Examining Instructional Technologies in Hospitality and Tourism Education: A Systematic Review of Literature

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Examining Instructional Technologies in Hospitality and Tourism Education: A Systematic Review of Literature

Arthur Huang, PhD, Efrén de la Mora Velasco, PhD, and Adam Haney, BS

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ABSTRACT

This paper reviews the state-of-art articles on instructional technologies for hospitality and tourism education. The types of technologies, roles in instruction, theoretical underpinnings, assessments, benefits, and challenges are synthesized. Education context, knowledge, skills, and attitudes developed through instructional technologies are also explored. Virtual reality, virtual games, social media, online courses, and simulations have been primarily used. Instructional technologies were applied to facilitate content delivery, practice, communication, assessments, feedback, and authentic learning experiences. Most studies did not ground their educational technologies in defensible learning theories. Only a limited number of studies employed adoption theories to examine the intention of using technologies. Further studies should investigate whether certain instructional technologies provide significant benefits to learning relative to their costs.

KEYWORDS

Hospitality and tourism education; instructional technology; evidence-based education; learning outcomes; virtual reality; game-based learning; MOOC

Introduction

As technological innovations increasingly penetrate the hospitality and tourism (H&T) industry (Lee et al., 2016), educational institutions can add value to their H&T curriculum by adopting emergent instructional technologies. Also known as “educational technology” or “learning technology,” instructional technology is defined as “the study and ethical application of theory, research, and best practices to advance knowledge as well as mediate and improve learning and performance through the strategic design, management and implementation of learning and instructional processes and resources” (AECT, 2021). Instructional technologies can be strategically used to increase students’ engagement, amplify access to education, reduce costs, and optimize learning (Hirumi et al., 2021). Therefore, acquiring and disseminating new knowledge on emergent instructional technologies becomes essential to produce systematic and long-lasting improvements in the H&T curriculum and instruction.

Instructional technologies can facilitate acquiring and transferring fundamental knowledge, skills, or abilities (KSA) required by future H&T professionals. A panoply of technological applications to facilitate learning and performance of the H&T curriculum has been empirically and conceptually examined. Prominent examples of instructional technology implemented in H&T education include but are not limited to classroom response systems (Thomas et al., 2015), learning management systems (Feinstein et al., 2005), simulations (McGrath et al., 2021), virtual reality (Papachristos et al., 2018), interactive games (Fu et al., 2019), and mobile learning (Lötter & Jacobs, 2020). The design, aesthetic, and functional features of new emergent technologies (e.g., mobile technologies, virtual reality) allow the delivery of more accessible, realistic, immersive, and simulated learning scenarios, which are elemental for performance-based H&T education (Patiar et al., 2017). Instructional technologies may also facilitate the transfer of knowledge and skills to the work context through student-centered approaches, such as experiential learning (Kolb, 2015), game-based learning (Adukaite et al., 2017), and technology-based adaptive learning (Kerr, 2016). Nevertheless, the application of new instructional technologies in H&T education remains limited and has great potential for further development.

Prior Reviews on Instructional Technology Adoption

By employing survey research designs, prior studies have empirically explored tourism students’ expectations and preferences and the adoption of instructional technologies. For instance, Lee et al. (2016) surveyed hospitality management students on their expectations of
educational technology. Lee et al. (2016) found that the current adoption of technology differs significantly from students’ expectations. For example, automated response systems (i.e., Clickers) and learning management systems (e.g., Blackboard) are used more than students’ expectations (Lee et al., 2016). Moreover, students reported their willingness to study with more engaging educational software such as virtual worlds and simulations. Lee et al. (2016) also identified instructional technologies’ advantages (e.g., flexibility, availability, personalized learning) and challenges (need for higher motivation, distraction, feelings of confusion) in the H&T education context.

In a similar vein, Goh and Sigala (2020) identified factors affecting instructional technology adoption among faculty and how to overcome those challenges. Through a comprehensive literature review, Goh and Sigala (2020) found that there are different types of adopters of technology and that all lecturers may not be able to adopt technology at the same time. Goh and Sigala (2020) suggested that educational technologies’ adoption must be followed by reinforcing positive attitudes about the technology. In addition, adequate technical support must be provided to lecturers once the technology is implemented (Goh & Sigala, 2020). They recommended a step-by-step approach for educators and administrators to implement technology based on a staged innovation adoption process.

Sun et al. (2016) examined students’ readiness to adopt educational technology. By applying a survey to measure students’ readiness for technology adoption and perceived technology attributes, it was found that technology engagement was a factor positively influencing five dimensions of adoption (i.e., commitment, personal involvement, motivation, passion, and availability). Similarly, flexibility had a positive influence on all dimensions except motivation. However, previous academic achievement had a negative impact on all dimensions except personal involvement. Sun et al. (2016) concluded that successful implementation of instructional technology relies on balancing what technology offers and students’ readiness levels. In short, Goh and Sigala (2020) and Sun et al. (2016) focused mostly on the perceptions toward technology implementation rather than the impacts of such technologies on learning and did not examine how instructional technology should be designed and implemented to facilitate students’ learning.

**Prior Reviews on Specific Instructional Technologies in H&T**

Three literature reviews have synthesized the process and outcomes in the application of specific instructional technologies in H&T education, namely, Massive Open Online Courses (MOOCS; Lin et al., 2018), mobile learning (Tu & Hwang, 2020), and students’ response and engagement systems (Thomas et al., 2015). Thomas et al. (2015) summarized the benefits and challenges of students’ response/engagements systems. The benefits included accessibility, and student readiness; the challenges included the cost for students and instructors, bandwidth requirements, hardware needs, and student perspectives on device sharing (i.e., passing their device to a friend to participate in an activity in the response system). Lin et al. (2018) proposed a framework for MOOCs with six key factors: scaffolding, lectures, networking, collaboration, assessment, and affirmation. The proposed framework was used to analyze and assess 18 MOOC from H&T programs. Lin et al. (2018) found that MOOCs face the following challenges: (a) a lack of diversity in course modules, (b) limited social media usage compared with other communication tools (e.g., forums), (c) insufficient multilingual support, and (d) high discontinuity and dropout of MOOC instructors.

Tu and Hwang (2020) explored the use of mobile learning in hospitality and leisure education, considering application domains, research issues, research sample groups, research methods, adopted technologies, and learning strategies. Tu and Hwang (2020) found that research on mobile learning has focused on learner affect, attitudes, motivation, and learning experiences. Tu and Hwang’s (2020) key findings are that mobile learning studies have focused on learning perceptions, content delivery, and skills development. A lack of studies examining higher-order thinking skills such as problem-solving, critical thinking, and collaborative competencies was also noted.

The above literature evidences the increasing research on students’ preferences and adoption of instructional technologies in H&T education. However, such studies are limited in three ways. First, they have focused on students’ expectations (Lee et al., 2016) and only provide fractional pictures of the integration of instructional technologies in H&T higher education (Lin et al., 2018). Therefore, there is a lack of understanding about the panoply of instructional technology uses, outcomes, and related contexts to inform H&T faculty’s and instructional designers’ practice. Second, empirical evidence is missing about how theories inform the design/implementation of instructional technology in H&T education. Last, past research has not directed fine-grained analyses in key elements essential to inform H&T instructional technology design and implementation. Such vital factors include theoretical underpinnings, research designs, and the role of the instructional technologies, which are critical for enhancing students’ learning outcomes and performance. To
this end, this study addresses the above limitations by synthesizing recent empirical research on instructional technology processes and outcomes in H&T educational settings. This study systematically reviews and synthesizes existing empirical research on the design, implementation, or application of instructional technology in H&T education. The following research questions guided the present study:

- **RQ1**: What types of instructional technologies were studied in hospitality and tourism education from 2011 to 2021?
- **RQ2**: What have been the main roles of instructional technologies in H&T education?
- **RQ3**: What theories have supported the design and integration of instructional technologies in H&T education?
- **RQ4**: What hospitality programs/courses have benefited from the application of instructional technology in H&T education?
- **RQ5**: What knowledge, skills, and abilities (KSA) have been supported through instructional technologies in H&T education?
- **RQ6**: What characteristics of learning have been assessed (e.g., reactions, learning, behavior, results)? and what instruments (e.g., questionnaires, rubrics, etc.) have been implemented to measure the impact of instructional technologies in the H&T research?
- **RQ7**: What are the main benefits/challenges of implementing instructional technologies in H&T education?

