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Hospitality education and the skills gap: The future of hospitality training in the digital era

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Abstract

The hospitality industry, a cornerstone of the global economy, is experiencing a widening skills gap despite its ongoing growth and increasing employment opportunities. Businesses typically lament the lack of digital literacy, sustainability knowledge, supervisory abilities, and service quality. The hotel sector has seen a full transformation due to the advent of AI-powered guest services, online reputation management platforms, property management systems, and sustainable practices. However, many schools continue to emphasize traditional service methods, leaving graduates unprepared for the demands of the contemporary industry. This study synthesizes information from both global and Indian contexts between 2023 and 2025 in order to examine skills requirement, evaluate effective digital training options, and assess how education policy frameworks could assist bridge the gap. The most promising approaches for cutting down on training time and enhancing workforce preparedness are blended learning, modular micro-credentials, and immersive technology like virtual reality and simulation. The Academic Bank of Credits, SWAYAM MOOCs, and India's National Credit Framework (NCrF) provide structural facilitators for incorporating modules related to the workplace into formal education. According to the report, all theoretical and practical areas in hospitality curriculum should incorporate digital and sustainability competences, and industry partnerships should guarantee the courses' continued relevance.

According to the findings, employment now depends on baseline digital fluency, platform literacy, data-driven decision-making, and green behaviors. Infrastructure investment, faculty expansion, and strict quality assurance will all be necessary for scaling solutions. Ultimately, retaining hospitality's competitiveness in the digital era requires developing a workforce that is both customer-focused and tech-savvy.

Keywords: Hospitality education, skills gap, digital transformation, virtual reality, micro-credentials, swayam, NCRF, sustainability

Introduction

The hospitality and tourism industry continues to be one of the most important economic sectors in the world, supporting approximately 350 million jobs worldwide and contributing roughly 10% of global GDP. In addition to their economic benefits, these businesses have a big impact on consumer lifestyles, regional development, and cross-cultural interactions. Even though the industry is resilient and has recovered swiftly from global shocks like the COVID-19 pandemic, it nevertheless faces a recurring issue: a shortage of worker skills that satisfy shifting employer demands. This skills gap has been documented in a number of locations and has several facets.

Finding workers that can both adjust to the digitalized and sustainability-driven realities of modern business and are proficient in traditional service standards is a common problem for employers. In particular, a lack of digital literacy, limited exposure to state-of-the-art service technology, poor managerial competence, and poor problem-solving skills are frequently cited.

In a field that is fundamentally people-centric, these differences directly affect service quality, customer satisfaction, and organizational competitiveness. In the Indian context, this issue is made worse by two interrelated factors. First, the domestic hospitality and tourism industry is expanding quickly due to a number of factors, including an increase in both domestic and international travel, government-led programs like "Dekho Apna Desh" and Incredible India 2.0, and rising disposable incomes. The demand for employable graduates is exceeding supply, despite the fact that the industry's rapid expansion is creating new work opportunities in the hotel, resort, restaurant, airline, and associated services sectors.

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Second, the country's higher education system is undergoing a major transformation according to the National Education Policy (NEP 2020), which places a strong priority on digital integration, credit portability, and trans-disciplinary learning. Even if this reform sounds promising, its benefits won't become apparent until hospitality courses quickly adapt to the needs of the market.

The digital revolution is the primary driver of change in the hospitality industry. Major features of today's hotels and restaurants include contactless check-in and mobile key systems to increase safety and convenience; chatbots and concierge services powered by AI to interact with guests around-the-clock; digital housekeeping applications to maximize efficiency and communication; and property management systems (PMS) for reservations, billing, and room allocation. Beyond operations, digital marketing, revenue management, and reputation platforms all have an impact on client acquisition and retention. As a result, rather than being an option, digital competency is now necessary for all positions, from entry-level workers to managers. The imperatives of sustainability are equally radical. The hospitality business has been forced to reevaluate its economic strategy due to stricter regulations, worldwide sustainability goals, and rising customer awareness. Energy-efficient building designs, waste management systems, water conservation methods, and sustainable food and facility supplies are now considered essential components of

a competitive strategy rather than optional extras. Graduates entering the profession are therefore expected to comprehend ethical business methods, sustainability ideals, and service regulations. But many hospitality training programs, particularly in poorer countries, are still firmly based on outdated curricula and traditional teaching methods. Classroom lectures usually concentrate on theoretical service operations, while practical labs replicate old setups without integrating the technology and environmental techniques that are becoming more prevalent in prestigious properties around the world. Graduates may possess exceptional memorizing skills, but they lack the adaptability, technological know-how, and problem-solving mindset required for real-world operations due to this disconnect between academia and business.

