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Effect of Educational Infrastructure on Learning Outcomes: The Moderating Role of Student Motivation in Online Tourism Education

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Abstract

This article aimed to identify the underlying factors of theoretical clusters such as educational infrastructure, teaching-learning practices, student motivation, and educational outcomes from the literature related to online tourism education, as well as establish significant statistical relationships among them. A valid sample of data (644) was collected using stratified random sampling through the survey method from students and faculty actively engaged in tourism programs at higher education institutions. Structural equation modelling was employed for the data analysis to examine the possible relationship between and moderating effect, among the variables. Results indicate that all four exogenous variables (smart institutions, internet connectivity, online platforms, teaching & evaluation, course workload & preparation, student engagement, learning motivation, learning challenges) significantly affect students' educational outcomes towards online tourism education. However, Internet Connectivity and Online Platforms did not show significant effects on the specified outcomes. Further in mediation analysis, the results showed a significant positive relationship (CEI = 0.178, $p < 0.001$) between Educational Infrastructure (EI) and Educational Outcomes (EO) in tourism education, indicating that facilities like Smart Institutions, Internet Connectivity, and Online Platforms positively impact EO. However, the

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moderation analysis found that student motivation did not significantly moderate this relationship (CEI*CEO = 0.040, p = 0.141). The findings may serve as a reference point for future studies for improving the quality of online tourism education and facilitate tourism educators and learners with technological advancements in tourism educational institutions.

Keywords: Tourism education, online tourism programs, student motivation, online teaching-learning, teaching-learning environment, moderation analysis, tourism educational institution.

1. Introduction

The tourism education landscape in India is rapidly evolving and is playing an important role in shaping the educational experience. The field of online tourism education has witnessed a transformational change with the integration of ICT in tourism educational institutions. The field of online tourism education has experienced significant growth due to increased investment in educational infrastructure (EI) in higher educational institutions. The establishment of smart institutions, improved Internet connectivity, and advanced online learning platforms reflect a commitment to expand access and improve the quality of online courses, thereby reaching diverse audiences. However, challenges remain. Disparities in educational infrastructure across regions pose a threat to equitable access, potentially excluding certain segments of the population (Blanchard & Cook, 2012; Picciano, 2017). Additionally, ensuring effective teaching-learning practices (TLPs) in online teaching-learning environments (TLE) presents challenges including technical barriers, maintaining student engagement, and developing reliable assessment methods (Wiggins, 2012; Gikandi et al., 2011).

Recent studies have shown the significance of online tourism education, which depends on its critical dimensions and their transformative effects. A well-designed teaching-learning environment helps learners master basic tourism knowledge by overcoming barriers in online learning. It also motivates students towards online learning, creates industry interface and course relevance (Swan, 2001; Palloff and Pratt, 2013). Studies (e.g. Ryan & Deci, 2000; Martin & Bolliger, 2018) have underlined the importance of the constructs of students' motivations and their educational outcomes with a supportive learning environment. In dealing with challenges, it is essential to understand the how relationship of various dimensions like educational infrastructure, teaching learning environment, teaching learning practices, students motivation and their outcomes shape the contemporary practice and future strategies of online tourism education in India (Blanchard & Cook, 2012; Swan, 2001; Ryan & Deci, 2000).

2. Literature Review and Hypotheses Formulation

Tourism Higher Education Institutes (TEIs) in India and around the world that have all the necessary ICT infrastructure to support online education have been considered smart institutions in research. The availability and use of these ICT infrastructures to make teaching-learning practices effective in online tourism education drive the educational outcomes. Additionally, effectiveness also depends on how smart institutions are equipped with technological tools, internet connectivity available in them and the online platforms used to design, deliver and evaluate tourism courses (Gherheș et al., 2021; Chen et al., 2023).

In the relationship between educational infrastructure (EI) and the teaching-learning environment (TLE), effective teaching-learning practices and students' motivation contribute to the overall educational outcomes (EO). This approach, balanced active student participation promotes a favorable learning environment and also workload among the online class participants (Zhao et al., 2022). As per reviewed literature, while on the one hand, teaching-learning environment (TLE) mediates the relationship between educational ICT infrastructure (EI), teaching-learning practices (TLP), and educational outcomes (EO), on the other hand, student motivation also have a positive moderating impact (Acosta, 2021). Student motivation moderates the relationship, and a well-designed curriculum, fair assessment, and interactive learning experiences contributes to student engagement and motivation (Deci & Ryan, 2000; Bao, 2020). Motivated students are more likely to convert positive learning experiences into better educational outcomes. Finally, a positive teaching-learning environment contributes to favorable educational outcomes. An environment that removes barriers, provides an industry interface, and aligns with curriculum requirements enhances students' overall achievements (Akinci et al., 2018).

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 encompasses various formats, including fully 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. 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. Sigala (2001)

reviewed and assessed the evolution of e-practices in order to identify the e-learning models in tourism and hospitality departments. ICT is vital for teaching and learning about tourism before students enter in the tourism industry (Adukaite et al., 2017).

2.1. Educational infrastructure [EI]

The study of educational infrastructural facilities has become important in the present scenario as a lot of educational institutions are opening up everywhere, where the basic needs and expectations of the staff, professors and students are not being fulfilled (Krishnaiah et al., 2024). Research conducted by Altbach and Knight (2007) to examine the role of educational/ ICT infrastructure (EI) emphasized the importance of technology in reshaping higher education globally. They further advocated the transformative impact of technology on higher education and the adoption of "smart infrastructure" to enhance the overall educational experience. In the context of tourism, online education can include fully online courses, degree programs, and professional development offerings. This educational model is governed by technological tools such as learning management systems (LMS), video conferencing, discussion forums, and interactive simulations to promote an engaging and effective learning environment. According to Buhalis and Law (2008), the integration of ICT in tourism education not only supports knowledge delivery but also enhances student interactivity and engagement, which is vital for experiential learning in tourism and hospitality. Furthermore, Sigala (2002)included other important factors arguing that online education platforms in tourism must evolve alongside advancements in internet connectivity and smart institutional strategies to remain relevant and effective. These critical reviews highlighted the benefits, challenges, and emerging trends associated with leveraging internet connectivity and digital platforms in tourism education, underscoring how technological advancements are shaping the learning environment and directly impacting the overall quality of tourism-related academic programs (Altbach& Knight, 2007; Buhalis & Law, 2008; Sigala, 2002).

Smart institution: The concept of Smart Institutions involves the integration of advanced technologies to enhance the overall educational experience (Chao, Chen, & Li (2019). There has been significant development in the use of internet connectivity and online platforms for online tourism education. This included the incorporation of smart classrooms, digital resources, and interactive learning tools. A study conducted by Mishra & Yadav (2016)examined the impact of 'smart institutions' on student learning outcomes. They further emphasized on the influence of online platforms on student learning outcomes. These studies explored how these platforms contribute to interactive and engaging learning experiences, fostering student participation and knowledge retention.

Internet connectivity: The role of 'internet connectivity' and its impact on bridging geographical gaps and providing equitable access to educational resources is explored by Teräs M. (2022).The study further called attention to the digital divide and its implications for online education. A similar study was conducted by Mishra & Yadav (2020) previously. They also emphasized the significance of robust internet connectivity for effective online education. Reliable and high-speed internet is a fundamental prerequisite for accessing online platforms, participating in virtual classrooms, and engaging with digital content. Although Internet connectivity facilitates seamless communication, collaboration, and access to a vast array of resources in Smart Institutions for Online Tourism Education (Al-Emran et al., 2016) it introduces security and privacy concerns in online tourism education, necessitating robust measures to protect sensitive information.