This study makes several contributions to H&T education, management, and research. First, it informs H&T faculty and instructional designers’ practices by presenting the panoply of instructional technology implementations, their benefits, drawbacks, learning outcomes, and students’ preferences for certain learning technologies. Second, the synthesized outcomes support educational managers in informing technological investment decisions and factors that could enhance teaching and learning. Third, this study advances evidence-based educational practice by noting what learning theories (e.g., experiential learning) and adoption theories (e.g., self-determination theory) have been used to design and implement learning experiences. The findings will inform researchers in H&T education about the state-of-art H&T instructional technologies and applications.

The rest of the article is structured as follows. First, the methods section explicates the search strategy and how articles were located, retrieved, and coded. Second, the results section summarizes the findings based on the seven posed research questions. Third, findings are presented and discussed to provide a fuller view of the H&T instructional technology landscape. The last section discusses the implications for theory, research, and practice.

**Methods**

This review followed a systematic approach to guide the necessary steps to search, gather information, analyze, and integrate the results of the existing literature that has examined the use of instructional technology in H&T education. Particularly, Cooper’s (2015) framework was used for three reasons: (a) it leads to standardize and make explicit the methods used to collect, categorize, and synthesize the primary research, (b) it suggests systematic procedures to ensure that all relevant scholarship was included (e.g., Boolean search, multiple databases) to reduce bias in accounts of the research, and (c) offers ways to assess the accuracy of the information gathered from the selected literature (i.e., coding process). The steps to complete the present review are described as follows.

**Search Method**

A Boolean search string containing key terms relevant to the research questions was used. Databases related to educational technology in H&T were searched based on the abstracts. EBSCO Host, EBSCO Hospitality and Tourism, and Google Scholar were used because they allow the searching/retrieval of articles from multiple journals and facilitate the application of inclusion/exclusion criteria. Based on the PRISMA flow diagram posited by Moher et al. (2010), Figure 1 depicts the different stages and flow of information during the different stages of the present systematic review. An initial search in the two EBSCO databases yielded 180 articles. Twenty-five additional articles were in the first ten lists of results from the Google Scholar database. The Boolean search terms were also used to search within keywords of the top ten H&T journals with the highest H5 indexes in Google Scholar. Specifically, nine articles were identified in the Journal of Hospitality, Leisure, Sport & Tourism Education and four in the Journal of Hospitality & Tourism Education. Twenty-eight duplicates were excluded from the 205 articles, yielding 177 potentially relevant articles.

**Inclusion/Exclusion Criteria**

The authors reviewed empirical articles published between 2011 and 2021 in English, peer-reviewed, and related to the design and delivery of H&T instruction through technology. Conceptual papers, review articles,
editorials, opinion articles, dissertations, and perspective papers were excluded to focus on the observed and measured impacts of instructional technology in H&T teaching and learning.

Articles’ Screening

Titles and abstracts of the 177 retrieved articles were screened to determine relevancy. The abstracts were analyzed by applying the inclusion and exclusion criteria. 144 articles were excluded for being secondary research, one for not being available in English, and 138 for low relevance. For example, articles about hotel staff training were deemed as low relevance because such studies were not conducted in H&T educational settings. Articles related to the field of medicine or therapy were not considered due to them not being hospitality- or tourism-centric. Thirty-three articles were finally selected for coding.

Coding Process

We developed an electronic coding guide to direct the extraction of data from the selected articles and facilitate the synthesis of information. The coding guide was mainly a spreadsheet document that allowed the recording of data for each of the 33 articles. The electronic coding guide supported the filtering, ordering, and summarization of codes. A total of 29 codes divided into 5 categories were included in the coding guide as follows:

1. General information: title of the article, author(s), year of publication, abstract, DOI, country in which the study was conducted, hospitality program/course, H&T topic, and main findings.
2. Research design: approach (e.g., quantitative, qualitative) and type of research design (e.g., experimental, quasi-experimental, survey, case-study).
3. Participants: sample size, mean age, percentage of females, grade level of participants, and type of participants (undergraduate students, graduate students, etc.).
4. Aspects of the instructional technology: type (e.g., virtual reality, online course) duration of the technological implementations, role of the technology (e.g., presenting content/Instruction, providing feedback, facilitating practice, facilitating communications), and level of development (e.g., preexisting, adapted from existing technology, or fully developed).
Learning outcome: type of learning outcome measured (verbal Information, intellectual skills, psychomotor skills, and/or attitudes), type of assessment instrument employed in the study (e.g., quiz, rubric), and learning related outcomes (motivation, engagement, satisfaction, etc.).

The final 33 selected articles were coded based on the full lengths of the articles. Each code was then typed in the coding guide and discussed among the three coauthors to ensure validity. Trends, patterns, and themes were identified by segmenting out the various relevant codes (e.g., segmenting title and year of publication in a separate sheet to track the growth of the literature over time). Table 1 summarizes the primary characteristics of the 33 articles.

Results

Descriptive Summary

Thirty-three articles that examined the integration of instructional technology in H&T education during the ten-year study period were identified. Three articles on average ($SD = 2.14$) were published each year (Figure 2). The main research outlets were the Journal of Hospitality & Tourism Education ($n = 4$) and the Journal of Hospitality, Leisure, Sport & Tourism Education ($n = 5$). Twenty articles (60.6%) were published in journals specific to H&T research, whereas 13 articles (39.4%) were published in generic educational technology and development journals.

Research on H&T instructional technologies has transcended different geographies. From the selected studies, the majority were conducted in Taiwan ($n = 7$). The United States garnered the second highest number of published articles ($n = 5$), followed by Australia ($n = 4$) and the rest distributed in other countries ($n = 17$). On a continental scale, about a third of articles were conducted in Asia ($n = 10, 30.3%$); followed by North America ($n = 7, 21.21%$), Africa ($n = 5, 15.15%$), Australia ($n = 5, 15.15%$), and Europe ($n = 4, 12.12%$). Two articles (6%) did not report the country in which the study was conducted.

Regarding the research methods, 25 of the selected studies were quantitative (75.76%), six were qualitative (18.18%), and two were mixed methods (6%). The majority of articles employed survey research ($n = 17, 51.52%$), followed by experimental group-designs ($n = 8, 24.24%$), case studies ($n = 4, 12.12%$), design-based research ($n = 2, 6%$), and other qualitative approaches ($n = 2, 6%$). 4,899 participants were examined across all 33 studies. On average, each study had a sample size of 153 participants ($SD = 134.85$). Twenty-two articles examined undergraduate students (66.67%), six included undergraduate and graduate students (18.18%), and three included instructors of H&T programs (9%). Only one study examined graduate students (3%), and one study did not specify the type of participants (3%). Regarding the research setting, 16 studies implemented educational technologies in face-to-face modalities (48%), and 10 were conducted remotely (e.g., online surveys) (30.3%).

Results Related to RQ1: What Types of Instructional Technologies Were Studied in Hospitality and Tourism Education from 2011 to 2021?

