FLOW EXPERIENCE AND CONTINUANCE INTENTION TOWARD ONLINE LEARNING: AN INTEGRATED FRAMEWORK

Completed Research Paper

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Abstract

This study integrated the person-artefact-task model (PAT) and value-satisfaction-behavioral intention (V-S-BI) model to examine factors influencing students getting into positive and optimal flow experience in online learning, and flow impacts on students’ continuance intention toward learning online. Results showed that telepresence was a more significant factor getting students into flow experience than clear goals on task, balance between challenges and skills of the task, and perceived ease of use. Concentration on task at hand was found to be the most influential factor of the flow experience, while sense of control was the weakest one. Although flow had a direct impact on satisfaction, the indirect impacts through utilitarian value and hedonic value were stronger. The positive relationship between satisfaction and continuance intention was confirmed in this study. The findings of this study have significant theoretical and practical implications to both researchers and practitioners.

Keywords: Flow experience, online learning, telepresence, perceived value, continuance intention
Introduction

Given the significant benefits it provides to students, instructors, and universities, online learning has become a popular and viable teaching alternative adopted by many universities worldwide (Choi et al. 2007). The global online learning market has grown at a compound annual rate of 36.5% between 2002 and 2006 (Wu et al. 2006), and is expected to reach USD$107.3 billion by 2015 (GIA 2010). Online learning, in this study, refers to “one where the majority of instruction and interaction is accomplished via online resource, that is readily accessible via the Internet” (Schell 2004). Notwithstanding the enormous growth of online learning globally, previous studies have found that difficulties exist in engaging students and keeping them engaged through the duration of their online courses, minimizing their dropout rate, as well as sustaining their motivation for learning online (Frankola 2001; Park and Choi 2009; Pearce et al. 2005; Shin 2006; Wiersema and Bird 1993). Considering the significant cost required to acquire new students rather than to retain existing ones (Keaveny 1995), both researchers and practitioners need to understand the factors that affect students' intentions to continue their online courses (Choi et al. 2007).

Literature shows that the success of online learning depends largely on user satisfaction as well as other factors that will eventually increase users' intentions to continue their online courses (Chiu et al. 2007; Kim et al. 2010). In the field studies of computer-mediated environments (CMEs), Csikszentmihalyi's flow theory has been applied widely as one of the dominant paradigms for explaining “optimal experience” of online consumer behaviors. Flow theory has been used to capture an individual's subjective enjoyment of the interaction with the technology, and has been identified as a key to increasing students' online learning satisfaction (Choi et al. 2007; Dringus and Ellis 2010; Ghani and Deshpande 1994; Konradt et al. 2003; Siekpe 2005). Csikszentmihalyi (1975, p.4) defines “flow” as “the state in which people are so involved in an activity that nothing else seems to matter”. Flow is an intrinsically enjoyable state and is accompanied by an order in consciousness where the person experiences complete concentration, feelings of control, loss of self-consciousness, and a distorted sense of time (Csikszentmihalyi 1990). In CMEs, the concept of flow has been empirically confirmed to be a significant predictor of several important consumer behavior outcomes, such as increased exploratory behavior, communication, positive affect satisfaction, acceptance of Information Technology (IT), and in particular, learning and continuance intention (Chen 2006; Chen et al. 1999; Ghani and Deshpande 1994; Ghani et al. 1991; Guo and Poole 2009; Hoffman and Novak 1996; Kim et al. 2010; Trevino and Webster 1992).

Among various flow models studied, the “three-stage” model (Chen et al. 1999) is a widely adopted one used to explain pre-conditions necessary to develop flow, flow experience, and benefits of flow experience on people's behavior, although some debate exists as to which factors belong in each stage of flow (Chen et al. 1999; Finneran and Zhang 2005; Hoffman and Novak 1996; Skadberg and Kimmel 2004). However, previous studies have identified that flow is too broad and ill-defined due to the numerous ways it has been conceptualized, operationalized, and measured (Koufaris 2002). There are discrepancies in the placement of the dimensions of the flow model as well as ambiguities in the operationalization of flow construct among various studies adopting the three-stage model (Finneran and Zhang 2005; Guo and Poole 2009; Hoffman and Novak 2009). These issues become more evident in online learning environments, and this is largely due to the interactions among students, the technology itself, and tasks conducted via technology by the students, all of which add a level of complexity to students' online learning activities (Finneran and Zhang 2003; Finneran and Zhang 2005). Consequently, additional research is needed to clearly conceptualize flow concepts and unambiguously operationalize flow dimensions in order to distinguish the aspects of the task that lead to flow and the consequences generated by flow in online learning environments (Finneran and Zhang 2005; Hoffman and Novak 2009). In particular, two significant gaps are evident in the research.

The first gap is an unclear definition of flow antecedents in online learning environments. Confusion comes from the ambiguity of interactions among the technology used, the task conducted via the technology, and students who use the technology to complete the task (Finneran and Zhang 2003). Although clear goals, a balance between challenges and skills, and immediate feedback are three key flow antecedents (Chen et al. 1999; Finneran and Zhang 2003), most studies fail to disambiguate the task from the technology, resulting in a misunderstanding of what aspects of the task enhance flow (Finneran and Zhang 2003; Finneran and Zhang 2005). According to Csikszentmihalyi and LeFevre (1989), it is students themselves who perceive how clear and how challenging the task is, and how skillful they are in handling
such tasks. Although Finneran and Zhang (2003) proposed a PAT (person, artefact [technology], and task) model to clarify the ambiguities between the task and the technology, few studies have adopted the framework as a potential theoretical foundation and have tested it empirically, especially in online learning environments. This study, therefore, is specifically designed to narrow this gap.

The second gap relates to positive outcomes which flow may generate in relation to student's online learning behavior. Although technology users’ satisfaction and continuance intention are suggested positive outcomes of flow (Ho and Kuo 2010; Shin 2006), studies incorporating a technology user’s perceived value into an accepted research model are limited. In marketing literature, it is found that perceived value plays a pivotal role which bridges customers’ experience and their satisfaction (Gallarza et al. 2011). Accordingly, in online learning environments, a student’s affirmative experience - consumption of online education - may be positively associated with perceived value in online courses and may in turn lead to a higher level of satisfaction and continuous learning intention (Liaw 2008). In the online learning literature, however, the widely accepted marketing consumers’ Value-Satisfaction-Behavioral Intention (V-S-BI) model has not been incorporated as a consequence of flow within online learning environments.

