Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Determinants of hospitality students’ perceived learning during COVID 19 pandemic: Role of interactions and self-efficacy

Narayan B. Prabhu M, Kartikeya Bolar, Jyothi Mallya, Prithvi Roy, Valsaraj Payini, Thirugnanasambantham K

ARTICLE INFO
Keywords:
Online learning
Transactional distance
Model of interaction
Self-efficacy
Learner-content interaction

ABSTRACT:
Our study adopts the Theory of Transactional Distance (TTD) as the theoretical framework to investigate the impact of the four interaction levels: content, instructors, peers, and technology on perceived learning among hospitality students with self-efficacy as the moderating factor. The data sample for the study includes responses from 461 hospitality students from various institutes in India. Our findings reveal that all the four-point of interactions, content, instructors, peers, and technology, have a significant positive impact on perceived learning. Further, learners’ interaction with the content was emerged as the most significant predictor of perceived learning. The data was put to moderation analysis, with results suggesting that self-efficacy has a conditional effect only on the interaction between content and perceived learning.

1. Introduction

A survey conducted by the International Association of Universities (Marinoni et al., 2021) shows that almost all Higher Educational Institutes (HEI) have been affected by COVID-19, with two-thirds reporting their classroom teaching had been replaced by a form of online learning known as Emergency Remote Teaching (ERT). Due to this, effective communication between the staff, students, and other stakeholders remained a challenge even though nearly 91% of the HEIs surveyed had the infrastructure for communication. Then, there were some other challenges that these institutes faced, such as access to technical infrastructure, competencies and pedagogies for online learning, and the resources to support specific fields of study. Given that hospitality and tourism education focuses more on experiential learning and on-the-job training, educators need to understand the factors that affect the learners’ perceived learning experience in ERT. As emphasized by many academicians, the ultimate purpose of hospitality and tourism education is to provide professionally trained talents to the industry (Liburd et al., 2018; Lo, 2012).

While, online learning platform enables flexibility in teaching and learning, the abrupt shift from the traditional to the online, driven by the COVID-19 pandemic, has resulted in a Transactional Distance (TD) between the instructor and learner. The Theory of Transactional Distance (TTD) defines TD as “the psychological or communicative space that separates instructor from the learner in the transaction between them, occurring in the structured or planned learning situation” (Moore, 1993, p. 1). This theory is the first of its kind pedagogical theory that bases its analysis on online learning and teaching rather than the classroom. According to this theory,
three sets of variables define the pedagogical aspects of education: Structure, Learner Autonomy, and Dialog, as known as interaction (Moore, 1993). While structure refers to what is designed to be learned, autonomy refers to the self-management exhibited by the students when they interact with teachers within the designed structure. The dialog relates to the interaction that takes place between the instructor and the learners when the structured program is implemented (Moore & Kearsley, 2012). This interaction is further divided into three components: learner-content, learner-teacher, and learner-learner. According to Moore, an increase in interaction and structure would reduce TD (Michael Grahame Moore, 1993). More recently, several researchers have used Moore’s theory as the theoretical framework to examine the interaction effect in an online learning environment (Abrami et al., 2011; Alqurashi, 2019; Hamdan et al., 2021; Kara et al., 2021; Kennedy & Cavanaugh, 2008, pp. 485–490), thus, confirming its usefulness as a framework. However, though Moore’s model addresses learners’ interaction effect with content, peer, and the instructor, it ignores another important interaction component that occurs when learners use the intervening technology to communicate with the instructors and peers. Hillman et al. (1994) introduced the fourth interaction, technology interaction, to fill this gap. Thus, our study adapts TTD as the theoretical framework to investigate the impact of the four interaction levels on perceived learning among hospitality students.

Perceived learning (PL), defined as “changes in the learner’s perceptions of skill and knowledge levels before and after the learning experience” (Alavi et al., 2002, p. 406), is one of the core elements for evaluating a course (Wright et al., 2006). It is learner’s belief about the learning they have achieved during online learning. The instructors gauge this perceived learning experience to assess the quality of the content delivery, course design, evaluation, and insights to improve further the learning experience (Alavi et al., 2002). Perceived learning, also seen as an indicator of learning is one of the core elements of course evaluation (Wright et al., 2006). Therefore, learners’ perceived learning helps to measure the success or failure of any innovation, in this case, the ERT. Thus, it is wise to investigate the role of these interactions on perceived learning in the context of hospitality students in India.

Meanwhile, Self-efficacy (SE) is defined as an individual’s belief in their capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1978, p. 3). It is believed to play a significant role in ensuring the completion of requisite tasks in an online learning environment. SE determines how individuals feel, think and motivate themselves towards set tasks. A strong sense of SE enhances a person’s overall well-being and self-accomplishment—individuals with higher SE approach complex tasks as a challenge to be mastered than threats to be avoided. Pajares (2002) concludes that SE plays a significant role in the performance of online learners. However, the relationships between SE and academic outcomes such as perceived learning are complex due to many factors. These relationships are likely to be influenced by learners’ previous success with online learning, technology anxiety, instructor’s feedback, and pre-course preparation (Bates & Khasawneh, 2007). More research is required to understand how SE influences online learners’ academic outcomes. Therefore, based on this literature review, our study intends to answer these research questions. (1) To what extent do the four levels of interaction predict learners’ perceived learning within ERT? (2) To what extent does the predictor variable SE explain the learner’s perceived learning? and (3) To what extent SE has a conditional effect on the relationship between the four predictors and perceived learning?