Online platforms: These create interactive and dynamic learning environments, allowing students to engage with multimedia content, simulations, and virtual experiences in tourism education (Buhalis & Law, 2008). Web repositories, video conferencing tools, LMS, MOOCs by Swayam are the main online learning platforms in Online Tourism Education. As Picciano, A. G. (2017) argued Learning Management Systems play a crucial role in Smart Institutions, offering a centralized platform for course management, content delivery, and student interaction in online tourism education. Palvia et al. (2018) in their research study has also discussed the importance of Online Platforms in delivering educational content. They highlighted the role of user-friendly platforms in facilitating seamless communication, collaboration, and content delivery in online education. Hence, Internet connectivity and online platforms enhance accessibility, allowing students to participate in tourism courses from various locations and providing flexibility in learning (Wiers-Jenssen &Stensaker, 2002). But, in contrast, the digital divide remains a challenge, with disparities in internet access and technology hindering equitable participation in Smart Institutions for Online Tourism Education as argued by Warschauer (2002).

2.2. *Teaching-Learning Practices [TLP]*

Previous literature on teaching learning practices (TLP) in the context of Online tourism education involved an in-depth exploration of the latent constructs such as teaching and evaluation, course workload and preparation, and students' engagement.

Teaching and evaluation: Teaching and Evaluation within the Online Tourism Education encompasses instructional strategies, assessment methods, and the overall educational experience. Chick, Hassel, and Haycock (2012) highlighted the significance of engaging teaching methods. Similarly, Picciano (2017) stressed active learning and prompt feedback in

creating effective online teaching environments. Wiggins (2012) advocated for authentic assessment methods, and Nicol and Macfarlane-Dick (2006) emphasized formative assessment and feedback. Technology integration in assessment was explored by Gikandi, Morrow, & Davis (2011), and McGill, Klobas, & Renzi (2011). Quality assurance in online teaching, as outlined by Quality Matters (2018) and Conrad (2015), ensures high standards. Palloff and Pratt (2013), discussed that instructor presence enhances teaching and evaluation. Means et al. (2010) highlighted student-centered approaches, and Anderson and Dron (2011) discussed the role of teaching presence in online environments.

Course workload and preparation: The course workload and preparation encompass coursework volume and preparation for instructors and students in Online Tourism Education. Biggs and Tang (2011) emphasized balanced workloads for deep learning, and workload management in online course design. Boettcher and Conrad (2016) addressed instructor workload challenges, and Lehman and Conceição (2013) offered guidance on designing efficient online courses. Means et al. (2013) explored student engagement and workload, while Swan (2001) investigated perceived workload reduction through engaging courses. Song et al. (2004) and Artino & Stephens (2009) examined student readiness for online learning. Bates (2015) and Ally (2008) discussed technology's role in course preparation, aiming to streamline development. Balancing course design, technology integration, and workload considerations is crucial for effective online tourism education.

Students' engagement: Students' Engagement in learning, explored by Fredricks, Blumenfeld & Paris (2004), underscores its significance for positive academic outcomes. Factors contributing to engagement are essential for effective learning experiences.

2.3. Student motivational [SM]

The literature on Student Motivation (SM) draws from Self-determination Theory (Deci & Ryan, 1985) and Achievement Goal Theory (Pintrich, 2000). The seminal work Deci and Ryan (1985)on self-determination theory provides a theoretical framework for understanding intrinsic and extrinsic motivation. The study argues that fostering autonomy, competence, and relatedness enhances motivation in learning contexts. Achievement goal theory by Pintrich(2000) explores how students' goals influence their motivation and learning strategies. The study categorizes goals into mastery and performance orientations, providing insights into the dynamics of student motivation. Eccles and Wigfield (2002) discuss the multifaceted nature of motivation in learning. The study further emphasized the role of individual beliefs, values, and interests in shaping students' motivation

and engagement with educational content, while Vallerand (1997) provided insights into the concept of intrinsic and extrinsic motivation, and challenges to student motivation were explored by Kember (1999) in the context of higher education.

Learning motivation: Learning Motivation is a central aspect of student engagement in online education, as evidenced in the research by Deci, Vallerand, Pelletier, and Ryan (2014). The study explored the role of intrinsic and extrinsic motivation in driving student commitment and persistence in online learning environments. Several other studies have explored factors influencing learning motivation in online settings, particularly in the context of tourism education. Gikandi et al. (2011) emphasized the significance of technological support and training programs to boost self-efficacy and reduce anxiety. Swan (2001) discusses the importance of interactive elements, such as virtual discussions and collaborative projects, in fostering student engagement. Martin and Bolliger (2018) highlighted the role of clear communication strategies and timely feedback to create a supportive online learning environment. These findings collectively underlined the multifaceted nature of factors affecting student motivation in online tourism education, encompassing technological considerations, interactive elements, and communication strategies (Gikandi et al., 2011; Swan, 2001; Martin & Bolliger, 2018).

Learning challenges: The literature review examined studies that explore challenges faced by students in online tourism education, revealing common issues such as technological barriers and a sense of isolation (Gikandi et al., 2011; Blanchard & Cook, 2012). Learning Challenges are addressed by Lu and Chiou (2010) in their study, which identifies common obstacles faced by students in online education. The research examines strategies to overcome challenges related to technology, communication, and self-regulation. Addressing these challenges is pivotal for enhancing student motivation and engagement. Strategies include comprehensive technical support to empower students (Gikandi et al., 2011), integrating interactive elements to mitigate isolation (Swan, 2001), and providing timely feedback for a supportive learning environment (Martin & Bolliger, 2018). Incorporating multimedia elements and real-world examples can make the learning experience dynamic, while collaborative opportunities foster student involvement and community (Swan, 2001). These researches contribute practical insights, and offer a valuable framework for improving online learning experiences in tourism education (Gikandi et al., 2011; Blanchard & Cook, 2012; Swan, 2001; Martin & Bolliger, 2018).

2.4. Educational outcomes [EO]

The literature also includes an exploration of the dependent variable, 'academic outcomes', which is an important aspect of any educational

framework. 'Educational outcomes' comprise key latent constructs such as 'skills and knowledge achievements', 'academic progression', 'global recognition' and 'job placements'. These dimensions collectively represent the effectiveness and success of online tourism education systems. Existing studies have suggested a direct relationship between mediating factors such as quality of ICT infrastructure, pedagogical approaches and student motivation and their impact on final educational outcomes (Kirkpatrick & Kirkpatrick, 2006; Martin & Bolliger, 2018). In the Indian context, with increasing digitalization and global industry integration, these dynamics are particularly relevant. A recent mediation analysis conducted by Jayswal and Mishra (2025) suggested that infrastructural support significantly influences teaching–learning processes, which in turn affect educational outcomes in online tourism programs in India. The review aims to identify and critically examine these key drivers to better understand how they shape both academic progression and employability among students entering the tourism sector through digital learning platforms.

Skill and knowledge achievement: Skills and knowledge achievements are fundamental components of educational outcome. The assessment of student learning outcomes in online education includes 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 (Jemni,2017).

Academic progression: The study conducted by Altbach and Teichler (2001) provided insights into global recognition of educational qualifications. They explored factors influencing the international acceptance of degrees earned in the context of tourism education. Research conducted by Jaggars and Xu (2016) also explored academic progression, examining the progression and completion rates of students in online programs. Also, they examined factors influencing academic success and retention in the online learning environment.

Global recognitions and job placements: The design and delivery of tourism education, especially through online and blended platforms, has become increasingly aligned with industry needs, enhancing employment prospects for graduates in a variety of studies (UNWTO, 2017). In terms of academic achievements, global recognition and job placement are the primary outcomes for learners. The study conducted by Shyju and Singh (2018) also emphasized students' job readiness and success influenced by tourism-related educational programs in securing employment within the tourism and hospitality sectors. Online education and learning in tourism programs provide a global reach, enabling students from diverse

geographical locations to access courses (Xiang, 2017). Han, et al., (2019) have also highlighted that global recognition and job placements are interconnected aspects of educational outcomes in the context of tourism education. They further explored the global recognition of online degrees in tourism and examined the correlation between online education and successful job placements. Furthermore, the study by Roberto and Johnson (2019) pointed out a similar interconnection between global recognition and job placement in online education. They emphasized that online degrees' widespread acceptance and recognition still depend on employer perceptions and industry-specific expectations. This is important in tourism education, where practical skills and industry alignment are indispensable. Recent findings from Frontiers in Education (2022) have also confirmed that students enrolled in well-designed online tourism and hospitality programs can develop the competencies needed to succeed in the job market.

