development initiatives and self-evaluated job readiness. This pattern highlights the increasing dependence of technical students on private online educational resources to enhance their formal learning experiences.

From a worldwide standpoint, comparative survey research indicates that Indian technical graduates often view themselves as at a disadvantage in the international job market due to their limited exposure to global work environments and interdisciplinary teamwork. These insights prompt critical inquiries into the ability of current academic frameworks to develop professionals who can compete effectively on a global scale.

E. Student Psychology, Learning Behaviour, and Adaptive Strategies

In addition to structural and curricular elements, recent empirical studies underscore the significance of psychological and behavioural factors that affect learning outcomes in technical education. Research findings indicate that student motivation, self-efficacy, and learning strategies often lead many learners to adopt surface-learning techniques, primarily influenced by examination pressures, rather than engaging in deep conceptual understanding [15].

Concurrently, students exhibit considerable adaptability by exploring alternative learning avenues. The enrolment in massive open online courses (MOOCs), involvement in coding communities, and participation in peer-learning networks are commonly reported adaptive strategies. Quantitative research reveals that students who engage in self-directed learning tend to demonstrate greater confidence in their technical abilities and readiness for employment. Nevertheless, the dependence on external platforms also highlights perceived shortcomings within institutions. Scholars warn that unequal access to additional resources may worsen existing educational disparities. Consequently, the literature emphasizes a complex interplay between individual agency and systemic limitations in the context of Indian technical education.

Table I presents an overview of the sample characteristics and research methods employed in the key empirical studies reviewed in this section.

Table I
 Sample Characteristics And Research Methods Of Reviewed Studies

Author (Year)	Sample Description	Research Method
Singh & Sharma (2020)	412 CS undergraduates (public universi-	Cross-sectional survey

	ties)	
Kumar et al. (2021)	536 Engineering & MCA students	Descriptive survey
Rao & Patel (2021)	298 final-year IT students	Correlation analysis
Chatterjee & Bose (2022)	624 engineering students (Tier 1 & 2)	Comparative survey
Mehta & Iyer (2022)	351 MCA postgraduates	Mixed-method survey
Nair et al. (2023)	487 technical students (national sample)	SEM analysis

F. Critical Summary of Key Empirical Studies

Throughout the examined literature, notable methodological strengths encompass substantial student populations and the application of validated survey tools. However, certain limitations are also apparent. A significant number of studies depend on cross-sectional designs, which restrict causal inference. The prevalence of self-reported measures raises issues regarding response bias. Furthermore, there is a lack of longitudinal tracking concerning graduate outcomes.

In spite of these limitations, the alignment of findings across various institutional settings enhances confidence in the recognized themes.

The studies outlined in Tables I and II provide consistent empirical evidence of the disconnect between academic training and global industry expectations within Indian technical education. Although there are methodological differences across samples and research designs, the convergence of reported findings bolsters the credibility of the identified challenges.

The major findings and methodological limitations identified across these studies are summarized in Table II.

TABLE II
 KEY FINDINGS AND METHODOLOGICAL LIMITATIONS OF REVIEWED STUDIES

Author (Year)	Key Findings	Major Limitations
Singh & Sharma (2020)	Outdated curriculum reduces job readiness	Self-reported data
Kumar et al. (2021)	Practical exposure improves employability confidence	Regional sampling bias
Rao & Patel (2021)	Digital readiness mediates online learning outcomes	Pandemic-specific context
Chatterjee & Bose (2022)	Industry exposure varies by institution type	Private platforms excluded

Mehta & Iyer (2022)	High reliance on external learning platforms	Limited qualitative depth
Nair et al. (2023)	Industry-aligned curriculum predicts global competence	Cross-sectional design

IV. RESULTS AND SYNTHESIS

This section provides a comprehensive synthesis of findings obtained from the systematically reviewed survey-based studies that concentrate on technical and computer-related education in India. Instead of merely presenting results from one empirical dataset, this synthesis amalgamates recurring quantitative trends, statistically significant correlations, and prominent qualitative themes recognized across various studies. The objective is to offer a cohesive overview of the primary challenges influencing India's standing in the global knowledge competition.

