Assessing the Impact of Practical Training Infrastructure and Educational Programs on Technical Skill Development among Tourism and Hospitality Students in Egyptian Technological Universities

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Abstract

This study looks at how practical training facilities and educational programs help develop technical skills among Tourism and Hospitality students at technological universities in Egypt. In recent years, about ten technological universities across the country have started offering related programs. However, only two universities—Port Said East Technological University and Thebes Technological University in Luxor— have established a Faculty of Tourism and Travel Technology. The main goal of this research is to understand how practical training and curriculum affect the technical skills of students. Applying a quantitative approach, the study collected data through a structured questionnaire given to 175 students. It explores how hands-on training facilities, and the content of the educational programs influence students' ability to develop technical skills. This study demonstrates that the effectiveness of educational programs plays a crucial role in enhancing the technical skills of tourism and hospitality students. Additionally, ICT applications and infrastructure significantly influence the quality and success of these educational programs. Together, these factors highlight the importance of well-structured programs supported by adequate technological resources in fostering skill development in this sector. These findings highlight the importance of having well-designed courses and hands-on training facilities to help students build important skills in digital literacy and operations within the tourism and hospitality industry. The study also suggests that integrating new technologies such as artificial intelligence, virtual reality, and data analytics into the curriculum could better prepare graduates to compete in the global tourism market.

1. Introduction

Technological education plays an increasingly critical role worldwide in preparing a skilled workforce capable of addressing the demands of rapid industrial and digital transformation. Defined broadly as education that integrates theoretical knowledge

with practical application in scientific and technical fields, technological education equips learners with competencies essential to thrive in evolving labor markets (UNESCO, 2016). Countries such as Germany, the United States, and Japan have successfully leveraged technological universities to enhance innovation, economic development, and employment outcomes by bridging the gap between academic preparation and sector-specific skills (Yildizet al., 2020; Başer et al.,, 2025).

As well Egypt is currently witnessing a profound transformation in its higher education system, having adopted an ambitious strategy to establish technological universities as a foundational pillar for achieving the Sustainable Development Goals detailed in Egypt's Vision 2030 These universities are a direct response to the growing gap between the outputs of the traditional educational system and the requirements of the modern labor market, which increasingly demands technically qualified cadres capable of keeping pace with rapid technological advancements. Therefore, Egypt established 10 technological universities during the first phase, in accordance with Law No. 72 of 2019, targeting 27 such universities—one in each governorate These universities are distinguished by a unique educational model that combines theoretical learning and practical training, with students spending 60% of their time in hands-on experiences. (Awad, 2022). The National Strategy for Higher Education and Scientific Research 2030 emphasize the development of technological education to meet sustainable development and labor market needs, integrating technology into education, developing human skills, promoting project-based learning, and supporting green jobs (Ministry of Higher Education and Scientific Research, 2025).

The tourism and hospitality sector is among the fastest growing globally, requiring specialized technical cadres to adapt to rapid technological change. Technological universities address these needs by offering specialized programs that blend theory and practice. The Faculty of Hotel and Tourism Services Technology at Thebes Technological University (TTU) and East Port Said Technological University (EPT), offers advanced programs designed to prepare professionals in hospitality and tourism through curricula that combine theoretical study with practical training. These programs enable graduates to work in travel agencies, airlines, airports, tourism organizations, conferences, Hotels, Restaurant, Hospitality service provider…. etc. (Ministry of Higher Education and Scientific Research, 2019).

The importance of this research lies in addressing the persistent gap between technical education outcomes and the evolving needs of Egypt's tourism and hospitality sector. Specifically, it examines how technological education programs can be optimized to equip students with the necessary technological proficiencies and practical skills that enhance their employability and contribute to national economic goals. Furthermore, the research problem focuses on this misalignment between graduates' skills and industry demands, a challenge magnified by the rapid digitalization of service industries and the increasing adoption of sophisticated information and communication technologies (ICT) in tourism and hospitality management (Daif & Elsayed, 2019; Moussa et al., 2023). The study aims to contribute evidence-based insights to support curriculum enhancement, infrastructure development, and policy formulation tailored to these pressing needs. **Therefore, the research aims to achieve the following objectives:**

- To evaluate the adequacy and effectiveness of Practical training infrastructure and simulation-based training facilities (e.g. airline‑ booking labs, mock hotel rooms, educational kitchens, training restaurants) in tourism and hospitality programs.

- To examine how the design and delivery of educational programs in technological universities contribute to students' acquisition of technical competencies in tourism and hospitality.
- To investigate the relationship between Practical training infrastructure and the enhancement of students' practical technical skills.

Research Hypotheses

- **H1:** There is a significant positive relationship between practical training infrastructure of technological universities and students' technical skill development in tourism and hospitality sector.
- **H2:** There is a significant positive relationship between the content of educational programs in technological universities and students' technical skill development in tourism and hospitality sector.
- **H3:** There is a statistically significant effect of educational program effectiveness on the development of technical skills among tourism and hospitality students.
- **H4:** There is a statistically significant effect of ICT applications and infrastructure on the effectiveness of educational programs.