2. Theoretical framework and hypotheses development

2.1. Frameworks of model of interaction and hypotheses development

According to Moore’s (1993), in a distance learning environment such as ERT, separation or distance between instructor and learner can lead to a communication gap. A communication gap like this may further lead to instructor and learner misapprehensions (Moore, 1993). This notion has found support from Giossos et al. (2009) in their review of the relevance of Moore’s Theory in contemporary settings. Moore also opined that the interaction between the instructor and learner comprises three factors: Dialog, structure, and autonomy. While dialog refers to two-way communication that ultimately helps solve the learners’ problem (Giossos et al., 2009), structure refers to the nature of the level of rigidity or simplicity of the courses. The factor autonomy depends on the dialog and structure and refers to the learner’s independence and interdependence as they engage in the learning. Though this theory’s validity is not accepted unanimously (Gorsky & Caspi, 2005), generally, there is conformity regarding its usefulness as a theoretical framework in a distance learning environment such as ERT (Best & Conceição, 2018; Gavrilis, Mavroidis, & Giossos, 2020; Goel, Zhang, & Templeton, 2012; Kara, 2020; Weidlich & Bastiaens, 2018). Meanwhile, TD is believed to increase when there is greater learner autonomy, more structure, and less dialog (Ekwunife-Orakwue & Teng, 2014).

Moore (1993) opined that a positive interaction between learners, teachers, and peers enhances the learner’s understanding and engagement with the courses. Specifically, he suggests that “one of the major determinants of the extent to which TD will be overcome is whether the interaction between learners and instructors is possible, and the extent to which it is achieved” (p. 26). It is argued that increased interaction is likely to reduce the TD. Specifically, in a complete online learning environment such as ERT, this interaction is likely to either impede or foster based on other factors, such as technology-based communication, the course structure, and responsiveness of instructors/learners (Smith et al., 2000). Thus, an effective interaction plays a crucial role in the success of the teaching and learning experience in a complete online learning environment. It, therefore, becomes imperative to investigate this dimension from the learner’s perceived learning and satisfaction point of view. Additionally, interaction is a key dimension in fostering, supporting, and engaging learners (Anderson, 2003) in the online learning environment (Moore & Kearsley, 1996) and bridging the physical separation between instructor and the learner. Going further, Moore (1993) identifies three types of interactions: (a) learner-learner, (b) learner-instructor and, (c) learner-content.

2.1.1. Learner-learner interaction (LLI)

LLI refers to exchanging knowledge, ideas, and feedback by peer dialog (Elyakim et al., 2019). Peer interactions enable students to
understand the teacher’s requirements better and are sometimes an integral part of an assignment. Moore (1989, p.3) defines this interaction as “the interaction between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor”. They describe the LLI as a “two-way reciprocal communication between or among learners who exchange information, knowledge, thoughts, or ideas regarding course content, with or without the presence of an instructor.” Many researchers in the past have investigated this interaction and its relationship with the perceived learning experience. For example, Kassandrinou et al. (2018) exclusively examined the LLI and its impact on perceived learning. The findings of their semi-structured interviews with 12 postgraduate students revealed that LLI negatively impacted perceived learning. However, contrary to this, a study conducted by Lewis (2011) found LLI was a significant predictor of perceived learning. This finding was further supported by the research conducted by Ekwunife-Orakwue and Teng (2014). Considering the above, we propose the following hypothesis.

**Hypothesis 1.** LLI has a positive impact on learner’s perceived learning.

2.1.2. Learner-instructor interaction (LLI)

The second interaction, learner-instructor, provides feedback and enhances motivation and dialog between the instructor and the students. It is considered the most valuable interaction in distance learning environments (Moore, 1989, p. 103). Learners need guidance from their teachers to determine whether they have understood the content material correctly, how particular content needs to be studied, and how they need to discuss the content. Irrespective of whether or not they are physically present, instructors have a crucial role in supporting learning. Thus, LLI is the most researched component of transactional distance (Kanini Mbwesa, 2014). Ekwunife-Orakwue and Teng (2014) found that LLI has a significant role in perceived learning outcomes. This notion found further support from other researchers (Fredericksen et al., 2000; Jiang & Ting, 2000; Kang & Im, 2013). Therefore, we propose the following hypothesis.

**Hypothesis 2.** LII has a positive impact on learner’s perceived learning.

2.1.3. Learner-content interaction (LCI)

According to (Moore, 1989), LCI is a hidden interaction that allows students to acquire intellectual knowledge using learning materials. It is an internal debate that takes place in the mind of the learner. The learners engage in a dialog with the learning content asking themselves about the new thing they have learnt, agree with, or still lack. In the absence of the instructor, content necessitates a high degree of self-direction on the part of the learner (Elyakim et al., 2019). This step can best be described as an interaction between the learner and the subject under study. Moore (1989, p.3) describe the LCI as “involving a process of individual learners elaborating and reflecting on the subject matter or the course content”. These authors also note that unlike LII or LLI, only the learner is directly involved in LCI. Though Moore (1993) has not elaborated on LCI, it is worth mentioning that (Huang et al., 2015) described it as a structural rather than a dialogic factor of TD. While investigating the impact of TD on learner’s perceived learning in an online and blended environment, Ekwunife-Orakwue and Teng (2014) found that LCI has a larger impact on learning outcomes than any other type of dialog. This notion was further echoed by Sebastianelli et al. (2015), who suggests that LCI is a significant predictor of learners’ perceived learning. A more recent study conducted in India during the COVID-19 pandemic also suggests that LCI has a significant positive impact on perceived learning and learners’ satisfaction (Kumar et al., 2021).

Therefore, we propose the following hypothesis.