These insights highlighted that with appropriate design, online tourism education can lead to comparable employment outcomes enhancing both the credibility and global recognition of such degrees in tourism.

2.5. *Students' Motivation [SM] as a moderator*

The existing literature provided a comprehensive foundation for understanding how educational infrastructure, teaching practices, and student motivation collectively influence educational outcomes in online tourism education. Within this framework, students' motivation (SM) emerges not only as an independent factor but as a moderating variable – one that can strengthen or weaken the relationship between institutional inputs (e.g., infrastructure, teaching quality) and desired educational outcomes (e.g., knowledge acquisition, employability). Amir Batouei& Ai Ping Teoh (2021) emphasized how physical learning environments influence student satisfaction, yet in online contexts, motivation can determine how students perceive and adapt to digital spaces. Zhang et al. (2022) directly correlated learning motivation to improved outcomes, with the learning experience acting as a catalyst, suggesting that when motivation is high, even modest infrastructure can lead to strong results. Ainon Ramli &Rosmaizura Mohd Zain (2018) underscored the significant contribution of infrastructure to academic achievement, but this effect may be increased or decreased depending on the student's intrinsic or extrinsic motivation. Similarly, Chen et al. (2020)advocated customized learning environments based on types of motivation, which strengthens the moderating role of students' motivation (SM) in maximizing educational returns. In addition, Tang ShuPeng and Jamalsafri Bin Saibon (2022)highlighted that student readiness and attitude (components of motivation) mediate the effect of online learning environments on performance, which corresponds to the view that motivated students are better positioned to benefit from available

resources. Other studies such as Maldonado et al. (2011), Seyedeh Khadijeh Taghizadeh et al. (2022), Hsu (2021), and Singh &Meena (2023) further provided empirical support for the complex, interactive effects between motivation, engagement, infrastructure, and pedagogy.

Overall, these findings supported the role of student motivation as a moderator, emphasizing that the success of online tourism education depends not only on institutional quality, but also on how motivated students engage, adapt, and persist.

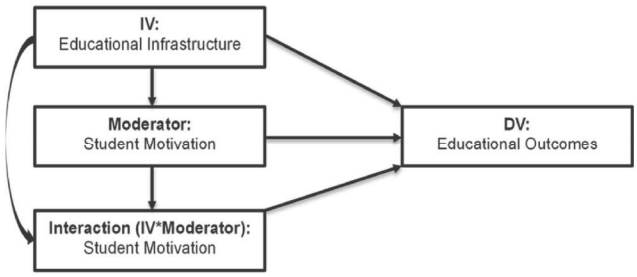


Figure 1: Conceptual model for moderation analysis

While the existing literature acknowledges the roles of educational infrastructure, teaching-learning practices, and student engagement in online tourism education, it lacks a nuanced understanding of how students' motivation (SM) moderates these relationships. Particularly, there are limited studies focused on how motivational constructs such as autonomy, competence, and relatedness influence students' ability to benefit from technology-enhanced pedagogical strategies. While ICT infrastructure is widely adopted, their alignment with teaching–learning practices and impact on educational outcomes are yet to be explored. Additionally, while studies highlighted the importance of workload balance for in-depth learning, little is known about how motivation interacts with workload to influence outcomes. These gaps in the literature suggested a need to investigate how students' motivation (SM) influence the effectiveness of online teaching-learning environments, teaching-learning practices (TLP), and educational outcomes (EO). Examining this moderating role can lead to more effective instructional design, engagement strategies, and platform selection in online tourism education.

Based on the above constructs, the following hypotheses for the present study can be formed;

H1: Smart Institutions (SI) positively affect Skill & Knowledge Achievement (SKA), Academic Progression (AP), and Job Placement (JP), and Global Recognition (GR).

H2: Internet Connectivity (IC) has a positive impact on Skill & Knowledge Achievement (SKA), Academic Progression (AP), Job Placement (JP), and Global Recognition (GR).

H3: Online Platforms (OP) positively influence Skill & Knowledge Achievement (SKA) and Job Placement (JP), but not Academic Progression (AP) and Global Recognition (GR).

H4: Teaching & Evaluation (TE) positively affects Academic Progression (AP), Skill & Knowledge Achievement (SKA), Job Placement (JP), and Global Recognition (GR).

H5: Course Workload & Preparation (CWP) positively influences Skill & Knowledge Achievement (SKA), Job Placement (JP), Global Recognition (GR), and Academic Progression (AP).

H6: Student Engagement (SE) positively affects Skill & Knowledge Achievement (SKA), Global Recognition (GR), Job Placement (JP), and Academic Progression (AP).

H7: Students' Motivation has a significant influence between Educational Infrastructure and Educational Outcome through Teaching-Learning Practice in online tourism education.

3. Objectives

1. To explore the various underlying factors of the key dimensions of online tourism education.
2. To establish significant relationships between factors related to educational infrastructure and educational outcomes through teaching-learning practices of online tourism education.
3. To find the role of student motivation in moderating between educational infrastructure and educational outcomes through teaching-learning practices.

4. Methodology

4.1. Research Design

A survey-based quantitative research design using structural equation modelling (SEM) was adopted for the present study to examine the relationships among variables. The primary data were collected from students and teachers of tourism programs from various tourism educational institutions (TEIs) across India. A total 644 participants, 97 Teachers and 547 Students were included for the study. 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). Data collection entailed a survey-based structured questionnaire designed to capture insights across five theoretical constructs: educational infrastructure, teaching-learning environment, teaching-learning practice, students' motivation, and educational outcomes in the context of online tourism education (Amin et al. (2021). The research instrument was then designed to ask about the degree of agreement with the statements by the respondents. A five-point Likert scale were used to collect responses ranging from 'Strongly Agree' to 'Strongly Disagree'. This research design provided an understanding of online tourism education landscapes to explore key variables which contribute to the effectiveness of study in online tourism education (Shyju et al., 2022).

4.2. Data analysis

In the present study, split-sample validation method and SEM were used for data analysis. It is a critical method in social science research, which evaluates the generalizability and robustness of statistical models or hypotheses (Brown, 2015). This approach examines the stability and consistency of findings across different samples by splitting the dataset into two sub-groups, thereby enhancing the reliability of findings (Tabachnick & Fidell, 2013). For this, the dataset of a total 644 responses was divided into two samples, training sample (n=310) and validation (n=334) samples (Hair et al., 2010). Thereafter, SEM technique was employed for its capability to analyze intricate relationships between observed and latent variables simultaneously. Exploratory factor analysis (EFA) was applied to the training sample, while confirmatory factor analysis (CFA) to the validation sample, and then assessed model fit through moderator analysis. Furthermore, tools such as MS Excel for data tabulation and refinement, IBM SPSS v26 Package for EFA, AMOS for CFA and Moderation Analysis, and CR-AVE Calculator for assessing measurement model fit were used. This methodological rigor ensures in-depth analysis and robust interpretation supported by scholars (Brown, 2015; Hair et al., 2010; Tabachnick & Fidell, 2013).

5. Result and Discussion

5.1. Demographic Analysis

In the present study, 644 respondents were included whose demographic profile is shown in Table 1. Out of 644 participants, the majority were students (547, 84.94%), and only 97 (15.06%) were teachers. In case of gender, 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%).

Table 1: 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

Variables	No. of Respondents (n=644)	Percentage (n=644)
Location of respondents' institutions		
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

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. In contrast, very few (3.88%) exhibited a long term engagement of 4 years or above with the online pedagogical modalities, possibly suggesting early adopters or low practice. Annual family income of the respondents, the distributions explained a prevailing proportion reporting incomes below 1 Lakh (34.94%), followed by meagre numbers extending up to incomes exceeding 12 Lakhs, thereby depicting a diverse spectrum of economic backgrounds within the sampled population. Overall, these findings provide a detailed account of the demographic analysis, educational competencies, online instructional skills, and socio-economic status of the study participants, which forms a robust base for further analysis and drawing conclusions.