2. Literature Review

2.1. Technological Education

The demand for creative teaching strategies has increased due to the growing use of digital technology and sustainability requirements (Sidik et al., 2024; Tavitiyaman & Zhang, 2022). Information technology has caused a significant shift in higher education, affecting both how institutions provide instruction and how students interact with their coursework. Due to fast changing learning patterns and high expectations for participatory, digitally enhanced experiences, today's students view IT as a necessary tool rather than a novelty. To increase accessibility and student involvement, this shift forces universities to create online and mixed learning environments that get over the conventional time and location limits. Additionally, IT developments have transformed academic services, such as digital library access and administrative procedures, increasing productivity and student happiness. Especially in hospitality and tourism education, integrating this technology promotes interactive learning and improves understanding of complicated management issues. Educational institutions must satisfy the technical demands and expectations of contemporary learners to guarantee instructional efficacy, student retention, and long-term competitiveness in a changing academic environment (Muscanell & gay, 2025, NCBI, 2025, UNESCO, 2023).

By establishing technology-driven collaborations between academic institutions, the government, community organizations, and the commercial sector, collaborative education in higher education seeks to give students all around the world access to top-notch information. Through these partnerships, educational institutions can benefit from pedagogical and technological know-how while preserving curriculum independence and quality control. Colleges can increase the scope and impact of education by combining resources and creating learning resources at a reasonable cost through partnerships and consortia. This method gives access to cutting-edge instructional tools, promotes knowledge sharing, and increases student participation. In today's educational setting, technology is crucial for facilitating virtual learning environments, sharing resources, and simplifying communicational of which are necessary for productive teamwork. (Jisc, 2024; Badawi, 2025).

Access to education for sustainable development improves across homes, workplaces, and schools through integration of open-source and digital learning

environments. Tourism and hospitality programs are crucial in advancing sustainability by promoting ethical business practices, responsible travel, environmental awareness, and cultural heritage preservation. These programs emphasize respect for culture, excellent customer service, and human interaction. Practical training—using contextual learning, collaborative education, simulation games, problem-based learning, and case studies—is a defining feature of vocational education and training (VET) in this field (Vakhmanova & Bychkova, 2024).

2.1.1: Challenges in Curriculum and Technology Integration

Curricula increasingly use technological tools to enhance learning experiences, such as virtual reality, social media, and online courses. The integration of educational technology in hospitality and tourism is growing in importance (Huang et al., 2022). These tools improve knowledge delivery, student practice, and real-world learning opportunities. However, these benefits require students to exhibit higher self-motivation (Lee et al., 2016). VET programs in tourism and hospitality prioritize hands-on training through advanced teaching strategies like contextual education, problem-based learning, and case studies (Vakhmanova & Bychkova, 2023). Yet, hospitality and tourism-related programs have not adequately kept pace with rapid industry changes, including technological advancements and evolving customer expectations (Lüthy, 2025). To meet student and market demands, adopting sustainable technologies, increasing multimedia use, and promoting lifelong learning are essential (Lee et al., 2016; Vakhmanova & Bychkova, 2023). Tourism and hospitality education curricula vary notably in philosophy, structure, and focus, which influence course sequencing and program design. Recent research identifies three main curricular models that reflect differing priorities between tourism and hospitality disciplines:

- A balanced model combining institutional research with hands-on internships, preserving discrete identities yet sharing common transferable processes.
- A hospitality-dominant model that treats tourism as a complementary service industry and emphasizes business management alongside hospitality expertise.
- A tourism-dominant model centered on liberal arts, broad tourism courses, infrastructure development, and economic growth.

These models continue to shape current educational frameworks, necessitating ongoing adaptation to keep pace with industry needs (Fei, 2023; Kusumawardhana, 2019). Curriculum development in tourism and hospitality education follows a systematic and strategic approach aimed at delivering comprehensive learning experiences that address students' needs, faculty expertise, and societal demands. It emphasizes integrating real-world industry experiences to enhance the practical application of knowledge, employing sequential learning models that progress from fundamental to advanced skills. Recent studies highlight the importance of curriculum design that aligns with industry trends and prepares learners for dynamic roles in tourism and hospitality sectors (Kusumawardhana, 2019; Fei, 2023). Curriculum development in tourism and hospitality is systematic, aiming to provide comprehensive experiences that consider student needs, faculty abilities, and societal expectations. It focuses on incorporating real-world experience to enhance knowledge application, grounded in sequential learning principles progressing from basic to complex skills (Scotland, 2006). Curricula include defined learning objectives, student experiences, and course material to prepare students for modern industry and societal demands. Effective curricula integrate humanities, social sciences, professional and vocational knowledge to meet commercial and broader tourism needs. Modern businesses seek graduates who are critical thinkers, culturally

sensitive, multilingual, and digitally literate. Curricula should promote internationalization, responsible global citizenship, active learning, creativity, and innovation. Graduates must be prepared for complex hospitality operations and long-term career success through general management and transferable skills like communication, problem-solving, teamwork, leadership, alongside specific technical skills (Oktadiana & Chon, 2017).

Vocational programs should blend technical skills with academic knowledge, tailored to employer requirements. Universities and industry must collaborate to update job requirements, facilitating relevant curricula and hands-on learning such as industrial internships. This partnership supports the shift to a knowledge-based economy by enhancing student skills and employability (Elshaer and Marzouk, 2018). **The key benefits of vocational curricula include:**

- Delivering technical skills alongside academic knowledge across multiple fields.
- Emphasizing focused practical training.
- Offering flexible programs from various real-world sources.

