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Impact Of Educational Infrastructure On Educational Outcomes: A Mediation Analysis Of Teaching-Learning Environment In Online Tourism Education In India

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ABSTRACT
The present study aimed to examine whether and to what extent the educational outcomes of online tourism education were influenced by the availability of educational infrastructure facilities, and whether this influence was mediated by online teaching and learning environment. A conceptual research model was developed by integrating and synthesising, extensive literature review of theories in the field. A quantitative correlational study using a predictive design and multivariate analysis method was employed. A sample of 644 students studying in higher educational institutions across India were employed through survey based on a stratified random sampling method. The factor analysis was employed for factor exploration under the key dimensions concerning online tourism education. Structural Equation Modelling analysis was employed to examine the possible relationship between and mediating effect, among the variables. The findings revealed statistically significant relationships between educational infrastructure and educational outcomes through mediation effect of teaching-learning environment. The results revealed educational infrastructure having a significant positive effect on teaching learning environment (β = 0.864), emphasizing the importance of educational infrastructure in tourism educational institutions. However, a direct negative influence of educational infrastructure on educational outcomes was observed (β = - 0.232), suggesting possible additional factors. Interestingly, educational infrastructure was found to significantly enhance educational outcomes, but indirectly, through teaching-learning environment (β = 1.139). This highlighted the crucial role of infrastructure in fostering positive educational outcomes. The findings underscore the complexity of factors shaping the educational landscape, necessitating educational planning and interventions. The study concludes by suggesting the advancement of educational and information and communication technology infrastructure to assist tourism students in their pursuit of online tourism education and a fruitful career.

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1. Introduction

India has more than 700 million active internet users by 2022, including 295 million in urban areas and 425 million in rural areas (India Internet Report, 2023). With the advancement of Internet access across the country, the use of ICT and educational technology has increased rapidly. This led to a steady increase in

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the proliferation of online educational programs offered in higher education institutions. Online education sometimes known as e-learning, refers to the delivery of educational content and instruction through digital technologies and the internet (Bui & Kumar, 2023). It allows students to access educational resources, participate in courses, and interact with instructors without being physically present in a traditional classroom setting. Also, it has gained prominence due to advancements in technology, providing flexible and accessible learning opportunities for students worldwide. According to Means et al. (2013), "Online education is electronically mediated instruction comprising a wide range of technology tools, instructional systems, and learning environments that connect teachers and learners. It is not bound by time or place, allowing learners to acquire knowledge and skills through a variety of synchronous and asynchronous delivery methods." Online education therefore encompasses various formats, including completely online courses, blended or hybrid courses that combine online and face-to-face elements, and massive open online courses (MOOCs). It provides learners with flexibility, allowing them to pursue education while accommodating work, family, and other commitments. The field continues to evolve with innovations in technology, making education more accessible and inclusive on a global scale.

The online education system is not new. It has already been a topic of discussion with the advancement of the internet. However, after COVID-19, its necessity and importance have been understood across the world as well as in India. In the context of Tourism Education, the shift to online education or e-learning has also been a notable trend since past decades, driven by technological advancements and the evolving needs of students and the industry. This transition has been evident in various aspects, including course delivery, interactive learning experiences, and skill development. It has accelerated new forms of pedagogy and tremendous initiatives from individual academics and institutions. There is a growing integration of e-learning platforms in tourism education to facilitate flexible and accessible learning experiences (Buhalis & Law, 2008). Doolin et al. (2005) argued that e-learning in tourism education often incorporates interactive and multimedia learning resources, enhancing engagement and understanding. Online learning in tourism education provides flexibility, catering to the needs of working professionals seeking skill enhancement (Fesenmaier et al. (2014). The transformation in online education of tourism education aligns with broader trends in e-learning, offering diverse and dynamic educational experiences that cater to the needs of modern learners and the demands of the tourism industry.

Several studies have been undertaken to understand and represent the use of online learning/ online education in tourism management. Braun and Hollick (2006) examined the flexibility of online delivery and discussed whether sharing knowledge could contribute to capacity building in the tourism sector. Haven and Botterill (2003) reviewed the existing and potential exploitation of virtual learning spaces in hospitality, leisure, sport and tourism. Sigala (2001) reviewed and assessed the evolution of e-practices in order to identify the e-learning models in tourism and hospitality departments. Also, proficiency in the application of information and communication technology (ICT) is vital for teaching and learning about tourism before students enter in the tourism industry (Adukaite et al., 2017).

2. Literature Review

2.1. Educational Infrastructure

Educational infrastructure in online tourism education comprises several factors, including Smart Institutions, Internet Connectivity, and Online Platforms, all of which significantly influence the learning environment and outcomes. These components play a pivotal role in shaping the teaching-learning environment and mediating the outcomes in online tourism education. Among these components, Smart Institutions represent a fundamental shift in educational practices, integrating advanced technologies to enrich the learning experience. Chao, Chen, and Li (2019) discuss the integration of smart classrooms, digital resources, and interactive learning tools within educational institutions. Mishra & Yadav (2016) further explore the impact of Smart Institutions on student learning outcomes, with a particular focus on

the role of online platforms in fostering engaging learning experiences. Furthermore, Internet Connectivity emerges as another crucial aspect of EI, facilitating access to educational resources and ensuring equitable participation. Selwyn (2011) highlights the role of internet connectivity in bridging geographical gaps and providing universal access to educational materials. Mishra & Yadav (2020) emphasize the necessity of robust internet connectivity for effective online education, underscoring its importance in accessing online platforms and participating in virtual classrooms. However, challenges such as security and privacy concerns arise in the context of online tourism education, necessitating measures to safeguard sensitive information (Rainer & Cegielski, 2011).

Furthermore, online platforms play a central role in shaping the learning environment in online tourism education. Buhalis & Law (2008) discuss how online platforms facilitate interactive learning experiences through multimedia content and virtual simulations. The significance of Learning Management Systems (LMS) in Smart Institutions is highlighted by Picciano (2017), providing a centralized platform for course management and student interaction. Palvia et al. (2018) further emphasize the importance of user-friendly platforms in facilitating communication and collaboration in online education.