To bridge this gap, a deliberate shift in the design, implementation, and assessment of hospitality education is required. It calls for enhancing industry-academic collaboration, incorporating digital fluency and sustainability as crucial components of curricula, and utilizing cutting-edge learning technologies like simulation, virtual reality, and modular online training. It is challenging to prepare graduates for immediate employability while simultaneously equipping them with the lifelong learning skills required for adaptation in a subject that is still undergoing rapid change.

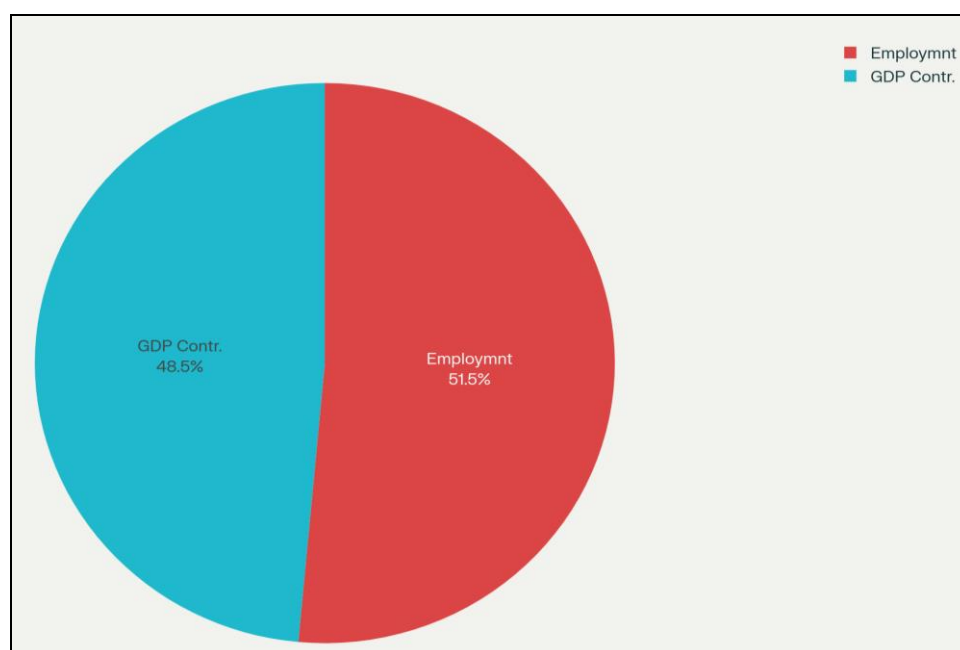


Fig 1: Global Hospitality: GDP & Jobs

Materials and Methods

a. Research Design

Through a scoping review and policy analysis, this study investigates the skills gap in hospitality education and how digital training methods may bridge it. A scoping review was selected over a systematic review because its objective is to map the extent of available data, highlight emerging patterns, and identify areas that need more research, not to evaluate the effectiveness of a precisely defined intervention. Policy analysis was used to evaluate how industrial frameworks, educational changes, and government initiatives impact curriculum alignment with workforce demands, especially in the Indian setting.

The two-pronged approach enables a thorough understanding: the policy analysis contextualizes the findings in light of evolving labor and educational policy, while the scoping study provides evidence-based insights into the nature of the skills gap and training solutions.

b. Data Sources

The study draws upon a wide range of secondary sources to ensure comprehensive coverage:

International Reports and Datasets

World Travel and Tourism Council (WTTC) - for global employment data, GDP contribution, and sector forecasts.