The curriculum encourages participation in vocational education and training during senior secondary study and activities fostering enterprise skills, flexibility, and adaptability, also promoting vocational learning in compulsory education years (Yi Tsai, 2013). The vocational tourism and hospitality curriculum aims for a comprehensive educational experience balancing technical skills, knowledge, and ethical attitudes. Thoughtful content decisions seek to shape graduate perspectives and competencies. Integration of vocational competence with ethical awareness effectively balances industry requirements with broader social and environmental responsibilities in hospitality education. Recent studies emphasize that ethics and professionalism, combined with practical skills, are critical to preparing graduates who can meet contemporary challenges in the hospitality sector (Dzia-Uddin et al., 2025).

Curriculum and instruction are fundamental drivers of educational quality. Emphasis placed on aligning course design and curricula with program objectives, contemporary trends, and development needs, while ensuring effective teaching that achieves desired learning outcomes through faculty expertise (Shen et al., 2015).

Despite industry cooperation and technology integration advantages, Egypt's vocational education in tourism and hospitality faces significant challenges (Verian, 2024). Outdated curricula, insufficient hands-on training, and a disconnect between academic results and labor market demands are primary issues. Technology use including virtual reality and artificial intelligence is increasing; however, practical components face challenges from the rise of online learning. Sustainability and soft skills integration is growing but not fully realized. Advancing graduate preparedness and matching education with evolving market needs require ongoing curriculum updates, deeper industry collaboration, enhanced faculty development, and increased funding (Syafruddin et al., 2025).

2.1.2: Thebes Technological University's Overview

According to the academic bylaws system (2019), the dynamic changes in global literature are reflected in Thebes Technological University's vocational and technological education approach. Its curriculum effectively links theory and practice, emphasizing experiential, hands-on learning along with technical and soft skills. The program prepares students for the digitalized and sustainable tourism industry's future by integrating sustainability, digital literacy, and cutting-edge technologies such as virtual reality and artificial intelligence. Strong industry partnerships underpin the

university's teaching methods: internships, work-integrated learning, and cooperative program development ensure alignment with industry standards and enhance employability. The university promotes ongoing communication and effective governance to maintain long-term collaboration, despite challenges in sustaining consistent enterprise participation and partnership frameworks.

To improve student experience and operational skills, the university actively pursues technological integration through digital tools, AI applications, and immersive learning platforms. It continues addressing faculty training and equitable access to technology to responsibly harness these benefits. The vocational tourism and hospitality programs at Thebes Technological University consistently achieve positive educational outcomes, producing graduates equipped with impactful skills and readiness for employment. Supported by industry alliances and innovative teaching, the university balances theoretical knowledge with real-world application. Future includes expanding international benchmarking, enhancing faculty technological readiness, and strengthening industry cooperation to maintain adaptive, inclusive, forward-looking vocational education aligned with regional and global demands.

Thebes Technological University designs cutting-edge curricula combining theoretical and practical training, meeting tourism labor market demands. The College of Tourism and Hotel Services Technology offers specialized programs in food and beverage technology, hospitality services technology, and tourism and travel technology. These programs blend academic coursework with hands-on field experience to equip students with current knowledge and skills, ensuring graduates meet the evolving needs of tourism and hospitality employment.

- **Tourism and Travel Technology:** Provides comprehensive understanding of the tourism sector through academic instruction and field internships in travel agencies and aviation firms to prepare students for workforce entry and market expectations.
- **Hotel Services Technology:** Equips students for hospitality careers by covering hotel operations, guest services, hospitality management, and food and beverage services, combining classroom teaching with hands-on training in real hospitality environments.
- **Food and Beverage Technology:** Focuses on food production, service management, and hygiene standards in hotels, integrating applied training in kitchens and catering to enhance practical skills and align with industry requirements.

2.1.3: East Port Said Technological University's Overview

East Port Said Technological University develops advanced curricula that integrate theoretical foundations with applied training to respond to the labor market's requirements in tourism and hospitality. The Faculty of Tourism and Hospitality Services Technology provides specialized programs in tourism and travel technology, hotel services technology, and food and beverage technology. These programs emphasize the combination of academic study with experiential learning to prepare students with the competencies required for professional success in a competitive and evolving industry (EPT,2025)

- **Tourism and Travel Technology:** Offers students in-depth knowledge of the tourism and travel industry through academic courses and field internships in travel agencies and aviation companies, enabling them to meet workforce expectations and market trends.
- **Hotel Services Technology:** Prepares students for careers in hospitality by covering hotel operations, guest services, hospitality management, and food and

beverage operations. Learning combines theoretical coursework with applied training in real hospitality environments.

- **Food and Beverage Technology:** Concentrates on food production, service management, and hygiene standards, integrating hands-on training in professional kitchens and catering facilities to provide graduates with strong technical and managerial skills aligned with industry needs.

2.2: Technical Skills and Employability Skills

During the 1990s, key reports were published that clarified the skills employers sought in response to the changing demands of the workforce. (AGR, 1995. Bailey, 1990. McLaughlin, 1995. Meltzer and Berryman, 1990. SCANS, 1991). Two influential studies originating from the United States—SCANS (2000) and Carnevale et al. (1990)—are often regarded as foundational references in the current literature on employability. In 1990, the American Society for Training and Development (ASTD), with funding from the U.S. Department of Labor, released "Workplace Basics: The Essential Skills Employers Want." This report identified 16 key skills organized into six categories: fundamental skills (including literacy, writing, and arithmetic); communication skills (both verbal and auditory); adaptability skills (such as problem-solving and creative thinking); self-improvement skills (covering career planning, motivation, self-esteem, and goal setting); group effectiveness skills (including teamwork, social interaction, and negotiation); and influencing skills (such as embracing organizational culture and leadership). The ASTD study highlighted the importance of these skills from the perspective of employers and focused on competencies that are essential across all levels of the workforce.