Overall, the integration of smart institutions, robust internet connectivity, and effective use of online platforms enhances accessibility and flexibility in online tourism education. However, challenges such as disparities in internet access and technological limitations persist, hindering equitable participation in Smart Institutions for online tourism education (Warschauer, 2002; Wiers-Jenssen & Stensaker, 2002). These components of educational infrastructure collectively contribute to shaping the teaching-learning environment and mediating the outcomes in online tourism education.

2.2. Online Teaching – Learning Environment

Literature focuses on teaching learning environment as the mediating variable in online tourism education practices. The online learning environment is also a unique cultural context in itself in terms of internet or cyberspace from its beginning. As Benedikt (1992) argued…. cyberspace has a geography, a physics, a nature and a rule of human law. Many students might be new to this context, but increasingly, students may come to online learning with preconceptions gathered from both formal and informal experience in virtual environments (Anderson, 2004).

In the present study, it is the second key dimension of online tourism education, synthesized existing latent constructs such as basic tourism knowledge, teaching learning barriers, and industry interface & curriculum. The discussion shed light on the factors influencing the overall learning environment, including challenges faced by both educators and learners, and the integration of industry perspectives in the curriculum. First, barriers in teaching and learning environment has been the key issue in online education. In the research by Al Lily et al. (2018), also identified many challenges faced in the online learning environment such as technological barriers, lack of instructor support, and student readiness issues. Similarly, Houston & Floyd (2005) have also mentioned within the context of tourism education in their study shedding light on challenges faced by both educators and learners, offering insights into potential areas for improvement. Second, in realm of online tourism education, basic tourism knowledge is another importance factor of teaching learning environment. In terms of tourism knowledge, Tsiotsou & Vasioti (2016) focused on the importance of a well-defined curriculum that aligning with the industry standards and imparts foundational knowledge to tourism students.

Tribe (2011) has mentioned teaching learning environment as a mediating variable through the lens of basic tourism knowledge in tourism education. He further explored the importance of imparting tourism knowledge in educational settings, emphasizing the foundational elements that contribute to a well-rounded understanding of the tourism industry among students. Similarly, Papanikolaou et al. (2018) also discussed how adaptive learning systems, utilizing data and analytics, can personalize the learning experience, addressing diverse learning styles and preferences in context of tourism knowledge and

practical skills. They further argued…. this ensures that students acquire knowledge and skills most relevant to their career aspirations within the context of online tourism education.

Subsequently, industry interface & curriculum are interconnected aspects of teaching and learning environment. As examined by Li, Wang & Huang (2021), the integration of industry perspectives into the curriculum, fostering a dynamic and relevant learning environment. The teaching-learning of tourism programs mainly focuses on practical training or, in technical language, experiential learning like internships, practicals, and trips to this particular industry. Apart from this, case studies and real-time learning on tourism help the learner to understand "real life" situations and problems better (Dart, 2009). Williams & Hall (2000) have also examined by emphasizing the need for industry-relevant education with the integration of industry interface and curriculum. The study argued that aligning educational content with industry requirements enhances the relevance of tourism education and better prepares students for the workforce.

2.3. Educational Outcomes

Tourism education has progressed through a strong background and is thus strongly focused on the industry (Xiao,Qiu & Cheng, 2018). The literature culminates in an exploration of the dependent variable, educational outcomes, which are a crucial aspect of any educational framework. In the present study the dimension - educational outcomes encompass the constructs: skills & knowledge achievement, academic progression, global recognition, and job placements. These latent constructs collectively represent the success of the online tourism education system. There is a direct relationship between the quality of infrastructure, teaching practices, mediating factors like teaching-learning environment, and the ultimate educational outcomes in the context of online tourism education in India. The review aims to identify these factors influencing the success of students in the industry and academia.

In the present study, Skills & Knowledge Achievement [SKA] are the first fundamental components of EO in context of online tourism education. As Kang and Im (2013) explored the assessment of student learning outcomes in online education, including the acquisition of specific skills and knowledge relevant to the tourism industry. In the realm of tourism education, research by Prideaux et al. (2003) explored the link between education and industry success in the context of tourism. The study investigates how educational experiences contribute to the development of skills and knowledge that are valued by the industry. Secondly, Academic Progression [AP] as latent construct of EO provide insights into global recognition of educational qualifications (Altbach & Teichler, 2001a). The study explored factors influencing the international acceptance of degrees earned in the context of tourism education. AP is discussed in the research by Jaggars & Xu (2016), which examined the progression and completion rates of students in online programs. They further investigated factors influencing academic success and retention in the online learning environment. Lastly, the Job Placements [JP] and Global Recognition [GR]

Online education/learning in tourism programs provides a global reach, enabling students from diverse geographical locations to access courses (Xiang, 2017). Further, Han, et al., (2019) have highlighted, Global Recognition and Job Placements are interconnected aspects of EO in context of tourism education. They further explored the global recognition of online degrees in the tourism industry and examines the correlation between online education and successful job placements. Bridges & Hallinger (2010) have also discussed the relationship between education and job placements. They further examine how educational programs impact graduates' success in securing employment within the tourism industry.

2.4. Why Teaching – Learning Environmentas Mediator?

In the present study, the teaching-learning environment is a critical mediating variable in online tourism education, facilitating interaction between educational (ICT) infrastructure and educational outcomes. Extensive research, such as Martin & Bolliger, 2018 Chick et al., 2012 Williams & Hall, 2000 and Dalgarno

& Lee, 2010 have shed light on the various components and dynamics of the teaching-learning environment, emphasizing its significance in shaping the effectiveness of online education delivery, specifically within the tourism domain. Williams and Hall (2000) stress industry integration, advocating for curricula reflecting real-world scenarios to develop practical skills. Chick et al. (2012) highlighted strategies to overcome teaching-learning barriers, addressing technological challenges and enhancing student engagement. Similarly, Martin and Bolliger (2018) emphasize the importance of student engagement, promoting interactive activities and instructor presence. Dalgarno and Lee (2010) also explored the benefits of 3-D virtual environments, offering experiential learning opportunities. The reviews of these research collectively emphasize the significance of a dynamic teaching-learning environment in enhancing online learning experiences and achieving educational outcomes in online tourism education.