This study adopts the PAT model to reduce the ambiguity in the conceptualization of the flow research model: in particular, flow antecedents. Moreover, this study adopts the V-S-BI model, widely used in marketing to explain consumer behavior and the possible consequences generated by flow experience: in particular, students’ online learning continuance intention. Given the worldwide adoption of online learning and the complexity and variety of information technologies used in university learning and teaching, this is a very important area of research. In particular, the evaluation of pre-conditions of flow, flow experience, and consequences generated by flow within online learning environments is of significance to university instructors, online course design, administration, and may eventually result in improved student learning satisfaction and continuance intention.

The next sections will outline our research model, and discuss relevant theoretical perspectives. Our research hypotheses will then be presented, followed by a brief description of the research methods. Data analysis results will then be reported. Finally, the paper will conclude with a discussion focusing on the interpretation of results and an examination of the theoretical and practical implications of the study.

Theoretical Foundation and Hypotheses Development

Our research model, which is developed based on the “three stage” model of flow, is presented as Figure 1. This model suggests that, as students interact with peers and instructors to complete their online learning tasks via online learning technologies, they may develop optimal and extremely enjoyable experiences which may lead to enhanced perceived value, increased and more positive satisfaction as well as continuous learning intention.

There are three theoretical perspectives relevant to the above model. The first one focuses on the flow experience concept. The second one explores flow antecedents, i.e., influencing factors that may generate flow. The final aspect is the consequences flow may have on students’ behavior, that is, whether flow has an impact on students’ online learning continuance intention. These perspectives will be further developed in the discussion below.

Flow Experience Concept

Csikszentmihalyi (1975) theorized how and when “optimal experience” - or a state of flow - can occur. His idea was that if any activities or tasks were interesting but not too difficult so as to cause frustration, there was a likelihood of one’s total engagement. Therefore, he defined flow as the state which occurs when an individual is partaking in an activity for its own sake; the state is so satisfying that individuals want to repeat the activity continually (Csikszentmihalyi 1988). Csikszentmihalyi (1990) described flow as comprising the following nine dimensions: (1) clear goals, (2) immediate feedback, (3) balance between challenge and skill, (4) concentration on task at hand, (5) loss of self-consciousness, (6) sense of control, (7) time distortion, (8) merger of action and awareness, and (9) experience which becomes autotelic.
Csikszentmihalyi’s work has influenced a great number of studies in the field of marketing, psychology, and CMEs and in particular, among educational settings (Pearce et al. 2005). The concept of optimal experience is found to be theoretically useful; it has been used to study a diverse set of activities, such as shopping, music, rock climbing and human-computer interactions (HCIs) (Csikszentmihalyi and LeFevre 1989; Hoffman and Novak 1996). In Internet-based contexts, flow may occur during playing online games, web surfing, online shopping and online learning environments (Choi et al. 2007; Guo and Poole 2009; Koufaris 2002; Wang et al. 2007). In particular, numerous studies have been conducted in computer-mediated learning environments to investigate how students can generate “optimal experience” during their online learning activities, what characterizes the flow experience, and the consequences of such “optimal experience” on learning outcomes (Chiu et al. 2007; Choi et al. 2007; Dringus and Ellis 2010; Konradt et al. 2003; Pearce et al. 2005; Shin 2006).

Although it seems that the depiction of the flow experience is straightforward, it is actually quite complex, in particular in CMEs. Recently, Nah et al. (2011) and other researchers (e.g., Guo and Poole 2009; Hoffman and Novak 2009) provided summaries of flow related studies by reviewing journal publications on flow in CMEs. Their summaries of flow studies indicate that, although all studies made explicit comparisons to Csikszentmihalyi’s (1990) model of flow, many of the studies only used some of the nine original dimensions of flow, and not all of the flow dimensions were found to be important in order for flow to occur. Although determining the placement of the dimensions of flow for each of the three stages is still one of the key problems of flow research (Hoffman and Novak 2009; Kimiecik and Stein 1992), previous studies have demonstrated that the nature of the activities people engage in may explain the variance found between studies (Jackson and Marsh 1996). Furthermore, previous research indicates that the relative importance of the flow characteristics in different contexts may vary (Jackson and Marsh 1996; Swann et al. 2012). For instance, prior research found that the nature of sport performance demands awareness of time and of how the self is being presented, making time distortion and loss of self-consciousness to be factors less significant to the athlete’s flow experience (Jackson 1992; Jackson and Marsh 1996; Swann et al. 2012).

As illustrated in Figure 1, this study has adopted Csikszentmihalyi’s flow theory as the theoretical base. However, one of the nine dimensions of flow, the merging of action and awareness, was not included in the model due to the inconsistency of the placement of the dimension across most flow studies in the HCI context. In Chen’s (2006) study it was found that this dimension was loaded across three factors. In addition, the insignificant correlations found between this dimension and other factors, such as time distortion and loss of self-consciousness, also indicate that the merging of action and awareness, time distortion and loss of self-consciousness may be less likely to occur together (Martin and Cutler 2010).
Furthermore, prior research also indicates that concentration on task at hand helps make the mind and action to merge since there is not enough attention to think about anything else except the task at hand (Chen et al. 2000; Kimiecik and Stein 1992). Another flow dimension, namely autotelic experience, was integrated into our model as part of flow consequences, namely hedonic value. According to Csikszentmihalyi (1990) and other researchers (Chen 2006; Chen et al. 1999; Lombard and Ditton 1997), autotelic experience, or an enjoyable feeling, is one consequence of flow experience, in particular in CMEs. As we discuss later, happiness with pleasure, comfort and enjoyment is the hedonic outcome (Fave et al. 2010; Nah et al. 2011).

In this section, we discuss each of the flow experience dimensions. Flow antecedents and consequences will be discussed in the subsequent sections.