In 1991, the U.S. Department of Labor established the Secretary's Commission on Achieving Necessary Skills (SCANS) to build upon and update the earlier work conducted by Carnevale et al. (1990). The SCANS report, published in 2000, integrated perspectives from both employers and recent graduates, identifying 36 critical skills categorized into three foundational skill sets and five core competencies. These competencies included resource management (such as managing time, money, personnel, materials, and space); interpersonal skills (teamwork, negotiation, leadership, and customer service); information skills (gathering, assessing, interpreting, and communicating information); systems thinking (analyzing social, organizational, and technological systems); and technology skills (choosing, applying, maintaining, and troubleshooting technology). The foundational skills encompassed literacy, writing, arithmetic, listening, and speaking abilities. Cognitive skills involved creativity, willingness to learn, problem-solving, and reasoning, while personal qualities included responsibility, self-esteem, self-discipline, social competence, and ethical behavior. Compared to the earlier ASTD report, SCANS provided a more comprehensive framework with broader implications for enhancing youth employability, although both reports continue to hold significant influence in industry and higher education settings.

In the 1990s, McLaughlin (1995), supported by the Conference Board of Canada, developed a flexible employability skills framework covering academic skills, self-management, and teamwork. Simultaneously, the UK's Association of Graduate Recruiters (AGR, 1995) identified key graduate skills such as self-awareness and networking. In Japan, Kajihara's (1997) survey highlighted 22 essential attributes, with industry-specific differences—manufacturing prioritized honesty and sociability, finance valued enterprise and adaptability, and

engineering emphasized creativity. These findings underline the importance of tailoring employability skills to different sectors.

An analysis of key studies and government reports from the 1990s across various countries identified a total of 85 skills, which were consolidated into 39 distinct items. Table 1 highlights the top ten employability skills: problem-solving, self-esteem, teamwork, communication, creativity and initiative, interpersonal skills, adaptability, responsibility, goal setting, and learning. Among these, problem-solving, self-esteem, and teamwork emerged as universally prioritized skills, closely followed by communication and creativity/initiative. Other commonly recognized skills included planning and decision-making, critical thinking, basic IT proficiency, leadership, integrity, and personal management. (Tushar & Sooraksa, 2023)

Andrews and Higson's (2008) EU-wide study highlighted employers' preference for graduates with strong interpersonal skills, practical business knowledge, and relevant work experience, such as internships. Specifically, they identified key transferable skills including professionalism, adaptability, communication, teamwork, ICT literacy, creativity, self-esteem, and time management. Moreover, Bridgstock's graduate employability model further emphasized the importance of career-building, personal management, academic, communication, ICT, and career management skills. Between 2000 and 2009, literature reviews similarly identified a wide range of skills, with communication and teamwork consistently prioritized alongside ICT skills, problem-solving, creativity, and self-management. In addition, other frequently cited skills included integrity, responsibility, critical thinking, and motivation.

Furthermore, Bloomberg (2018) identified top soft skills sought by U.S. employers, including teamwork and ethical judgment. In addition, European research by Humburg and van der Velden (2015) and Greek studies by Matsouka and Mihaly (2016) reinforced the importance of professional, creative, interpersonal, and organizational skills, while also highlighting notable gaps in graduates' leadership, emotional intelligence, and professionalism. Collectively, these findings stress the evolving and multifaceted nature of employability skills across regions and industries.

The existing body of research underscores the critical role of both practical training infrastructure and educational programs in shaping the employability and technical skill development of students across various sectors. Studies such as those by Andrews and Higson (2008) and Rosenberg et al. (2012) emphasize the importance of transferable skills, including communication, adaptability, and ICT literacy, which align closely with the competencies required in the tourism and hospitality industry. This broader literature informs the present research by contextualizing the significance of practical, hands-on training alongside theoretical instruction in technological universities in Egypt. By employing statements that measure students' self-perceived readiness and the effectiveness of training programs—such as the qualification to work efficiently, improved job opportunities for graduates, enhancement of technical skills through training, and the ongoing need for further skill development—this study contributes valuable insights into how well technological universities are equipping tourism and hospitality students with the necessary skills to succeed in a competitive labor market. The findings resonate with previous research advocating for integrated curricula and robust infrastructure to foster technical proficiency and adaptability, thereby supporting the sector's evolving demands.

3. Research Methodology

In this research, a descriptive–analytical approach was employed to assess the role of practical training infrastructure and curricular design in the development of technical skills among tourism and hospitality students at Egyptian technological universities.

1.1.Data Collection. An electronic questionnaire was distributed between January and April 2025 to a stratified random sample of 175 diploma-level students drawn from a total study population of 320 second-year students enrolled in the Faculty of Hotel Services Technology and Tourism at Thebes Technological University in Luxor and East Port Said Technological University. The sample size was determined using the following finite population correction formula to ensure adequate representation: (Kothari, 2004)

$$n = \frac{N}{1 + N \times e^2}$$

Where:

n= is the sample size,

N is the population size (320 students), and

e is the acceptable margin of error (commonly set at 0.05). This formula helps adjust for the relatively small population size and minimize sampling error.

All returned questionnaires were screened for completeness and subsequently analyzed using SPSS version 25 to verify the integrity and validity of the responses.