**Hypothesis 3.** LCI has a positive impact on learner’s perceived learning.

2.1.4. Learner-technology interaction (LTI)

As technology increasingly becomes the means of communication between the learner-teacher, learner-learner, and learner-content, the design of these mediating technologies becomes correspondingly important (Ramessur & Santally, 2007). Hillman et al. (1994) proposed the LTI as a structural interaction that could extend and improve the TTD proposed by Moore (1993). This fourth dimension emerges when learners interact with the technological interface that was not theorized earlier (Gunawardena & Gunawardena, 1999; Hillman et al., 1994). In an online learning context, the role of LTI remains inconclusive though there are studies that find that it interacts with specific learner’s factors (Roblyer & Wiencke, 2003). For instance, Strachota (2003) finds that the impact of LTI on learners’ satisfaction is negligible (only 9%). However, other studies state that LTI is not the sole predictor of learning outcomes. Specific learners’ factors interact with LTI to impact the learner’s perceived learning, such as prior computer training (Dupin-Bryant, 2004) and learner’s self-confidence (Menlove & Lignugaris/Kraft, 2004). Based on these, we propose the following hypothesis.

**Hypothesis 4.** Learner-Technology Interaction has a positive impact on learner’s perceived learning.

2.1.5. The moderating role of self-efficacy (SE)

Drawing from the social cognition theory, SE refers to “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1978, p. 3). According to Bandura SE is a key factor of human agency, and individuals with high confidence in their capabilities are believed to have a high level of SE. Existing research also testifies to the role of the SE as a significant predictor of academic achievement (Honicke & Broadbent, 2016), satisfaction (Hamdan et al., 2021), and learning engagement (Kuo et al., 2021; Muchsini et al., 2021). Therefore, SE is critical to learning and performance (Hodges, 2008). Additionally, SE helps learners to adjust and handle unfamiliar environments (Alivernini & Lucidi, 2011), even when they have little prior online experience (Swan, 2004).

The sudden closure of educational institutes across the globe forced learners to transit to online learning, a mode which a majority
were completely unfamiliar. Thus, the SE of learners seems particularly important for ERT. Further, it is found that SE can alter the perception of the learning environment (Milton et al., 1991). Meanwhile, studies outside the online educational domain have tested and empirically proved that SE has a moderating effect on the relationship of mentoring and personal learning of employees (Jyoti & Bhau, 2016; Pan et al., 2011). Thus, SE represents an important individual trait, which moderates the relationship between the interaction and learning outcomes, including perceived experience. Considering these studies, it seems logical to investigate both the direct and moderating impact of SE on perceived learning. Therefore, the following hypotheses were formulated.

Hypothesis 5. Self-efficacy has a positive impact on learner’s perceived learning.

Hypotheses 6 (a, b, c, d). Self-efficacy has a significant conditional effect on the relationship between a) learner-learner, b) learner-instructor, c) learner-content, and d) learner-technology interaction and learner’s perceived learning.

Based on the above mentioned literature and theoretical assumptions, this study propose that LLI, LII, LCI, LTI and SE is expected to impact the perceived learning of hospitality students. Further, this study also propose that learners’ SE has moderation effect on the relationship between learners’ interaction and perceived learning. The framework of perceived learning is presented the Fig. 1:

3. Research methodology

3.1. Background of the study and sample characteristics

This study was conducted among both undergraduate and postgraduate hospitality students in India. The students undergoing bachelor’s or master’s degrees in hotel management, hospitality, and tourism, culinary arts were included. Data were collected using an online survey instrument between the period Nov 27, 2020 to Feb 20, 2021. Initially, all institutes offering the hospitality and tourism programs were listed. Later, the authors used their personal contacts to approach instructors from these institutes and request them to distribute the survey instrument to respondents. Finally, a total of 12 institutes participated in the survey with respondents’ distribution as follows: Andhra Pradesh (25), Bihar (24), Chandigarh (26), Delhi (28), Gujarat (27), Rajasthan (15), Karnataka (118), Kerala (33), Maharashtra (47), Tamil Nadu (27), Uttar Pradesh (34), and West-Bengal (57). This study adopted the convenience sampling technique to collate and analyze data. The key advantages of convenience sampling are that it is simple, cheap, efficient, and easy to implement. Additionally, it is found that when the population is homogeneous (for example, students as respondents), the adoption of the convenience sampling method is common because it offers narrower but clearer generalizability (Jager et al., 2017). A survey instrument was forwarded to 1262 students. The total number of responses was 461 resulting in 36.5% of the response rate. The sample consisted of 330 (71.6%) male and 131 (28.4%) female respondents. This vast difference in the male and female ratio could be attributed to more enrollments from male aspirants than females. According to a recent report (Ministry of Education, 2021), the total

Fig. 1. Proposed research model.
number of enrollment of male students in hospitality and tourism programs (for undergraduates) is 12630 as against females (3378). The ratio is 4:1. However, there is a slight improvement regarding enrollment for the postgraduate program (512 males and 303 females). In terms of age, most respondents, 346 (75%), were aged between 18 and 21. The remaining 116 (25%) were above 21 years. The average age of the respondents was 20.9 years (SD = 2.8). Considering the educational level, most respondents were Bachelor in Hotel Management (four years) 278 (60.3%). This sample was followed by three years of Bachelor in Hotel Management 80 (17.4%), Bachelor in Hospitality and Tourism Management 22 (4.8%), Bachelor in Culinary Arts 6 (1.3%) and others 12 (2.6%).

3.2. Measuring instrument

Six scales were used in the survey: 1) Learner-course content interaction (LCI), 2) Learner-instructor interaction (LII), 3) Learner-learner interaction (LLI), 4) Learner-technology interaction (LTI), 5) Perceived learning (PL), and 6) Learners’ self-efficacy (SE). The interaction with course content comprised of four items (α = 0.848), interaction with an instructor having six items (α = 0.876), and interaction with peers consisting of eight items (α = 0.910) and these were measured using items adapted from the study by (Y. C. Kuo et al., 2014). The learner-technology interaction was measured using eight items (α = 0.935) adapted from the study (Sun et al., 2008). The construct perceived learning was measured using six items (α = 0.945) adapted from the study (Hiltz, 1994). The learner’s self-efficacy was measured using an eight-item scale (α = 0.973) adapted from the study (Shen et al., 2013). The learners were asked to rate their agreement or disagreement with statements on a five-point Likert scale and their self-efficacy on a five-point rating scale where “1” and “5” indicated least and most confidence, respectively. The outcome variable, i.e., learning experience, was measured using a five-point Likert scale. The survey instrument also included questions related to the learners’ demographic details, such as age, gender, study field, previous online learning experience, etc.