5.2. Factor Analysis (EFA & CFA)

The two significant techniques of Structure Equation Modelling (SEM), Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used for analyzing the data in the study. Through EFA, latent constructs like student motivation and engagement, aiding curriculum development in online tourism education have been identified. Further CFA was used to validate the conceptual models, aligning observed variables with constructs such as learning motivations and Educational/ICT infrastructure integration (Xiang et al., 2017). EFA revealed educational outcomes (EO), while CFA assessed online teaching learning practice (TLP) frameworks, enhancing online platforms (OP) effectiveness (Wang et al., 2019). Both techniques synergize, advancing online tourism education, and optimizing learning experiences (Jaggars& Xu, 2016; Xiang et al., 2017; Wang et al., 2019).

To achieve the objective 1, the 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 key-

dimensions (i.e. EI, TLP, SM and EO) were found .894, .936, .947, .932 and .959, respectively, which are >0.60. And, Bartlett's Test of Sphericity p=.000 ($p < 0.05$) were also found suitable to employ EFA for each key-dimension. Principal Component Analysis (PCA) technique and Rotated Component Matrix rotation method was used for factor extraction to identify a smaller number of uncorrelated variables (principal components) from a larger set of data (Muir, 2017). The result shown the total variance explained in factor analysis 68.162%, 67.062 %, 71.057 and 80.842% (>50%), with the initial Eigenvalues for all the extracted factors range from 1.017 to 8.801 (>1). These values validated all the explored factors under the key dimensions of online tourism education. The summary of exploratory factor analysis is shown in Table 2 enlisting all extracted factors, such as, Smart Institutions (SI), Internet Connectivity (IC), Online Platforms (OP) under EF; Teaching & Evaluation (TE), Course Workload & Preparation (CWP) and Student Engagement (SE) under TLP; Learning Motivations (LM) and Learning Challenges (LC) under SM; Thereafter, Skills & Knowledge Achievement (SKA), Global Recognition (GR), Academic Progression (AP) and Job Placements (JP) under EO.

Table 2: Summary of Exploratory Factor Analysis

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-Learning Practices (TLP): KMO: .936 Bartlett's test(P): .000 Total Variance: 67.062				
	Factor 1: Teaching & Evaluation (TE)		*52.140 %*	*7.300*
TLP7	*There is a continuous and comprehensive evaluation of teachers and instructors.*	*.829*		
TLP8	*The evaluation of teachers reflects in their career advancement and appraisal.*	*.812*		
TLP3	*Facilitates teachers to update their subject/ content knowledge and skills.*	*.779*		
TLP4	*Teachers' effectiveness in handling the online classes.*	*.711*		
TLP2	*Online discussion forum should encourage learners to articulate and reflect their thinking*	*.707*		
TLP6	*Online class-room participation should be part of the students' assessment.*	*.648*		
TLP5	*Instructors' expectations are higher than students' performance.*	*.639*		
TLP9	*Online education suffers from Insufficient tools for students' assessment.*	*.567*		
	Factor 2: Course Workload & Preparation (CWP)		*8.604% %*	*1.205*
TLP12	*Online evaluation has lesser credibility.*	*.824*		
TLP14	*We have a higher workload in online courses compared to physical classes.*	*.720*		
TLP13	*Longer preparation is required for online courses.*	*.704*		
	Factor 3: Student Engagement (SE)		*6.318 %*	*1.115*
TLP1	*Innovative projects and practicals are offered online/ offline for teaching- learning.*	*.877*		
TLP11	*Online teaching requires innovative methods of engaging with the students.*	*.696*		
TLP10	*Incorporation of multimedia stimulate learners' interest*	*.590*		
Students Motivation (SM): KMO: .932 Bartlett's test (P): .000 Total Variance: 71.057				
	Factor 1: Learning Motivational (LM)		*61.809 %*	*6.799*
SM1	*Students can make international friends and learn about diverse cultures.*	*.835*		
SM2	*Students can get diverse knowledge in OTE compared to the physical classroom.*	*.814*		

SM3	*Students can learn OTE from the best tourism teachers worldwide.*	*.791*		
SM5	*High salary expectations after OTE degree motivate students.*	*.737*		
SM6	*Online education offers innovative modules and broadening aptitude.*	*.731*		
SM4	*OTE is helpful in getting job and also in learning while on Job.*	*.706*		
	Factor 2: Learning Challenges (LC)		*9.248 %*	*1.017*
SM11	*It's a challenge to motivate students in online learning than in traditional teaching.*	*.804*		
SM8	*Online learning is cost-effective & allows to continue study during pandemic-related lockdowns.*	*.779*		
SM9	*Additional online learning is often rewarding.*	*.751*		
SM10	*Students are worried about lower grades in online evaluations.*	*.712*		
SM7	*Students can access online course materials universally; abroad study certificate is highly esteemed in the country.*	*.638*		
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*		

In further analysis, the measurement models for the key dimensions in context of online tourism education have been developed using IBM SPSS AMOS through CFA which assesses the quality standard and model fit of the constructs that have been derived in EFA. These demonstrate the reliability

and validity of the constructs which determines the effect and importance of constructs. Construct Reliability was assessed using Cronbach's Alpha and Composite Reliability. Cronbach's Alpha for each construct in the study was found over the required limit of .70 (Nunnally and Bernstein, 1994). And, composite reliabilities were found to range from 0.947 to 0.742, which is >0.70 as suggested by Hair et al. (2010) and >0.60 as suggested by Fornell and Larcker (1981) benchmark, are considered good in measurement model analysis. Thus, the construct reliability was established for each construct in the study. Convergent validity of scale items was estimated using Average Variance Extracted (AVE). The AVE values were above the threshold value of 0.50 (Fornell & Larcker, 1981) indicating that the scales used for the present study have fulfilled the required convergent validity. Furthermore, factor loadings were assessed for each item, each parcel item achieved factor loadings (>.50). The models yielded good fit (Table 3). The model-fit measures were used to assess the model's overall goodness of fit, and all values were within their respective common acceptance levels (Ullman, 2001; Hu and Bentler, 1998, Bentler, 1990).

Table 3: Summary of Confirmatory Factor Analysis

Latent Constructs	Cronbach's Alpha (α)	CR	AVE	Items (Observed Variables)	Code	Standar-dized 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 -Learning Practices (TLP)									
Teaching & Evaluation (TE)	*.918*	*.933*	*.637*		*There is a continuous and comprehensive evaluation of teachers and instructors.*	*TLP7*	*.850*	*.097*	*13.072*
					The evaluation of teachers reflects in their career advancement and appraisal.	*TLP8*	*.860*	*.096*	*13.189*
					Facilitates teachers to update their subject/ content knowledge and skills.	*TLP3*	*.852*	*.091*	*13.094*
					Teachers' effectiveness in handling the online classes.	*TLP4*	*.826*	*.093*	*12.797*
					Online discussion forum should encourage learners to articulate and reflect their thinking	*TLP2*	*.826*	*.100*	*12.789*
					Online class-room participation should be part of the students' assessment.	*TLP6*	*.796*	*.097*	*12.431*

					Instructors' expectations are higher than students' performance.	TLP5	.708	.078	13.069
					Online education suffers from Insufficient tools for students' assessment.	TLP9	.640	-	-
Course Workload & Preparation (CWP)	.794	.839	.635		Online evaluation has lesser credibility.	TLP12	.809	.070	15.052
					We have a higher workload in online courses compared to physical classes.	TLP14	.791	.070	14.712
					Longer preparation is required for online courses.	TLP13	.790	-	-
Student Engagement (SE)	.634	.707	.548		Innovative projects and practicals are offered online/ offline for teaching-learning.	TLP1	.577	.078	10.526
					Online teaching requires innovative methods of engaging with the students.	TLP11	.701	.074	12.867
					Incorporation of multimedia stimulate learners' interest	TLP10	.721	-	-
Students Motivation (SM)									
Learning Motivational (LM)	.918	.936	.709		Students can make international friends and learn about diverse cultures.	SM1	.879	.046	22.638
					Students can get diverse knowledge in OTE compared to the physical classroom.	SM2	.810	.053	19.372
					Students can learn OTE from the best tourism teachers worldwide.	SM3	.852	.039	25.063
					High salary expectations after OTE degree motivate students.	SM5	.759	.057	17.195