Eight (27%) of the studies explored the use of virtual reality (VR), eight (27%) gamified learning environments, four (12%) social media tools, four (12%) online courses, and three (9%) other education technologies such as podcasts ($n = 1, 3%$) and simulations ($n = 2, 6%$). Figure 3 shows the main families of instructional technologies and specific applications that distilled from the H&T education literature. The features, functionalities, and context of the specific technologies is synthesized in the following subsections.

Virtual Reality

Immersive and non-immersive virtual reality (VR) technologies were implemented to provide more realistic and authentic H&T learning experiences. VR is defined as “an environment (actual or simulated) in which the perceiver experiences it as real” (Blascovich & Bailenson, 2011, cited by Bailey & Bailenson, 2017, p. 182) and “allow learners to experience via multiple senses (e.g. visual, auditory, haptic, and kinesthetic)” (Huang et al., 2019, p. 745). VR technologies are highly immersive when learners see, hear, move, and interact more authentically within a learning environment, for instance, while using head-mounted displays that give the impression that users are part of a simulated world (Huang et al., 2019). Non-immersive VR allows learners to interact with a virtual space through a less realistic environment (e.g., desktop computer).

Four articles (12%) implemented immersive technologies to facilitate the learning of information about existing tourism destinations, emulate field trips, and provide opportunities to practice culinary skills. VR headsets increased students’ engagement by immersing them in an island-based 3D environment that presented stakeholders’ interviews and different tourism challenges (Schott & Marshall, 2021). VR field trips were used to replicate a food and beverage hotel atmosphere to supplement face-to-face teaching (Patiar et al., 2017).
Table 1. Summary of characteristics of the reviewed articles.

<table>
<thead>
<tr>
<th>Author(s)/year</th>
<th>Research design</th>
<th>Hospitality /tourism Program or course</th>
<th>Type of learning technology</th>
<th>Role of the instructional technology</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith, S. &amp; Walters, A. (2012)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Business</td>
<td>Mobile Learning Tool and app</td>
<td>Facilitate Practice</td>
<td>Positive attitudes towards mobile learning increased following intervention; disadvantages identified included cost of the devices and screen size.</td>
</tr>
<tr>
<td>Zehrer, A. &amp; Grabmuller, A. (2012)</td>
<td>Qualitative (Case Study)</td>
<td>N/R</td>
<td>Social Network</td>
<td>Promote Socialization/ Collaboration/ Communication</td>
<td>Students likes to use Facebook as their main platform but prefer to observe others’ content rather than post themselves.</td>
</tr>
<tr>
<td>Huang et al. (2013)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>Introductory PRTM Course and tourism marketing class</td>
<td>Virtual Reality-Non-Immersive</td>
<td>Promote Socialization/ Collaboration/ Communication</td>
<td>There is a relationship between learners’ virtual experiences, psychological needs, satisfaction, and motivation.</td>
</tr>
<tr>
<td>Brown, J., Mao, Z., &amp; Chesser, J. (2013)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>Introductory cooking course</td>
<td>Online Course</td>
<td>Instruction</td>
<td>Students under the online delivery method had better group performance than students taught in live classes.</td>
</tr>
<tr>
<td>Ma, C., &amp; Au, N. (2014)</td>
<td>Quantitative (Survey)</td>
<td>Hospitality and Tourism Management</td>
<td>Social Network</td>
<td>Learner’s Assessment</td>
<td>Social media addresses different learning styles and supports students’ networking and relationship development.</td>
</tr>
<tr>
<td>O’Boyle, I., (2014)</td>
<td>Qualitative (Case Study)</td>
<td>Sport and Recreation Management</td>
<td>Social Network</td>
<td>Promote Socialization/ Collaboration/ Communication</td>
<td>Facebook and Twitter enhanced interactions between students, the university, and organizations relevant to the program.</td>
</tr>
<tr>
<td>Hsu, L. (2014)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>N/R</td>
<td>Video game; Game Elements</td>
<td>Providing Feedback</td>
<td>Inquiry-based learning modules can change students’ epistemological beliefs and foster more sophisticated belief systems.</td>
</tr>
<tr>
<td>Sobaith, A. &amp; Moustafa, M., (2016)</td>
<td>Qualitative (Case Study)</td>
<td>Hotel Management and Tourism Studies Programs</td>
<td>Social Network</td>
<td>Promote socialization/ collaboration/ Communication</td>
<td>Social media is a viable tool to foster students’ networking peer-to-peer relationships.</td>
</tr>
<tr>
<td>Tseng et al. (2015)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Management</td>
<td>Virtual Reality-Non-Immersive</td>
<td>Facilitate Practice</td>
<td>3-D virtual reality interventions in tour-guiding courses may increase study effectiveness.</td>
</tr>
<tr>
<td>Adukaite, A., Zyl, I., &amp; Cantoni, L., (2016)</td>
<td>Qualitative (Case Study)</td>
<td>Introduction to Tourism</td>
<td>N/A</td>
<td>Instruction</td>
<td>Challenges of ICT usage include technology anxiety, staff training, resource availability, and students’ resistance to use their mobile devices for learning.</td>
</tr>
<tr>
<td>Edmonds, R., &amp; Smith, S. (2017)</td>
<td>Quantitative (Survey)</td>
<td>International Tourism</td>
<td>Video game; Game Elements</td>
<td>Instruction</td>
<td>Games can engage students and facilitate interaction with aspects of tourism locations and their fellow students.</td>
</tr>
<tr>
<td>Adukaite, A., Zyl, I, Er, S., &amp; Cantoni, L. (2017)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Management</td>
<td>Video game; Game Elements</td>
<td>Instruction</td>
<td>Perceived playfulness and curriculum fit have a positive and direct impact on intention to adopt digital games in the classroom.</td>
</tr>
<tr>
<td>Patiar, A., Kensoho, S., Ma, E., &amp; Cox, R. (2017)</td>
<td>Qualitative (Phenomenology)</td>
<td>Food &amp; Beverage Management</td>
<td>Virtual Reality-Immersive</td>
<td>Authentic Learning</td>
<td>Learning was enhanced by a virtual field trip and helped students develop problem-solving skills and active learning.</td>
</tr>
<tr>
<td>Lee, S., Sergueeva, K., Catangui, M., &amp; Kandaurova, M. (2017)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>N/A</td>
<td>Virtual Reality-Immersive</td>
<td>Instruction</td>
<td>No significant differences on learning performance were found between immersive and non-immersive VR experiences.</td>
</tr>
<tr>
<td>Fatima, J., Gandhorush, P., Khan, M., &amp; Mascio, R. (2019)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Management</td>
<td>Mobile Learning Tool/App</td>
<td>Instruction</td>
<td>Innovation was the most important factor in readiness to adopt mobile learning. Self-efficacy was not a moderating factor in mobile-learning adoption.</td>
</tr>
<tr>
<td>Author(s)/year</td>
<td>Research design</td>
<td>Hospitality /tourism Program or course</td>
<td>Type of learning technology</td>
<td>Role of the instructional technology</td>
<td>Main findings</td>
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<tr>
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<tr>
<td>Kim, W. &amp; Malek, K. (2018)</td>
<td>Quantitative (Survey)</td>
<td>Five different hospitality and tourism programs</td>
<td>Social Network</td>
<td>Learner's Assessment</td>
<td>Professional networking sites (e.g., LinkedIn) has several benefits (e.g., coaching and mentoring) and no perceived drawbacks, whereas a purely social networking site (e.g., Facebook) has no benefits but several drawbacks (e.g., personal, and social negativity).</td>
</tr>
<tr>
<td>Yu, H., Sirsat, S., &amp; Madera, J. (2018)</td>
<td>Quantitative (Survey)</td>
<td>Food Safety and Sanitation</td>
<td>Mobile Learning Tool/App</td>
<td>Instruction</td>
<td>Learning motivation was significantly improved by the implementation of a tablet-supported simulations.</td>
</tr>
<tr>
<td>Lin, J., &amp; Cantoni, L. (2018)</td>
<td>Qualitative (Other)</td>
<td>N/R</td>
<td>Online course</td>
<td>Instruction</td>
<td>MOOC adoption was mostly due to institute intervention versus instructor suggestion, instructors chose to avoid the risk of implementing emergent technology into their MOOCs. Half of the instructors plan to teach in MOOC format again.</td>
</tr>
<tr>
<td>Huang et al. (2018)</td>
<td>Quantitative (Survey)</td>
<td>N/A</td>
<td>Virtual Reality-Non-Immersive</td>
<td>Instruction</td>
<td>3D virtual destinations lead to enhancement of enjoyment and motivation in participants for the learn the cultural and spatial characteristics of the destination.</td>
</tr>
<tr>
<td>Papachristos et al. (2018)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>Culinary Arts</td>
<td>Virtual Reality-Immersive</td>
<td>Facilitate Practice</td>
<td>No significant differences in performance or workload were found between immersive and non-immersive virtual reality chef simulations.</td>
</tr>
<tr>
<td>Fu et al. (2019)</td>
<td>Quantitative (Experimental Group Design)</td>
<td>English Tourism</td>
<td>Video game; Game Elements</td>
<td>Facilitate Practice</td>
<td>Mind-map based RPG games were perceived positively by students and enhanced their English writing performance, fluency, and elaboration.</td>
</tr>
<tr>
<td>Rockhill, C., Pastore, D., &amp; Johnston, D. (2019)</td>
<td>Quantitative (Survey)</td>
<td>Event and Facilities Management</td>
<td>Other: Podcast</td>
<td>Instruction</td>
<td>Students favored podcasts and had positive reactions to them. Yet, motivation to listen to the podcast was moderate to low.</td>
</tr>
<tr>
<td>Lötter, M. &amp; Jacobs, L. (2020)</td>
<td>Quantitative (Survey)</td>
<td>Adventure Destinations First-Year Module</td>
<td>Mobile Learning Tool/App</td>
<td>Promote Socialization, collaboration, or Communication</td>
<td>The use of smartphones enhanced overall learning experience and helped to collaborate by sending messages, leaving/receiving feedback.</td>
</tr>
<tr>
<td>Wang, M., Yang, L., &amp; Chen, T. (2020)</td>
<td>Mixed Methods</td>
<td>Service Management</td>
<td>Multimedia Presentation</td>
<td>Providing Feedback</td>
<td>Video-making activities (i.e., solving customer complains in different cultural contexts) may increase knowledge retention and Intercultural competencies.</td>
</tr>
<tr>
<td>McGrath et al. (2021)</td>
<td>Quantitative (Survey)</td>
<td>Destinations and Attractions</td>
<td>Virtual Simulation</td>
<td>Facilitate Practice</td>
<td>Destination development game simulations can give students a better understanding of complex decision-making in tourism destinations.</td>
</tr>
<tr>
<td>Hsu (2020)</td>
<td>Mixed Methods</td>
<td>Hospitality and Tourism Management</td>
<td>Online course</td>
<td>Instruction</td>
<td>Competence, autonomy, and time were identified as key factors affecting learners' engagement with MOOCs about tourism and hospitality subjects.</td>
</tr>
<tr>
<td>Aguiar-Castillo et al. (2020)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Management</td>
<td>Video game; Game Elements</td>
<td>Instruction</td>
<td>Gamified apps that allow students post contents related to tourism subjects were perceived beneficial and well-accepted. However, the benefits are mediated by the perceived cost of loss of privacy.</td>
</tr>
<tr>
<td>Mahfouz, W. &amp; Elsaid, H. (2020)</td>
<td>Quantitative (Survey)</td>
<td>English Language Course</td>
<td>Video game; Game Elements</td>
<td>Learner's Assessment</td>
<td>Results indicated positive reaction towards English learning apps which can lead to positive effects on learners' motivation.</td>
</tr>
<tr>
<td>Aguiar-Castillo et al. (2020).</td>
<td>Quantitative (Survey)</td>
<td>Organizational Behavior</td>
<td>Video game; Game Elements</td>
<td>Learner's Assessment</td>
<td>Satisfaction, deep learning, and high recommendation was found using a gamified app that allow students to share tourism-related contents.</td>
</tr>
<tr>
<td>Chan, C., Chan, Y., &amp; Fong T. (2020)</td>
<td>Quantitative (Survey)</td>
<td>N/A</td>
<td>Video game; Game Elements</td>
<td>Presenting Content or Instruction</td>
<td>An online scenario game for hypothetical urban destination was effective in increasing knowledge conceptual and theoretical knowledge on urban tourism.</td>
</tr>
<tr>
<td>Schott, C. &amp; Marshall, S. (2021)</td>
<td>Quantitative (Survey)</td>
<td>Tourism Management</td>
<td>Virtual Reality-Immersive</td>
<td>Presenting Content or Instruction</td>
<td>Virtual reality tourism location experience enhanced engagement and immersion, but also produced motion sickness and general discomfort.</td>
</tr>
</tbody>
</table>
Similarly, Google cardboard headsets were used to display 3D videos to teach aspects of a tourism destination (i.e., Nepal), and found students’ high levels of enjoyment (Lee et al., 2017). VR headset simulations have been used to replicate culinary environments to teach students how to select ingredients and prepare recipes by placing the ingredients in the correct order and enabling learners to prepare the recipes in a relatively short time (Papachristos et al., 2018).

