

# Examining Factors Influencing Technical-Vocational University Students' Learning Effectiveness of English Proficiency Development in a Blended e-Learning Environment

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## Abstract

Based upon the perspective of social cognitive theory, this study develops a conceptual framework that examines the antecedents of technical-vocational university students' active participation and learning effectiveness of English proficiency development in a blended e-learning (BEL) environment. A BEL system was employed to support technical-vocational university students' English proficiency development. The research model is tested using a questionnaire survey of 298 participants. Confirmatory factor analysis was performed to test the reliability and validity of the measurements. The partial least squares method was used to validate the measurement and hypotheses. The empirical results indicate that e-learning self-efficacy, social influence and BEL system characteristics are the primary antecedents of students' active participation in a BEL environment. The results also show that e-learning self-efficacy, student active participation and BEL system characteristics saliently affect technical-vocational university students' learning effectiveness of English proficiency

development. The findings signify that technical-vocational university students show positive incline towards the active participation in BEL for English as a foreign language (EFL) courses and exposed a possible benefit of English proficiency development from its use in the long run. The results can not only proffer instrumental suggestions for the critical research issue of e-learning, but also may serve as instrumental guidelines for a BEL environment to be effectively implemented with care to avoid the risk to weaken student's interests and activations in English proficiency development in BEL.

**Keywords:** Blended e-learning, Social cognitive theory, Active participation, Learning effectiveness, English proficiency development

## 1. Introduction

In today's cloud computing era, the use of e-learning technologies for English proficiency development has been increasing around the world (Bueno-Alastuey & López Pérez, 2014; Raj et al., 2016; Sharma, 2010). With either synchronous or asynchronous communication through e-learning platforms, English learners can communicate and interact with other learners or native English speakers throughout the world in a time-saving and cost-effective way (Lin et al., 2016; Van Huy & Hamid, 2015). Given the salient potential of applying e-learning in English education, various sorts of educational institutions and educators devote significant effort to the design of e-learning curricula and the creation of digital English course materials delivered through the web-based platforms (Hung, 2015; Mueller & Strohmeier, 2011; Sharma & Westbrook, 2016). As a matter of fact, the Taiwan Ministry of Education (MOE) has initiated an advanced project for the purposes of enhancing English proficiency through e-learning since 2002, so that all Taiwanese people could learn without the constraints of time and space. To carry out this project numerous universities in Taiwan develop e-learning environments for English as a foreign language (EFL) courses (Spence & Liu, 2013; Tan, 2013; 2015). To cope with the rising trend of ubiquitous e-learning, English teachers thus need to understand how to create effective English instruction through e-learning technologies with the goal of preparing students for the new information society as well as cultivating students with good English proficiency in order to utilize this global language wisely in future working environments.

However, even if e-learning has a great potential to facilitate students' personalized and collaborative English learning, it is still frequently questioned for some shortcomings including lack of peer-to-peer interaction, high setup cost of e-learning platform implementation and the requirement for face-to-face (FTF) tutorial supports (Carliner & Shank, 2016; Wagner et al., 2008; Wu et al., 2010). With the above concerns, the blended e-learning (BEL) has been introduced as an emerging alternative option for English proficiency development (Pellas & Kazanidis, 2014; Wu et al., 2010). A BEL environment integrates FTF classroom with asynchronous and/or synchronous online learning to maximize the best advantages of FTF and online education for English learning. In such an intensive learning environment, the extent of learning effectiveness of English proficiency development plays an important role in evaluating the success of BEL implementation

(Sharma & Barrett, 2011; Tomlinson & Whittaker, 2013; Wang & Chiu, 2011). Thus, the application of BEL approach in supporting English learning have make it significant to probe the crucial determinants that would encourage students to actively participate and enhance student learning effectiveness of English proficiency development.