					Online education offers innovative modules and broadening aptitude.	*SM6*	*.861*	*.045*	*21.692*
					OTE is helpful in getting job and also in learning while on Job.	*SM4*	*.883*	-	-
Learning Challenges (LC)	*.875*	*.906*	*.659*		*It's a challenge to motivate students in online learning than in traditional teaching.*	*SM11*	*.781*	*.056*	*18.376*
					Online learning is cost-effective & allows to continue study during pandemic-related lockdowns.	*SM8*	*.861*	*.047*	*22.144*
					Additional online learning is often rewarding.	*SM9*	*.762*	*.057*	*17.599*
					Students are worried about lower grades in online evaluations.	*SM10*	*.747*	*.058*	*17.03*
					Students can access online course materials universally; abroad study certificate is highly esteemed in the country.	*SM7*	*.898*	-	-
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 internationa lization.	*EO10*	*.854*	-	-

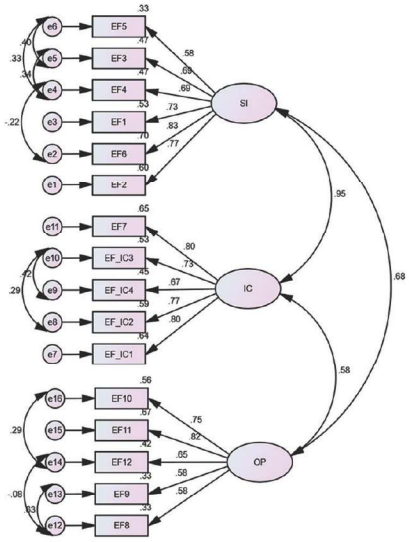
Academic Progression (AP)	.806	.889	.668	Opportunity for higher education.	EO2	.823	.052	17.646
				Increased enrolment for online courses.	EO1	.824	-	-
Job Placements (JP)	.792	.742	.595	Placements.	EO8	.777	.051	17.845
				Enhanced industry-institution interface.	EO13	.844	-	-

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 analysis conducted for various measurement models across different aspects of educational infrastructure reveals promising results. The Confirmatory Factor Analysis (CFA) employed to assess these models consistently demonstrates good fit, as indicated by multiple indices within acceptable ranges. For instance, in evaluating educational infrastructure, the three-factor model (Figure 2) encompassing Smart Institutions, Internet Connectivity, and Online Platforms exhibits commendable fit statistics, with indices such as CMIN/DF = 3.795, GFI = 0.875, CFI = 0.917, TLI = 0.893, RMR = 0.100, and RMSEA = 0.085 falling within accepted thresholds (Ullman, 2001; Hu and Bentler, 1998; Bentler, 1990). Similarly, the CFA conducted for teaching-learning practices and student motivation also yields favorable outcomes, with all measures meeting established criteria for model adequacy. In examining teaching-learning practices, the three-factor model (Figure 3) comprising Teaching & Evaluation, Course Workload & Preparation, and Student Engagement demonstrates robust fit indices across various measures, including CMIN/DF = 2.831, GFI = 0.923, CFI = 0.957, TLI = 0.947, RMR = 0.057, and RMSEA = 0.074 (Ullman, 2001; Hu and Bentler, 1998; Bentler, 1990). Moreover, the analysis of student motivation reveals a two-factor model (Figure 4) capturing Learning Motivations and Learning Challenges, which also exhibits satisfactory fit statistics, with measures such as CMIN/DF = 3.641, GFI = 0.926, CFI = 0.965, TLI = 0.954, RMR = 0.037, and RMSEA = 0.079, reinforcing the validity of the model (Browne &Cudeck, 1992). Furthermore, the evaluation extends to educational outcomes, where a four-factor model encompassing Skill & Knowledge Achievement, Global Recognition, Academic Progression, and Job Placement (Figure 5) demonstrates promising fit indices, with measures such as CMIN/DF = 3.995, GFI = 0.912, CFI = 0.960, TLI = 0.945, RMR = 0.034, and RMSEA = 0.095, consolidating the effectiveness of the measurement approach (Steiger, 1990; Browne &Cudeck, 1992).

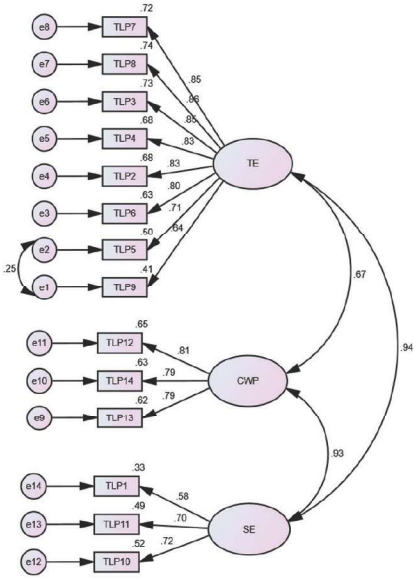
Overall, the comprehensive assessment of these measurement models underscores their reliability and validity in capturing essential dimensions of educational infrastructure, teaching-learning practices, student motivation, and educational outcomes. The consistent alignment of model-fit measures

with established criteria bolsters confidence in the analytical frameworks employed, providing valuable insights for educational research and practice.



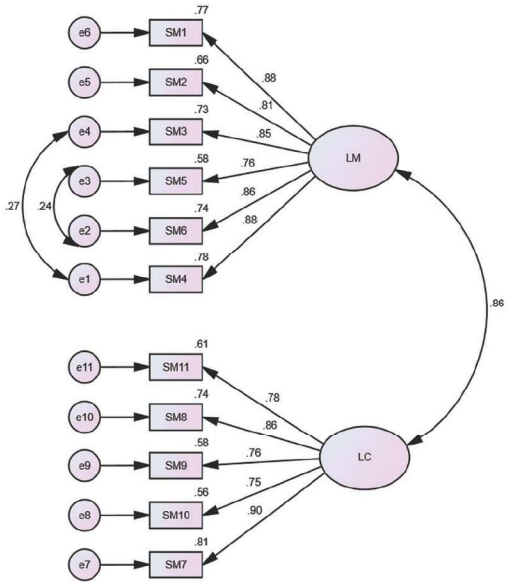
Abbr.: *SI - Smart Institutions, IC- Internet Connectivity, OP - Online Platforms, EF - Educational Infrastructure, EF_IC - Internet Connectivity.*

Figure 2: Measurement model for educational/ICT infrastructure



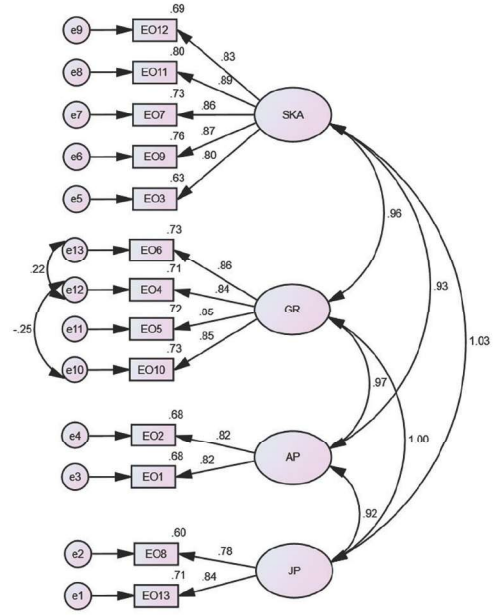
Abbr.: *TE – Teaching & Evaluation, CWP – Course Workload & Preparation, SE – Student Engagement, TLP – Teaching Learning Practices.*