1.2.Questionnaire Design. The instrument comprised three main sections— (1) Educational Programs, (2) Practical Training Infrastructure, and (3) Technical Skills—each containing four items anchored on a five‑point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Section 1 probed students' perceptions of curriculum design and delivery in tourism and hospitality programs; Section 2 examined the adequacy and effectiveness of ICT infrastructure and simulation-based facilities (e.g., airline‑booking labs, mock hotel rooms, educational kitchens, training restaurants); and Section 3 measured self‑reported proficiency in key technical competencies.

1.3.Data Processing and Analysis. Prior to inferential testing, all questionnaire responses were checked for completeness, coded, and entered SPSS v25. Quantitative data underwent editing, categorization, and tabulation to produce descriptive statistics (frequencies, percentages, means, standard deviations, ranks). Inferential analyses included Pearson correlation, one-way ANOVA, and Chi-square tests to examine relationships among ICT infrastructure, educational program quality, and technical skill levels.

1.4.Research model or framework:

This research is guided by a conceptual framework **(Fig.1)** that clarifies the relationships between the key factors affecting students' technical skill development in the tourism and hospitality fields at Egyptian technological universities. The framework includes three main components: the educational program offered by the universities, the practical training infrastructure available to students, and the overall effectiveness of the educational program. These components are hypothesized to influence how well students acquire the necessary technical skills.

The educational program itself represents the curriculum and academic activities designed to equip students with relevant knowledge and skills. It is considered a fundamental factor that directly impacts student skill development (**H.1**).

- Educational program effectiveness acts as a mediating factor that reflects how successfully the educational program achieves its objectives, including the acquisition of competencies and readiness for industry challenges. It is expected to have a direct positive effect on students' skills (**H.3**).
- Practical training infrastructure includes physical resources, labs, workshops, and hands-on facilities that allow students to apply and practice their skills. This infrastructure is proposed to have both a direct effect on skill development (**H.2**) and an indirect effect through improving the educational program's effectiveness (**H.4**).
- The primary outcome variable in the study is students' technical skill development, which indicates their capability to perform technical tasks relevant to tourism and hospitality professions.

In summary, the model proposes that the educational program and practical training both contribute significantly to skill development, with educational program effectiveness serving as an important intermediary. These relationships form the basis for testing the research hypotheses and help structure the study's data collection and analysis.
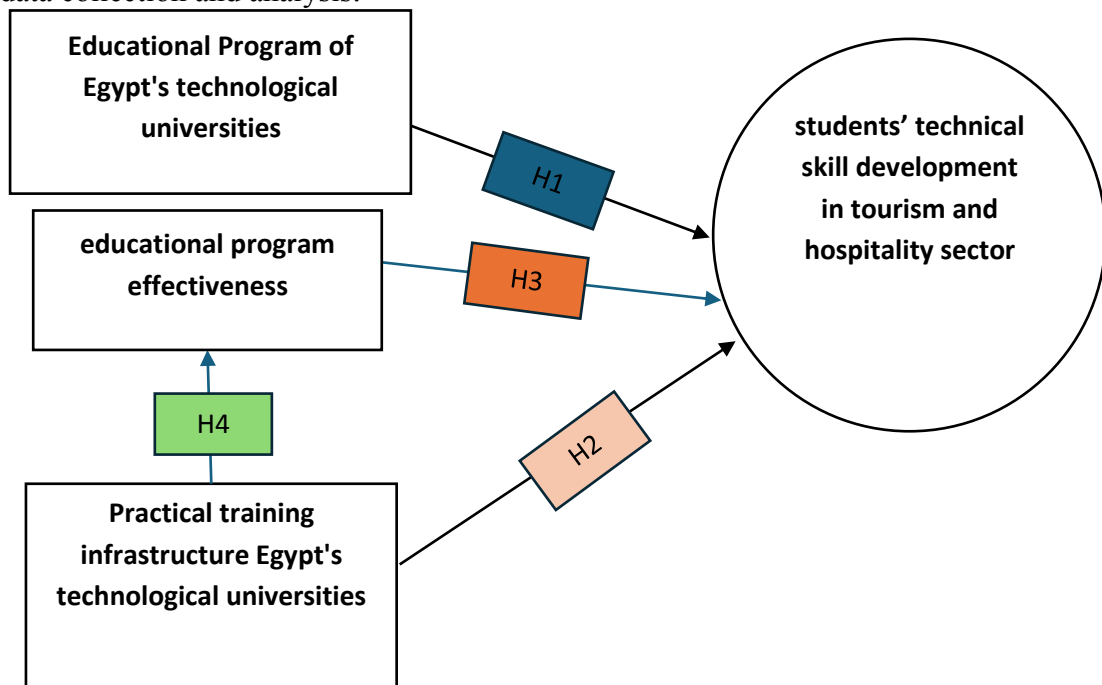
Figure. 1: Conceptual framework of research

3.1: Data Validity and Reliability

3.1.1: Data Validity

To ensure the data collection instrument employed in this study is valid, it was evaluated for clarity, structural design, and effectiveness in accurately capturing the constructions relevant to the research. The researcher distributed the questionnaire instrument to hospitality industry training employees, and academic members in the field of this study. The questionnaire was then modified and refined based on the domain experts' views and suggestions. Furthermore, the experts showed interest and communicated with the researcher about the questionnaire instrument, which adds to its validity.

Moreover, the results of the exploratory factor analysis (EFA) indicated that three components had eigenvalues greater than 1, accounting for a cumulative variance of 63.19%. After Varimax rotation, the variance was more evenly distributed across the three factors (30.3%, 25.8%, and 7.1%). Communalities ranged from 0.43

to 0.72, exceeding the minimum recommended threshold of 0.40, which indicates that the extracted factors adequately explained the variance of the observed variables. These findings support the construct validity of the measurement instrument.