UN Tourism (formerly UNWTO) - for global recovery trends, digitalization in tourism, and workforce development needs.

UNESCO-UNEVOC - for global perspectives on Technical and Vocational Education and Training (TVET), especially relating to digital and green skills.

Indian National Sources

- *Tourism and Hospitality Skill Council (THSC)* - for role-specific demand projections and skills-gap analysis in India.
- *University Grants Commission (UGC) & Ministry of Education (MoE)* - for education frameworks such as SWAYAM MOOCs, National Credit Framework (NCrF), and Academic Bank of Credits (ABC).
- *National Education Policy (NEP 2020)* - as a guiding framework for reimagining higher education in India.

Peer-Reviewed Journals and Conference Proceedings

- *Journals in hospitality, tourism, education, and management were searched (e.g., Journal of Hospitality & Tourism Education, Tourism Management, Worldwide Hospitality and Tourism Themes).*
- *Relevant case studies of digital learning, simulation, and VR-based training were included.*

c. Time Frame

To ensure current relevance, the analyzed material's critical time span was 2023-2025. The post-pandemic era, during which the digital revolution spread throughout the hotel sector, was mirrored in this time frame. However, key research and policy documents published before 2023 were also included if they significantly influenced current debates or policy frameworks.

d. Inclusion and Exclusion Criteria

Inclusion Criteria

- Research and publications that specifically address the need for skills in the hospitality and tourism industries.
- Studies on virtual reality, blended learning, online learning, and simulation as digital training modalities.
- Policy papers pertaining to skill frameworks, credit systems, education reforms, or sustainability integration.
- Studies conducted both internationally and in India to enable cross-comparison.

Exclusion Criteria

- Editorial commentary or opinion writings without of supporting data.
- Case studies lacking a defined technique yet including anecdotal evidence.
- Unless they had transferable value, studies conducted outside of the hospitality, tourist, or educational setting were not included (for example, VR use in medical education was not included unless it was connected to training in the service industry).

e. Screening and Selection Process

- Three-stage screening strategy was used in the selection process

The technique of initially reviewing titles to exclude research that isn't relevant is known as title screening.

The process of assessing abstracts for thematic relevance to digital training, policy frameworks, or skills is known as abstract screening.

Full-Text Analysis: A thorough examination of a few chosen papers to gather information on training results, skill requirements, and policy enablers.

f. Data Analysis Approach

Rather than being statistically aggregated, the results from the literature were narratively synthesized because meta-analysis was not feasible because of the variety of study types (qualitative reports, employer surveys, policy briefs, and academic case studies). The narrative synthesis enabled the identification of trends, parallels, and discrepancies among sources.

The policy component was analyzed using a document analysis method. Policies such as NEP 2020, NCrF, and SWAYAM guidelines were evaluated from three angles:

The policy's intent is its objective.

Implementation

How it is made possible for institutions to embrace it

Implications: What results are anticipated in the field of hospitality education?

g. Limitations

Several limitations shape the scope of this research

Secondary Data Dependence: The study solely analyzes data that has already been published; it does not employ primary research techniques like as surveys or interviews with educators, employers, or students. As a result, conclusions reflect trends observed in current research rather than the real perspectives of stakeholders.

Heterogeneity of Evidence on Digital Tools: Although virtual reality and simulation are widely discussed, there is a vast range in the quality and design of research. Some find notable increases in learner engagement and skill acquisition, while others show a slight, measurable influence on information retention.

Contextual Constraints: Most global research is carried out in more developed countries with stronger internet infrastructure. Results may need to be adjusted before being used in India, where the digital divide is still an issue.

Time Sensitivity: Given the speed at which technology is developing in the hospitality sector, some training techniques could quickly become outdated. What works now may need to be reassessed in a few years.