3.3. Composite reliability and construct validity

The factor loading of items, Composite Reliability (CR), and Average Variance Extracted (AVE) were used to test the model’s reliability and convergent and discriminant validity. First, the six-factor model’s factor loadings were re-examined, and items with poor factor loading values (less than 0.6) were removed from the model. The final factor loading values of items are presented in APPENDIX A. Further, results reveal that the CR estimates of all the constructs were above the threshold of 0.7. Thus, these results provide evidence for the presence of reliability. Furthermore, the AVE estimates were found to be above 0.5, suggesting the presence of convergent validity. The AVE estimates of all the constructs were greater when compared to their respective square-root values of AVE for LCI, LII, LLI, LTI, PL, and SE (Fornell & Larcker, 1981). These results offer evidence for the presence of discriminant validity between the constructs (Table 1).

4. Data analysis and findings

4.1. Measurement model

Before conducting structural equation modeling, confirmatory factor analysis was performed to establish all construct and corresponding items’ factor structure. All the items were loaded onto their respective theorized constructs. The model demonstrated acceptable fit to the data (χ²/df = 2.37, CFI = 0.966, NFI = 0.943, GFI = 0.924, AGFI = 0.899, RMSEA = 0.055, SRMR = 0.030).

4.2. Hypothesis testing

After achieving the reliability and validity of the measurement model, the structural equation model fit was assessed. The overall model achieved acceptable model fit as recommended by Hair et al., (2018): χ² = 282.521, df = 109, p < 0.001, TLI = 0.960, CFI = 0.968, RMSEA = 0.059 and SRMR = 0.030. The proposed model was evaluated using the coefficient of determination (R²), standardized path coefficients (β), and significance level (t-values). R² was above the recommended value of 0.1 (Hair et al., 2014). The model explained a 75.9% variance in perceived learning. Further, five hypotheses assessing the direct effect of interaction on perceived learning were measured using structural equation modeling. The standardized path coefficients and t-values suggest that the four out

| Table 1 Discriminant validity. |
|-------------------------------|
|          | SE   | TEC  | PEER | CM   | INS  | EXP  |
| SE       | 0.801|      |      |      |      |      |
| LTI      | 0.004| 0.731|      |      |      |      |
| LPI      | 0.001| 0.244| 0.609|      |      |      |
| LCI      | 0.007| 0.294| 0.426| 0.694|      |      |
| LII      | 0.011| 0.253| 0.443| 0.495| 0.575|      |
| EXP      | 0.004| 0.363| 0.481| 0.687| 0.562| 0.76 |

Note: Diagonal elements are Average Variance Extracted. Non-diagonal elements are square of correlation coefficients between constructs.
of five hypotheses proposed in the model were supported (Table 2). Hypothesis 1, which considered the influence of learner-learner interaction on perceived learning, was supported ($\beta = 0.144, p < 0.01$). Hypothesis 2, testing the effect of learner-instructor interaction on perceived learning, was also significant ($\beta = 0.237, p < 0.001$). Hypothesis 3 ($\beta = 0.489, p < 0.001$), examining the positive influence of Learner-content interaction on perceived learning, was also supported. Hypothesis 4, proposing the positive influence of learner-technology interaction ($\beta = 0.148, p < 0.001$), also had a significant positive impact on learners’ perceived learning. Therefore, Hypothesis 4 was also accepted. However, the hypothesis that SE has a positive influence on perceived learning was not supported. Therefore, H5 was rejected.

4.3. Results of K-means cluster analysis

K-means cluster analysis was carried out to identify the different clusters based on the SE of the learner. Two cluster solutions seemed to be more interpretable. The cluster solution distinctively identified the profile of the clusters. From the cluster centres, the first cluster profile appeared to have a high value on the questions and was named the high SE group. Nearly 47% ($n = 213$) of the learners belonged to this cluster. The second cluster was of those who had a low score on the SE items, and so this was named the Low SE group. Nearly 53% ($n = 248$) of respondents belonged to this cluster (Table 3).

4.4. Moderation analysis

To test the moderating effect of SE on the relationships between the four interactions and perceived learning, a PROCESS macro 1 (Hayes, 2018) with a 5000 bootstrap resample was used. The results specify that SE had a moderating effect only on the relationship between learner-content interaction and perceived learning. The index of moderated mediation that provides a formal test for moderated mediation (Hayes, 2018) (index $= 0.069$, Boot CI $= [0.003, 0.154]$) did not include zero, accepting H6c (Table 4). However, SE had no conditional effect on the relationship between the other three interactions (learner-instructor, learner-peer, and learner-technology) and perceived learning. The index of conditional includes zero, thus, rejecting H6a, H6b, and H6d. Further, as shown in Table 5, the conditional effect of LCI on perceived learning via SE was stronger for learners with low SE ($\beta = 0.7821$, Boot CI $= [0.7014, 0.8628]$) than higher SE ($\beta = 0.6523$, Boot CI $= [0.5583, 0.7467]$). Furthermore, the plot of the conditional effect between learner-content interaction and perceived learning showed that the effect was higher for students with low self-efficacy than those with higher SE (Fig. 2).