A. Aggregate Patterns in Curriculum Relevance and Skill Alignment

Throughout the studies examined, a clear trend is observed that highlights a pervasive sense of dissatisfaction among students regarding the relevance of curricula in technical education programs. Survey results consistently indicate that a significant number of students in computer science, information technology, and computer applications view the curricular offerings as misaligned with the current demands of the global industry. Quantitative results presented in various studies reveal statistically significant correlations between the perception of curriculum obsolescence and diminished confidence in employability [2], [6].

Regression analyses conducted across diverse institutional settings identify curriculum relevance as one of the most robust predictors of perceived job readiness. Students who report engagement with updated technologies and course content aligned with industry standards tend to achieve higher scores on indices measuring employability perception. In contrast, those from institutions that infrequently update their curricula express lower confidence in their ability to apply theoretical knowledge to practical challenges [4]. Collectively, these findings suggest that the rigidity of curricula serves as a systemic barrier that impacts global competitiveness.

B. Synthesis of Findings on Practical Exposure and Experiential Learning

Practical exposure represents a significant challenge emphasized in almost all the survey-based studies reviewed. Quantitative analyses comparing students who have had sustained experiential learning opportunities with those who have not indicate notable disparities in skill confidence, adaptability, and perceived preparedness for global roles. Students who indicated involvement in internships, live projects, or laboratory-focused coursework consistently exhibited greater self-reported competence in applied programming, system design, and collaborative problem-solving [1], [2].

As shown in Fig. 2, higher levels of practical exposure are consistently associated with stronger employability confidence across learning pathways.

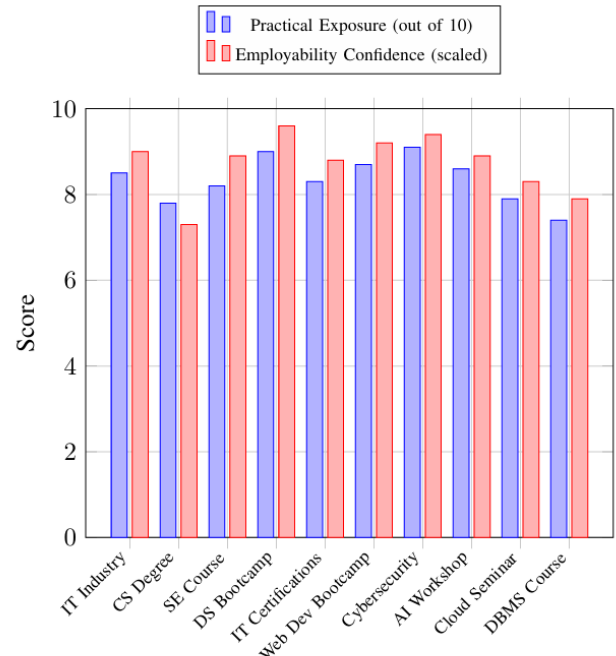


Fig. 2. Relationship Between Practical Exposure and Employability Confidence Across Learning Pathways

Statistical analyses, such as independent-sample t-tests and correlation assessments, reveal notable positive correlations between the length of practical training and employability results. Nevertheless, a synthesis of various studies suggests that access to these opportunities is inconsistent. Students from well-funded institutions gain disproportionately, whereas those attending smaller colleges experience limited exposure. This inequality exacerbates the differences in global competitiveness among technical graduates.

C. Digital Infrastructure, Online Learning, and Technology Readiness

The literature that has been examined shows varied results concerning the incorporation of digital learning within Indian technical education. Survey findings demonstrate a moderate to high level of acceptance for online and blended learning formats, especially in relation to theoretical content. Nevertheless, the effectiveness of these formats differs considerably depending on the quality of infrastructure and the level of digital readiness. Quantitative analyses highlight internet reliability, availability of personal computing devices, and previous digital literacy as key factors influencing satisfaction with online learning [5], [13].