Concentration on Task at Hand

Concentration on task at hand is defined as the extent to which the individual’s attention is completely absorbed by the task to the extent that nothing else matters (Csikszentmihalyi 1990). Although it is generally considered a dimension of flow experience, “concentration” has been interchangeably employed with “focused attention” (Siekpe 2005). Therefore, in the context of online learning, it is redefined as the degree to which a student’s attention focuses on an involving activity (Trevino and Webster 1992). Lee (2010) empirically tested and validated the positive relationship between flow and concentration in an online learning environment. Therefore, students in a state of flow may intensively concentrate on their online courses.

Loss of Self-consciousness

A loss of self-consciousness can be defined as losing a sense of self and of separating from the world around. Thus, a person will be unable to recognize changes in his or her surroundings while performing the task (Csikszentmihalyi 1990). In general, humans tend to monitor and self-defend their appearance and behavior in compliance with social norms and cultures and others’ expectations. Absorption in a certain activity, however, eliminates these concerns because other irrelevant thoughts are all taken away (Chen et al. 1999). Therefore, it is argued that when they are totally engaged in online learning, students may no longer care how their writing or contribution may be viewed by others. For example, a student may fail to answer a discussion topic which may result in embarrassment.

Sense of Control

A sense of control in flow studies is somewhat distinguished into two different concepts: control over the artefact (e.g., Internet), and task (e.g., web navigation) (Chen et al. 1999; Hoffman and Novak 1996; Li and Browne 2006; Liao 2006). It can be broadly described as an individual’s perception of being in charge of an activity and the environment with social norms and cultures and others’ expectations. However, the online learning management system itself is hardly controllable as well as adjustable by the students since they do not have any authority to alter the system. Hence, this dimension is defined in this study as an individual’s perception of how much control they feel over completing the task (Finneran and Zhang 2003). It is predicted that the students will exercise a strong sense of control over their actions when absorbed in online courses.

Time Distortion

Time distortion is one of the most imperative constructs in flow models studied by many researchers (Hoffman and Novak 2009). It suggests that an individual is unable to keep track of the passage of time in the human-computer interactive experience (Agarwal and Karahanna 2000). In a state of flow, the students lose a sense of objective clock time and alter it subjectively at a slower pace. Chen et al. (1999) have validated “temporal transformation of time” during certain activities on the web. Therefore, it is believed that when participating in an online course, students may transform their perceived psychological time to be much slower than the actual time if they are in flow.
Flow Antecedents

In order to re-conceptualize flow theory in CMEs, Finneran and Zhang (2003) developed the PAT model. In their novel study, they addressed three distinct but interacting components that contributed to the flow experience, namely “Person”, “Artefact”, and “Task” (Finneran and Zhang 2003). The complexity of the HClS within CMEs determines that any activity needs to be broken down into the task and the artefact (technology), and the likelihood of an optimal experience is dependent on the interplay between the person, the task, and the technology (Finneran and Zhang 2003; Finneran and Zhang 2005). According to the authors, in CMEs, it is the person who is working on a computer-related task that can be influential to the flow experience. Thus, computer-related activity needs to be broken down into the task, which is the main goal of the activity, and the artefact, the tool for accomplishing the activity (Finneran and Zhang 2003). In online learning environments, students take online courses with an online learning management system (LMS) (e.g., Blackboard). They may experience flow through participating in computer-based learning tasks at hand by interacting with learning systems and instructors/peers. Thus, when we discuss three pre-conditions of flow: clear goals, balance between challenges and skills, and immediate feedback, it is valuable to take PAT as a logical foundation to develop our research model and hypotheses. In other words, we need to examine these factors from both the task and the technology perspectives. Thus, the three flow antecedents included in this study were clear goals on task, immediate feedback on task, and balance between challenges and skills of the task. According to Finneran and Zhang’s PAT model (2003), perceived ease of use represented a strong linkage between person and artefact, and was recommended as a broad enough construct to include clear artefact goals and feedback from the artefact, it was therefore included in our model as one pre-condition of flow.

Hoffman and Novak (1996) were the first to suggest the existence of the telepresence dimension as one of the flow pre-conditions in the hypermedia environment. Although telepresence was not included in the original flow theory, we have elected to include it as a pre-condition of flow in our model. The uniqueness of the Internet in general and the web-based online learning environment in particular, has resulted in the emergence of this new theme (Hoffman and Novak 1996). Empirical research demonstrates that this dimension is useful and important for generating flow experience in online environments (Hoffman and Novak 2009; Nah et al. 2011; Novak et al. 2000; Zaman et al. 2010). Each of the flow antecedents is discussed below.

Clear Goals on Task

Many of the flow elements from Csikszentmihalyi relate to the actor’s interaction with task, one of which is clear goals on task. Having clear goals is an instrumental condition of Csikszentmihalyi’s (1990) flow theory. In online learning environments, goals have to be clear for both the tasks to be completed and the technology used to conduct the task. However, Csikszentmihalyi’s (1990) notion about a set of clear goals emphasizes task, or how clear the person perceives the task to be. Finneran and Zhang (2003) suggested that future research should clearly disambiguate whether the measurement of clear goals is for the task itself or for the technology. Otherwise, participants may feel confused about the question, and the answers obtained for this construct will be invalid.

Research shows that clear goals on task enable students to focus on the essentials of an activity (Guo and Poole 2009) as well as promote intrinsic motivation (Moneta 2004). Accordingly, we hypothesize that clear goals on task have a positive impact on flow.

H1: Clear goals on task have a positive impact on flow.

Immediate Feedback on Task

Immediate feedback is another important aspect to make flow happen (Csikszentmihalyi 1990). Even in CMEs, the feedback a person receives can come from either other participants, such as instructors and peers, or from technology, such as spell checking. The key point is that the person obtains feedback on how well he or she is doing in achieving task goals (Finneran and Zhang 2003). However, research reports that feedback from a human, not an auto-response from a computer, has more positive influence in achieving flow (Weibel et al. 2008). Prompt, clear and unambiguous feedback from communication partners including instructors and other participants in online courses helps to narrow the user’s focus on the activity of messaging (Zaman et al. 2010). Therefore, we hypothesize that:
H2: Immediate feedback on task has a positive impact on flow.