Objectives Of the Study

1. To explore the underlying factors of the available educational infrastructure in institutions for online tourism education, the teaching-learning environment, and their educational outcomes.
2. To investigate the mediating effect of the teaching-learning environment between educational infrastructure and educational outcomes in online tourism education.

3. Methodology

3.1. Conceptual Framework

Based on the extant online educational theories (Davis, 1989; Garrison, Anderson, and Archer, 2000; Eccles & Wigfield, 2002) and literature on tourism education, a conceptual framework has been developed by summarising into key dimensions for the present study. The key dimensions alongwith their codes used in the research analysis are as; Educational/ICT Infrastructure (EI), Teaching Learning Environment (TLE) and Educational Outcomes (EO). The symbiotic relationship between advanced ICT infrastructure and pedagogical approaches, Mishra and Yadav (2016) Tourism teaching Learning Environment Williams and Hall (2000), Educational Outcomes Prideaux et al. (2003) have in all given directions for summarising the underlying key dimensions of online tourism education. However, no study till the date have established the direct and consequential relationship between educational/ ICT infrastructure (EI) and educational outcomes (EO) in the realm of online tourism education. Also, no study bothered to examine the importance of the online teaching-learning environment in the entire online tourism education system. Based on the above literature, researchers have developed the following conceptual framework for the study –

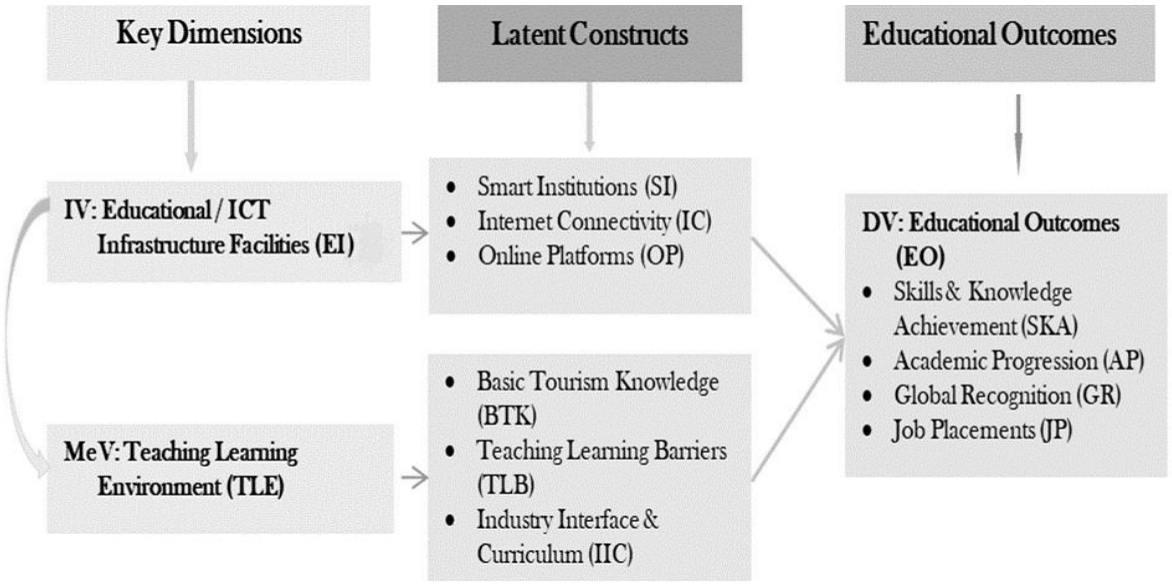

Figure 1. Conceptual Framework

3.2. Sample, Instrument and Data Collection

The research design adopted a quantitative approach utilizing structural equation modeling (SEM) to investigate the interrelations among variables under the key dimension in the realm of online tourism education. The study comprised 644 participants, including 97 Teachers and 547 Students enrolled in tourism programs across various Tourism Educational Institutions (TEIs) in India. A Stratified Random sampling technique was employed to ensure representativeness across different geographical regions (i.e., North, South, East, West) of India, and various types of institutions (i.e., Public/ Private/Central/ State University/Leading Institutions). The data collection entailed a survey-based structured questionnaire designed to capture insights across five theoretical constructs: educational infrastructure facilities, teaching-learning environment, teaching-learning practice, students' motivation, and educational outcomes in the context of online tourism education. Subjects were then instructed to respond to their degree of agreement with the statements contained in the research tool. Responses were recorded on Likert's five-point scale, ranging from 'Strongly agree' to 'Strongly disagree'. This comprehensive methodology aimed to provide insights into the landscape of online tourism education in India by examining key factors contributing to its effectiveness.

3.3. Data Analysis

In present study, the split-sample validation technique is used for data analysis. It is a critical method in social science research for assessing the generalizability and robustness of statistical models or hypotheses (Brown, 2015). By dividing a dataset into subsets, this approach examines the stability and consistency of findings across different samples, thereby enhancing the reliability of conclusions (Tabachnick & Fidell, 2013). In a study comprising 644 data points, researchers divided the dataset into training (n=310) and validation (n=334) samples (Hair et al., 2010). The training sample underwent Exploratory Factor Analysis (EFA), while the validation sample evaluated model fit through Confirmatory Factor Analysis (CFA), Mediation Analysis, and Moderator Analysis. SEM technique is chosen for its capability to analyze intricate relationships between observed and latent variables concurrently. Additionally, tools such as MS Excel for data tabulation and refinement, IBM SPSS v26 Package for EFA and AMOS for CFA and Mediation Analysis, and the CR-AVE Calculator for assessing measurement model fit were utilized. This methodological rigor ensures thorough analysis and robust interpretations, supported by scholars (Brown, 2015; Hair et al., 2010; Tabachnick & Fidell, 2013).