The results of structural equation modelling, derived from a selection of studies, indicate that technological readiness serves as a mediator in the relationship between online instruction and learning outcomes. Students exhibiting high levels of digital readiness tend to report enhanced engagement and learning effectiveness, while those encountering issues related to connectivity and resource availability experience diminished academic satisfaction [14]. These results highlight the significance of infrastructural and contextual elements in influencing educational outcomes within digitally mediated settings.

Fig. 3 compares digital learning readiness between higher access and lower-access contexts across key indicators.

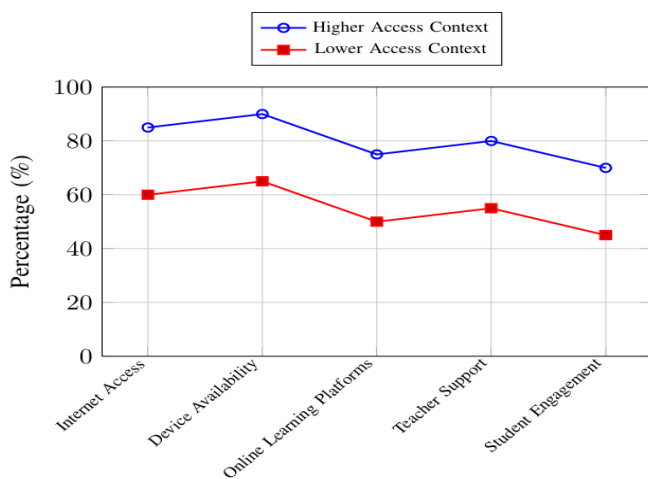


Fig. 3. Comparative Digital Learning Readiness Across Key Indicators

D. Employability Outcomes and Global Readiness Perceptions

Employability stands out as a key outcome variable in the studies examined. Survey-based assessments consistently reveal heightened levels of anxiety among technical students about their preparedness for international job markets. Quantitative analyses demonstrate that perceptions of employability are notably linked to exposure to industry-relevant skills, certification programs, and practical learning experiences [3], [4].

Cross-study synthesis indicates that students are progressively depending on external learning platforms to improve their employability. Correlation analyses reveal positive associations between participation in online certification courses and the perception of job readiness. Nevertheless, the dependence on these external platforms also signifies perceived shortcomings in institutional training, implying that formal education is frequently regarded as inadequate for global competitiveness.

Comparative findings further suggest that students identify limitations in soft skills, interdisciplinary exposure, and familiarity with global workplaces as obstacles to international employability. These perceptions are consistent across both undergraduate and postgraduate technical programs,

underscoring structural deficiencies in comprehensive skill development.

Key factors influencing global readiness and employability outcomes are summarized in Fig. 4.

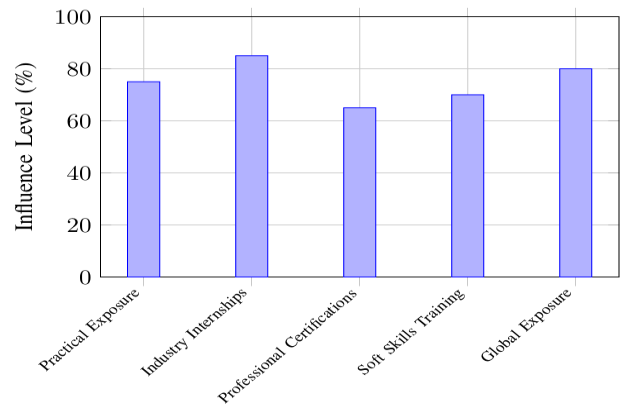


Fig. 4. Key Factors Influencing Global Readiness and Employability

E. Psychological and Behavioural Dimensions of Student Learning

In addition to structural elements, the synthesis reveals important psychological and behavioural factors that affect learning outcomes in technical education. Research based on surveys that investigate motivation, self-efficacy, and learning strategies shows a propensity for examination-focused learning. Quantitative findings suggest that students under significant assessment pressure are more inclined to utilize surface-learning techniques, which may hinder their ability to achieve a profound conceptual understanding [15].