**Balance between Challenges and Skills of the Task**

Csikszentmihalyi (1975) has argued that there is an optimal balance between challenges and skills that can induce flow and emphasized the importance of challenge-skill balance in his subsequent work. However, previous research on flow fails to disambiguate required skills with respect to the task or the artefact (e.g., software package) (Finneran and Zhang 2003). In this study, balance between challenges and skills is specifically related to task (e.g., challenges students may encounter when being involved in discussions on a certain topic, and skills students have to handle the challenges). In order for students to fully engage in and to commit to dialogue, flow requires some degree of overall challenge (e.g., discussion topic) or skill (e.g., background information or knowledge). Csikszentmihalyi (1975, p.50) has stated that whether one is in flow “depends entirely on one’s perception of what the challenges and skills are”. If the task can offer the students such challenges that are in correspondence with their skills, the possibility of experiencing flow is higher (Csikszentmihalyi 1990). Otherwise, students may experience either anxiety or boredom. Hence, it is believed that the perceived challenges and skills of the task must be well-balanced and fall within flow channel. Accordingly, the following hypothesis is proposed:

H3: Balance between challenges and skills of the task has a positive impact on flow.

**Perceived Ease of Use**

Flow theory has a strong relationship to the technology acceptance model (TAM) and, in particular, to perceived ease of use (PEoU). Csikszentmihalyi (1975) advocated that a lack of skills needed to solve a challenge can result in anxiety. Thus, an easy-to-use interface could help students by minimizing the amount of time they would need to allocate to master the technology (Choi et al. 2007). In CMEs, computer anxiety in using software could impede the user’s total engagement or inhibit strong feelings of involvement. PEoU can be defined as the extent to which the user expects a particular system or software to be easy-to-learn and use (Davis and Wiedenbeck 2001). In TAM, PEoU represents self-efficacy which has significant impact on one’s attitude toward using the artefact that further indicates behavioral intention (Davis 1989). Thus, if a student perceives that using the online learning system is effortless and the interface is easy-to-use, it will have a positive influence on the student's intrinsic motivation and continuous usage.

In addition, according to Finneran and Zhang (2003), PEoU is a broad enough construct to include clear artefact goals, feedback from the artefact, and balance between challenge and skills required to use the artefact (Davis and Wiedenbeck 2001; Trevino and Webster 1992). Therefore, the following hypothesis is proposed:

H4: Perceived ease of use has a positive impact on flow.

**Telepresence**

Telepresence is defined as the experience of presence in an environment by means of a communication medium and is related to the extent to which one feels present in the mediated environment (Steuer 1992). When technology users perceive a sense of telepresence in mediated environments, they can create a perceptual illusion of being present and highly engaged (Biocca 1997). Such a sense of immersion will allow people to focus on their actions and feel in control of the environment (Nah et al. 2011). Thus, telepresence is considered to be an essential factor enabling media users to remain concentrated on the task in CMEs, ultimately leading to enjoyment (Chen 2006; Finneran and Zhang 2003; Nah et al. 2011). Lombard and Ditton (1997) argue that the most prominent psychological impact of telepresence is enjoyment. Therefore, this study believes that telepresence can lead to the occurrence of flow. Hence we propose that:

H5: Telepresence has a positive impact on flow.

**Flow Consequences**

The primary studies on flow consequences in the discipline of CMEs have been inspired by Hoffman and
Novak’s (1996) conceptual model. The novel researchers posited four flow consequences, labeled increased learning, perceived behavioral control, exploratory behavior, and positive experience (Ghani and Deshpande 1994; Hoffman and Novak 1996; Trevino and Webster 1992). Most of the scholarly research on consumer behavior postulates value as an antecedent of satisfaction and behavioral intention (Gallarza et al. 2011; Orsingher and Marzocchi 2003; Wang et al. 2007; Woodruff 1997). These approaches are rooted in the franchise work of two primary research teams. Firstly, Zeithaml et al. (1988) defined the service quality-value-behavioral intention chain (Boulding et al. 1993; Zeithaml 1988; Zeithaml et al. 1996) which conceptualized the relationship between consumers’ perception on quality, value, and their possible behaviors. Secondly, Oliver (2010) theorized consumers’ satisfaction in his expectation and confirmation model. The commonality of these two conceptual models is that one’s expectation to evaluate the product/service is a key metric of their dependant variables. Therefore, many studies in marketing and information systems (IS) have strived to study satisfaction and service quality chain framework in an aggregated model (DeLone and McLean 2003; Landrum and Prybutok 2004; Yang and Peterson 2004).

In online learning environments, the significant linkages between flow experience and satisfaction (Ho and Kuo 2010; Shin 2006) and flow experience and behavioral intention (Liao 2006; Saade and Bahli 2005) are separately validated. There are negligible academic approaches that investigate linkages among flow experience, value, satisfaction, and behavioral intention in a holistic manner. Therefore, this study will take into account all constructs in one integrated model.

Flow Impacts on Perceived Value

Utilitarian and hedonic consumer behaviors have been widely recognized in marketing research, but not in IS, especially not in online learning environments (Poyry et al. 2012; Wang et al. 2007). Utilitarian value describes a consumer’s behavior as task-related and rational, making purchases in an efficient and timely manner to achieve their goals (Batra and Ahtola 1991). In contrast, hedonic value describes consumers’ shopping for fun and playfulness, reflecting shopping’s potential entertainment and emotional worth rather than the achievement of any end goal (Babin et al. 1994).

Some researchers have empirically validated that utilitarian and hedonic value perceived by web users can be derived from positive flow experience (Koufaris 2002; Wang et al. 2007). Indeed, theoretically, value is closely related with flow experience. Utilitarian value reflects action (task) with a work mentality, i.e., a given task is completed in a deliberate and efficient manner whereas hedonic value is more subjective and personal, i.e., feeling fun and playful (Babin et al. 1994). For instance, students may gain extrinsic rewards (utilitarian value), e.g., high grades from participating in online courses, but they can also gain more intrinsic, personal, and emotional rewards (hedonic value), e.g., optimal happiness and pleasure. These rewards are achieved from autotelic nature (activity rewards in itself), extreme concentration on task, and other elements of flow. Therefore, the following hypotheses are proposed:

H6: Flow experience has a positive impact on utilitarian value.