3.4. Item Parceling Technique

A subject or a course remains a core element of the teaching-learning environment, which also includes digital pedagogy, assessment methods, and institutional support (Biggs & Tang, 2011). Henceforth In online tourism education, a total of 45 items (24 of tourism subjects/ skills & knowledge, 9 of practical experience and others), were initially identified across three factors under the key dimension of teaching and learning environment. To streamline the measurement model for confirmatory factor analysis (CFA), 33 items with theoretically similar concepts were grouped into 8 parcels using item parceling technique. This reduction was necessary to avoid issues like model overfitting. Item parceling, a statistical method, combines multiple indicators into composite units, enhancing the model's efficiency. The resulting parcels demonstrated strong relationships with factors, indicated by high factor loadings and internal consistency (Cronbach's alpha > 0.85) as given in the Table 1. This approach not only simplifies the measurement model but also ensures reliable assessments of the latent constructs (see analysis Figure 3).

Table 1. Subject Knowledge and Skills in Tourism Education

S. No.	Tourism skills/ subject knowledge & practical experience	Mean	SD	Item Parceling	Code	Parcel item Mean	Coronach's Alpha (α
1	Tourism Education Knowledge	3.94	1.048	1. Concepts and Principles in Tourism	TLE1	3.92	.937
2	Tourism Principles	3.84	1.078				
3	History and Culture	3.73	1.159				
4	Tourism Law	3.56	1.158				
5	World Geography	3.66	1.126				
6	Impact of Tourism	3.77	1.072				
7	Financial Management	3.51	1.112	2. Business and Management Education in Tourism	TLE2	3.71	.938
8	Tourism Marketing	3.78	1.053				
9	International Trade	3.48	1.172				
10	Tourism Entrepreneurship	3.60	1.180				
11	Forex Management	3.34	1.220				
12	Hotel Management	3.60	1.193	3. Hospitality and Service Management	TLE3	3.92	.938
13	Hospitality Behaviour	3.72	1.148				
14	Travel and Transport Management	3.79	1.124				
15	Tourism Products and Services	3.82	1.062				
16	Customer Relationship Management	3.58	1.138				
17	Communication Skills	3.78	1.145				
18	Tour Operation	3.77	1.125	4. Destination and Event Management	TLE4	3.89	.937
19	Destination Management	3.65	1.136				
20	Itinerary Planning and Costing	3.73	1.158				
21	Event Management	3.66	1.116				
22	Sustainable and Ecotourism	3.69	1.131	5. Specialization, Sustainability, and Research	TLE5	3.79	.937
23	Special Interest Tourism	3.69	1.144				
24	Tourism Research and Statistics	3.60	1.155				
25	Local / national study tours	3.51	1.294	6. Management skill (e.g., organizing local / national study tours, events, workshops and seminars)	TLE6	3.72	.945
26	Events organization	3.53	1.185				
27	Workshop and seminar	3.49	1.205				
28	Expert counselling	3.34	1.195	7. Expert interaction (e.g., expert counselling, interview & group discussion)	TLE7	3.52	.941
29	Expert interaction	3.48	1.180				
30	Interview/group discussion	3.51	1.172				
31	Industry interaction	3.42	1.229	8. Industry engagement (e.g., industry interaction, industry property visit, summer job training)	TLE8	3.45	.946
32	Industry property visit	3.20	1.292				
33	Summer job training	3.46	1.241				

Table 1 also presented a comprehensive analysis of various dimensions of tourism skills and knowledge areas, utilizing item parceling techniques for streamlined analysis. Mean scores, standard deviations (SD), and Coronach's Alpha (α) values provide valuable insights into respondents' competencies and experiences in the tourism industry. Mean scores, derived from a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree," reflect respondents' average agreement levels with surveyed statements. For instance, "Concepts and Principles in Tourism" received a high mean score of 3.92, indicating strong agreement among respondents. Conversely, "Forex Management" garnered a mean score of 3.34, suggesting less consensus or leaning towards disagreement. Standard deviations highlight the variability or spread of opinions around the mean within each item. Larger standard deviations indicate more diverse opinions among respondents. For example, a higher SD for "Forex Management" suggests a wider range of attitudes or perceptions regarding this aspect compared to "Concepts and Principles in Tourism." Coronach's Alpha values assess the internal consistency or reliability of items within each dimension. Higher alpha values imply greater consistency in measuring the intended construct. For instance, a high α value of 0.938 for TLE1 signifies strong internal consistency within the dimension of Tourism Education Knowledge. This structured approach enables a nuanced understanding of respondents' perceptions and attitudes towards various aspects of tourism education, management, and engagement, facilitating informed decision-making and strategy development within the tourism industry.

4. Results

4.1. Demographic Profile

The research study elucidated the demographic characteristics of its 644 participants, comprising predominantly students (84.94%) and a minority of educators (15.06%). Out of which 350 (54.3%) were male and 294 (45.7%) were female respondents. Geographically, respondents hailed from 26 states across India, with notable representation from Madhya Pradesh, Odisha, and Karnataka. Institutional affiliations revealed a preponderance of respondents from Central Universities (40.4%), followed by Leading Central Institutions (17.7%) and Deemed-to-be-Universities (12.4%). Analysis of age distribution highlighted a predominant cohort aged 20-30 years (69.41%), with smaller contingents across other age brackets. Qualification-wise, the majority possessed undergraduate degrees (56.37%), with a notable presence of postgraduates (30.59%), while a smaller fraction held advanced degrees such as Ph.D. or post-doctorate qualifications. Assessment of online teaching and learning experience unveiled that a significant majority of respondents (84.16%) had 0-2 years of experience, indicative of a nascent engagement with online pedagogical modalities. Conversely, a minority (3.88%) exhibited a prolonged tenure exceeding 4 years, possibly emblematic of early adopters or seasoned practitioners. Exploration of annual family income distributions delineated a prevailing proportion reporting incomes below 1 Lakh (34.94%), followed by staggered brackets extending up to incomes exceeding 12 Lakhs, thereby depicting a diverse spectrum of economic backgrounds within the sampled population. Collectively, these findings offer a nuanced depiction of the demographic fabric, educational proficiencies, online instructional acumen, and socioeconomic strata characterizing the study's participants, thereby furnishing a robust foundation for subsequent research analysis and inference derivation. Table 2 provides the demographic profile of the respondents involved in the study.

