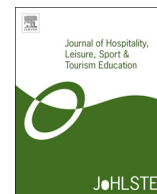




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Enhancing hospitality students' motivation to learn food safety knowledge using tablet personal computer (TPC)-based simulation game class activity

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ABSTRACT

Previous studies showed that students in hospitality major have relatively low interest and motivation to learn in food safety-related courses. The objectives were to examine the effects of a tablet PC (TPC) simulation game as a class activity on students' motivation to learn food safety and the factors influencing students' motivation change. The results showed that students' motivation to learn food safety knowledge increased significantly after participating in the TPC-simulation game. The results demonstrated that hospitality students' motivation to learn food safety can be maximized when learners are engaged in the learning material with both cognitive and affective structures.

1. Introduction

The Centers for Disease Control and Prevention (CDC) reported approximately 19,986 foodborne illness outbreaks and 387,788 foodborne diseases (FBD) between 1998 and 2016 (CDC, 2016). Approximately 50% of the single-setting FBD outbreaks were caused by food prepared in the food service and retail industry (CDC, 2017). In addition, the recent report from CDC identified that poor food safety practices and improper food handling of employees caused approximately 64% of all FBD outbreaks in the restaurant settings (Angelo, Nisler, Hall, Brown, & Gould, 2017). Therefore, it is critical to require food professionals (both managers and employees) to practice scientifically validated safe food-handling behaviors (Powell, Jacob, & Chapman, 2011).

The number of hospitality programs that offers hospitality baccalaureate and graduate degrees increased from 20 in 1972–127 in 2015 (Myung & Li, 2015). These hospitality programs provided a significant number of professionals and leaders in the hospitality industry (Casado, 2009; Dawson, 2014; Weber & Ladkin, 2008). Due to the prevalence of the FBDs, it is crucial for hospitality educators to ensure that students acquire adequate food safety knowledge and demonstrate proper food-handling practices (Griffith, Livesey, & Clayton, 2010). Even though a food safety course could be a required component within a curriculum in a majority of the hospitality programs (Scheule, 2000), several studies have indicated that students in hospitality major have relatively low interest and motivation to learn in food safety-related courses (Cha & Park, 2005; Chu, Hwang, Tseng, Judy & Hwang, 2006; Scheule, 2002). Hence, Nik Husain, Wan Muda, Noor Jamil, Nik Hanafi, and Abdul Rahman (2016) suggested that the future food safety education needs to focus on developing interventions that contain both knowledge and motivational elements.

With the development of the mobile electronic device and simulation-based technology, simulation game, as a pedagogical

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method, has been widely used in the classrooms. Simulation game refers to the instruction delivered via a personal computer that immerses learners in a decision-making exercise in an artificial environment to learn the consequences of their decisions (Sitzmann, 2011). Using simulation game activity as a part of the curriculum has been empirically demonstrated to increase students' interest, involvement, and enthusiasm toward the educational material (Brown & Ford, 2002; DeRouin-Jessen, 2008; Garriss, Ahlers, & Driskell, 2002; Sukhai, 2005). However, Salas, Wildman, and Piccolo (2009) emphasized that "enthusiasm toward the simulation game is not fully equivalent to motivation to learn." More specifically, different from enthusiasm toward the knowledge delivery approach, motivation to learn is defined as the direction, intensity, and persistence of learning-directed behaviors related to a certain subject-matter. Students with high motivation to learn tend to proactively seek and acquire information related to the certain subject-matter (Colquitt, LePine, & Noe, 2000; Klassen & Tze, 2014). Traditionally, motivation to learn has been considered as a static trait-like construct in the developmental psychology area (Baldwin & Ford, 1988; Colquitt et al., 2000). However, recent research showed that motivation to learn could vary meaningfully within-person (Baldwin, Ford, & Blume, 2009). Therefore, not only students' motivation to learn levels are different between each other, but a student's motivation to learn levels can vary over time as one of the consequences of instruction during a course. Therefore, Sitzmann (2011) recommended that future research should examine the effects of simulation game on learners' motivation to learn.