SEClass $= 1$ stands for low SE (blue line) and SEClass $= 2$ (green line) stands for high SE. As can be seen from the graph, there is a difference in the y-intercept, which suggests no rating for LCI (i.e., low rating for the content provided). Students with high SE find an interaction with the content was a significant predictor of their perceived learning. This finding is in line existing studies in literature (Alqurashi, 2019; Ekwunife-Orakwue & Teng, 2014; Y. C. Kuo et al., 2014; Sebastianelli et al., 2015). According to the reintegration of the teaching and learning acts (Keegan, 1996), the instructional materials should help the learner reconstruct the LII in a different timeframe. In other words, the learning materials should be designed to help the learner have an internal dialog with the instructor. Further, Holmberg (1989) describes this as a guided didactic conversation between the learner and instructor in the course content. The LCI is often thought to be a distinguishing feature of education. It is the process of intellectually engaging with material that improves the learner’s comprehension, perspective, or cognitive constructs in their minds. (Moore, 1989, p. 2). Moore further insists that without LCI, there cannot be education (p. 2), a view which finds support in Anderson

| Standardized hypothesized relationship | $\beta$ | t-value | p-value | Supported? |
|---------------------------------------|--------|---------|---------|------------|
| H1: Learner-Learner interaction $\rightarrow$ Perceived learning | 0.144  | 2.686   | 0.004   | Yes        |
| H2: Learner-Instructor interaction $\rightarrow$ Perceived learning | 0.237  | 4.155   | 0.001   | Yes        |
| H3: Learner-Content interaction $\rightarrow$ Perceived learning | 0.489  | 9.282   | 0.001   | Yes        |
| H4: Learner-Technology interaction $\rightarrow$ Perceived learning | 0.148  | 3.849   | 0.001   | Yes        |
| H5: Self-efficacy $\rightarrow$ Perceived learning | -0.017 | -0.0588 | 0.556   | No         |

$R^2 = 0.759$. 

5. Discussion, implications, and limitations of the study

5.1. Discussion

The purpose of this study was to investigate the influence of the four levels of interactions (learner-learner, learner-instructor, learner-content, and learner-technology) on the perceived learning of hospitality students during ERT. Additionally, this study sought to examine SE’s direct and conditional effect on the relationship between these interactions and perceived learning.

SEM results suggest that learners’ interaction with the content was a significant predictor of their perceived learning. This finding is in line existing studies in literature (Alqurashi, 2019; Ekwunife-Orakwue & Teng, 2014; Y. C. Kuo et al., 2014; Sebastianelli et al., 2015). According to the reintegration of the teaching and learning acts (Keegan, 1996), the instructional materials should help the learner reconstruct the LII in a different timeframe. In other words, the learning materials should be designed to help the learner have an internal dialog with the instructor. Further, Holmberg (1989) describes this as a guided didactic conversation between the learner and instructor in the course content. The LCI is often thought to be a distinguishing feature of education. It is the process of intellectually engaging with material that improves the learner’s comprehension, perspective, or cognitive constructs in their minds. (Moore, 1989, p. 2). Moore further insists that without LCI, there cannot be education (p. 2), a view which finds support in Anderson
Table 3
Cluster analysis based on SE.

| Clusters | Count | Mean (S1) | Mean (S2) | Mean (S3) | Mean (S4) |
|----------|-------|-----------|-----------|-----------|-----------|
| High SE  | 213   | 4.192     | 3.972     | 4.197     | 4.376     |
| Low SE   | 248   | 1.988     | 2.024     | 2.077     | 2.089     |

SE = self-efficacy.

Table 4
Conditional effect of SE on interactions and PL.

| Model | Coeff (SE) | t     | p      | LLCI     | ULCI     | Supported? |
|-------|------------|-------|--------|----------|----------|------------|
| H6a   | LLI        | -0.1514 (0.077) | -1.9473 | 0.0521    | -0.3042, 0.0014 | No         |
| H6b   | LII        | -0.1417 (0.0881)  | -1.6783 | 0.0940    | -0.3211, 0.253  | No         |
| H6c   | LCI        | -0.1298 (0.0631)  | -2.0583 | 0.0401**  | -0.2537, -0.0059 | Yes        |
| H6d   | LTI        | -0.1495 (0.0826)  | -1.8096 | 0.710     | -0.3118, 0.0129 | No         |

Note: Coeff = Coefficient, SE = standard error, CI = confidence interval, p < 0.001.

Table 5
Conditional effects of the focal predictor at values of the moderator(s).

| Self-efficacy clusters | Coeff (SE) | t     | p      | LLCI     | ULCI     |
|------------------------|------------|-------|--------|----------|----------|
| Low SE                 | 0.7821 (0.0411) | 19.0522 | 0.001  | 0.7014, 0.8628 |          |
| High SE                | 0.6523 (0.0479) | 13.6313 | 0.001  | 0.5583, 0.7464 |          |

Note: Coeff = Coefficient, SE = standard error, CI = confidence interval, p < 0.001.

Fig. 2. Interaction plot for interpreting H5c.
Further (Bervell et al., 2020), reveal that LLI and LII are both predicted by LCI. In other words, the instructor’s online content is a significant promoter of LLI and LII. Additionally, during an empirical study conducted by Terumi & Anderson (2010), participants were asked to rank their preferred interaction type. Interestingly, they ranked LCI the highest, followed by LII and LLI. This result reveals a shift in perspective from instructor-centered learning to a content-centered approach to learning. Therefore, hospitality educators can use this insight while designing course content such as interactive texts, videos, and computer-based multimedia for better learning outcomes in an online learning environment such as ERT.