Table 2. Demographic Profile of Respondents

Variables	*No. of Respondents (n=644)*	*Percentage (n=644)*
	Location of respondents' institutions	
Madhya Pradesh	93	14.44
Odisha	77	11.96
Karnataka	74	11.49

Sikkim	70	10.87
West Bengal	55	8.54
Pondicherry	53	8.23
Meghalaya	41	6.37
Kerala	26	4.04
Tamil Nadu	26	4.04
Uttar Pradesh	22	3.42
Haryana	19	2.95
Andhra Pradesh	17	2.64
Jammu & Kashmir	13	2.02
Assam	11	1.71
Chandigarh	10	1.55
Telangana	10	1.55
Punjab	8	1.24
Others	19	2.95
		Type of tourism institutions
Central University	260	40.37
State University	60	9.32
Private University	54	8.39
Deemed-to-be-University	80	12.42
Leading Central Institution	114	17.70
Government College	38	5.90
		Gender
Male	350	54.3
Female	294	45.7
		Age
Below 20 yrs	115	17.86
20 - 30 yrs	447	69.41
30 - 40 yrs	51	7.92
40 – 50 yrs	27	4.19
50 yrs and above	4	0.62
		Position
Student	547	84.94
Teacher	97	15.06
		Qualification
Undergraduate	363	56.37
Postgraduate	197	30.59
NET/SET	19	2.95
Ph. D.	35	5.43
NET/SET and Ph.D.	26	4.04
Post Doctorate	4	0.62
		Years of online teaching and learning experience
0 - 2 yrs	542	84.16
2 - 4 yrs	77	11.96
Above 4 yrs	25	3.88
		Annual income
Below 1 Lakh	225	34.94
1 Lakh-3 Lakhs	141	21.89
3 Lakhs-6 Lakhs	115	17.86
6 Lakhs-9 Lakhs	74	11.49
9 Lakhs-12 Lakhs	37	5.75
Above 12 Lakhs	52	8.07

4.2. Exploratory Factor Analysis

Exploratory factor analysis (EFA) was performed to explore the factors from the items under the key dimension concerning online tourism education. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy for all the three key-dimensions (i.e. EI, TLE and EO) were found .894,.947 and .959, respectively, which are >0.60. And, Bartlett's Test of Sphericity p=.000 ($p < 0.05$) were found also found suitable to employ Exploratory Factor Analysis for each key-dimensions. Principal component analysis (PCA) technique and Rotated Component Matrix rotation method was used for factor extraction identified a smaller number of uncorrelated variables (principal components) from a larger set of data (Muir et al, 2017). The result shown the total variance explained in factor analysis 68.162%, 71.710% and 80.842% (>50%), with the initial Eigenvalues for all the extracted factors range from 1.298 to 11.160 (>1). Table 3 shows the summary of exploratory factor analysis enlisting extracted factors: Smart Institutions (SI), Internet Connectivity (IC), Online Platforms (OP) under Educational /ICT Infrastructure (EI); Teaching Learning Barriers (TLB), Basic Tourism Knowledge (BTK), Industry Interface & Curriculum (IIC) under online Teaching and Learning Environment (TLE); And Skills & Knowledge Achievement (SKA), Global Recognition (GR), Academic Progression (AP) and Job Placements (JP) under Educational Outcomes (EO).

Table 3. Summary of EFA Results

Code	Variables	Factor loadings	Factor variance	Eigen-value
Educational ICT infrastructure (EI): KMO: .894 Bartlett's test (P): .000 Total Variance: 68.162				
Factor 1: Smart Institutions (SI)			48.528%	7.764
EF5	Seminar / Conference Hall	.781		
EF3	Smart Classroom	.779		
EF4	Board-room	.729		
EF1	Computer Lab	.634		
EF6	Centralized Wi-Fi	.623		
EF2	Tourism Labs	.604		
Factor 2: Internet Connectivity (IC)			10.749%	1.720
EF7	Internet Connection	.781		
EF_IC3	Internet connectivity through Fiber-optic.	.767		
EF_IC4	Internet connectivity through Broadband	.764		
EF_IC2	Internet connectivity through DSL	.649		
EF_IC1	Internet connectivity through V-Sat.	.570		
Factor 3: Online Platforms (OP)			8.885%	1.422
EF10	Video conferencing tools (e.g., Zoom, Google Meet, MS Teams, Webex)	.826		
EF11	Learning Management System (LMS e.g., Moodle, Google Classroom)	.782		
EF12	Social media platforms (e.g., Facebook, YouTube/ WhatsApp, Twitter, Telegram)	.778		
EF9	MOOCS (e.g., Swayam)	.757		
EF8	Open online technologies (e.g., Perusall, Kahoot, Socrative, Padlet, EdPuzzle).	.756		
Online teaching and learning environment (TLE): KMO: .947 Bartlett's test(P): .000 Total Variance: 71.710				
Factor 1: Teaching Learning Barriers (TLB)			55.801 %	11.160
TLE15	Teachers & students face technical & internet issue in online education.	.832		