Non-immersive VR was also used to facilitate the acquisition of H&T contents and skills. Virtual tour-guiding platforms help students build itineraries based on routes and tourism destinations provided as they navigated the virtual H&T landscape (Chiao et al., 2018), increasing students’ showed awareness of the cultural and environmental characteristics of the destination. VR panoramas of the Hakka region that included scenes of the Hakka culture was translated into increased learning

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**Figure 2.** The number of articles published on the use of instructional technology in H&T education between 2011 and 2021.

**Figure 3.** Types of instructional technologies and specific applications in the T&H literature.
effectiveness (Tseng et al., 2015). Similarly, Huang et al. (2013) developed a virtual environment in the Second Life platform. Huang et al. (2013) created a virtual environment of the Masai Mara Basecamp’s in Kenya, featuring interactive images of Masai art, clothing, and jewelry to provide cultural information about the area, and found a positive relationship between students’ virtual experience and hedonic motivation. Chiao et al. (2018) utilized a similar VR environment of a basecamp as a teaching tool and found that students had higher motivation and enjoyment while interacting with the various cultural images of art and jewelry.

**Digital Games**

Gaming elements and the invoked behaviors can contribute to enhancing motivation-activation in H&T teaching (Aguiar-Castillo et al., 2020). Gamification is a term referring to the use of complete games, ludic practices, and playful design (game elements) for learning purposes (Adukaite et al., 2017). The present review identified eight articles (27%) that examined the use of digital games in H&T education. Online gamified tasks related to culture, geography, history, and languages of major European countries, representative of a tour guide’s professional knowledge were explored by Hsu (2014) who found that such activities may lead to better long-term retention of factual knowledge. Gamified mobile apps probed to enhance students’ knowledge retention when stories of the local businesses can be heard when walking through the area or virtually observing key tourism attractions (Edmonds & Smith, 2017). RPG games can help students develop travel management skills (e.g., helping a city mayor create a travel plan) when in-game rewards and points are given for the completion of each digital task to increase engagement (Fu et al., 2019). Aguiar-Castillo et al. (2020) and Elsaid (2020) explored students’ motivation and intention to use gamified apps. It was found that gamified apps in conjunction with face-to-face learning can foster peer evaluation of student-published content, and keep track of accomplishments (e.g., points, trophies) reached by students (Aguiar-Castillo et al., 2020). Gamified apps can promote deeper learning and increase learners’ satisfaction (Elsaid, 2020).