Concurrently, the synthesis underscores the presence of adaptive behaviours among students. Those who actively engage in self-directed learning, collaborate with peers, and participate in online communities tend to report greater confidence in their technical skills and improved perceptions of employability. These results imply that individual agency can somewhat alleviate systemic deficiencies, even though access to additional resources is still inconsistent [3].

F. Methodological Convergence and Divergence Across Studies

The synthesis of methodological characteristics indicates a convergence in the application of cross-sectional survey designs alongside self-reported measures. Although large sample sizes contribute to enhanced generalizability, the dependence on perception-based data restricts causal inference. A limited number of studies integrate longitudinal tracking or objective skill assessments, which hinders the capacity to assess long term outcomes.

In spite of these constraints, the convergence of findings across various samples and institutional contexts bolsters confidence in the robustness of the challenges identified. The consistency of statistical relationships observed across studies reinforces the conclusion that curriculum relevance, practical

exposure, digital readiness, and alignment with employability are critical leverage points for reform.

In summary, the synthesized results illustrate a technical education ecosystem that is underpinned by strong theoretical foundations yet hampered by structural rigidity, uneven distribution of resources, and a misalignment with the demands of the global knowledge economy. These findings lay the groundwork for a more profound interpretation and policy-oriented discussion in the following section.

V. DISCUSSION

This discourse analyses the synthesized results of the systematic-style review within the larger framework of the global knowledge economy and India's ambitions to establish itself as a competitive knowledge-driven nation. By incorporating empirical trends identified through survey-based research, this section rigorously evaluates how structural, pedagogical, psychological, and contextual elements collectively influence the efficacy of technical education in India.

A. *Interpreting Curriculum–Industry Misalignment in a Global Context*

The synthesis indicates that the misalignment of curricula is not simply a technical problem associated with outdated content; rather, it is a systemic issue deeply embedded in institutional governance, regulatory frameworks, and pedagogical inertia. In the context of the global knowledge race, characterized by rapid technological advancements, education systems must adopt curricula that are both adaptive and responsive. The studies reviewed indicate that Indian technical education is still hindered by inflexible syllabus approval processes and examination-centric structures that emphasize content coverage over actual competence [6], [15].

From a global standpoint, leading educational systems prioritize modular curricula, ongoing revisions, and robust industry involvement in academic design. Conversely, the Indian scenario reveals a lack of institutional autonomy regarding curriculum innovation, which leads to a slow integration of emerging technologies. This delay adversely affects the competitiveness of graduates in international labour markets and perpetuates reliance on external skill-development platforms [7], [8].

B. *Practical Exposure as a Determinant of Knowledge Trans-fer*

The results emphasize the importance of experiential learning as a crucial element in converting theoretical knowledge into skills that are relevant on a global scale. Engaging in practical experiences allows learners to cultivate problem-solving skills, teamwork abilities, and contextual awareness—qualities that are highly esteemed in the international technology industry. Nevertheless, the unequal availability of experiential learning opportunities among various institutions mirrors larger disparities in the distribution of resources [1], [2].

The conversation points out that practical experience is influenced not only by the available infrastructure but also by the educational objectives. Faculty-led project-based learning, assignments guided by industry professionals, and integrated internship programs can greatly improve skill development, even in settings with limited resources. The studies reviewed suggest that in the absence of such educational approaches, students tend to face reduced confidence and adaptability, which hinders their preparedness for a global environment [4].

C. *Digital Transformation, Equity, and Learning Effectiveness*

Digital technologies offer both advantages and obstacles for technical education in India. Although online and blended learning approaches provide scalability and flexibility, their success is influenced by infrastructural and socio-economic conditions. The evidence reviewed indicates that without equitable access and adequate faculty training, digital transformation may exacerbate existing inequalities [5], [13].

From a perspective of global competitiveness, digital literacy is an essential skill. Students who do not have consistent access to technology face disadvantages not only in their academic pursuits but also in acquiring the digital fluency necessary for contemporary job markets. Therefore, the conversation highlights the importance of comprehensive digital strategies that encompass infrastructure enhancement, pedagogical development, and support systems for learners [10], [11].