Figure 3: Measurement Model for Teaching Learning Practices



Abbr.: LM – Learning Motivations, LC – Learning Challenges, SM - Students' Motivation

Figure 4: Measurement Model for Students' Motivation

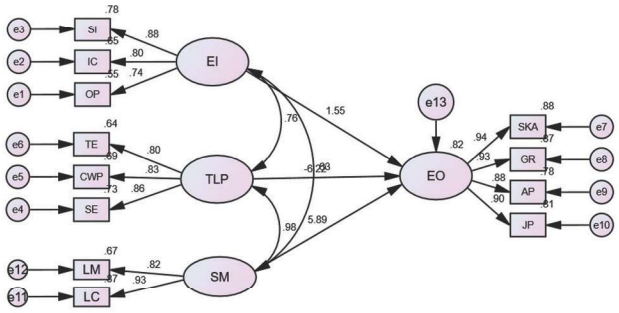


Abbr.: *EO- Educational Outcome, SKA - Skill & Knowledge Achievement, GR - Global Recognition, AP - Academic Progression, JP – Job Placement.*

Figure 5: Measurement model for educational outcome

5.3. Path Analysis and Hypotheses Testing

In subsequent analysis, the structural model (path model) analysis for the theoretical groups formed through IBM SPSS AMOSv26 was used. This facilitates the examination of multifaceted relationships within online tourism education, assessing direct and indirect effects among variables like student engagement, instructor support, and educational ICT infrastructure integration (Wang et al., 2019). A full Structural Model or Path Model analysis is utilized in online tourism education for examining complex relationships among multiple variables simultaneously, elucidating the direct and indirect effects within a conceptual model (Figure 6). Since, platform effectiveness in virtual learning environments is a critical factor in student engagement and academic performance, the course design and platform functionality significantly affect student outcomes in online education (Jaggars & Xu, 2016). It identifies significant pathways influencing EOs, thereby optimizing TLPs and platform effectiveness in virtual learning environments. Acceptable model fit criteria include CMIN/df, GFI, TLI, CFI, RMR, and RMSEA, with thresholds set at ≥ 0.90 for GFI, and between 0.05 to 0.08 for RMSEA (Hair et al., 2010). The applied model yielded favorable fit indices: CMIN/df = 5.121, GFI = 0.942, TLI = 0.961, CFI = 0.971, RMR = 0.039, and RMSEA = 0.080.



Abbr.: *EI- Educational Infrastructure, TLP – Teaching Learning Practices, SM – Student Motivation, EO- Educational Outcome.*

Figure 6: Path Model

Hypotheses Testing: The table 4 presents hypotheses testing results using IBM SPSS AMOS v26. For each hypothesis, the table provides standardized estimates (b-value), standard errors (S.E.), critical ratio (C.R.) or t-value, and p-value. Based on the provided results, hypotheses are evaluated as either supported or not supported, depending on the significance of the relationship between the independent and dependent variables in the context of online tourism education.

Table 4: Hypotheses Results

Hypothesis	*Hypothesized Relationship*	*Standardized Estimates (b-value)*	*S.E.*	*C.R. (t-value)*	*p-Value*	*Significant Direct Relationship b/w IV & DV*
H_1	SI --> SKA	0.023	.048	6.515	***	Supported
	SI --> AP	0.130	.036	5.704	***	Supported
	SI --> JP	0.016	.037	2.597	.009	Supported
	SI --> GR	0.011	.047	.227	.821	Not supported
H2	IC --> SKA	0.024	.041	.517	.605	Not supported
	IC --> AP	-0.080	.040	-1.768	.077	Not supported
	IC --> JP	-0.001	044	-.016	.987	Not supported
	IC --> GR	0.009	.041	.208	.835	Not supported
H3	OP --> SKA	0.131	.044	3.002	.003	Supported
	OP --> AP	0.091	.041	1.926	.054	Supported
	OP --> GR	0.158	.167	.0440	3.768	Not supported
	OP --> JP	0.179	.040	3.347	***	Supported
H4	TE --> AP	0.179	.041	11.666	***	Supported
	TE --> SKA	0.176	.050	3.697	***	Supported
	TE --> JP	0.171	.054	3.580	***	Supported
	TE --> GR	0.207	.050	4.495	***	Supported
H5	CWP --> SKA	0.234	.039	3.997	***	Supported
	CWP --> JP	0.207	.048	4.746	***	Supported
	CWP --> GR	0.219	.044	5.194	***	Supported
	CWP --> AP	0.267	.043	6.288	***	Supported
H6	SE --> SKA	0.171	.058	3.186	.001	Supported
	SE --> GR	0.187	.058	3.607	***	Supported
	SE --> JP	0.182	.063	3.406	***	Supported
	SE --> AP	0.180	.057	3.458	***	Supported

****p<0.001*

H_1: Smart Institutions (SI) positively affect Skill & Knowledge Achievement (SKA), Academic Progression (AP), and Job Placement (JP) and Global Recognition (GR).

In Hypothesis 1 (H1), the analysis reveals several relationships between Smart Institutions (SI) and various dependent variables. Firstly, the standardized estimate indicates a positive relationship between SI and Skill & Knowledge Achievement (SKA), with a strong statistical significance denoted by a high critical ratio (6.515) and a p-value of less than 0.001. Similarly, SI demonstrates a positive influence on Academic Progression (AP), supported by a significant standardized estimate (0.130) and robust critical ratio (5.704). Furthermore, the relationship between SI and Job Placements (JP) is affirmed, as indicated by a positive standardized estimate (0.016) and a p-value of 0.009, falling below the typical significance threshold. However, when considering Global Recognition (GR), the data suggest otherwise, with a non-significant relationship between SI and GR, highlighted by a low critical ratio (0.227) and a p-value of 0.821, indicating no statistical support for this association. In conclusion, Smart Institutions (SI) positively affect

Skill & Knowledge Achievement (SKA), Academic Progression (AP), and Job Placement (JP), but not Global Recognition (GR).

H_2: Internet Connectivity (IC) has a positive impact on Skill & Knowledge Achievement (SKA), Academic Progression (AP), Job Placement (JP), and Global Recognition (GR).

In Hypothesis 2 (H2), the analysis indicates a lack of statistically significant relationships between Internet Connectivity (IC) and the dependent variables. The standardized estimate for Internet Connectivity's influence on Skills & Knowledge Achievement (SKA) is 0.024, but with a critical ratio of 0.517 and a p-value of 0.605, the relationship lacks statistical significance. Similarly, Internet Connectivity confirmed a negative association with Academic Progression (AP), as indicated by a standardized estimate of -0.080. However, with a critical ratio of -1.768 and a p-value of 0.077, this relationship falls marginally short of typical significance levels. Moreover, Internet Connectivity shows no statistically significant influence on Job Placements (JP) or Global Recognition (GR), with both relationships yielding low critical ratios and high p-values, suggesting a lack of support for these associations.

H_3: Online Platforms (OP) positively influence Skill & Knowledge Achievement (SKA) and Job Placement (JP), but not Academic Progression (AP) and Global Recognition (GR).

For Hypothesis 3 (H3), the analysis revealed significant findings regarding the impact of Online Platform (OP) on the dependent variables. A positive relationship is observed between OP and Skills & Knowledge Achievement (SKA), with a standardized estimate of 0.131, a critical ratio of 3.002, and a p-value of 0.003, indicating statistical significance. However, while OP exhibits a positive influence on Job Placements (JP), as evidenced by a standardized estimate of 0.179 and a highly significant p-value denoted by '***', the relationship between OP and Academic Progression (AP) falls marginally short of typical significance levels. Additionally, OP demonstrates a statistically significant positive association with Global Recognition (GR), with a standardized estimate of 0.158 and a high critical ratio, affirming its impact on this variable. OP has a significant positive effect on SKA ($p = 0.003$) and JP ($p < 0.001$), supporting H3 for these variables. However, there is no significant relationship between OP and AP or GR, thus not supporting the hypothesis for these variables.