1.4.1. Data Reliability

Before moving on, reliability testing was conducted to ensure consistent measurement across the various items within the questionnaire. Reliability reflects the stability and consistency of the measurement instrument. This process assesses internal consistency by examining how well the individual items, such as questionnaire questions, correlate with one another. (Creswell & Creswell, 2018) A widely used statistic for evaluating reliability is Cronbach's Alpha, which ranges from 0.0 to 1.0. Values closer to 1.0 suggest a more reliable and consistent instrument. In the social sciences, a Cronbach's Alpha value of 0.7 or higher is generally considered acceptable for demonstrating adequate reliability. (George & Mallery, 2003)

Table 1: Cronbach's Alpha Value

Variables	No. of items	Cronbach's Alpha	Validity Coefficient*
Educational Program of Technological Universities	4	0.840	0.916
ICT Applications and infrastructure	4	0.790	0.889
Technical skills	4	0.725	0.851
Total	12	0.893	0.945

* Validity coefficient = $\sqrt{}$ Reliability coefficient

To assess the internal consistency and reliability of the study's constructs, Cronbach's alpha (α) was utilized. The reliability of the scales was evaluated, with Cronbach's alpha values for all scales presented in Table 1 ranging from 0.725 to 0.840. Additionally, the overall reliability for the entire questionnaire was 0.893. These values indicate acceptable reliability, as a Cronbach's alpha above 0.7 is generally considered satisfactory.

4. Results and Discussion

The following part explains the results concerning the four sections representing the role of the Egyptian technological universities in supporting students with technical skills in tourism and Hospitality.

4.1: Descriptive analysis

In this section, the researcher relied mainly on descriptive analysis to get the means and the standard deviation for the research constructs along with their items. The items were measured using a Likert-type scale as follows.

Section One: Demographic characteristics of the respondents

As depicted in Table (2), the discussion of the research findings begins with a brief demographic profile of respondents in terms of age. The age bracket of 18 to 25 had the greatest number of respondents (98.90.)

Table (2): Demographic profile

AGE	Percent
18 – 25 years old	98.9
Over 25 – 30 years old	.6
Over 30 – 35 years old	.6
Total	100.0
Latest educational qualifications	%
High School (diplom) (3 years)	38.9
High School (diplom) (5 years)	5.1

Hotel Secondary school (3 years)	32.6
Hotel Secondary school (5 years)	1.7
High School	21.7
Total	100.0

In analyzing Latest educational qualifications, as indicated in Table 2. the most representative degree is a High School (diplom) (3 years), with 38.90% of the respondents, while 32.60% of respondents had Hotel Secondary school (3 years) in the sample.

Section 2: Educational Program of Technological Universities

Table (3): Educational Program of Technological Universities

Variables	Mean	Std Deviation	Rank	Attitude
Educational programs in tourism and hospitality are designed to address industry development	4.22	.736	1	**Strongly agree**
Educational programs in tourism and hospitality are developed based on monitoring labor market needs	4.17	.776	2	**Agree**
Educational programs in Tourism and hospitality are focusing on enhancing practical skills	4.13	.830	3	**Agree**
Practical assessment is more than Theoretical assessment in educational programs	4.12	.892	4	**Agree**
Total Mean	**4.16**			**Agree**

Table (3) displays the means and standard deviations concerning the Educational Program of Technological Universities, with mean values ranging from 4.12 to 4.22 and an overall domain mean of 4.16. The respondents' attitudes were measured using a 5-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). To interpret the mean values, the scale was divided into five equal intervals, where 1.00–1.80 represents "very low," 1.81–2.60 "low," 2.61–3.40 "moderate," 3.41–4.20 "high," and 4.21–5.00 "very high" levels of agreement (Boone & Boone, 2012; Joshi et al., 2015).The highest-ranked item was "Educational programs in tourism and hospitality are designed to address industry development," with a mean of 4.22 and standard deviation of 0.763, indicating strong agreement on the alignment of curricula with industry needs. Conversely, the lowest-ranked item was "Practical assessment is more than theoretical assessment in educational programs," with a mean of 4.12 and a higher standard deviation of 0.892, suggesting a slightly less consensus on the predominance of practical evaluations. The previous results confirm the findings of Moussa et al. (2023) stressed that continuous updates to educational programs are essential to meet evolving industry standards and better prepare students for employment. Moreover, studies acknowledge that practical assessments should complement theoretical knowledge to ensure comprehensive student skill development aligned with labor market expectations. (Awad, 2022)

Section 3: Practical Training infrastructure in Tourism and Hospitality Education

Table (4): Practical Training Infrastructure in Tourism and Hospitality Education

Variables	Mean	Std Deviation	Rank	Attitude

Variables	Mean	Std Deviation	Rank	Attitude
Tourism and hospitality curricula at technological universities integrate ICT concepts along with specialized training facilities that simulate real industry environments.	4.03	.809	3	Agree
The university provides simulation labs for airline reservation systems, hotel booking platforms, and tourism company operations to support ICT learning.	4.32	.711	2	Strongly agree
I have received practical training on tourism and hospitality software applications through hands-on sessions in specialized ICT labs.	4.02	.985	4	Agree
Training infrastructure includes educational kitchens, travel agency simulation, training restaurants, mock hotel rooms, and hospitality simulation systems that enhance my technical skills in food service, accommodation, and travel sectors.	4.41	.713	1	Strongly agree
Total Mean	**4.20**			**Strongly agree**