H7: Flow experience has a positive impact on hedonic value.

Relationships between Perceived Value and Satisfaction

Kotler (2000) defined satisfaction as a person’s feeling of pleasure or disappointment resulting from comparing a product’s perceived performance (or outcome) in relation to their expectation. In essence, this definition is closely related to perceived customer value. A general view of value recognizes both (1) a utilitarian outcome resulting from some type of conscious pursuit of intended consequences, and (2) an outcome related more to spontaneous hedonic responses (Babin et al. 1994). In this regard, value is a perceived outcome of one’s assessment of their experience using product/service. Woodruff (1997, p.139) stated that “customer satisfaction management needs to be backed-up with in-depth learning about customer value”. Students would choose to learn online or intend to take more online courses if they saw superior value offered by online courses (Woodruff 1997). Therefore, the perceived utilitarian and hedonic value in overall online courses will be associated with the level of satisfaction respectively. Accordingly we hypothesize that:

H8: Utilitarian value has a positive impact on satisfaction.

H9: Hedonic value has a positive impact on satisfaction.
Relationships between Satisfaction and Behavioral Intention

Eagly and Chaiken (1993) defined behavioral intention as a person’s conscious plan to exert effort to carry out a particular behavior with these intentions being formed from both a personal evaluation and a normative construct. In this regard, behavioral intention equates to IT continuance intention, the intention to continue the use of the artefact and task (Bhattacherjee 2001). It is also a validated construct in online learning literature as a consequence of satisfaction (Liaw 2008; Mathieson 1991). Therefore, if the students who take part in an online course are satisfied with their experience, they will be apt to continue to take more online courses.

A great deal of research has validated a strong association between satisfaction and behavioral intention with theoretical supports. Expectation-confirmation theory can well explain how a discrepancy between expectation and actual delivery of product/service leads to corresponding action. When the students' expectation for online courses is confirmed, their satisfaction will more likely to be higher and it will be positively associated with favorable behavioral intention (Bhattacherjee 2001; Oliver 2010). We therefore propose that:

H10: Satisfaction has a positive impact on online course continuance intention.

Research Design

Study Context

To test our hypotheses, data was collected via the use of a survey instrument. Data collection was conducted in one of the largest universities in Australia. Students enrolled in one online general education course were invited to participate in this study. Undergraduate students at this university are required to complete two general education courses as an integral part of studies for their degree, with the aim of broadening and deepening students’ understanding of the environment in which they live and work. The general education course which was used to gather data for this study aimed to explore the conflict between religious faith and scientific knowledge of creation, miracles and suffering, mind and consciousness, and modern ethical problems. The course was delivered via Blackboard, and included online lecture notes and online tutorials with up to 25 students per tutorial. The lecture notes, which were subject to online discussion, were available on Monday and Thursday of the relevant week. The online tutorial group discussion, to which 30% of the overall marks were allocated, took place as soon as the lecture notes appeared. The online tutorial discussion was conducted via the Discussion Forum tool, an asynchronous communication tool embedded within Blackboard. Students were required to not only post at least one significant comment for each lecture, but to also respond with a comment on another student's posting with a minimum of one response per week. The tutor was responsible for allocating online discussion marks based on the quality and quantity of postings. Other assessment components for this course included a journal (15%), essay on a topic to be chosen from a list supplied (25%), mid-semester and final take-home examinations (15% each). Students were advised to email their tutors with any queries or questions. Neither the lecturer nor the tutors were involved with online discussions.

Sample and Data Collection

A survey was distributed to the students in the tenth week of the semester (the third last week of the course). According to the literature, since flow experience represents an ephemeral phenomenon situated in time and space, people’s flow experience can only be captured more reliably when measured immediately during, or right after the computer interaction, (Chen et al. 2000; Webster et al. 1993). In total, 244 useful surveys were collected, 114 (46.7%) respondents were male and 127 (52.4%) respondents were female (with three missing gender data). 59% participants were doing their degrees in the areas of Commerce and Economics, 14% in Engineering, 9.8% in Science, 5.8% in Arts and Social Sciences, and the rest in other faculties of the university.

Overall, participants were generally very experienced and active technology users with 238 (97.5%) of participants using the Internet for more than 3 years. Additionally, 188 (77%) participants reported that they used the Internet for more than 3 hours daily. Participants recorded a mean of 6.39 (out of 7) for their perceived level of Internet literacy (where 1 = “Not at all literate” and 7 = “Completely literate”).
Participants’ Internet and computer accessibility also suggested that participants had many opportunities to communicate through the use of technology and the Internet. 238 (97.5%) participants reported home as the usual venue for going online, and 158 (64.8%) participants reported university as the usual venue for going online. On average, students had studied more than 24 months at this university, providing a good indicator of their competence in using Blackboard, university learning management system. Over 75% of all participants completed at least one online course and over 66% participants had more than 12 month experience using Discussion Forums for online course discussion. We therefore considered all of them to be experienced with the use of online learning technologies.

All items among the constructs were tested against demographic and Internet experience variables (gender, degree, Internet literacy, Internet experience, years of using Blackboard, discussion forum experience, the number of online courses completed). There was no significant difference found for any variables of interest, indicating it was justifiable to analyze the data as a single group.

Instrument Development

The items used to operationalize the variables in our model were adapted from the Flow State Scale (Jackson and Marsh 1996), and other previous flow research in IS and marketing (Ajzen and Fishbein 1980; Babin et al. 1994; Ghani and Deshpande 1994; Green and Taber 1980; Kim and Biocca 1997; Mathieson et al. 2001; Venkatesh 2000; Zeithaml et al. 1996). Antecedents of flow, flow experience, and flow consequences are reflective constructs measured by variables provided in Figure 2, in which both flow experience and satisfaction were measured as second-order constructs. Reflective items are viewed as affected by the same underlying concept (Chin 1998a). Thus, reflective items should be partially or entirely intercorrelated because of the underlying common cause (Mathieson et al. 2001). All these measures were phrased as questions on a seven-point Likert scale, from 1 = strongly disagree to 7 = strongly agree. A copy of the instrument items is provided in the Appendix.