Study Area

This study, which is being carried out in a broader global framework, focuses primarily on India's hospitality workforce and educational environment. One of the fastest-growing hospitality markets in the world, India was selected as the focus due to a number of factors, including strong domestic demand, a developing middle class, an increase in foreign tourists, government-backed initiatives like Dekho Apna Desh and Incredible India 2.0, and advancements in the nation's infrastructure, such as its railroads, airports, and

smart cities. Even though these developments have created an unparalleled need for qualified individuals, the education and training ecosystem still faces challenges from outdated curricula, poor industrial links, and inadequate digital integration.

a. The Indian Hospitality Education Landscape

In India, hospitality education is offered by a mix of federal government organizations, private schools and colleges, and state-run institutions. The National Council for Hotel Management and Catering Technology (NCHMCT) oversees the flagship Institutes of Hotel Management (IHMs), which set the bar for structured hospitality education. Private universities and specialized institutes have expanded significantly in tandem to serve the growing student body.

The infrastructure, industry involvement, faculty training, and program design of these schools are still lacking. Many programs still heavily emphasize traditional service training, which puts front desk operations, cleaning, and food preparation ahead of technology, analytics, sustainability, and innovation. The demands of modern hospitality employment are often too much for recent graduates to handle.

b. National Education Policy (NEP 2020)

India's National Education Policy (NEP 2020) provides a ground-breaking framework that directly impacts hospitality education. Multidisciplinary work, flexibility, digital integration, and skill development are all highly valued at NEP. Institutions of higher learning are intended to serve as both knowledge providers and hubs for innovation with ties to the industry.

Particularly relevant to the hotel sector are NEP's recommendations about experiential learning, vocational exposure, and credit mobility. It promotes the integration of vocational courses in degree programs, which aligns well with the hotel industry's business-oriented, hands-on training approach. Additionally, the expansion of specialized training modules across the country is made feasible by the demand for digital platforms and online courses.

c. National Credit Framework (NCrF) and Academic Bank of Credits (ABC)

The National Credit Framework (NCrF), which was introduced in 2023, was a major step toward the integration of academic and vocational education in India. In addition to classroom instruction, this approach allows students to earn credits from work experiences, skill-based credentials, and online courses. These credits are stored in the Academic Bank of Credits (ABC), a digital repository that allows credit transfer between universities.

This implies that students can receive credit for earning short-term certifications in digital skills, sustainability, or customer service.

The flexibility of the NCrF allows for lifelong learning pathways, allowing professionals to re-skill or up-skill without having to repeat formal degree programs.

d. SWAYAM MOOCs and Digital Integration

SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds), India's national MOOC initiative, seeks to democratize access to high-quality education. After the

University Grants Commission (UGC) authorized the inclusion of SWAYAM courses in the university curriculum, students are able to transfer a specific percentage of their MOOC credits to degree programs.

Many colleges would not be able to offer specialized digital and sustainability courses in the hospitality sector on their own, but this creates opportunities for them. A hospitality student in Chennai or Gorakhpur, for example, can enroll in a SWAYAM course in digital marketing, revenue management, or tourism sustainability offered by a respectable university in another region of India and earn credit that their home university will recognize. This eliminates regional differences and guarantees that students in smaller communities or institutions with fewer resources are still exposed to knowledge that is pertinent to the business.

e. Comparison with Global Practices

Leading hospitality education institutions in the US, Singapore, and Switzerland have already included technology and sustainability into their core curricula. Programs at institutions such as École hôtelière de Lausanne (EHL) and Cornell University School of Hotel Administration use simulation-based training, digital labs, and sustainability case studies. Similarly, Singapore's Institute of Technical Education (ITE) developed immersive virtual reality training for hospitality tasks. Even while this transition is still in its early stages, frameworks like NEP, NCrF, and SWAYAM have put India in a good position to pursue a similar trajectory. The challenges of industry collaboration, infrastructure limitations, and faculty readiness must be addressed to reach international standards.

f. Rationale for India as the Study Area

India's twin status as a large consumer market and a developing training ecosystem make it an excellent place to study. The industry's quick growth ensures a demand for skilled labor, and educational reforms provide the framework for modernizing curricula. This study looks at India's hospitality education system from a global perspective, suggesting strategies that other developing countries facing similar challenges of finding a balance between volume and quality might use.