D. *Psychological and Behavioural Dimensions of Student Readiness*

The synthesis underscores that merely implementing structural reforms is inadequate without considering the psychological and behavioural elements that affect learning. Assessment practices that focus primarily on examinations foster surface learning strategies, which restrict profound engagement with intricate technical concepts. This type of learning behaviour does not align with the requirements of global knowledge work, which necessitates creativity, critical thinking, and ongoing learning [12], [15].

In contrast, the adaptive behaviours exhibited by students—such as participation in self-directed learning and involvement in peer networks—reveal the untapped potential within the student body. The discussion indicates that if institutions were to acknowledge and incorporate these behaviours into formal educational frameworks, it could lead to increased motivation and self-efficacy, while simultaneously decreasing reliance on external platforms [3].

E. *Implications for Policy and Institutional Reform*

The results have profound implications for educational policy and institutional practices. The modernization of curricula must be underpinned by adaptable regulatory frameworks that facilitate swift adjustments. Enhancing collaboration between industry and academia should progress beyond mere symbolic alliances towards a genuine, ongoing co-creation of curricula and assessment frameworks [8], [9].

Faculty development stands out as a pivotal leverage point. Ongoing professional development in emerging technologies, digital teaching methods, and industry practices is crucial for converting reform goals into tangible classroom results. Furthermore, implementing systematic evaluation processes that utilize data-driven metrics of employability and skill development can improve accountability and foster continuous enhancement [10].

F. Methodological Reflections and Research Gaps

The discourse also contemplates methodological trends evident in the literature that has been reviewed. Although survey-based investigations provide significant insights into learner perceptions, an excessive dependence on self-reported data undermines objectivity. Furthermore, the lack of longitudinal designs limits the comprehension of how educational experiences correlate with long-term career outcomes [4].

Subsequent research ought to incorporate mixed-method and longitudinal strategies, merging survey data with performance-based evaluations and employment tracking. Comparative analyses across various national contexts could further clarify optimal practices for aligning technical education with global knowledge requirements [11].

In summary, the discussion positions the identified challenges within a more extensive systemic and global context, underscoring that improving India's standing in the global knowledge competition necessitates coordinated reforms across curriculum, pedagogy, infrastructure, and learner engagement.

VI. CONCLUSION AND FUTURE SCOPE

This systematic review aimed to synthesize empirical research based on surveys that investigate the challenges encountered by Indian technical education, specifically in the fields of computer science, information technology, and computer application programs, within the framework of the global knowledge race. By amalgamating insights from recent peer reviewed studies, the review offers a comprehensive understanding of the structural, pedagogical, technological, psychological, and contextual elements that influence learner readiness and global competitiveness.

The synthesis indicates that although Indian technical education exhibits strengths in theoretical instruction and widespread access, it continues to grapple with enduring challenges that hinder its ability to produce graduates who are competitive on a global scale. A significant issue identified is the misalignment of the curriculum with the rapidly changing demands of the industry, which is consistently associated with diminished confidence in employability and skill readiness among students. The infrequency of curriculum updates, coupled with rigid regulatory frameworks and examination focused teaching methods, collectively limits the system's responsiveness to global technological advancements [6], [15].

Furthermore, practical exposure and experiential learning are recognized as essential factors for effective knowledge transfer. Evidence gathered from surveys suggests that students who have consistent access to internships, project-based learning, and interactions with industry professionals

report greater technical confidence and adaptability. Nevertheless, such opportunities are not uniformly available across institutions, thereby perpetuating disparities in employability outcomes. This inequality presents a considerable obstacle to inclusive participation in the global knowledge economy [1], [2].

Digital transformation embodies both a significant opportunity and a formidable challenge for technical education in India. Although online and blended learning models have broadened access and enhanced flexibility, their effectiveness is influenced by the quality of infrastructure, the level of digital literacy, and the preparedness of faculty. Ongoing digital divides hinder learning outcomes for students from underprivileged backgrounds, highlighting the necessity for equitable and comprehensive digital education strategies [5], [11], [13].