The findings presented in Table (4) indicate a strong consensus among students concerning the sufficiency of practical training facilities within technological universities, with an overall mean score of 4.20. Notably, the highest evaluations were given to the availability of specialized training environments such as educational kitchens, travel agency simulations, mock hotel rooms, and hospitality simulation systems, which received a mean rating of 4.41. This highlights the significance of immersive, real-world learning settings in equipping students effectively. Additionally, simulation laboratories focused on airline and hotel booking systems garnered a high level of agreement (mean of 4.32), underscoring the importance of incorporating digital tools into tourism education. While responses about the receipt of practical training were generally favorable (mean of 4.02), the higher standard deviation suggests variability in students' experiences. Furthermore, the positive perception towards the integration of ICT topics into curricula (mean of 4.03) points to ongoing efforts but also signals potential areas for refinement to better align academic content with available training infrastructure.

These findings align with prior research emphasize the critical role of well-equipped practical training environments in hospitality and tourism education. For instance, Agwa (2020) highlighted that experiential learning through simulations and internships is essential for bridging the gap between theoretical knowledge and industry requirements in Egyptian hospitality education institutions.

Section 4: Technical skills

Table (5): Technical skills

Variables	Mean	Std Deviation	Rank	Attitude
The skills I have acquired qualify me to work efficiently in the tourism and hospitality sector.	4.07	.814	4	Agree
The graduates of technological universities have better job opportunities in the tourism and hospitality field	4.14	.853	3	Agree

the training programs offered by the technological university improve practical and technical skills of students	**4.23**	**.761**	**2**	**Strongly agree**
I need more training to develop my technical skills in using technology in the tourism and hospitality sector.	**4.44**	**.657**	**1**	**Strongly agree**
Total Mean	**4.22**			**Strongly agree**

The previous table indicates that respondents strongly acknowledge the importance of technical skills in tourism and hospitality, as evidenced by the highest-rated statements: the need for more training to enhance technical skills in using technology within the sector (mean = 4.44), the effectiveness of training programs offered by technological universities in improving students' practical and technical competencies (mean = 4.23), and the superior job opportunities for graduates from technological universities in this field (mean = 4.14). These results underscore the critical role of technology-focused training in preparing students for employment in tourism and hospitality.

This finding aligns with previous studies highlighting the crucial role of technical skills development in hospitality education. Mohamed and Abdou (2022) found that training programs significantly enhance employability skills in Egypt's tourism and hospitality sector.

4.2: Pearson Correlation analysis

Table 6: Correlation Between Educational Program of Technological Universities and Technical Skills

		Technical skills
Educational Program of Technological Universities	Pearson Correlation	**.642**[**]
	Sig. (2-tailed).	**.000**

As seen in the table (6), there is a positive and significant relationship between Educational Program of Technological Universities and technical skills. The value of the Pearson correlation coefficient was (.642[**] - sig = 0.000). These results showed that there is a medium positive relation between Educational Program of Technological Universities and technical skills. This positive correlation indicates that as Educational Program of Technological Universities increases, technical skills increase.

Accordingly, **the hypothesis (H1)** stating that " There is a significant positive relationship between practical training infrastructure of technological universities and students' technical skill development in tourism and hospitality sector." **is supported**.

Table 7: Correlation between Practical Training Facilities and technical skills

		Technical skills
Practical Training Facilities	Pearson Correlation	**.748**[**]
	Sig. (1-tailed).	**.000**

As seen in table (7), there is a positive and significant relationship between Practical Training Infrastructure and technical skills. The value of the Pearson correlation coefficient was (.748[**] - sig = 0.000). These results showed that there is a strong positive relation between Practical Training Infrastructure and technical skills. This positive correlation indicates that as ICT Applications and infrastructure increases, and technical skills increase.

Accordingly, **the hypothesis (H2)** stating that " There is a significant positive relationship between the content of educational programs in technological universities and students' technical skill development in tourism and hospitality sector." **is supported**.

4.3: Regression Analysis

H3: There is a statistically significant effect of educational program effectiveness on the development of technical skills among tourism and hospitality students.

Table (8) Regression Model Summary for relationship between the effectiveness of educational programs and the technical skill development of tourism and hospitality students.

Hypothesis	Effect Direction			R	R Square	Adjusted R Square	Std. Error of the Estimate
H.3	*educational program effectiveness*		*technical skills among tourism and hospitality students*	.642[a]	.413	.409	1.763

a. Predictors: (Constant), Educational Program of Technological Universities

As depicted in Table (8) shows the discussion of the research R is equal to .642[a], there is a significant effectiveness of educational programs and technical skill development of tourism and hospitality students 64.20%

Moreover, these results suggest that the effectiveness of educational programs has a significant and meaningful positive effect on the technical skill development of students in tourism and hospitality. About 41% of the changes in technical skills can be attributed to how effective the educational programs are, confirming that program quality is an important factor for skill advancement in this field

H4: There is a statistically significant effect of ICT applications and infrastructure on the effectiveness of educational programs

Table (9) Regression Model Summary for relationship between ICT Applications and infrastructure and the effectiveness of educational programs

Hypothesis	Effect Direction			R	R^2	Adjusted R^2	Std. Error of the Estimate
H.4	*ICT Applications and infrastructure*		*the effectiveness of educational programs*	.691[a]	.478	.475	1.932

The results shown in Table (9) reveal a strong and statistically significant effect of ICT applications and infrastructure on the effectiveness of educational programs, with a regression coefficient (R) of 0.691, indicating that approximately 69.10% of the variance in educational program effectiveness can be explained by ICT-related factors. This finding is consistent with prior research demonstrating that adequate digital infrastructure, comprehensive ICT resources, and effective technical support significantly enhance educational program outcomes by fostering improved teaching methodologies and learner engagement (Timotheou et al., 2022; Ghavifekr & Rosdy, 2015; Bariu, 2020).