Results and Discussion

Four major themes in-demand skills, effective training techniques, system and policy enablers, and implications for hospitality education are used to organize the research's findings. Together, these themes provide a comprehensive grasp of the issues and opportunities affecting hospitality training in the digital era.

a. Skills in Demand

1. Digital Proficiency

Employers are starting to require digital literacy for graduates in the hospitality industry. Front desk employees must be proficient in property management systems (PMS) for guest check-in, billing, and reservations; marketing teams depend on CRM platforms and digital reputation management tools; and food and beverage managers are increasingly using digital dashboards to monitor inventory

and service quality. Since the epidemic accelerated the adoption of contactless technology such as mobile check-in, QR code menus, and

AI-enabled concierge services, digital adaptability is crucial. If a graduate was not exposed to these tools throughout training, they will have a harder time finding employment.

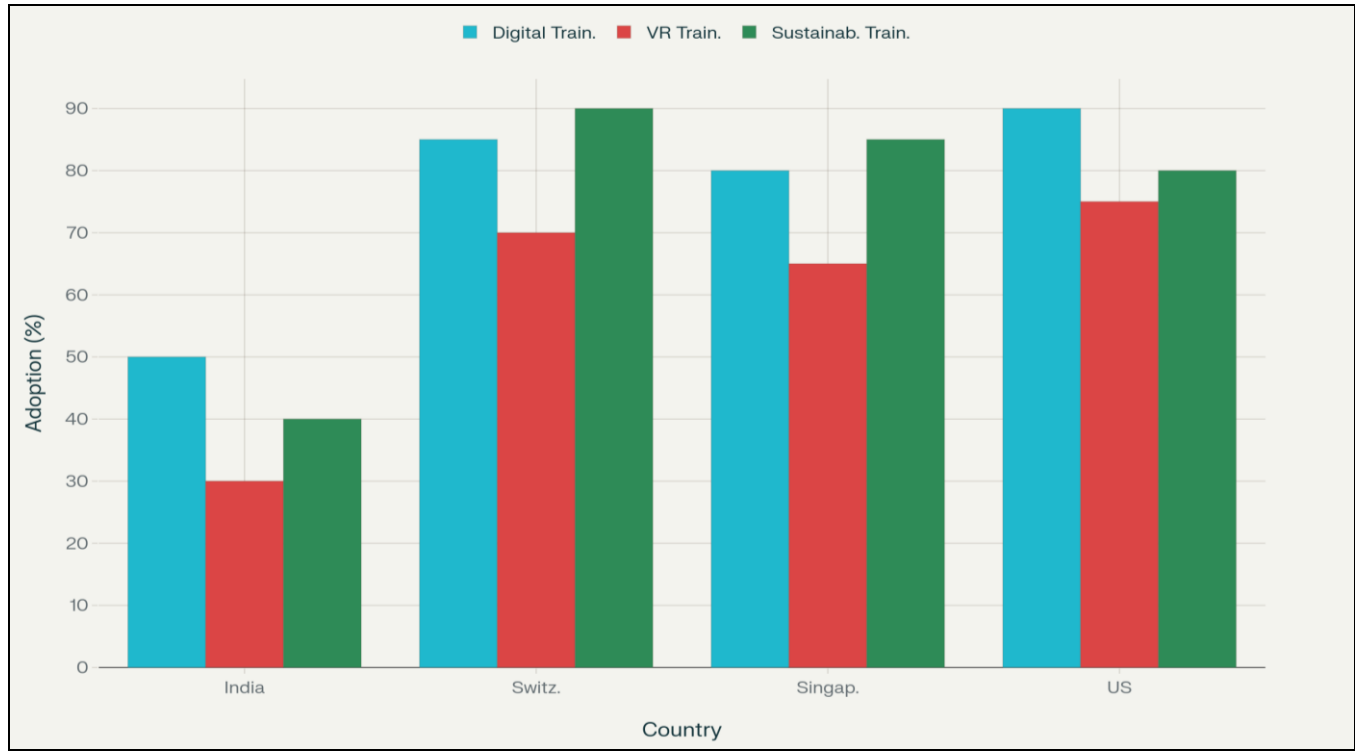


Fig 2: Adoption of Modern Training Methods in Hospitality: India vs Global Benchmarks