Two studies explored the effects and adoption of gamified technologies. One gamified technology was used in the urban tourism context to mimic real-life scenarios of hypothetical tourism destinations (Chan et al., 2020). The scenarios placed students in the position of destination marketing organization employees in charge of advising the mayor about tourism policy and planning decisions. The online game featured a series of decisions that progressed the overall storyline. Self-reported results indicated learners’ attitudinal changes and knowledge enrichment which was significantly higher when compared to lectures and group discussions (Chan et al., 2020). Adukaite et al. (2017) surveyed instructors on factors that affected willingness to adopt digital gaming technologies. The online questionnaire contained questions relating to several areas of technology acceptance including behavioral intention, perceived playfulness, perceived curriculum fit, self-efficacy, computer anxiety, challenge, and learning opportunities. Adukaite et al. (2017) argued that perceived playfulness and curriculum fit have a positive and direct impact on the construct of behavioral intention to adopt gaming technologies in H&T education.

**Internet-Based Social Networks**

Five articles (15%) studied the use of online social networks in H&T education. In the educational context, social media is typically used to promote student-student and student-university communications as a growing number of universities are establishing their own social media pages. Ma and Au (2014) investigated factors that may affect students’ perceptions of social media use in H&T education programs. The findings suggested that networking and relationship building were the primary indicators of perceived value for social media sites. A year later, Sobaih and Moustafa (2016) echoed Ma and Au’s (2014) results, findings that H&T students see value in social media use in academia and encouraging H&T education leaders to develop online communities where students can network and foster relationships. Professional networking websites (e.g., LinkedIn) were popular among students for the job posting features that help them grow their careers throughout their education. O’Boyle (2014) tracked the interactions of sports management students with a university’s social media channels (Facebook and Twitter) and found high levels of student-student and student-organizations interactions. Zehrer and Grabmüller (2012) identified the benefits (at-work assistance, networking, marketing) and drawbacks (social negativity, personal negativity, regret from posting information) of using social media in H&T education settings.

**Online Courses and MOOC**

Two (12%) articles examined the implementation of H&T online courses. The studies focused on the use of online courses for delivering content (Brown et al., 2013) as well as presenting feedback systems.
to assess and minimize learner anxiety when learning foreign languages for tourism (Lin et al., 2015). Brown et al. (2013) used a learning management system to feature recorded video sessions with cooking demonstrations originally performed in a face-to-face class. Such videos allowed online students to replay and review the demonstrations. Brown et al. (2013) found that students in the online delivery group had overall better group performance than the face-to-face group. In consonance, Lin et al. (2015) implemented affective feedback strategies (e.g., signs of joy, sadness, surprise) in response to students’ behaviors or choices in a class module with a virtual teaching assistant. It was found that affective feedback on online courses might lead to lower anxiety levels when undergraduate tourism students learn a foreign language (Lin et al., 2015).

Two studies (6%) examined the integration of Massive Open Online Courses (MOOC) in H&T education. Hsu (2020) studied learner engagement by analyzing 20 H&T MOOCs and found that learners’ competence (i.e., belief that one can play a successful role in the learning process), and autonomy were two factors affecting students’ engagement. In the same vein, Lin and Cantoni (2018) interviewed instructors who used MOOCs in teaching H&T topics and found that many instructors implemented MOOCs due to organizational pressure rather than a desire to provide open and accessible instruction for all. Lin and Cantoni (2018) also argued instructors tend to avoid risks when implementing innovative teaching tools (e.g., Google Hangouts) and activities (e.g., shared documents, apps, widgets) in their H&T MOOCs and favor more traditional tools such as forums, video presentations, and conventional assessments.

**Mobile Technologies**

Four articles (12%) were focused on the use of mobile technologies (e.g., tablets, smartphones) for learning purposes in H&T programs. Smith and Walters (2012) explored perceptions of mobile technologies amongst H&T students by providing them with a study tool to reinforce the learning of tourism business concepts. The tool included 12 interactive activities (jeopardy, hangman, puzzles, etc.) generated in the StudyMate app after teachers input core concepts. Students’ perception of the mobile-learning tool effectiveness increased following actual implementation. Similarly, Fatima et al. (2019) explored students’ opinions of mobile-learning applied in H&T courses and found that readiness to adopt mobile-learning was affected mostly by attitudes toward innovation and moderated by self-efficacy.

A tablet-supported simulation for a food safety course was developed and tested (Yu et al., 2018). It allowed students to act as agents of the CDC working to prevent the spread of foodborne illness by analyzing clues and locating the food safety violation behind the outbreak. Yu et al. (2018) found that learners’ motivation was improved due to factors such as content relevancy, peer interaction, and perceived enjoyment. Similarly, Lötter and Jacobs (2020) examined the use of smartphones as a social constructivism tool to promote collaborative learning. Students were divided into small groups, used their mobile devices to search, analyze, and summarize online information related to a South African tourism destination. By assessing self-administering questionnaires, it was found that smartphones enhanced their learning by facilitating collaboration with peers, sending real-time messages, sharing questions, and collecting feedback posted by students.

**Virtual Simulations, Multimedia Presentations, and Podcast**

The use of other instructional technologies such as virtual simulations (1, 3%), multimedia presentations (1, 3%) and podcasts (1, 3%) was relatively low compared to other technologies. McGrath et al. (2021) developed a simulation in which students play the role of a destination marketing organization to reinforce and apply sustainable tourism principles. Wang et al. (2020) engaged students in learning intercultural competencies by requiring them to post a video that demonstrate their knowledge on service concepts from a multi-cultural perspective. The video-making process increased their involvement in the learning experience and help them to understand better cultural differences in service management. Podcasts are defined as “audio and video broadcasts launched on the Internet and automatically downloadable to computers or smartphones when synchronized” (Yeh et al., 2021). Rockhill et al. (2019) surveyed students on the use of facility and event management podcasts developed by instructors to deliver study content. Podcasts acted as an “ask the expert” style presentation wherein instructors described an event/facility management scenario and presented questions for students to answer. Students reported positive reactions to the podcasts yet were unmotivated to moderately motivated to listen to the podcasts.
Results Related to RQ2: What Has Been the Main Role of Instructional Technologies in H&T Education?

Figure 4 depicts roles of instructional technologies examined in the H&T research. The selected literature distills functions of instructional technologies in H&T education as follows: presenting H&T contents (Adukaite et al., 2016, 2017; Aguiar-Castillo et al., 2020; Brown et al., 2013; Chan et al., 2020; Chiao et al., 2018; Edmonds & Smith, 2017; Fatima et al., 2019; Hsu, 2020; Huang et al., 2019; S. H. Lee et al., 2017; Lin & Cantoni, 2018; Rockhill et al., 2019; Schott & Marshall, 2021; Yu et al., 2018), facilitating practice (Fu et al., 2019; McGrath et al., 2021; Papachristos et al., 2018; Smith & Walters, 2012; Tseng et al., 2015), promoting socialization/communication (Huang et al., 2013; Lötter & Jacobs, 2020; O’Boyle, 2014; Sobaib & Moustafa, 2016; Zehrer & Grabmüller, 2012), enriching learners’ assessments (Aguiar-Castillo et al., 2020; W. Kim & Malek, 2018; H.-C. K. Lin et al., 2015; Ma & Au, 2014; Elsaid, 2020), facilitating feedback (Hsu, 2014; Wang et al., 2020), and delivering authentic learning experiences (Patiar et al., 2017).