Closely related to LCI, LII emerged as the second main predictor of perceived learning for hospitality students, in line with previous studies (Alqurashi, 2019; Ekwunife-Orakwe & Teng, 2014; Fredericksen et al., 2000; Jiang & Ting, 2000; Kang & Im, 2013). Though LII may not be a defining feature of online education, a study by Rhode (2009) shows that learners equally value the LCI and LII. Thus, hospitality educators need to increase the LII during online teaching by providing timely feedback and immediacy. The communication research offers ample evidence for the positive impact of instant messages (Kuyath et al., 2013) and feedback (Vlachopoulos & Makri, 2019) on LII during online learning. The increased LII further enhances the learners’ experience by identifying gaps in knowledge and prompting new learning strategies. Additionally (Arbaugh, 2001), records that immediacy behavior can reduce social and psychological distance. Therefore, a meaningful LII is important for a better learning environment during an online program.

The findings of our study reveal that the LTI is the third significant predictor of perceived learning. As rightly pointed out (Hillman et al., 1994), the inability to interact successfully with the technology will hinder learners’ active involvement in online learning. This finding is in line with existing studies (Carswell & Venkatesh, 2002), which suggest that learners’ perception of the technology is positively related to learning outcomes. Therefore, hospitality educators must pay attention to the technology interface used during online teaching to minimize its apparent weaknesses. The technology interface aspects of online learning should be tailored to meet the specific needs of hospitality students to facilitate more significant interaction in an online learning environment (Chou, 2003). However, as a note of caution, this interface should not be viewed as an end but as a means to assist in the construction of knowledge because technology alone does not guarantee online learning success (Rezende et al., 2013).

The third dimension of Moore’s Interaction model, LII, has emerged as the least important predictor of perceived learning. The lower impact may occur because of the absence or minimal interaction among peers during ERT. However, one cannot wholly ignore its importance because it is one of the fundamental predictors of online learning (Samuels-Peretz & Powers, 2014). Peer review is also a critical interactive method that facilitates meaningful engagement and critical thinking (Vlachopoulos & Makri, 2019).

Our findings suggest that learners’ SE has a conditional effect on the relationship between LCI and perceived learning. This effect is high for the learners with low SE as they have to struggle to carry out basic academic activities or learning from their instructors or peers. Results recommend that well-designed course content will help such students overcome their struggle in engaging with an online course. Thus, the impact of content interaction is more on the learning experience of students with low SE. On the other hand, students with high SE have more sources to rely upon, like instructors, peers, and their abilities for having a great learning experience. This result suggests the importance of appropriate content design, which is crucial for students with low-self efficacy.

5.2. Theoretical implications

The findings of our study contribute to the hospitality education literature in several ways. This study successfully applied the TTD to understand the role of different interactions on learners’ perceived learning during the COVID-19 pandemic. This is the first study investigating the impact of interactions on learners’ perceived learning during the COVID-19 pandemic. While the majority of studies have investigated three types of interaction (content, instructor, and peer), our study integrates the fourth interaction (LTI) to the model of Interaction proposed by Moore (1993). According to this theory, in online education, a physical distance of a learner from instructor, peer, and content may lead to a communication gap, leading to apprehensions amongst them. Though this theory is not accepted unanimously (Gorsky & Caspi, 2005), its usefulness in distance learning is confirmed (Goel et al., 2012). In that light, our findings demonstrate that interactions (including LTI) positively impact perceived learning (H1 to H4) and provide empirical evidence for the usefulness of the theory in distance/online education.

In a crisis such as the COVID-19 pandemic, online learning/blended learning has emerged as a solution in a more significant way. A post-pandemic study conducted on blended learning in India reveals that most respondents preferred the blended form as the most suitable form of learning in the future (Bordoloi et al., 2021). The same study also opined that this would influence the entire Indian educational system in the coming days. Further, the adoption of ICT-based technologies has evolved the whole teaching-learning from teacher-centric to learner-centric. Following this, using technology is one of the critical factors for both the instructor and the learner in ensuring a learner-centric environment. Therefore, understanding the learners’ interaction with the technology interface and its impact on their perceived learning becomes crucial for educators and academicians. Towards this, our study findings provide evidence for the significant positive impact of LTI on perceived learning beyond the interactions proposed by Moore (1993). Thus, this finding significantly contributes to the body of the knowledge of online learning literature.

Contrary to Alqurashi’s (2017) findings, the results of our study reveal that SE on its own does not have any positive impact on perceived learning in an online learning environment (H5). This non-significant negative impact is probably due to the sudden shift from face-to-face mode to the online learning mode during the COVID-19 pandemic. Additionally, many previous studies on the relationship between SE and perceived learning were conducted in an environment where learners were enrolled for complete online learning modes such as MOOCs. Contrary to this, our study was conducted among the students who had classroom learning experiences before they were forced to online learning during the COVID-19 pandemic. This finding also significantly contributes to the body
of knowledge on ERT.

Further, our study also examined the conditional effect of SE on interactions and perceived learning. To the best of our knowledge, an aggregated moderation effect has not been studied in the previous hospitality education studies. Our study provided empirical evidence for SE’s conditional effect on LCI and perceived learning. This result suggests that the SE of learners alters the relationship between LCI and perceived learning. Our findings reveal that the conditional effect of SE is higher for the learners with a low SE score.

5.3. Practical implications

Corresponding to the increasing interest among hospitality educators on how the learning was affected during the COVID-19 pandemic, our study provides important insights for the hospitality educators by integrating the integration model to investigate learners’ perceived learning in an online environment. Our results show that all four interactions significantly impact perceived learning among hospitality students. The findings have important implications for hospitality educators who can use them to design more interactive, engaging, and immersive online learning experiences. For example, our results reveal that LCI is the most significant predictor of perceived learning for hospitality students, followed by LII, LTI, and LLI. Any increase in LCI will decrease the TD. Learning materials in the form of multimedia, lectures, and handouts can greatly improve learning outcomes. Further, by adding challenging tasks, instructors can significantly improve learners’ interaction with the content. This can be achieved by adding simulations, case studies, and web searches that demand learners’ interaction with the content. Our results align with (Alhiih et al., 2017), who find that learning materials enriched by dynamic and multimedia components increase the LCI.