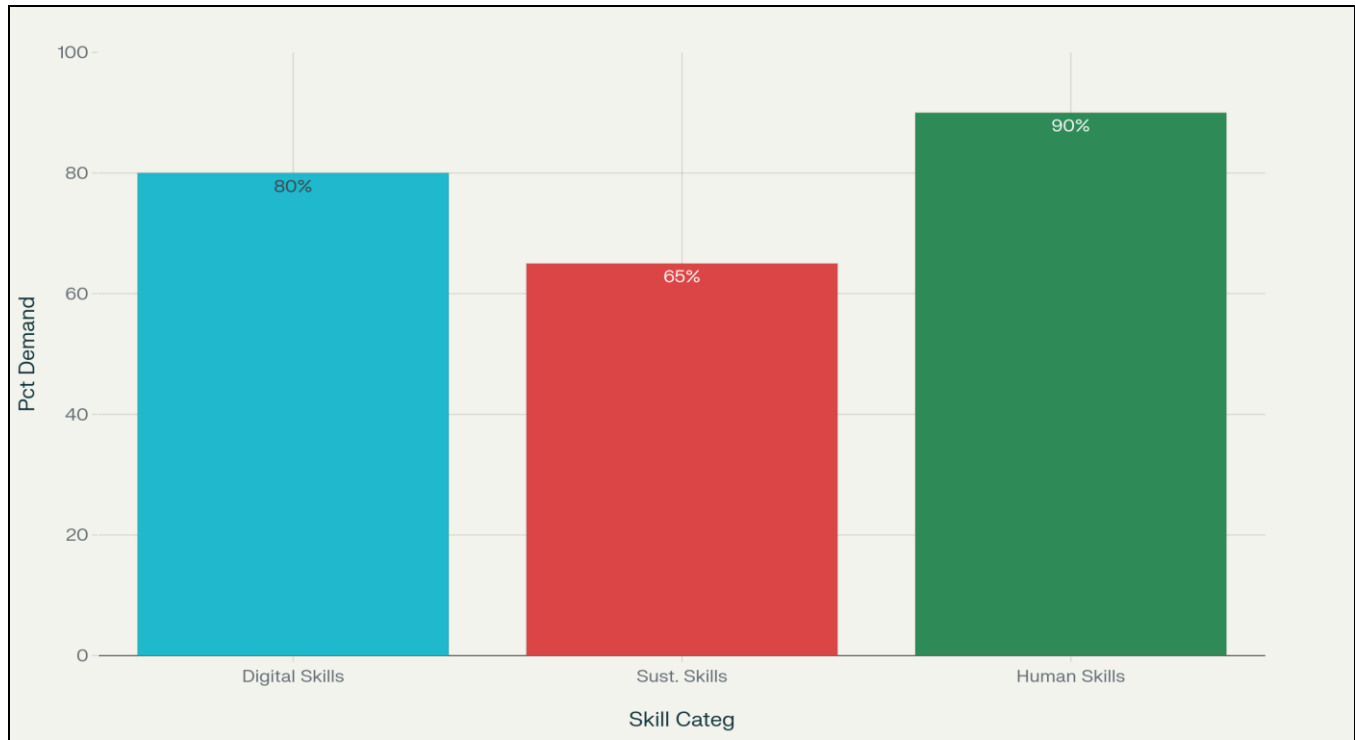


Fig 3: Employer Priorities Hosp Skills 2025

2. Data and Analytical Skills: Hospitality operations today generate vast amounts of data from guest feedback surveys to point-of-sale transactions. Employers expect graduates to not only collect data but also interpret it for decision-making. For instance, revenue management requires

analyzing booking patterns and competitor pricing, while marketing relies on interpreting social media analytics. The industry is gradually moving toward data-driven personalization, and the workforce must be able to translate numbers into guest-centric strategies.

Table 1: Summary of key skills and proficiency.