Data Analysis Technique

Data analysis was undertaken in a holistic manner using partial least squares (PLS). PLS has the capacity to estimate simultaneously both the measurement component and the structural component (Gefen et al. 2000). Compared with other structural equation models, PLS does not require a large sample size and is more suitable when the objective is causal predictive testing, rather than testing an entire theory (Chin 1998b). Given that the model presented in this study has not been tested before and considering the difficulty of recruiting the large sample size, we used PLS-graph version 3.0 to analyze our model.

We followed a common practice to test measurement models as described by Chin (1998b). For reflective items, we first examined path loadings for acceptability at 0.7 or higher. We then measured internal consistency using composite reliability to see whether all items exceeded the recommended cut-off of 0.7 (Fornell and Larcker 1981). The discriminant validity of the measurement model was assured by first looking at the cross-loadings. The loadings of indicators for that particular construct should be higher than the other indicators used to measure the other constructs (Chin 1998b). The square root of the average variance extraction (AVE) for a particular construct should be larger than the correlations between it and the other constructs (Chin 1998b).

Results

We followed a two-step procedure to analyze our model. First, the measurement model was assessed and then the structural model was tested. We report the results of both the measurement and the structural models in the following sections.

Measurement Model

In evaluating the reflective measurement model, we examined the individual item reliability by following the criteria described above, as shown in Table 1 and Table 2. Results from the measurement model analyses revealed that the reflective measures in our model had adequate convergent and discriminant validity. Firstly, the factor loadings for all constructs with multiple-item measures exceeded 0.7, the recommended parameter value (Chin 1998b). Secondly, for all multiple-item measures, the composite
scale reliability exceeded the recommended cutoff of 0.7. Thirdly, no measurement item loaded more highly on a construct other than the construct it intended to measure. Fourthly, the square root of the average variance extracted exceeded the respective constructs’ correlation with any other variable in the models. Taken together, these factors imply that this study exhibits convergent and discriminant validity.

Table 1. Results of Measurement Model

<table>
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<tr>
<th>C-R</th>
<th>BA</th>
<th>CG</th>
<th>FT</th>
<th>EU</th>
<th>TE</th>
<th>CO</th>
<th>LS</th>
<th>CT</th>
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Note: C-R: Composite Reliability; BA: Balance between Challenges & Skills of the Task; CG: Clear Goals on Task; FT: Immediate Feedback on Task; EU: Perceived Ease of Use; TE: Telepresence; CO: Concentration on Task at Hand; LS: Loss of Self-consciousness; CT: Sense of Control; TD: Time Distortion; HV: Hedonic Value; UV: Utilitarian Value; PO: Perceived Learning Outcomes Satisfaction; PP: Perceived Learning Process Satisfaction; PA: Positive Learning Attitude; CI: Continuance Intention

Table 2. Loadings and Cross-loadings

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<tr>
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<td>0.59</td>
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Having confirmed the psychometric properties of the scales in our model, the next step was to assess the explanatory power of the entire model on flow experience and consequences, as well as the predictive power of the independent variables and mediating variables. We omitted gender, age, Internet and online course experience in our final structural model since no significant impact was found on the results, consistent with previous studies’ findings (Csikszentmihalyi and LeFevre 1989; Konradt et al. 2003).

The multiple R-square values given for the endogenous constructs were used to assess the productiveness of the model. Paths in this model were interpreted as standardized regression weights. A bootstrapping procedure with replacement using 1000 subsamples was used to estimate the statistical significance of the parameter estimates.

The results of the PLS analysis are shown in Figure 2. First, both flow and satisfaction are second-order constructs with four and three dimensions respectively. Positive and significant path coefficients shown in Figure 2 indicated that flow can be measured by concentration on task at hand, loss of self-consciousness,
sense of control, and time distortion, while perceived learning outcome satisfaction, perceived learning process satisfaction, and positive learning attitudes are three dimensions of the satisfaction construct.

**Figure 2. Structural Model**

Our results indicated that the structural model explained 76.1%, 59.5%, and 23.6% of the variances on flow, satisfaction, and continuance intention respectively. The R-square indicated the predictive power of this model, and suggested that there was a significant combined effect of all independent and mediating variables on the dependent variables in this operational model. In particular, clear goals on task, a balance between challenges and skills of the task, perceived ease of use, and telepresence exhibited a strong and significant effect on flow respectively ($\beta=0.245$, $t=3.542$; $\beta=0.224$, $t=2.882$; $\beta=0.177$, $t=2.545$; and $\beta=0.726$, $t=15.11$), indicating that the clearer the task goals, the better balance between challenges and skills of the task, the easier of use of online learning technologies, and the higher the telepresence, the greater influence on the inducement to online student’s flow, supporting H1, H3, H4, and H5. The immediate feedback on task had no significant impact on flow, leading to the rejection of H2. The coefficients for utilitarian value, hedonic value, satisfaction, and continuance intention were highly significant and positive, providing support for hypotheses H6 to H10 respectively.

**Discussion**

**The Importance of Telepresence on Students’ Flow Experience**

Although clear goals on task, balance between challenges and skills of the task, perceived ease of use, and telepresence were strong pre-conditions of flow, the impact of telepresence on flow experience was the strongest one. The overall explanatory power for flow had an R-square of 76.1%, indicating that all suggested flow antecedents were capable of explaining a relatively high proportion of variation of flow construct. However, telepresence itself had an R-square of 42%, compared to other factors. This construct has been included in numerous CME studies since it was initially proposed by Hoffman and Novak in 1996 as one of the key flow antecedents (Hoffman and Novak 1996). This study’s results indicate that, in online
learning environments, telepresence is a key determinant for students to experience flow, feel good, and achieve better learning outcomes. The findings of this study support the claim that technology users cannot concentrate on computer-related tasks they are performing if they cannot perceive a sense of being in a mediated environment (Finneran and Zhang 2003).