Content was presented through technologies such as videos (Brown et al., 2013), games (Adukaite et al., 2017; Aguiar-Castillo et al., 2020; Chan et al., 2020; Edmonds & Smith, 2017; S. H. Lee et al., 2017), and multimedia (Chiao et al., 2018). Practice was facilitated through VR scenarios (S. H. Lee et al., 2017; Schott & Marshall, 2021; Chiao et al., 2018; Huang et al., 2019) and formative quizzes (Smith & Walters, 2012). Likewise, tools such as social media (O’Boyle, 2014; Sobaib & Moustafa, 2016; Zehrer & Grabmüller, 2012), and personalized peer-to-peer communication tools (Lötter & Jacobs, 2020) facilitated communication either between learners, between learners and their instructors, or between learners and the university. Learner assessment enrichment was achieved through facilitating learner feedback from peers and professionals (Kim & Malek, 2018; Ma & Au, 2014) and developing online quiz games as a tool embedded with the material (Aguiar-Castillo et al., 2020; Lin et al., 2015; Elsaid, 2020). Authentic learning experiences were delivered through virtual field trips that mimicked real-world travel experiences (Patiar et al., 2017).

Results Related to RQ3: Which Theories Have Informed the Integration/Design of Instructional Technologies in H&TE?

Thirteen articles (39.4%) used defensible theoretical underpinnings to inform the instructional technology design/implementation, but the majority were atheoretical (n = 20, 60.6%). From the articles that were grounded in theoretical frameworks (n = 13, 39.4%), three (9.1%) utilized self-determination theory (SDT) to understand and increase learner motivation. Two articles (6.1%) used the planned behavior theory (Ajzen, 1991) to predict/explain...
attitudes toward adoption of mobile learning, perceived hedonic benefits and satisfaction from gamification strategies. Two articles (6.1%) employed the technology acceptance model (Davis et al., 1989) to predict acceptance of gamified learning platforms. One study used the gratification theory (Katz, et al., 1973) to evaluate perceived benefits and drawbacks of social and professional networking sites among H&T students. Other theoretical frameworks that H&T educational researchers used were the interactive cognitive complexity theory (Tennyson & Jorczak, 2008), the affective filter theory, human-computer interaction conceptualization (Hassenzahl &Tractinsky, 2006) and network theory (Meyers et al., 2005). The only learning theory that was adopted to inform the design and pedagogical implementation of instructional technologies for H&T was constructivism (Msonde & Van Aalst, 2017) to inform active, social, and creative features of educational podcasts.

**Results Related to RQ4: What Hospitality Programs/Courses Have Been Benefited from Using Instructional Technologies in H&TE?**

Thirteen articles (39.39%) examined the use of instructional technologies in H&T education by recruiting students enrolled in hospitality management programs and inquiring about past usage experiences. Other studies employed the same approach by recruiting students from culinary arts (n = 2, 6.1%), sports management (n = 2, 6.1%), and hotel management (n = 2, 6.1%) programs. By contrast, 12 studies (36.36%) examined the use of learning technologies tailored to specific H&T courses or modules, such as cooking courses (Papachristos et al., 2018) English for tourism courses (Fu et al., 2019), tourism marketing (Huang et al., 2013), international tourism (Edmonds & Smith, 2017), food and beverage management (Patiar et al., 2017), food and beverage safety and sanitation (Yu et al., 2018), event and facility management (Rockhill et al., 2019), service management (Wang et al., 2020), destinations and attractions (McGrath et al., 2021), and adventure destinations (Lötter & Jacobs, 2020).

**Results Related to RQ5: What Knowledge, Skills, and Abilities (KSA) Have Been Supported through Instructional Technologies in H&T Education?**

From the standpoint of content, instructional technologies were used to facilitate the learning of urban tourism development through videogames that provided tourism scenarios and choices mimicking an authentic tourism planning experience; and to facilitate the learning of how tourism planning impacts locals (Chan et al., 2020). Similarly, sustainability concepts and pillars of sustainability were taught through virtual simulations that allowed for high levels of interactivity between students and content (McGrath et al., 2021; Schott & Marshall, 2021). Social media and social media interactions were studied as a tool to facilitate social media marketing content and was examined to see how students interact with peers and with universities (Zehrer & Grabmüller, 2012).

To facilitate the learning of abilities, a virtual non-immersive tour guiding platform that presented verbal content and allowed for interactivity (Chiao et al., 2018) and gamified scenarios that facilitated attitudinal focus on the impacts of tourism development on locals were developed (Chan et al., 2020). Skill facilitation was accomplished through developing problem-solving skills in a tablet simulation game focused on food safety problems (Yu et al., 2018), networking skills through social media interaction between peers and professionals (W. Kim & Malek, 2018), and collaborative learning through peer-to-peer interaction on a smartphone app where learners commented on each other’s assignments (Lötter & Jacobs, 2020). Intercultural skill competencies were developed through multimedia presentations focused on individual cultures (Wang et al., 2020). English language skills were facilitated through an online immersive RPG game (Fu et al., 2020); whereas tour guiding skills were facilitated through 3-D VR panorama simulations that allowed for interactivity with the tourism destination in a virtual space (Tseng et al., 2015). Simulations were also used to facilitate cooking and preparation techniques through immersive and non-immersive VR tutorials (Brown et al., 2013).

**Results Related to RQ6: What Characteristics of Learning Have Been Assessed? What Instruments Have Been Implemented to Measure the Impact of Instructional Technologies in the H&T Research?**

Table 2 shows the seven studies that utilized questionnaires to quantitatively assess learning facilitated through instructional technologies. Instruments were used to measure knowledge retention (Wang et al., 2020), learning engagement (Hsu, 2020), hedonic benefits (Huang et al., 2019), technology adoption (Chiao et al., 2018), feelings about the learning experience (Lin et al., 2015), intrinsic motivation (Huang et al., 2013), belief systems (Hsu, 2014), and intercultural
<table>
<thead>
<tr>
<th>Author(s)/year</th>
<th>Type of learning technology</th>
<th>Learning/Measurement Instrument</th>
<th>Desired Outcome/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huang et al. (2013)</td>
<td>Virtual Reality-Non-Immersive</td>
<td>PENS scale, Intrinsic Motivation Inventory, PANAS Scale</td>
<td>Identify factors affecting learning and motivation in a virtual world.</td>
</tr>
<tr>
<td>Brown, J., Mao, Z., &amp; Chesser, J. (2013)</td>
<td>Online Webcourse</td>
<td>Instructor-designed rubric to evaluate knife skills, mayonnaise made from scratch, and butchering a whole chicken into 8 uniform pieces</td>
<td>Comparing the performance of online delivery methods and face-to-face learning in enhancing students' cooking skills.</td>
</tr>
<tr>
<td>Hsu (2014)</td>
<td>Video game/Game Elements</td>
<td>Epistemological Belief System Inventory</td>
<td>Using inquiry-based learning to build sophisticated epistemological beliefs in tourism students.</td>
</tr>
<tr>
<td>Chiao, H., Chen, Y., &amp; Huang, W. (2018)</td>
<td>Virtual Reality-Non-Immersive</td>
<td>Web-based questionnaire with items from the UTAUT model.</td>
<td>Creating a virtual tour-guiding platform to provide authentic tourism experiences and prepare students for these situations.</td>
</tr>
<tr>
<td>Huang et al. (2018)</td>
<td>Virtual Reality-Non-Immersive</td>
<td>PANAS Scale to measure positive emotions, seven-point Likert scale</td>
<td>Analyzing the relationship between VR learning and perceived hedonic benefits.</td>
</tr>
<tr>
<td>Fu et al. (2019)</td>
<td>Video game/Game Elements</td>
<td>Rubric of English writing performance consisting of five dimensions: organization of content, linguistic accuracy, originality, fluency, and elaboration. Questionnaire with guided questions</td>
<td>Developing a contextual mind-mapping gaming approach to provide students with an authentic English learning and practice context.</td>
</tr>
<tr>
<td>Wang, M., Yang, L., and Chen, T. (2020)</td>
<td>Multimedia Presentation</td>
<td>Intercultural Competence Scale, with its 3 subscales, namely, knowledge of intercultural interaction, affective orientation to intercultural interaction, and behavioral performance in intercultural interaction. Focus group interviews on phase 2</td>
<td>Increasing knowledge retention and cultural competencies through multi-modal presentations developed by students.</td>
</tr>
<tr>
<td>Hsu, L. (2020)</td>
<td>Online Webcourse</td>
<td>Study 1: system-reported engagement based on logins, self-determination questionnaire Study 2: N/R</td>
<td>Analyzing students’ Engagement levels in a 10-Week MOOC.</td>
</tr>
</tbody>
</table>
Results Related to RQ7: What are the Main Benefits/Challenges of Implementing Instructional Technologies in H&T Education?