5. Conclusion

This study aimed to assess the role of practical training infrastructure and curricular design in the development of technical skills among tourism and hospitality

students at Egyptian technological universities. Using a descriptive-analytical approach and a stratified random sample of diploma-level students from Thebes Technological University in Luxor and East Port Said Technological University, the research successfully examined the relationship between educational programs, practical training facilities, and students' technical skill development.

The results demonstrated that both the design and delivery of educational programs and the quality of ICT infrastructure and simulation-based training facilities significantly contribute to enhancing students' practical technical competencies. The findings revealed strong positive correlations between educational program content and technical skills (Pearson correlation = 0.642), and an even stronger association between practical training facilities and technical skills (Pearson correlation = 0.748). The internal consistency of the questionnaire was confirmed by acceptable Cronbach's alpha values (0.725 to 0.840), indicating the reliability of the measurement instrument. Students expressed high satisfaction with the availability of specialized training environments, such as simulation labs and mock hotel rooms, which are pivotal for bridging theoretical knowledge and real-world application.

Furthermore, the regression analysis results demonstrate that educational program effectiveness has a significant positive impact on the development of technical skills among tourism and hospitality students. Table 8 shows that educational program effectiveness explains approximately 41% of the variance in students' technical skill development, indicating its critical role in shaping practical competencies. Moreover, the results in Table 9 reveal a strong and statistically significant effect of ICT applications and infrastructure on the effectiveness of educational programs, accounting for about 47.8% of the variation in program effectiveness. These findings confirm that robust ICT support is essential for enhancing educational quality and outcomes. Together, these results support the proposed hypotheses that educational program effectiveness substantially influences technical skill development, and that ICT infrastructure is a pivotal factor affecting the quality and success of educational programs in the tourism and hospitality sector.

6. Recommendations

Based on these findings, the following recommendations are proposed:

- **For the University Sector:**
  - Continuously update curricula to align with evolving industry standards and labor market needs.
  - Invest further in ICT infrastructure and expand simulation-based training facilities to provide immersive, practical learning experiences.
  - Facilitate ongoing professional development for academic staff to enhance the delivery of practical and technical training.
- **For the Tourism Business Sector:**
  - Collaborate with technological universities to provide internship and apprenticeship opportunities that complement academic training.
  - Support the integration of industry-standard software and technologies in university programs to ensure students are job-ready.
  - Participate in curriculum advisory boards to help shape educational programs that reflect current and future workforce demands.

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تقييم أثر البنية التحتية للتدريب العملي والبرامج التعليمية على تطوير المهارات التقنية بين طلاب السياحة والضيافة في الجامعات التكنولوجية المصرية

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الكلمات الدالة	المستخلص
الجامعات التكنولوجية **البرامج التعليمية** **المهارات التقنية** **السياحة والضيافة** **مصر**	تهدف هذه الدراسة إلى استكشاف كيفية مساهمة مرافق التدريب العملي والبرامج التعليمية في تطوير المهارات التقنية لدى طلاب السياحة والضيافة في الجامعات التكنولوجية في مصر. في السنوات الأخيرة، بدأت حوالي عشر جامعات تكنولوجية في البلاد بتقديم برامج ذات صلة، إلا أن جامعة شرق بورسعيد التكنولوجية وجامعة طيبة التكنولوجية في الأقصر هما الوحيدتان اللتان أنشأتا كلية لتكنولوجيا الخدمات الفندقية والسياحية. يهدف البحث إلى فهم تأثير التدريب العملي والمحتوى الأكاديمي على قدرات الطلاب في اكتساب المهارات التقنية. ولقد اعتمدت الدراسة على المنهج الكمي حيث جُمعت البيانات من خلال استبيان منظّم تم تقديمه إلى ١٧٥ طالبًا. وقد تم تحليل كيفية تأثير المرافق العملية والمناهج الأكاديمية على تطوير المهارات التقنية لدي الطلاب من خلال برنامج SPSS v.26. , وأظهرت النتائج أن فعالية البرامج التعليمية تلعب دورًا محوريًا في تعزيز هذه المهارات لدى طلاب السياحة والضيافة. كما أظهرت الدراسة أن تطبيقات وتوافر البنية التحتية لتكنولوجيا المعلومات والاتصالات تشكل عوامل مؤثرة بشكل كبير على جودة ونجاح البرامج التعليمية.

تعكس هذه النتائج أهمية وجود برامج دراسية مصممة بعناية مدعومة بمرافق تدريب عملي كافية، وذلك لتعزيز تطوير المهارات، لا سيما فيما يتعلق بالمعرفة الرقمية وتشغيل التكنولوجيا في قطاع السياحة والضيافة. كما أوصت الدراسة أيضًا إلى ضرورة دمج تقنيات حديثة مثل الذكاء الاصطناعي والواقع الافتراضي وتحليل البيانات ضمن المناهج الدراسية لتحسين إعداد الخريجين لمنافسة سوق السياحة العالمية. |