**The Impacts of Immediate Feedback on Task on Students’ Flow Experience**

As one of the originally proposed flow antecedents, immediate feedback on task was not found to be a significant factor to develop flow, while the other two factors, clear goals on task and balance between challenges and skills of the task did demonstrate impacts on flow experience. As we described earlier, students who took this course knew that the online discussion was led by the students themselves. Thus, it was unlikely for them to expect their tutors or lecturer to provide immediate feedback on the tasks they conducted.

Although it has no direct impact on flow experience, immediate feedback on task may have an indirect impact on flow through influences on the other three correlated pre-condition factors (except telepresence) as it was significantly correlated with them (see Table 1), indicating that more complicated relationships might exist among pre-conditions and flow than were presumed in the original flow model (Guo and Poole 2009).

**The Relative Importance of Flow First Order Dimensions**

Although the proposed second-order structure of flow with four first-order dimensions was supported, the analytical results of the model revealed that among the four dimensions of flow, the relative strength of relationships between individual dimensions and the underlying flow construct varied, a finding that is consistent with previous studies (Guo and Poole 2009; Jackson and Marsh 1996). In particular, concentration on task at hand was the most influential factor of flow experience, while sense of control had the weakest relation with flow construct, indicating that flow in online learning environments may be featured primarily through concentration, time distortion, and loss of self-consciousness. This finding is consistent with previous studies’ claims that in different contexts we may expect different dimensions of flow to be more important or relevant than others due to different demands required by different nature of activities (Jackson and Marsh 1996; Swann et al. 2012). In Shin’s (2006) online learning study, concentration was found to be more highly correlated with flow than time distortion.

In addition, the significant and stronger correlations among concentration on task at hand, loss of self-consciousness, and time distortion indicated that they were more likely to occur together, while the relative weaker or no correlation between sense of control and these three dimensions indicated that sense of control and these three flow dimensions were less likely to be experienced together (Martin and Cutler 2010). This suggests that sense of control may not be important to changing participants’ sense of time while in flow, whereas when participants are in flow, they are most likely to report that they are very focused, and feel the loss of self-consciousness and time.

**The Mediating Effect of Perceived Value on Students’ Satisfaction**

Although flow, utilitarian value, and hedonic value were significant aspects in promoting students’ positive learning experience with improved satisfaction, there was a relatively weak impact from flow to satisfaction compared with stronger relationships between flow and satisfaction via utilitarian value and hedonic value variables. An R-square of 0.307 ($\beta=0.554$, $t=8.674$) was obtained when there was only a link between flow and satisfaction, which indicated the importance of including perceived utilitarian value and hedonic value into this model. Previous studies have demonstrated the direct relationship between flow and satisfaction (Shin 2006). This study indicated that the direct impact of flow experience on students’ satisfaction was less than the indirect impact of flow (through both value variables) on satisfaction. In other words, both utilitarian and hedonic values serve as mediating roles that facilitate and enhance the positive effect of flow experience on students’ satisfaction in online courses.

Furthermore, satisfaction has always been an important predictor of users’ continuance intention in CMEs. This relationship was further confirmed in online learning environments, demonstrating the robustness of this association.
Implications

This study has a number of important contributions to the research effort investigating the impact of flow on online learning environments, especially in regard to improving students’ overall learning experience.

Firstly, the study demonstrates the significant importance of including telepresence when studying virtual environments in general and more particularly, students’ online learning. Although the concept of telepresence has become an important component in our understanding of how online users experience flow and produce the hedonic outcome of an enjoyable experience and intention to continuously use computer mediated technologies (e.g., Hoffman and Novak 2009; Nah et al. 2011; Zaman et al. 2010), few studies have found the strongest influencing impact of it on flow occurrence, in particular, within students’ online learning environments. This study’s findings indicate that creating a sense of “being there” in an online environment is one of the key determinants to develop flow. Thus, future research examining how to enhance consumers’ online experience should consider telepresence as one of the determining factors of consumers’ positive experience.

Secondly, results from this study confirm previous studies’ claims that flow experience exists in a process and is context specific (Jackson and Marsh 1996; Lee and Chen 2010; Swann et al. 2012). This study’s findings demonstrate that the relationships among flow dimensions are complex. In particular, we found that not all flow antecedents had a direct impact on flow experience, although the significant correlations among them were found. In addition, we also found that the relative strength of flow experience first-order constructs was different, demonstrating that some flow states are more important or relevant than others. Thirdly, we found that not all first order constructs were correlated, indicating that they may not occur together. Future research examining people’s online flow experience needs to well understand the flow components since factors relating to flow experience may vary across tasks (Guo and Poole 2009).

Finally, the results of this study demonstrate that the V-S-BI model can be incorporated into the flow model in order to measure flow consequences more rigorously and precisely in online learning environments. In particular, both utilitarian and hedonic values are key mediators to predict satisfaction. Students’ continuance intention of learning online can be enhanced by improving their satisfaction of online courses. Future studies can combine this V-S-BI model into their flow studies to improve their explanatory power.

This study also has some practical implications. Firstly since students’ online learning satisfaction and continuance intention take place largely through telepresence and an enjoyable learning experience, it is essential for course instructors to design their online courses in such a way as to produce that sense of telepresence. Currently, most online learning courses are delivered through LMS and its embedded asynchronous communication media, such as Discussion Forums, Online Journals, and Emails. However, research shows that advanced technologies, such as synchronous communication tools, multimedia techniques, or 3D virtual reality learning environments (VRLE) can bring a real-time element into communicating online, increase the social presence of students, and create interactive and stimulating learning environments thus reinforcing the sensation of an immersion into computer generated virtual learning environment and making their learning more enjoyable (Huang et al. 2010; Monahan et al. 2008). Therefore, course instructors who aim to maximize the effectiveness of their online course delivery should incorporate such advanced technologies into their course design in order to facilitate the occurrence of an overall positive experience.

Secondly, university policy makers should provide sufficient resources and support in order for course instructors to be able to design online courses which offer a strong sense of telepresence. The complexity of advanced technologies may become a barrier for non-technical course instructors to design the online course as they desire. Thus, institutional support and incentives are necessary for course instructors who lack the skills for online course development. Of course, LMS vendors should provide an online learning system that is easy to use and user friendly.