Competency Area	Description	Importance Level	Current Graduate Proficiency	Notes/Implications
Digital Literacy	Basic technology usage including PMS, POS systems	Very High	Moderate	Essential for daily operations and guest management
Platform Literacy	Competence in online reputation and booking platforms	High	Low	Critical for brand management, marketing
Data-Driven Decision Making	Ability to analyze guest data and operational reports	High	Low	Supports personalized services and efficiency
AI and Automation Awareness	Understanding of AI-driven guest interaction tools	Medium	Very Low	Growing area with increasing relevance

3. Sustainability and Green Practices

Sustainability is evolving from a branding exercise to an operational necessity. Hotels are facing increasing pressure to comply with international standards such as the Sustainable Development Goals (SDGs) of the United Nations and to satisfy customer requests for eco-friendly operations. Graduates should understand concepts including waste segregation, energy-efficient design, carbon footprint reduction, and sustainable sourcing. Lack of training in these areas leads to a significant employability gap.

4. Human and Interpersonal Skills

Although digital skills and sustainability are important, people are still the main focus of the hotel industry. Interpersonal skills including empathy, communication, conflict resolution, and cross-cultural competency are equally crucial. These skills are now necessary for usage in digitally mediated scenarios, such handling visitor interactions on social media sites or using live chat to resolve a complaint.

5. Managerial and Supervisory Skills

Employers also say that supervision skills are deficient. As properties expand, frontline staff are often quickly promoted into management roles. Graduates who lack experience in leadership, team management, and problem-solving struggle in these positions. Thus, it is essential to incorporate scenario-based leadership training into curriculum.

B. Effective Training Approaches

1. Blended Learning Models: The most effective approach to hospitality education is blended learning, which blends online theoretical courses with in-person practicals. Short, modular online courses allow students to learn the theoretical foundations at their own pace, while in-person workshops focus on applying knowledge in simulated or real-world settings. For instance, a course on digital marketing for the hospitality industry might use online modules to teach theory before giving students an assignment to analyze data on a hotel's online reputation. This approach not only reduces class time but also encourages application and active learning.

2. Micro-Credentials and Modular Training

"Revenue Management Basics" and "Sustainable Housekeeping Practices," for example, are short, competency-based certifications that focus on a specific set of skills. Students can stack them toward degrees or diplomas in India by keeping them in the Academic Bank of Credits (ABC) and credit mapping them under the National Credit Framework (NCrF). Micro-credentials are particularly helpful in the hospitality business because of its quick innovation. Both recent graduates and working

professionals can utilize them to upskill or reskill without committing to full-time degrees.

3. Simulation-Based Learning

Simulation technologies replicate real-world scenarios in a controlled learning environment. For example, revenue management simulations allow students to practice changing room prices in response to demand trends, while service simulations replicate stressful dining or front desk circumstances. Research shows that simulations improve participation and decision-making, particularly when they provide immediate feedback. They also prepare students for rare but important scenarios, like emergency evacuations or handling a food safety issue, that are challenging to rehearse in real-world internships.

4. Virtual Reality (VR) and Immersive Technologies

Virtual reality (VR) has begun to acquire traction in international hospitality education, despite its relatively modest usage in India. Simulated reality (VR) may recreate complex, high-stakes scenarios, such as teaching a housekeeping student how to prioritize tasks in a fully simulated hotel floor or providing food and beverage trainees with the chance to practice serving in a busy restaurant. Virtual reality has been shown to increase motivation and confidence, but there are still problems with infrastructure, cost, and instructor readiness. However, with the help of shared labs, industry partnerships, and progressive curricular integration, these challenges can be overcome.

5. Work-Based Learning and Industry Partnerships

The most crucial tactic is probably integrating digital practices into actual work environments. Students can acquire training versions of CRM or PMS software through industry partnerships, guaranteeing they are conversant with it prior to starting work. Beyond traditional service roles, internships and apprenticeships must expose participants to digital systems and sustainability initiatives.