TLE16	OTE misses out on real-time interaction between teachers & students for campus experience.	.798		
TLE12	Online classes are planned and organized with classroom etiquette, bonding and teamwork among instructors and learners	.744		
TLE11	Flexibility in class time and place to cover up missed classes.	.729		
TLE10	Online education integrates with lonely environment for personalized learning and family work.	.723		
TLE18	OTE is Compatible for differently-abled students.	.692		
TLE17	Instructors/ learners face data privacy and security issues in OTE.	.679		
TLE13	Our institution has standard institutional IT policy for guidance & support to online students.	.656		
TLE9	Classroom environment is convenient and breaks the barrier of shyness and fear.	.636		
TLE14	Students are attentive to engage and participate in online classes.	.618		
TLE20	Relevant, structured and organized online study materials are available / accessible at our institution's website.	.571		
Factor 2: Basic Tourism Knowledge (BTK)			9.421 %	1.884
TLE4	Destination and Event Management	.877		
TLE5	Specialization, Sustainability and Research	.876		
TLE3	Hospitality and Service Management	.875		
TLE1	Fundamental Concepts and Principles in Tourism	.809		
TLE2	Business and Management Education in Tourism	.720		
Factor 3: Industry Interface & Curriculum (IIC)			6.488 %	1.298
TLE7	Expert interaction (e.g., expert counselling, interview & group discussion)	.866		
TLE8	Industry engagement (e.g., industry interaction, industry property visit, summer job training)	.837		
TLE6	Management skill (e.g., organizing local / national study tours, events, workshops and seminars)	.794		
TLE19	Our institution has active Board of Studies (BoS) for curriculum design and updation.	.591		
Educational outcomes (EO): KMO: .959 Bartlett's test(P): .000 Total Variance: 80.842				
Factor 1: Skills & Knowledge Achievement (SKA)			56.700%	8.801
EO12	Improved skill-sets.	.781		
EO11	Improved knowledge.	.687		
EO7	Academic performance.	.681		
EO9	Reading achievement.	.617		
EO3	Satisfaction and happiness.	.544		
Factor 2: Global Recognition (GR)			11.132%	6.667
EO6	Cooperation and social interaction.	.715		
EO4	Social recognition.	.700		
EO5	International accreditations.	.604		
EO10	Encourage internationalization.	.603		
Factor 3: Academic Progression (AP)			7.342 %	2.564
EO2	Opportunity for higher education.	.771		

EO1	Increased enrolment for online courses.	.685		
Factor 4: Job Placements (JP)			5.668%	1.477
EO8	Placements.	.716		
EO13	Enhanced industry-institution interface.	.624		

4.3. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) conducted using IBM SPSS AMOS aimed to assess the reliability, validity, and model fit of constructs derived from Exploratory Factor Analysis (EFA) in the context of online tourism education. Construct reliability was established through Cronbach's Alpha and Composite Reliability, with values exceeding recommended thresholds (Cronbach's Alpha > .70, Composite Reliability > .70), ensuring the reliability of the constructs (Nunnally & Bernstein, 1994; Hair et al., 2010; Fornell and Larcker, 1981). Convergent validity was confirmed by Average Variance Extracted (AVE) values surpassing 0.50 (Fornell & Larcker, 1981). Factor loadings for each item were satisfactory, with all parcel items achieving factor loadings above .50 (Table 4).

Table 4. Summary of CFA Results

Latent Constructs	Cronbach's (α)	CR	AVE	Items (Observed Variables)	Code	Standardized Estimate	S.E.	C.R. (t-Value)
Educational /ICT Infrastructure (EI)								
Smart Institutions (SI)	.836	.864	.517	Seminar / Conference Hall	EF5	.577	.064	10.145
				Smart Classroom	EF3	.688	.064	12.391
				Board-room	EF4	.688	.063	12.236
				Computer Lab	EF1	.726	.064	13.251
				Centralized Wi-Fi	EF6	.835	.065	15.551
				Tourism Labs	EF2	.772	-	-
Internet Connectivity (IC)	.884	.868	.570	Internet Connection	EF7	.804	.065	15.421
				Internet connectivity through Fiber-optic.	EF_IC3	.727	.067	13.521
				Internet connectivity through Broadband	EF_IC4	.668	.068	12.254
				Internet connectivity through DSL	EF_IC2	.768	.068	14.542
				Internet connectivity through V-Sat.	EF_IC1	.799	-	-
Online Platforms (OP)	.821	.808	.562	Video conferencing tools (e.g., Zoom, Google Meet, MS Teams, WebEx)	EF10	.747	.111	9.093
				Learning Management System (LMS e.g., Moodle, Google Classroom)	EF11	.816	.130	9.420
				Social media platforms (e.g., Facebook, YouTube/ WhatsApp, Twitter, Telegram)	EF12	.648	.121	7.999
				MOOCS (e.g., Swayam)	EF9	.578	.077	13.038
				Open online technologies (e.g., Perusall, Kahoot, Scrative, Padlet, EdPuzzle).	EF8	.578	-	-
Online Teaching and Learning Environment (TLE)								
Teaching Learning Barriers (TLB)	.935	.947	.644	Teachers & students face technical & internet issue in online education.	TLE15	.787	.069	13.881
				OTE misses out on real-time interaction between teachers & students for campus experience.	TLE16	.784	.069	13.838
				Online classes are planned and organized with classroom etiquette,	TLE12	.908	.070	15.954

				bonding and teamwork among instructors and learners			
				Flexibility in class time and place to cover up missed classes.	TLE11	.818	.077	14.419
				Online education integrates with lonely environment for personalized learning and family work.	TLE10	.867	.073	15.260
				OTE is Compatible for differently-abled students.	TLE18	.730	.085	12.902
				Instructors/ learners face data privacy and security issues in OTE.	TLE17	.653	.091	11.569
				Our institution has standard institutional IT policy for guidance & support to online students.	TLE13	.859	.077	15.125
				Classroom environment is convenient and breaks the barrier of shyness and fear.	TLE9	.787	.080	13.885
				Students are attentive to engage and participate in online classes.	TLE14	.802	.083	14.140
				Relevant, structured and organized online study materials are available / accessible at our institution's website.	TLE20	.702	-	-
Basic Tourism Knowledge (BTK)	.839	.964	.843	Destination and Event Management	TLE4	.919	.040	26.734
				Specialization, Sustainability and Research	TLE5	.930	.039	27.615
				Hospitality and Service Management	TLE3	.914	.038	26.407
				Fundamental Concepts and Principles in Tourism	TLE1	.935	.037	27.981
				Business and Management Education in Tourism	TLE2	.891	-	-
Industry Interface & Curriculum (IIC)	.886	.908	.715	Expert interaction (e.g., expert counselling, interview & group discussion)	TLE7	.940	.090	14.823
				Industry engagement (e.g., industry interaction, industry property visit, summer job training)	TLE8	.853	.093	13.766
				Management skill (e.g., organizing local / national study tours, events, workshops and seminars)	TLE6	.898	.094	14.354
				Our institution has active Board of Studies (BoS) for curriculum design and updation.	TLE19	.664	-	-
Educational Outcomes (EO)								
Skills & Knowledge Achievement (SKA)	.928	.929	.723	Improved skill-sets.	EO12	.833	.057	17.679
				Improved knowledge.	EO11	.892	.055	19.528
				Academic performance.	EO7	.857	.056	18.391
				Reading achievement.	EO9	.871	.055	18.838
				Satisfaction and happiness.	EO3	.796	-	-
Global Recognition (GR)	.912	.913	.723	Cooperation and social interaction.	EO6	.856	.049	20.562
				Social recognition.	EO4	.841	.056	17.843
				International accreditations.	EO5	.851	.049	20.38