Thirdly, by ascertaining the psychosocial factors that enhance, inhibit, or disrupt flow, course instructors may be better able to help students achieve optimal experience more frequently, which should ultimately enhance their learning outcomes. Although we agree that flow is not the only answer to positive learning outcomes, we believe that it does play a critical role in influencing students’ experiences in online learning. Course instructors should pay particular attention to match student’s skill levels with task difficulty and
establish clear task goals, in order to increase the probability of achieving optimal experience.

Finally, the significant impacts of satisfaction on students’ continuance intention of doing online courses indicate that students dissatisfied with online courses may stop joining online courses. In other words, dissatisfaction is the necessary condition for online course discontinuance. In order to make students feel satisfied with their online courses and to continue to take more online courses, developing flow experience is one way in which that might be achieved, however, it is not the only way. We can also improve students’ online learning satisfaction by improving their perceived value of the course. They will feel satisfied if they think the courses that they are doing are worthwhile and that they are able to achieve what they wish to achieve.

Limitations and Future Direction

This study has several limitations. Firstly, the sample consisted mainly of students who were undertaking their general education courses online, raising the concern of generalizability. Guo and Poole (2009) suggested that different samples may reveal different insights. Thus, future studies should examine the model in different contexts, such as the workplace. Future studies should also examine the model with data collected from students who are taking other types of online courses, such as degree core courses or some technical courses, to examine whether this model can be applied in different online course environments. Secondly, the technology this study used was Blackboard and embedded discussion forums, limiting the breadth of the conclusions. Future studies should re-examine this model in different technological contexts in order to investigate whether technology characteristics play a role in flow development and students’ perceptions towards online learning. Furthermore, this study is based on self-reported data and cross-sectional design. Since flow experience is a dynamic phenomenon which can not only improve momentary experience but also help build a better quality of life over time, additional research effort with longitudinal studies would give a better picture of how students develop their flow experience and how the relationships among constructs change over time (Chen 2006; Choi et al. 2007).

Considering the significant impact of telepresence on flow, future research is needed to identify the most important causes of telepresence in order to maximize enjoyment, satisfaction and enhanced learning performance. A pedagogical analysis was not included at this time as we were primarily interested in discovering whether telepresence and other flow antecedents were the keys for improved learning experience. Future research is needed to explore why telepresence can facilitate students’ learning and how it can be improved.

Finally, some external factors, such as social influence, technology characteristics, perceived usefulness of technology, and technology complexity, may also be important in understanding students’ perceptions towards those constructs. Future study may extend this study’s research model by including these external factors in order to present a more robust flow model (Choi et al. 2007; Finneran and Zhang 2003; Guo and Poole 2009).

Appendix: Instrument Items

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measurement Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance of challenges &amp; skills of the task (Jackson and Marsh 1996)</td>
<td>BA1 I was challenged by the task, but I believed my skills would allow me to meet the challenge in the online course.</td>
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<tr>
<td></td>
<td>BA2 My abilities matched the high challenge of the task in the online course.</td>
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<td></td>
<td>BA3 I felt I was competent enough to meet the high demands of the task in the online course.</td>
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<tr>
<td>Clear goals on task (Jackson and Marsh 1996)</td>
<td>CG1 I knew clearly what I wanted to do in the online course.</td>
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<tr>
<td></td>
<td>CG2 I had a strong sense of what I wanted to do in the online course.</td>
</tr>
<tr>
<td></td>
<td>CG3 I knew what I wanted to achieve in the online course.</td>
</tr>
<tr>
<td>Immediate feedback on task (Jackson and Marsh 1996)</td>
<td>FT1 In the online course, it was really clear to me that I was doing well.</td>
</tr>
<tr>
<td></td>
<td>FT2 In the online course, I was aware of how well I was performing.</td>
</tr>
<tr>
<td></td>
<td>FT3 In the online course, I had a good idea about how well I was doing.</td>
</tr>
<tr>
<td>Perceived ease of use (Venkatesh 2000)</td>
<td>EU1 I believed that it was easy to get the online learning system to do what I wanted it to do.</td>
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<tr>
<td>Telepresence (Kim and Biocca 1997)</td>
<td>EU2</td>
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<td></td>
<td>EU3</td>
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<tr>
<td>Concentration on task at hand (Ghani and Deshpande 1994)</td>
<td>TE1</td>
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<td></td>
<td>TE2</td>
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<td>TE3</td>
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<td>TE4</td>
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<tr>
<td>Loss of self-consciousness (Jackson and Marsh 1996)</td>
<td>LS1</td>
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<td></td>
<td>LS2</td>
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<td></td>
<td>LS3</td>
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<tr>
<td>Sense of control (Ghani and Deshpande 1994)</td>
<td>CT1</td>
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<tr>
<td></td>
<td>CT2</td>
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<tr>
<td>Time distortion (Jackson and Marsh 1996)</td>
<td>TD1</td>
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<tr>
<td></td>
<td>TD2</td>
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<td>TD3</td>
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<tr>
<td>Hedonic value (Babin et al. 1994)</td>
<td>HV1</td>
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<td></td>
<td>HV2</td>
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<td></td>
<td>HV3</td>
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<tr>
<td>Utilitarian value (Babin et al. 1994)</td>
<td>UV1</td>
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<td></td>
<td>UV2</td>
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<tr>
<td>Perceived learning outcomes satisfaction (Green and Taber 1980)</td>
<td>PO1</td>
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<td></td>
<td>PO2</td>
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<td></td>
<td>PO3</td>
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<td>PO4</td>
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<tr>
<td>Perceived learning process satisfaction (Green and Taber 1980)</td>
<td>PP1</td>
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<td></td>
<td>PP2</td>
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<td></td>
<td>PP3</td>
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<tr>
<td>Positive learning attitude (Ajzen and Fishbein 1980)</td>
<td>PA1</td>
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<tr>
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<td>PA2</td>
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<td></td>
<td>PA3</td>
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<tr>
<td>Continuance intention (Mathieson 1991)</td>
<td>CI1</td>
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<td></td>
<td>CI2</td>
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</table>
Acknowledgements

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References


Guo et al. /Flow Experience and Online Learning Continuance Intention