**Fig 4:** Integrated learning pathway combining digital

c. Policy and System Enablers

1. SWAYAM and Online Integration

SWAYAM is the national MOOC (Massive Open Online Course) program in India. It enables academic institutions to accept and provide credits for specialized online courses. For the hospitality sector, this is revolutionary. A

SWAYAM-certified "Hospitality Analytics" course at a renowned university can be taken by a student from a small town, earning them credits that can be used toward their degree. This eliminates regional differences and improves access to innovative content.

2. National Credit Framework (NCrF)

The NCrF integrates experience, academic, and vocational learning into a unified framework. This suggests that in addition to conventional classroom training, online courses, internships, apprenticeships, and industry certifications can be used to earn credits for students pursuing hospitality studies. The stackable structure encourages continuous professional development and satisfies the industry's need for lifelong learning.

3. Academic Bank of Credits (ABC)

Student credits are stored digitally in the ABC. Because they can earn micro-credentials at one school, complete part of a diploma at another, and still earn credits toward a full degree, this allows students flexibility in the hospitality sector. This adaptability reflects the workforce's dynamic and mobile nature in the hospitality industry.

4. Alignment with NEP 2020: Flexibility, transdisciplinary education, and experiential learning are all highly valued in NEP 2020 and are closely linked to the requirements of hospitality training. Closing the gap between school and industry can be achieved through the effective implementation of policies that support occupational exposure, credit mobility, and technology integration.

Table 2: Framework goals, execution, and industry advantages.

Policy/System	Aim	Implementation	Benefits for Hospitality Sector
NEP 2020	Revamp education to be multidisciplinary, skill-oriented with digital emphasis	Promotes flexible curricula, vocational training, and digital learning integration across education levels	Encourages inclusion of digital and sustainability skills in hospitality courses, promoting industry-relevant competencies
NCrF	Standardize credit transfer and accumulation to promote flexible learning paths	National Credit Framework enables modular courses credited for skill acquisition, applicable across institutions	Facilitates modular learning and recognition of hospitality skill modules enhancing workforce readiness and employability
SWAYAM	Provide Massive Open Online Courses (MOOCs) accessible nationwide	Online platform offering diverse courses including hospitality-related digital and green skills modules	Expands access to updated industry-relevant training, supports lifelong learning for hospitality professionals
ABC	Academic Bank of Credits to store and manage students' academic credits digitally	Digital repository for accumulated credits, supporting credit transfer and flexible education pathways	Enables students to accumulate and redeem credits for skill-specific courses, fostering continuous upskilling in hospitality

D. Implications for Hospitality Education

1. Curriculum Redesign

Digital and environmental competencies must be included in all hospitality training. Housekeeping labs should employ IoT-enabled checklists, guest encounters labs should incorporate CRM practice, and front office labs should use real or simulated PMS.

2. Faculty Development

Faculty members must constantly improve their knowledge of digital technologies, environmental concepts, and new teaching techniques. Without this, even well-designed curricula won't provide outcomes. Faculties are required to take part in train-the-trainer programs and industry internships.

3. Infrastructure Investment

Institutions are required to invest in digital labs, simulation software, and shared VR facilities. Software provider partnerships can reduce costs by offering training versions of CRM and PMS systems.

4. Strengthening Industry-Academic Linkages

Industry participation in curriculum development, assessment, and micro-credential generation keeps training up to date. Collaborative research, guest lectures, and internships that entail more than just routine tasks will improve employability outcomes.

5. Policy Implementation Challenges

Quality assurance, rural-urban digital disparities, and administrative capabilities must be addressed throughout implementation, even while frameworks like SWAYAM and NCrF provide structural support. If policies are not

monitored and reviewed, they may continue to be underutilized.

Conclusion

Digital innovation, sustainability requirements, and changing customer expectations are all having a rapid impact on the hotel industry. In order to stay current, hospitality education needs to incorporate digital and sustainability competences using simulation-based learning, blended learning, and micro-credentials that are backed by national frameworks like NCrF, SWAYAM, and NEP 2020. Implementation requires bolstering industry-academia cooperation, digital infrastructure, and faculty development. The future of the industry will be shaped by a workforce that is service-oriented, environmentally responsible, and technologically savvy. Government, academia, and industry must work together to close the skills gap and guarantee globally competitive and flexible hospitality education.

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