Hence, the current study, using interactive cognitive complexity theory as a framework examined (1) the effect of a TPC-based simulation game as a class activity on students' motivation to learn food safety knowledge; and (2) the impact of five factors of a simulation game activity on students' motivation to learn food safety, namely, i) content relevancy of material, ii) perceived enjoyment, iii) perceived usability, and iv) peer interactivity, as well as v) the interaction effect between content relevancy and perceived enjoyment.

2. Literature review

2.1. Theoretical framework for tablet PC-based simulation activity

Interactive cognitive complexity theory (Kozlowski & Bell, 2007; Tennyson & Jorczak, 2008), which focuses on the integration of learners' cognitive and affective structures, provides the theoretical framework for the current study. Interactive cognitive complexity theory indicates that learning is the outcome of an interaction between learners' affective (e.g., motivation and attitudes) and cognitive structures (memory and executive control). Hence, an effective education program will allow the information to continuously interact with learners' cognitive and affective structures and enhance the interaction between learners' affective and cognitive structures.

Interactive cognitive complexity theory highlights four features that influence the technology-based learning outcomes significantly: (1) richness of information and accessibility of delivery methods, (2) relevance to the real-world setting, (3) interactivity of educational program, and (4) enjoyable reaction (Bell & Kozlowski, 2008; Bell, Kanar & Kozlowski, 2008; Tennyson & Jorczak, 2008). Grounded in the interactive cognitive complexity theory (Tennyson & Jorczak, 2008; Kozlowski & Bell, 2008), six hypotheses were developed and tested in the present study. Hypothesis 1 proposed that students' motivation to learn food safety knowledge increased significantly after attending the simulation game activity. Hypotheses 2–5 tested the influence of four features proposed by Bell and Kozlowski (2008) of simulation game activity including i) content relevancy of material, ii) perceived enjoyment, iii) perceived usability, and iv) peer interactivity on students' change in motivation to learn food safety knowledge. The last hypothesis examined the fit of interactive cognitive complexity theory in food safety education context by testing the interaction effect of content relevancy and perceived enjoyment on students' change in motivation to learn food safety knowledge.

2.2. Effect of simulation game activity on motivation to learn food safety knowledge

There are two parts of learner motivation: intrinsic motivation and extrinsic motivation (Tannenbaum, Beard, McNall, & Salas, 2010). Intrinsic motivation refers to the learners' self-regulation and self-motivation component and extrinsic motivation refers to the component that is brought by benefits and rewards (Cannon-Bowers, Salas, Tannenbaum, & Mathieu, 1995). Malone (1981) indicated that simulation games are effective because they target learners' intrinsic motivation processes.

Garriss, Ahlers, and Driskell (2002) developed an "input-process-output" model to reveal the critical relationship between learners' enjoyment of gameplay, intrinsic motivation and decision to continue playing. DeRouin-Jessen (2008) conducted an empirical study to compare the learning outcomes of an experimental group that received simulation game activity with control groups that received lecture-based instruction. The results of both studies indicated that students' engagement improved more significantly after participating in simulation game instruction compared to those in control groups. The results of these studies fit within the interactive cognitive complexity theory, which states that learning is the outcome of an interaction between individuals' affective and cognitive structures. In other words, simulation game activity has a positive impact on motivation to learn because it is enjoyable, entertaining, but also challenges the students to apply their knowledge and skills actively.

In the food safety education context, Arendt, Strohben, and Paez (2011) developed a validated instrument Harris, Murphy, DiPietro, and Line (2017) extended Vroom (1964) Expectancy theory to food handlers' motivations to comply with food safety regulations and found that the Expectancy theory was supported in the food safety context. More specifically, the study found food handlers' intrinsic factors contributed more strongly to their motivations to comply with food safety regulations. Thus, the study suggested that food safety instructions that can engage food handlers and enhance their intrinsic motivation are strongly needed in the future. In another empirical research, Crandall et al. (2015) developed augmented reality-based simulation game to teach abstract food safety concepts

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