H_4: Teaching & Evaluation (TE) positively affects Academic Progression (AP), Skill & Knowledge Achievement (SKA), Job Placement (JP), and Global Recognition (GR).

In Hypothesis 4 (H4), the analysis of Teaching & Evaluation (TE) revealed significant positive associations across all dependent variables, especially, TE demonstrated a notable positive impact on Academic Progression (AP), Skill & Knowledge Achievement (SKA), Job Placement (JP), and Global Recognition (GR) as educational outcomes of online tourism education. With standardized estimates ranging from 0.171 to 0.207, critical ratios between 3.580 and 11.666, and p-values marked by '***'. These findings underscored the influential role of TE in driving positive outcomes across the domains.

H_5: Course Workload & Preparation (CWP) positively influences Skill & Knowledge Achievement (SKA), Job Placement (JP), Global Recognition (GR), and Academic Progression (AP).

Hypothesis 5 (H5) further examined the relationship between Course Workload & Preparation (CWP) and the dependent variables. The analysis revealed substantial positive relationships between CWP and SKA, JP, GR, and AP. Notably, standardized estimates ranging from 0.207 to 0.267, critical ratios between 3.997 and 6.288, and p-values marked by '***'. This indicated the significant influence of CWP on enhancing performance and recognition in the context of online tourism education.

H_6: Student Engagement (SE) positively affects Skill & Knowledge Achievement (SKA), Global Recognition (GR), Job Placement (JP), and Academic Progression (AP).

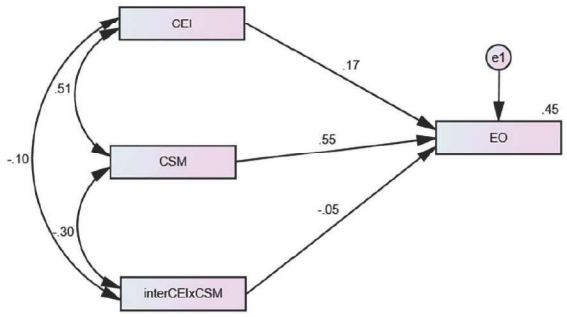
Similarly, in Hypothesis 6 (H6), the analysis of Student Engagement (SE) revealed significant positive associations with all dependent variables. SE demonstrated a meaningful positive impact on SKA, GR, JP, and AP. With standardized estimates ranging from 0.171 to 0.187, critical ratios between 3.186 and 3.607, and p-values marked by '***'. Thus, Student Engagement SE has a significant positive effect on SKA, GR, JP, and AP (all $p < 0.001$), supporting H6 for all variables. These findings underscore the substantial influence of SE in fostering positive outcomes across multiple domains of online tourism education.

The hypothesis testing results therefore indicate significant positive effects of Smart Institutions, Teaching & Evaluation, Course Workload & Preparation, and Student Engagement on various aspects of online tourism education, including skill and knowledge achievement, academic progression, job placement, and global recognition. However, Internet Connectivity and Online Platforms did not show significant effects on the specified outcomes. These findings underscore the importance of effective institutional support, instructional practices, workload management, and student engagement in optimizing learning outcomes in the online tourism education domain.

5.4. Moderation Analysis

In moderation analysis, researchers examined how the relationship between two variables (the independent variable and dependent variable) is affected by the presence of a third variable called the moderator. Moderation is where the direct influence of an independent variable on a dependent variable is altered or changed because of a third variable. This third variable, called the "moderator", can influence the strength (and sometimes sign) of the relationship from the independent variable to the dependent variable. A moderator is said to "interact" with the independent variable to determine the influence on the dependent variable. Thus, we use the term "interaction" when testing for moderation where the combined effect of the independent variable and the moderator is examined (Collier, 2020).

Various studies such as Singh and Meena (2023); Zhang et al. (2022); Tang ShuPeng & Jamalsafri Bin Saibon (2022); Amir Batouei & Ai Ping Teoh (2021); Hsu (2021) and Chen et al. (2020) have explored the mediation of students learning motivation in tourism education. Therefore, the factors under the Educational Infrastructure are considered as Independent Variables (IV), and factors of Educational Outcomes and Students' Motivation are considered as Dependent Variables (DV and Moderator (MoV), respectively for the present study. Educational infrastructure of tourism institutions leads to improved Educational Outcomes. If we say that the relationship from Educational Infrastructure is moderated by level of Students Motivation. Then we need to see how the interaction of Educational Infrastructure and Students' Motivation influence Educational Outcome (Collier, 2020b). Therefore, researchers have analysed how the relationship between Educational Infrastructure available in the institutions and their Educational Outcomes is moderated by Students' Motivation towards Online Tourism Education. This means, we are investigating whether the impact of Educational Infrastructure on Educational Outcomes depends on different levels of Students' Motivation (Figure 7).



***CEI** – Centered IV (Educational Infrastructure), **CSM** – Centered Moderator, **InterCEIxCSM** - Centered IV*Centered Moderator, **EO** – Educational Outcomes*

Figure 7: Moderation Analysis Model

The study assessed the moderating role of Students Motivation (with Learning Motivation and Learning Challenges) on the relationship between Educational Infrastructure (with Smart Institutions, various Internet Connectivity & Online Teaching Learning Platforms) and Educational Outcomes (Job Placements, Skills & Knowledge Achievement, Global Recognition and Academic Progression). Moderation analysis summary is presented in Table 5. The results revealed an insignificant moderating impact of Student Motivation on the relationship between CEI and EO (b=040, t=.027, p=.141), supporting null hypothesis. However, the first two relationships, Educational Infrastructure and Students Motivation, both have significant positive effects on Educational Outcomes (EO). The p-values (*** in both cases) indicate that these relationships are statistically significant.

Table 5: Moderation Analysis Summary

Relationships (Educational Infrastructure (EI) **-->**Students Motivation (SM) **-->** Educational Outcomes (EO)	**Estimate (Beta)**	**S.E.**	**C.R. (t-value)**	**P-value**
CEI ---> EO	.178	.035	5.063	***
CSM ---> EO	.601	.038	15.612	***
CEI*CEO ---> EO	.040	.027	-1.472	.141

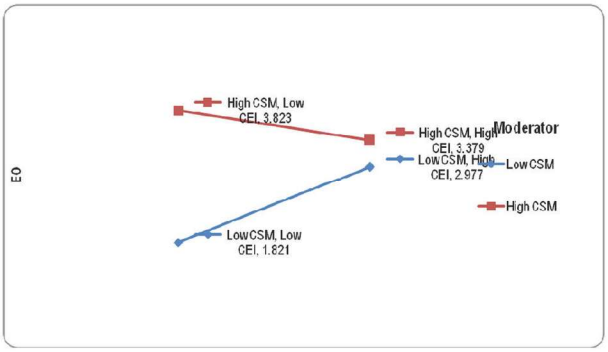
****p<0.001*

H7: Students' Motivation has a significant influence between Educational Infrastructure and Educational Outcome through Teaching-Learning Practice in online tourism education.