All types of instructional technologies were generally found to be associated with beneficial impacts on H&T learning through increasing learners’ enjoyment and motivation and creating a deeper and more active relationship between the learners and the instruction. In relation to VR, Chiao et al. (2018) found that a VR had significant technology acceptance among students. Non-immersive VR tech was found to have similar adoption levels and effectiveness as immersive technology while having a lower overall cost and fewer side-effects such as motion sickness and discomfort (Lee et al., 2017; Papachristos et al., 2018).

Digital games were also found to have benefits on learning outcomes. For example, Fu et al. (2019) used mind-mapping gamified platform for authentic English learning; it was found that it produced positive effects on students’ fluency, elaboration, and positive thoughts. Aguiar-Castillo et al. (2020) indicated that gamified instructional platforms positively impacted the intention to use deep learning approaches in light of enhanced user satisfaction and positive attitudes. Students overall had a high level of acceptance about gamified platforms and applications (Elsaid, 2020). A challenge to implementing gamified platforms is the potential loss of privacy, as they might require the student to provide sensitive information (e.g., legal name, birthdate). Loss of privacy was considered a key moderator for the perceived benefits of digital games in H&T learning (Aguiar-Castillo et al., 2020). Similarly, the usage of mobile games was found to be positively associated with learners’ motivation (Yu et al., 2018). H&T students expressed positive opinions about using mobile learning technologies in the classroom (Fatima et al., 2019; Smith & Walters, 2012). Lötter and Jacobs (2020) suggested that mobile technologies can foster cooperative learning and social learning.

Online courses can facilitate collaboration among students. Brown et al. (2013) compared students’ learning outcomes in online classes with face-to-face classes and found that online students had significantly higher group performance, suggesting greater group synergy despite lacking face-to-face interactions. Another MOOC with a feedback system to moderate learner anxiety was found to be effective in reducing learners’ anxiety (Lin et al., 2015). Social Media platforms can be used to enhance the interactions among students, their peers, universities, and outside organizations (O’Boyle, 2014).

Other technologies such as multimedia presentations were noted as increasing engagement and attention amongst learners; and the posting of these presentations on social media allowed for automatic feedback (Wang et al., 2020). Immediate feedback was also facilitated through learning apps that allowed for automated feedback and peer feedback (Aguiar-Castillo et al., 2020; Elsaid, 2020). As a whole, technologies that provide high levels of interaction and immersion such as VR and gamified scenarios facilitated learning through authentic learning experiences that mimicked real-life scenarios (Chan et al., 2020; Fu et al., 2019; S. H. Lee et al., 2017; Patiar et al., 2017). The challenges of using social media tools in teaching include faculty’s resistance to change, lack of funding, and privacy concerns (Sobah & Moustafa, 2016). Therefore, more research is needed to address how to leverage online social networking to facilitate H&T learning. Technologies such as VR and games face additional challenges such as a higher cost of investment and learners’ possible discomfort and motion sickness (Papachristos et al., 2018). Like VR technology, mobile technologies also have high implementation costs and limitations in the delivery of content due to the small screen size (Smith & Walters, 2012). While H&T instructors are willing to continue implementing MOOCs, they face challenges in adopting new technologies. Instructors tend to prefer using MOOCs in a more traditional manner similar to face-to-face instruction and avoid new learning activities and teaching methods (Lin & Cantoni, 2018). Lin and Cantoni (2018) also suggest the current limitations in the H&T pedagogy and a need for more robust research into innovative technologies in H&T education.

Discussion

There is an incremental trend of applying instructional technology in H&T education, thanks in part to students’ overall high technological acceptance (Fatima et al., 2019). This is consistent with Goh and Sigala (2020)’s finding that instructors gradually
adopt more technology in their teaching practice with the increasing technical support provided by higher education institutions. While technology resistance still exists (Lin & Cantoni, 2018), the present review of literature suggests an increasing number of educators and institutions are accepting and integrating new technological tools in the H&T curriculum (Adukaite et al., 2017). Evidently, the positivist paradigm has dominated this research topic, emphasizing observation, measurement, and interpretation of instructional technology implementation. More research is needed from a constructivist standpoint that can focus on how knowledge is constructed through these learning technologies and the psychological underpinnings of the various tools.

Virtual reality technology was primarily used to create authentic learning experiences and to mimic real-world scenarios. Such scenarios also allowed for a more objective measurement of learners’ performance through measuring the decisions made by learners during their interactions with the virtual worlds (Patiar et al., 2017). However, challenges such as users’ discomfort and the high cost of implementation and development exist (Schott & Marshall, 2021). These challenges are primarily a symptom of immersive VR; non-immersive VR experiences may avoid the high price-point and discomfort concerns (S. H. Lee et al., 2017). As VR technology becomes increasingly accepted and developed, this price-point may lower and make its implementation more widespread. However, Lee et al.’s (2016) study suggest using non-immersive VR for hard skills training from a performance perspective. Immersive VR appears to be valuable in providing experiences related to attitudinal change and soft skills training in practices such as tour guiding (Tseng et al., 2015).

Similar to VR, virtual games have been used to facilitate authentic learning experiences through their innate interactivity and ability to simulate real-world scenarios. The choices made within digital games and the levels of interaction within them allow for objective measurements of performance (Chan et al., 2020). Where they differ from VR experiences is that they face significantly fewer challenges toward implementation. While games certainly face developmental issues, no studies for game studies mentioned cost as a factor that may affect implementation.

The implementation of social media for H&T learning purposes is an underdeveloped area. Most research focused on the interaction between students and universities as informal communication tools for socialization and connection. Much less focus is placed on facilitating collective and individual learning through social interactions. In the H&T education context, MOOCs were identified as instructional tools that facilitate feedback and collaboration. By allowing immediate instructor feedback, MOOCs can reinforce learner assessments through discussion boards, collaboration, and peer interaction in online assignments. MOOCs with prerecorded lectures are advantageous in enabling students to learn at their own pace (e.g., pausing/re-watching lectures that they may have missed or want to study more in-depth). For MOOCs to be used to their highest instructional potential, learner-centered approaches (e.g., problem-solving, project-based) should be adopted over teacher-directed methods (e.g., lectures) (Lin & Cantoni, 2018).

Mobile technologies have primarily been used as study aids and assessment tools in H&T education. Multimedia presentations on mobile platforms were found to increase student knowledge retention and intercultural competencies when used to create presentations centered around different cultures. The various elements created a more engaging and effective experience for both learners and presenters (Wang et al., 2020). Podcasts were found to be ineffective due to learners’ low motivation to focus on the assigned content (Rockhill et al., 2019). While they are effective in these areas and even allow for better peer-to-peer communication and collaboration, the cost, small screen size, and the lack of acceptance as an educational tool continue to hinder implementation on a broader scale (Smith & Walters, 2012). More research is needed into how different elements (narratives, inviting celebrity guests, etc.) may increase motivation and lead to greater learning.