Further, we find that LII is the second most important predictor of perceived learning for hospitality students. This interaction is considered one of the most difficult facets of online teaching. The multimodal, multitasking interactions that happen in face-to-face classes are a difficult match with online teaching. Therefore, hospitality educators must create interactive course content and integrate appropriate communication tools. Further, they need to offer rewards and recognition to encourage learners participation in online activities. Educational institutes need to provide required training for instructors and learners to effectively use online platforms for an immersive learning experience (Krishnamurthi, 2000).

Our study also provides empirical evidence for the positive impact of technology on learner’s perceived learning. Hospitality educators need to adequately train the learners to use and interact with the technology interface for optimum learning outcomes. Any lack of this knowledge will make it challenging to establish higher LTI. When LTI is adequately structured and used, perceived learning also increases.

We also find that LLI is the least important predictor for perceived learning among hospitality students. However, that does not in any way take away from its significance in the online education context. This interaction happens naturally between learners and the instructor; however, it may require additional instructors’ efforts in the online context. Existing research shows that the interaction between learners has a positive impact on learning. For example, LII has an impact on learners’ perceived learning (Kara, 2020), satisfaction ((Hamdan et al., 2021), achievement (Kurucay & Inan, 2017) and performance (Beaudoin, 2002). Therefore, hospitality educators need to integrate activities that encourage more LLI to work with each other, such as peer-critique, pair-share, collaborative learning, debate, and case analysis.

The moderation analysis of SE between all the interactions and perceived learning suggests that SE has a conditional effect between LCI and PL. It is important to note that SE’s conditional effect is higher for the learner with low SE. In other words, LCI greatly moderates learning among learners with low SE. The perceived learning of learners with low SE is likely more related to LCI. Therefore, the finding suggests that SE is a moderator variable between LCI and PL. Therefore, hospitality educators need to focus on four areas accepted as the core elements in SE’s development (Bandura, 1978): Enactive Mastery Experiences, Vicarious Experience, Verbal Persuasion, and the Physiological Affective States. While enactive mastery refers to the learner’s successful learning experience in the past, vicarious experience refers to observing a role model perform a task successfully. Further, verbal persuasion involves one person convincing the other that they can perform a task successfully. Finally, physiological and affective states refer to stress, emotion, mood, pain, and fatigue, highlighting the need to focus on technology and course content. Further, the learning strategies (Keller, 1987) would be useful for enhancing the SE. For example, hospitality instructors can guide learners on developing a work plan, offering rewards and recognitions, motivating feedback, and setting realistic goals.

5.4. Limitations and recommendations for future studies

Despite its theoretical and practical implications, this study has several limitations that need further investigation to advance online hospitality education knowledge. While it provides empirical evidence for the impact of interactions on the perceived learning of learners, future studies may employ longitudinal, qualitative, or mixed-method approaches to investigate the influence of perceived learning interactions. They may also explore other outcome variables, such as learners’ satisfaction. Further, the data for this study is collected based on convenience sampling techniques. Future studies may employ other sampling techniques such as stratified sampling. One of the important limitations of the study is the gender ratio of the participants. In this study, nearly three fourth of the respondents were males. Therefore, this might have impacted the interaction effect of SE between interaction and perceived learning. It is believed that gender impact varies substantially at different ages across different study contexts. Therefore, future studies should consider other moderating variables such as age, gender, course to investigate the conditional effect on the outcome variable(s).
Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Narayan B. Prabhu M: Conceptualization, Supervision, Data collection, Writing – original draft. Kartikeya Bolar: Data curation, Formal analysis, Writing – original draft. Jyothi Mallya: Conceptualization, Supervision, Formal analysis, Writing – review & editing. Prithvi Roy: Data collection, Writing – original draft. Valsaraj Payini: Conceptualization, Supervision, Writing – review & editing. Thirugnanasambantham K: Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

None.

Acknowledgements

All individuals who have made substantial contributions to the work reported in the manuscript. This statement is signed by all the authors:

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jhlste.2021.100335.