				Encourage internationalization.	EO10	.854	-	-
Academic Progression (AP)	.806	.889	.668	Opportunity for higher education.	EO2	.823	.052	17.646
				Increased enrolment for online courses.	EO1	.824	-	-
Job Placements (JP)	.792	.742	.595	Placements.	EO8	.777	.051	17.845
				Enhanced industry-institution interface.	EO13	.844	-	-

Note: CR = $(\sum\lambda)^2 /[(\sum\lambda)^2 + \sum(1-\lambda^2)]$, AVE = $\sum\lambda^2 /n$ (where, λ is factor loadings, λ^2 is the square of factor loadings, n is the number of items in a variable/construct.).

The overall model fit of the measurement models for each dimension were assessed through various fit indices (Ullman, 2001; Hu and Bentler, 1998; Bentler, 1990). The result revealed for the measurement model of educational infrastructure, including Smart Institutions, Internet Connectivity, and Online Platforms, exhibited favorable fit indices: CMIN/DF = 3.795, GFI = 0.875, CFI = 0.917, TLI = 0.893, RMR = 0.100, and RMSEA = 0.085 (Figure 2). Similarly, the measurement model for the online teaching-learning environment (TLE), comprising Basic Tourism Knowledge, Teaching-Learning Barriers, and Industry Interface & Curriculum, demonstrated good fit measures: CMIN/DF = 2.779, GFI = 0.901, CFI = 0.957, TLI = 0.950, RMR = 0.053, and RMSEA = 0.073 (Figure 3). Lastly, the measurement model for Educational Outcomes (EO), including Skills & Knowledge, Better Opportunity, and Global Recognition factors, also showed favorable fit indices: CMIN/df = 3.995, GFI = 0.912, CFI = 0.960, TLI = 0.945, RMR = 0.034, and RMSEA = 0.095 (Figure 4).

These results indicated the reliability and validity of the measurement models for EI, TLE, and EO in the context of online tourism education. All measurement models demonstrated acceptable fit and provided valuable insights into the factors influencing the online tourism education domain (Steiger, 1990; Browne & Cudeck, 1992).

4.4. Mediation Analysis

The study assessed the mediating role of teaching learning environment (with constructs - teaching learning barriers, tourism skills & knowledge and industry interface & curriculum) on the relationship between educational infrastructure (with constructs - smart institutions, various internet connectivity and online teaching learning platforms) and educational outcomes (with constructs - job placements, skills & knowledge achievement, global recognition and academic progression).

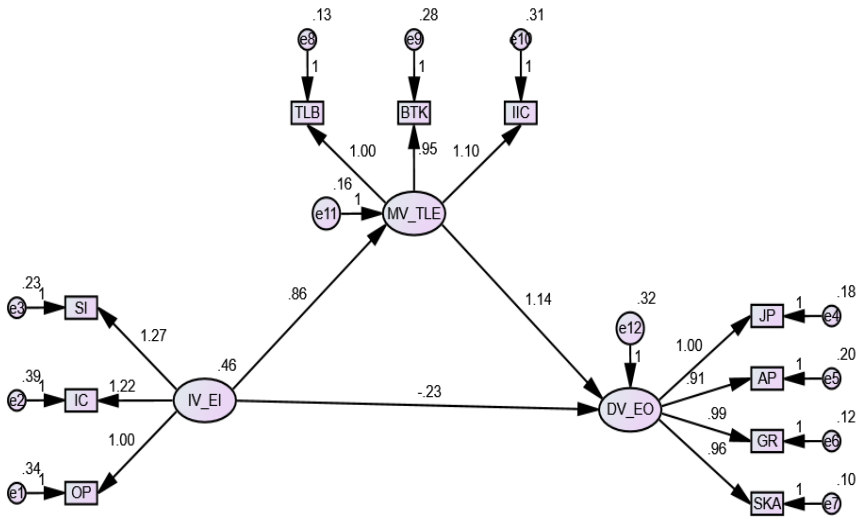

Figure 2. Mediation Analysis Model

Abbr.: IV_EI – Educational (ICT) infrastructure as Independent Variable; MV_TLE – Teaching learning environment as Mediating Variable; DV_EO – Educational outcomes as Dependent Variable. SI - Smart Institutions, IC- Internet Connectivity, OP - Online Platforms; BTK - Basic Tourism Knowledge, IIC – Industry Interface & Curriculum, TLB – Teaching & Learning Barriers; SKA - Skill & Knowledge Achievement, GR - Global Recognition, AP - Academic Progression, JP – Job Placement.

Table 5. Summary of CFA Results

Relationship–Educational Infrastructure (EI) --> Online Teaching Learning Environment (TLE) --> Educational Outcomes (EO)	Direct Effect	Indirect Effect	Estimate	S.E.	C.R.	P
IV_EI -------> MV_TLE	*.864*	*.000*	*0.864*	*0.045*	*19.211*	***
IV_EI -------> DV_EO	*-.232*	*.984*	*-0.232*	*0.096*	*-2.426*	*0.015*
MV_TLE -------> DV_EO	*1.139*	*.000*	*1.139*	*0.096*	*11.909*	***

The table 5 summarizes the outcomes of a mediation analysis examining the interplay among educational infrastructure (EI), Online teaching learning environment (TLE), and Educational Outcomes (EO) within the context of online education. Mediation analysis summary is presented that the direct effects of Educational Infrastructure (IV_EI)) to DV_EO through Teaching Learning Environment are -.232. Furthermore, the results revealed a significant indirect effect of Educational Infrastructure on Educational Outcomes is .984 (a*b = 864*1.139), was positive and significant (b= 0.984 and -.232, t = -2.426, p = .015). However, the negative estimate of -0.232 suggests a direct adverse impact of EI on EO. Overall, this suggests the partial mediation influence of TLE in the relationship between EI and EO in the context of online tourism education.