The analysis conducted using AMOS SPSS v26 revealed significant insights into the relationships between Educational Infrastructure (EI), Student Motivation (SM), and Educational Outcomes (EO) in the context of tourism education. The moderation analysis table provided estimates (Beta), standard errors (S.E.), critical ratios (C.R.), t-values, and p-values for the relationships under investigation. Firstly, the analysis indicated a positive and significant relationship between Educational Infrastructure (EI) and Educational Outcomes (EO) in tourism education. The coefficient estimate (CEI) of 0.178 with a p-value of less than 0.001 suggests that adequate educational infrastructure, such as Smart Institutions, Internet Connectivity, and Online Platforms, positively impact educational outcomes among students. This finding aligns with the research conducted by Ainon Ramli & Rosmaizura Mohd Zain (2018), who highlighted the significant impact of factors like E-learning System Management, Teaching Aids, and Learning Environment on students' academic achievement. Therefore, it can be inferred that robust educational infrastructure contributes to positive educational outcomes in tourism education. Secondly, the analysis revealed a strong and positive relationship between Student Motivation (SM) and Educational Outcomes

(EO). The coefficient estimate (CSM) of 0.601 with a p-value of less than 0.001 indicates that student motivation, encompassing factors such as Learning Motivation and Learning Challenges, significantly influences educational outcomes in tourism education. This finding corroborates the research by Tang ShuPeng & Jamalsafri Bin Saibon (2022), who emphasized the positive influence of the online learning climate on students' performance, mediated by factors like learning readiness and attitude. Thus, it can be concluded that higher levels of student motivation enhance academic achievement, progression, recognition, and job placements, while challenges may hinder these outcomes. However, the moderation analysis also explored the moderating role of Student Motivation (SM) in the relationship between Educational Infrastructure (EI) and Educational Outcomes (EO). The interaction term coefficient (CEI*CEO) of 0.040 with a p-value of 0.141 indicates that the combined effect of EI and SM on EO is not statistically significant. This suggests that while both EI and SM individually have significant impacts on EO, their interaction does not significantly enhance or diminish educational outcomes. This result contrasts with the findings of Zhang et al. (2022), who highlighted the moderating role of learning experience in the relationship between learning motivation and outcomes. Thus, it can be inferred that while student motivation serves as a crucial factor influencing the relationship between EI and EO, the direct effects of each predictor are more influential than their combined effect.

Furthermore, the results of simple slope analysis were also conducted to better understand the nature of the moderating effects (Figure 8). As can be seen in Figure 8, the line is much inclined downwards for Low CSM, this shows that at Low level of SM, the impact of CSM on EO is much weaker in comparison to high CEI. As the level of SM increased, the strength of the relationship between CEI and EO also increased. The following worksheet plots is the two-way interaction effects for unstandardized variables -



CSM dampens the positive relationship between CEI and EO.
Source: *Created through Gaskin Stats Tool Package*
Figure 8: Slope analysis of moderating effects

The analysis therefore provided valuable insights into the complex interplay between Educational Infrastructure, Student Motivation, and Educational Outcomes in tourism education. The findings underscored the importance of both educational infrastructure and student motivation in shaping educational outcomes. Adequate educational infrastructure positively impacts EO, while student motivation significantly influences academic achievement, progression, recognition, and job placements. However, while student motivation serves as a moderator in the relationship between EI and EO, the interaction effect between EI and SM on EO is not statistically significant, which indicates that the direct effects of each predictor are more noticeable. These results contributed to a deeper understanding of the factors influencing educational outcomes in tourism education.

6. Conclusion and Recommendation

The findings from the analysis give insights on the intricate dynamics between educational/ICT infrastructure (EI), student motivation (SM), and educational outcomes (EO) in context of online tourism education. Through a comprehensive investigation of these relationships, several key insights have emerged. Firstly, the study confirmed the key role of educational infrastructure in shaping educational outcomes. Full-fledged infrastructure, including smart institutions, internet connectivity, and online platforms, significantly enhances academic achievement among students (Chen et al., 2023; Gherheș et al., 2021), which means investing in adequate educational/ICT facilities to foster positive learning outcomes is very important in tourism education imparted through online mode. Secondly, the analysis highlighted the undeniable impact of student motivation on educational outcomes. Factors such as learning motivation and learning challenges play a crucial role in influencing academic achievement, progression, and job placements as outcome of online education in tourism (Bao, 2020; Deci & Ryan, 2000). To nurture and sustain the high levels of student motivation it is imperative to foster an encouraging learning environment and facilitating student success. However, while both educational/ICT infrastructure and student motivation independently contribute to educational outcomes, the interaction between these two factors did not yield a statistically significant effect (Zhao et al., 2022). This suggests that while each factor exerts its influence on educational outcome, their combined effect does not significantly change educational outcomes. This highlights the need for a nuanced understanding of the individual contributions of educational infrastructure and student motivation towards student success. In view of these findings, it is evident that optimizing both educational/ICT infrastructure and student motivation is essential for promoting positive educational outcomes in online tourism education. Institutions must prioritize the development of robust infrastructure while also implementing strategies to enhance student

motivation and engagement for delivering tourism education online. From the summary of findings, it can be understood that to ensure the sustainable practice of online tourism education, there is a requirement for both online and offline educational facilities; also, to determine and fulfil the expectations of the students is important in imparting tourism management education (Akinci et al., 2018). By doing so, educational stakeholders can create an environment conducive to academic achievement, progression, and future success in the field of tourism education. Further research is necessary to explore additional factors that may influence the relationship between EI, SM, and EO. Additionally, longitudinal studies could provide valuable insights into the long-term effects of educational interventions on student outcomes (Chen et al., 2023). Finally, by continually refining our understanding of the factors shaping educational success, stakeholders can strive to create inclusive and empowering learning environments that empower students to reach their full potential in tourism education and beyond. The findings may have implications for educational policy and practice in optimizing learning environments and fostering student motivation.

7. Educational Implications

In context of implications, these findings are significant for online tourism education. Educationalists should maximize ICT tools—through meticulous planning and the purposeful use of course materials and instructional videos—to achieve comprehensive learning (Godsk & Møller, 2024; Johnson et al., 2019). Additionally, integrating interactive elements such as one-on-one discussions and online activities improve student engagement in online tourism education (Brown & White, 2018). Institutions must prioritize infrastructure development to become smart institutions. This includes robust internet connectivity, development of well-designed and online platforms, to support online learning and assessment effectively (Garcia & Martinez, 2021). Furthermore, addressing student motivation and learning challenges is crucial for success, especially in online and blended learning environments where learners often face reduced interaction and engagement (Yahiaoui et al., 2022). Promoting intrinsic motivation and providing tailored support can boost student engagement and retention (García-Machado, Pérez-Rodríguez, & Rojas, 2024). Lastly, by implementing research-based practices and investing in resources, institutions can create an engaging online learning environment conducive to student success. Overall, a holistic approach integrating ICT tools, infrastructure enhancement, and motivational strategies are essential to enhance online tourism education.

8. Limitations and Future Scope of the Study

While the findings of this study provided valuable insights into the relationships between educational infrastructure (EI), student motivation

(SM), and educational outcomes (EO) in online tourism education, several limitations should be acknowledged. Firstly, the study utilized cross-sectional data, which limits the ability to establish causality (Dalgarno & Lee, 2010), while longitudinal studies might offer a more robust understanding of the dynamics between EI, SM, and EO over time (Dalgarno & Lee, 2010). Secondly, the study focused solely on the context of tourism education, limiting the generalizability of the findings to other educational domains (Altbach& Knight, 2007). Future research should explore these relationships across diverse educational settings to ascertain the broader applicability of the results (Altbach& Knight, 2007). Thirdly, the study relied on self-reported measures for EI, SM, and EO, which may introduce response bias and social desirability effects (Yang, 2017). Employing objective measures or triangulating data sources could enhance the validity of the findings (Yang, 2017). Finally, while the moderation analysis examined the interaction between EI and SM on EO, other potential moderating variables were not explored. Future research should investigate additional moderators to provide a more comprehensive understanding of the complex interplay between educational factors and outcomes (Deci & Ryan, 2000).

Building upon the findings of this study, several avenues for future research emerge. By tracking students' progress over time, researchers can assess the sustained impact of EI and SM on EO and identify potential mediators and moderators of these relationships (Dalgarno & Lee, 2010). Additionally, comparative studies across different educational contexts and cultures would enrich our understanding of the universality versus context specificity of the findings (Altbach& Knight, 2007). Furthermore, qualitative research methods, such as interviews and focus groups, could provide deeper insights into the subjective experiences and perceptions of students regarding EI, SM, and EO (Yang, 2017). Exploring the role of additional variables, such as socio-economic status and prior educational experiences, could explain the complex determinants of educational success in online tourism education (Deci & Ryan, 2000). By including these further inquiries, future research can advance knowledge of the factors influencing educational outcomes and inform evidence-based practices in online tourism education.

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