References

Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. Journal of Computing in Higher Education, 23(2–3), 82–103. https://doi.org/10.1007/s12528-011-9043-x
Alavi, M., Marakas, G. M., & Yoo, Y. (2002). A comparative study of distributed learning environments on learning outcomes. Information Systems Research, 13(4), 404-415. https://doi.org/10.1287/isre.13.4.404.72
Alhaj, M., Ostmannson, F., & Berigel, M. (2017). Levels of interaction provided by online distance education models. Eurasia Journal of Mathematics, Science and Technology Education, 13(6), 2733-2748. https://doi.org/10.12973/eurasia.2017.01250a
Alinverini, F., & Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: A longitudinal study. Journal of Educational Research, 104(4), 241–252. https://doi.org/10.1080/00220671003728062
Alqurashi, E. (2019). Predicting student satisfaction and perceived learning within online learning environments. Distance Education, 40(1), 133–148. https://doi.org/10.1080/01587919.2018.1535362
Anderson, Terry (2003). Getting the mix right again: an updated and theoretical rationale for interaction. International Review of Research in Open and Distance Learning, 4(2), 1–14. https://doi.org/10.19173/irrodl.v4i2.149.
Arbaugh, J. B. (2001). How instructor immediacy behaviors affect student satisfaction and learning in web-based courses. Business Communication Quarterly, 64(4), 42–54. https://doi.org/10.1177/108056990106400405
Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioral change. Advances in Behaviour Research and Therapy, 1(4), 139–195. https://doi.org/10.1016/0146-6402(78)90002-4
Bates, R., & Khasawneh, S. (2007). Self-efficacy and college students’ perceptions and use of online learning systems. Computers in Human Behavior, 23(1), 175–191. https://doi.org/10.1016/j.chb.2004.04.004
Beaudoin, M. F. (2002). Learning or lurking? Tracking the “invisible” online student. Internet and Higher Education, 5(2), 147–155. https://doi.org/10.1016/S1096-7516(02)00068-6
Bervell, B., Umar, I. N., & Kamlin, M. H. (2020). Towards a model for online learning satisfaction (MOLS): Re-considering non-linear relationships among personal innovativeness and modes of online interaction. Open Learning, 35(3), 236–259. https://doi.org/10.1080/02680513.2019.1662776
Best, Brett, & Conceição, Simone, C O (2018). Transactional distance dialogic interactions and student satisfaction in a multi-institutional blended learning environment. European Journal of Open, Distance and E-Learning, (201), 139–153. https://doi.org/10.1080/15555174.2017.1345169
Bordoloi, R., Das, P., & Das, K. (2021). Perception towards online/blended learning at the time of covid-19 pandemic: An academic analytics in the Indian context. Asian Association of Open Universities Journal, 16(1), 41–60. https://doi.org/10.1108/aoouj-09-2020-0079
Carnwell, Alan, D., & Venkatesh, Viswanath (2002). Learner outcomes in an asynchronous distance education environment. International Journal of Human Computer Studies, 56(5), 475–494. https://doi.org/10.1016/S1071-5819(02)0004
Chou, C. (2003). Interactivity and interactive functions in web-based learning systems: A technical framework for designers. British Journal of Educational Technology, 34(3), 265–279. https://doi.org/10.1111/1467-8535.00326
Dupin-Bryant, P. A. (2004). Pre-entry variables related to retention in online distance education. International Journal of Phytoremediation, 21(1), 199–206. https://doi.org/10.1207/s15389286ipj2101_2
Ekumfor-Okwuwe, K. C. V., & Teng, T. L. (2014). The impact of transactional distance dialogic interactions on student learning outcomes in online and blended environments. Computers & Education, 78, 414–427. https://doi.org/10.1016/j.compedu.2014.06.011
Elyakim, N., Reychav, I., Offir, B., & Mchaney, R. (2019). Perceptions of transactional distance in blended learning using location-based mobile devices. Journal of Educational Computing Research, 57(1), 131–169. https://doi.org/10.1177/0735633117746169
Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/002224378101800104
Fredderiksen, E., Pickett, A., Shea, P., Pelz, W., & Swan, K. (2000). Student satisfaction and perceived learning with on-line courses: Principles and examples from the SUNY learning network. Journal of Asynchronous Learning Networks, 4(2), 7–41. https://doi.org/10.24059/olj.v4i2.1899
Gavrilis, Vagalis, Mavroidis, Illias, & Giosossi, Yiannis (2020). Transactional distance and student satisfaction in a postgraduate distance learning program. Turkish Online Journal of Distance Education, 21(3), 48–62. https://doi.org/10.17711/TOJDE.762023.
Rhode, J. F. (2009). Interaction equivalency in self-paced online learning environments: An exploration of learner preferences. *International Review of Research in Open and Distance Learning, 10*(1). https://doi.org/10.19173/irrodl.v10i1.603

Roblyer, M. D., & Wiencke, W. R. (2003). Design and use of a rubric to assess and encourage interactive qualities in distance courses. *International Journal of Phytoremediation, 21*(1), 77–98. https://doi.org/10.1207/S15389286AJE1702_2

Samuels-Peretz, D., & Powers, J. (2014). Documentation and universal instructional design: A partnership supporting diverse learners in higher education. *The New Educator, 10*, 35–43. https://doi.org/10.1080/1547688X.2014.868222

Sebastianelli, R., Swift, C., & Tamimi, N. (2015). Factors affecting perceived learning, satisfaction, and quality in the online MBA: A structural equation modeling approach. *The Journal of Education for Business, 90*(6), 296–305. https://doi.org/10.1080/08832323.2015.1038979

Shen, D., Cho, M. H., Tsai, C. L., & Marra, R. (2013). Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction. *Internet and Higher Education, 19*, 10–17. https://doi.org/10.1016/j.iheduc.2013.04.001

Smith, S. B., Smith, S. J., & Boone, R. (2000). Increasing access to teacher preparation: The effectiveness of traditional instructional methods in an online learning environment. *Journal of Special Education Technology, 15*(2), 37–46. https://doi.org/10.1177/016264340001500204

Strachota, E. M. (2003). Doctoral Dissertation. Student satisfaction in online courses: An analysis of the impact of learner-content, learner-instructor, learner-learner and learner-technology interaction (Vol. 64, p. 2746). The University of Wisconsin-Milwaukee, Dissertation, B.

Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education, 50*(4), 1183–1202. https://doi.org/10.1016/j.compedu.2006.11.007

Terumi, Miyazoe, & Anderson, Terry (2010). Empirical research on Learners’ perceptions: Interaction equivalency theorem in blended learning. *European Journal of Open, Distance and E-Learning.*

Vlachopoulos, D., & Makri, A. (2019). Online communication and interaction in distance higher education: A framework study of good practice. *International Review of Education, 65*(4), 605–632. https://doi.org/10.1007/s11159-019-09792-3

Weidlich, Joshua, & Bastiaens, Theo, J (2018). Technology matters – the impact of transactional distance on satisfaction in online distance learning. *The International review of research in open and distributed learning, 19*(3), 222–242. https://doi.org/10.19173/irrodl.v19i3.3417.

Wright, V., Sunal, C., & The, E. W.-R. on enhancing, & 2006, U.. (2006). Future directions for online learning. *Research on Enhancing the Interactivity in Online Learning, 1–3.*

Zhang, Y., & Lin, C. H. (2020). Student interaction and the role of the teacher in a state virtual high school: What predicts online learning satisfaction? *Technology, Pedagogy and Education, 29*(1), 57–71. https://doi.org/10.1080/1475939X.2019.1694061