5. Discussion

To achieve the objective 1, EFA was employed to explore the underlying factors associated with the educational ICT infrastructure (EIF), teaching- learning environment (TLE) and Educational Outcomes (EO) within the realm of online tourism education. The utilization of EFA served as a valuable methodological approach to investigate the latent factors associated with educational ICT infrastructure (EIF), teaching-learning environment (TLE), and Educational Outcomes (EO) within the realm of online tourism education. EFA enabled the exploration of underlying constructs and relationships among variables, providing insights into the multifaceted nature of these dimensions. Through EFA, the study identified and delineated key factors within each dimension, shedding light on the complex interplay between educational ICT infrastructure, the teaching-learning environment, and educational outcomes in the context of online tourism education. This approach allowed for a comprehensive understanding of the factors influencing educational practices and outcomes in the digital learning environment. Moreover, EFA facilitated the identification of relevant variables and constructs that contribute to the effectiveness and success of online tourism education initiatives. By uncovering these underlying factors, EFA provides a foundation for further research and intervention strategies aimed at optimizing educational practices and enhancing student outcomes in the online tourism education domain. The findings from EFA contribute to the existing body of literature by offering empirical evidence and insights into the factors shaping online tourism education. This discussion aligns with previous research emphasizing the importance of employing robust methodological techniques, such as EFA, to explore complex phenomena and inform evidence-based practices in educational settings (Fabrigar et al., 1999; Tabachnick & Fidell, 2007). Hence, the employment of EFA in this study facilitated a nuanced understanding of the educational ICT infrastructure, teaching-learning environment, and educational outcomes in online tourism education, underscoring its significance in advancing knowledge and practice in this field.

Subsequently, to achieve the objective 2, CFA and SEM was employed to assess the measurement model fit and establishing the relationship through mediation analysis in direct and indirect influence of TLE between EIF and EO. The mediation analysis suggests whether the direct, indirect and mediating relationship between EI and EO is mediated by TLE. In line with prior research (Smith & Fassinger, 2011), the result illustrates the direct effect of EI on TLE (IV_EI --> MV_TLE). The estimate of 0.864 indicates a significant positive association between EI and TLE, denoting that an improvement in educational infrastructure enhances the online teaching-learning environment. This finding is consistent with studies emphasizing the critical role of infrastructure in shaping the online learning environment (Chen & Jones, 2007). The subsequent row delineates the direct effect of EI on EO, excluding the mediating influence of TLE (IV_EI --> DV_EO). The negative estimate of -0.232 suggests a direct adverse impact of EI on EO. This finding may indicate that despite advancements in infrastructure, there are other factors influencing educational outcomes, such as instructional design or learner characteristics (Alqurashi, 2019). Lastly, the result elucidates the indirect effect of EI on EO through TLE (MV_TLE --> DV_EO). The estimate of 1.139 underscores a substantial positive relationship between TLE and EO when mediated by EI. This indicates that enhancements in the online teaching-learning environment, driven by improvements in educational infrastructure, lead to better educational outcomes. Similar findings have been documented in previous research highlighting the significance of a conducive online learning environment in fostering positive outcomes (Sun et al., 2008).

Finally, the results suggest that the teaching-learning environment partially mediates the relationship between educational infrastructure and educational outcomes in online tourism education. Results also emphasize the pivotal role of infrastructure in shaping the online learning environment and ultimately impacting educational outcomes.

6. Conclusion

The study confirmed a strong positive and direct influence of 'educational infrastructure' on 'teaching and learning environment' and 'educational outcomes', with 'teaching and learning environment' partially mediating the relationship between the others. It may be argued that the students whose expectations of learning were duly satisfied; had positive opinion about the performance of online tourism education. They also had high levels of satisfaction with the online teaching-learning environment. For the occurrence of mediation of teaching and learning environment, good online/ICT infrastructure facilities, and virtual class environments are found to have importance to retain the students' interest in online education.

The study also offers insights into online tourism education within higher education but recognizes several limitations. Predominantly utilizing quantitative methods in the research, neglects the potential qualitative approach (Yang, et al, 2020). A mixed-method framework could achieve a more comprehensive understanding of online tourism education (Creswell & Plano Clark, 2017). Furthermore, the study's classification of variables, particularly designating the online teaching-learning environment as a Mediating Variable (MeV), warrants scrutiny (Deci & Ryan, 2000). Future inquiries could examine the role of teaching-learning environment as a moderating variable while considering online teaching and learning practices as independent variables. The study's limitations, including sample size and duration, underscore the necessity for future research adopting cross-sectional and longitudinal methodologies (Dalgarno & Lee, 2010).

7. Future Research

Benchmarking the online tourism education may unveil best practices and encourage cross-cultural collaboration in online education (Altbach & Knight, 2007b). Additionally, a cross-disciplinary approach is also deemed necessary for the future of online tourism education. The interdisciplinary nature of the tourism industry requires integration across business, environmental studies, cultural studies, and

technology, fostering innovative thinking and preparing students to understand the multifaceted dimensions of the industry (Jamal & Robinson, 2009). ÇINAR K (2020) also recommended that the development of ICT skills is recognized as crucial for learners' extensive and practical involvement in the ultimate society (OECD, 2015), and digital devices in teaching and learning do not assure active participation and performance of learners (Kirkwood,2009). These proposed research directions signify a commitment to continuous improvement and innovation in online tourism education, aligning with the evolving educational landscape.

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