The present review suggests that current studies in H&T education tend to use the traditional teacher-oriented approach to present information, facts, concepts, and knowledge through instructional technology. There is a need to shift toward a more learner-centered paradigm that allows students to take a more active role in the learning experience. Few studies provided opportunities to practice procedures (e.g., asking questions to virtual characters), communicate with peers, provide more effective tools for assessment (e.g., adaptive quizzes), deliver timely and personalized feedback, and learn through more real-world and authentic situations. Of the available technologies, VR and games are possibly the two technologies with the most potential for student-centered learning, as they enable students to actively interact with elements of the virtual worlds throughout the learning process.

This study also reveals a lack of studies grounding the instructional technology implementation on defensible theoretical underpinnings (e.g., learning theories and instructional theories). Amid the studies that had solid theoretical foundations (e.g., self-determination theory), high learner engagement and motivation were found based on their perceived benefits. This implies that technology can
stimulate both engagement and motivation if the technology provides perceived benefits to students. This echoes Sun et al.'s (2016) finding about numerous perceived benefits to learners in terms of flexibility and content availability. Technologies featuring these factors should be implemented to maximize learners' benefits and increase engagement and motivation. Yet, research on educational technology for H&T education has primarily focused on explaining the motivation to use technologies, rather than on the factors that may explain or predict the acquisition and transfer of knowledge, skills, or abilities needed for H&T professionals.

Another important finding is that the majority of studies examined students from H&T programs but did not focus on designing, implementing, and/or measuring the impacts of instructional technologies in more experimentally manageable situations (e.g., course-level, module-level, topic-level, assignment-level). Most studies examined learners and instructors perceptions of educational technologies by asking them to recall their learning/instructional experiences. Few studies examined the actual impacts of educational technologies at the course/module level. Notably, no studies were identified on entertaining management or senior living management. These areas, along with the impacts of instructional technologies at the course level are worth future research. Course-level research could lead to some insights into what specific technologies work best as instructional tools for specific topics and specific course content.

Regarding the context to which technologies are applied, a significant portion of studies focused on skills training prioritized soft skills like networking, problem-solving, collaboration, environmental awareness, and cultural competencies. Few studies focused on technical (hard) skills such as English language learning and food techniques. This indicates the need for research about the ability of technologies to help students develop disciplinary behaviors. More research into specific technical skills and how technology may facilitate learning should be conducted. Notably, no studies focused on developing digital literacy skills, which have become increasingly important in the future of work. Further, it seems that H&T education research has predominantly utilized self-perceived objective measures to determine how educational technology might influence or be adopted to enhance H&T learning. Our analysis reveals that most studies focused on traditional self-reporting methods subject to social desirability bias. Future research should expand the methodology used to avoid such biases and adopt more objective measures and metrics. Further, current learning measurements in the literature have not leveraged new insights that might emerge from neurosciences (i.e., brain activity), physiological measures (e.g., eye-tracking, skin conductance), and performance-based judgments (e.g., experts’ observation and verification). A broader scope that includes qualitative and design-based perspectives could lend more insight into these technologies’ psychological and physiological underpinnings.

In summary, the present literature review shows a growing interest in developing H&T knowledge and professional skills through the use of new instructional technologies. There is a need for more studies with deep theoretical underpinnings and objective measures and metrics, as many studies lack a basis in learning theory to explain how various factors impact technology adoption. It has become evident that there is a need for broader insights into a systemic view and sound theoretical principles regarding evaluating the effectiveness of technology implementation on learning outcomes.

Implications

Our findings have important implications for future research. The inquiry for instructional technology adoption should be based on understanding how to better design and integrate technology to enhance knowledge, skills, and abilities acquisition and transfer. Researchers are encouraged to focus on measuring the impacts of instructional technologies by using experimental and quasi-experimental designs that provide causal explanations. Exploring short-term and long-term learning outcomes for technological implementations could shed light on instructional technology benefits and how their benefits vary by learners’ populations over time.

This review can be used by H&T faculty to recognize and select appropriate instructional technology interventions. Such interventions could be applied to different H&T courses to reach the desired outcomes. As far as learning outcomes, it is notable that technologies that encourage students to take an active role in learning, such as VR and virtual games, can significantly improve learning outcomes. This indicates a need for practice in academia to move toward a learner-centered paradigm where students take a more active role in engaging with content. Multiple technologies could be sequentially or simultaneously used to support H&T students’ learning. For example, multimedia presentation and MOOCs can be used to present knowledge; immersive VR can be adopted to promote attitudinal change, and skills training may be delivered through interactive games and non-immersive VR.

Two implications are derived for H&T education managers. First, structural, and systemic changes are necessary to support integrating new technological uses into the H&T curriculum. As cost is a challenge in several instances, budgetary considerations at the institutional level are often needed, given the perceived benefits of the desired technologies. Second, support and training for faculty are
important given the emergent and innovative nature of the technological tools. Considering the challenge of some instructors’ technology resistance, higher education leaders can develop intervention strategies through specific training and incentives to reduce instructors’ anxiety and increase motivation. The development of university-wide initiatives or platforms can help improve the overall technology acceptance levels. Future research should understand instructors’ hesitations about adopting new technologies to address specific issues and concerns.

**Future Research Opportunities**

This study reveals that existing research on instructional technologies on H&T has employed inductive reasoning to understand students’ perceptions and reactions to educational technology. Some research has administered surveys to students and staff concerning susceptibility to adoption. Nevertheless, there is a lack of deductive (e.g., experimental) and inductive (e.g., phenomenology) studies focusing on measuring and understanding (respectively) the actual learning benefits of instructional technology in H&T education. The sole addition of technological infrastructure or tools to courses does not necessarily mean that students’ learning will be enhanced (Hirumi et al., 2021). Theory-grounded and evidence-driven approaches are needed so we can generalize or findings to situations beyond the unique examined conditions. Further studies should investigate whether certain instructional technologies provide significant benefits to learning relative to their costs.

Learning theories (i.e., how people learn) and instructional theories (i.e., how to sequence instruction to facilitate learning) could help future researchers to examine the impacts of instructional technologies on learning and adjacent outcomes (e.g., motivation, engagement, satisfaction). Theoretical and design approaches such as multimedia learning (Mayer, 2014), the motivational design theory (Keller, 2010), the systemic design of instruction framework (Dick et al., 2014), Merrill’s principles of instruction (Merrill, 2012), the SAM model (Allen & Sites, 2012), the cognitive load theory (Sweller, 2018), the embodied learning theory (Johnson-Glenberg, 2018) and the RASE design framework for mobile learning environments (Churchill et al., 2015) to name a few, could provide further insight in how best design and implement educational technology to enhance H&T teaching and learning.

More empirical research can also be conducted on the specific possible benefits and how different technologies suit H&T educational needs. For example, what technology can be used to best meet the educational need of mimicking field trips in a post-pandemic world where actual travel is sometimes not possible. Perhaps VR technologies could be used to solve such issues or perhaps a gamified simulation would work better. In addition, future research should place a greater emphasis on the relationship between technology use and specific learning processes and outcomes. Tu and Hwang (2020) indicated that there had been a great emphasis on perceptions and attitudes toward technology in research; much less is on the effects of instructional technologies on learning processes. Also, our review shows that there is insufficient research that focuses on the actual outcomes for students that have utilized technology throughout their education and whether these tools influence the overall outcome of students’ educational experience. Such studies, if conducted longitudinally, could produce deeper insight into the benefits of emergent technologies in H&T education.

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