The review further underscores the significance of psychological and behavioural aspects of learning. Assessment practices driven by examinations promote surface-learning strategies that do not align with the requirements of global knowledge work. Concurrently, students exhibit resilience and adaptability through self-directed learning and interaction with external platforms, showcasing untapped potential that formal education systems have yet to fully leverage [3], [15].

From a policy and institutional standpoint, the findings stress the urgent need for curriculum modernization, enhanced collaboration between industry and academia, and ongoing faculty development. Mechanisms for data-driven evaluation that concentrate on skill acquisition and employability outcomes can facilitate evidence-based reforms. Crucially, these reforms must strike a balance between scalability, quality, and equity to ensure that global competitiveness is achieved without sacrificing inclusiveness [8],[10].

Future research should progress beyond cross-sectional survey methodologies to include longitudinal and mixed-method approaches that monitor skill development and career paths over time. The integration of objective performance metrics alongside perception-based data would bolster analytical rigor. Additionally, comparative international studies could shed light on best practices for aligning technical education with the demands of the global knowledge economy [11].

In summary, improving India's standing in the international knowledge competition necessitates synchronized, multi-tiered reforms that harmonize curricula, teaching methods, technology, and student involvement with current global conditions. By integrating recent empirical findings, this review adds to the ongoing conversation about educational reform and lays the groundwork for future research and policy initiatives focused on enhancing the global competitiveness of technical education in India.

REFERENCES

- [1] S. Chatterjee and S. Bose, "Industry-academia collaboration and employability outcomes in Indian engineering education," *Journal of Education and Work*, vol. 35, no. 4, pp. 412-428, 2022.

- [2] R. Kumar, A. Singh, and P. Verma, "Skill gaps and employability perceptions among engineering graduates in India: A survey-based study," *Higher Education, Skills and Work-Based Learning*, vol. 11, no. 3, pp. 567–583, 2021.
- [3] P. Mehta and R. Iyer, "Employability readiness among postgraduate computer application students in India," *Education and Information Technologies*, vol. 27, no. 6, pp. 8123–8141, 2022.
- [4] S. Nair, K. Menon, and J. Thomas, "Modelling technical skill readiness and global competence among Indian engineering students," *International Journal of Educational Research*, vol. 119, Art. no. 102153, 2023.
- [5] P. Rao and D. Patel, "Digital readiness and online learning effectiveness in Indian higher education during COVID-19," *Computers & Education*, vol. 166, Art. no. 104175, 2021.
- [6] V. Singh and M. Sharma, "Curriculum relevance and employability in Indian technical education," *Education + Training*, vol. 62, no. 9, pp. 1037–1054, 2020.
- [7] World Economic Forum, *The Future of Jobs Report 2020*. Geneva, Switzerland: World Economic Forum, 2020.
- [8] World Economic Forum, *The Future of Jobs Report 2023*. Geneva, Switzerland: World Economic Forum, 2023.
- [9] Ministry of Education, *National Education Policy 2020*. New Delhi, India: Government of India, 2020.
- [10] OECD, *Education at a Glance 2021*. Paris, France: OECD Publishing, 2021.
- [11] UNESCO, *Reimagining Our Futures Together: A New Social Contract for Education*. Paris, France: UNESCO, 2021.
- [12] Y. Zhao, *Who's Afraid of the Big Bad Dragon? Why China Has the Best (and Worst) Education System in the World*. San Francisco, CA, USA: Jossey-Bass, 2020.
- [13] S. Bansal and P. Aggarwal, "Digital divide in Indian higher education: Evidence from student surveys," *Asian Education and Development Studies*, vol. 10, no. 3, pp. 425–441, 2021.
- [14] N. Gupta and P. Bhaskar, "Online learning adoption and student satisfaction in Indian universities," *Education and Information Technologies*, vol. 27, no. 4, pp. 4829–4851, 2022.
- [15] J. B. G. Tilak, "Higher education in India: In search of equity, quality, and sustainability," *Social Change*, vol. 51, no. 2, pp. 235–249, 2021.