Since using BEL applications for language-learning purposes are a relatively new and emerging phenomenon, empirical research on the learning effectiveness of using BEL applications in an educational setting is still scant (Jin, 2014; Sun & Qiu, 2017). In addition, an effective BEL environment should consider the human and technology factors that affect student learning effectiveness with a BEL system platform (Wu et al., 2010). Much more investigation is needed to gain meaningful insights on BEL approaches in the field of English learning and teaching. In the current literature, there is significantly less empirical research that investigated active participation in BEL and the learning effectiveness of using BEL applications for English proficiency development. Hence, comprehending the essentials of what determines student learning effectiveness of English proficiency development can provide insights into developing effective strategies that will allow educational institution administrators and instructors to create new educational benefits and value for their students. Because BEL environments differ from traditional classroom-based learning, a review of prior research in e-learning shows that there is a lack of studies that have examined the crucial factors that determine active participation in BEL and learning effectiveness of English proficiency development. There is a need for more in-depth research to understand what determines student learning effectiveness of English proficiency development in a BEL environment and to investigate how these factors influence student perceptions of BEL contexts and their causal relationships. Therefore, drawing upon the theoretical perspective from social cognitive theory, this study develops a nomological network to examine the critical factors influencing technical-vocational university students' active participation in BEL and learning effectiveness of English proficiency development. Two research questions are proposed in order to add to the current literature: (1) what are the critical determinants of technical-vocational university student's active participation in BEL? (2) how will those critical influencing factors and students' active participation impact on their learning effectiveness of English proficiency development in BEL?

## **2. Theoretical Foundations and Model Development**

### *2.1 Blended e-Learning in English Proficiency Development*

Blended e-learning (BEL) is a new sort of learning approach that combines different delivery methods and styles of learning strategies. Such an approach integrates various forms of instructional technologies with traditional classroom teaching (Tomlinson & Whittaker, 2013). The term of BEL emphasizes the central role of e-learning technologies in BEL contexts, focusing on access and flexibility, enhancing classroom teaching and learning activities, and renovating the way students learn (Al-Busaidi, 2013; Wu et al., 2010). It is commonly defined as an integration of traditional teacher-centered FTF classroom teaching and student-centered online learning instruction. Blended e-learning can occur in both offline and online environments and where the online component becomes a natural extension of

traditional classrooms (Cha, 2012; Cha & Kim, 2011). The blended learning approach attempts to overcome limitations on learning time and space that traditional FTF classrooms have by using online tools (Im & Kim, 2015; Means et al., 2013).

The benefits of BEL can be manifested as accessibility, collaborative and individual learning, synchronous and asynchronous learning, and motivated, autonomous, and socially interactive learning (Umoh & Akpan, 2014). Many BEL approaches have developed system platforms for integrating a mixture of functions to facilitate English learning activities. Such platforms can be used to integrate multimedia learning materials, live chat sessions, online forums, tests and assignments (Hwang et al., 2010; Wu et al., 2010). As a consequence, instructional delivery and communication between English teachers and students can be performed synchronously and/or asynchronously. BEL environments can provide English teachers and students with flexible and convenient instructional methods, e-learning technologies, interaction mechanisms or learning resources and applying them in an interactive learning environment to overcome the limitations of classroom and e-learning (Nedeva et al., 2010). This new kind of hybrid learning applications may better accommodate the needs of English teachers and students who are geographically dispersed and have conflicting schedules (Al-Hunaiyyan et al., 2008; Coutinho & Bottentuit, 2009). A well-adjusted implementation of learning components between the traditional approach and the online component has been suggested to ensure the effectiveness of BEL course and achievable learning outcomes (Thang et al., 2012; Wu et al., 2010). Accordingly, we defined BEL as the combination of online and FTF instruction and the convergence between traditional learning and e-learning environments.

As BEL emerges as perhaps the most prominent English instructional delivery solution, it is critical to explore what determines students' active participation and learning effectiveness of English proficiency development. Prior research (e.g., Al Zumor et al., 2013; Lawn & Lawn, 2015; Liang & Bonk, 2009) in education or e-learning has found that BEL could be effective for developing English proficiency. The integration of ever-advancing web-based technologies into core components of the BEL approaches might be a potential consideration and expected to see promising English instructional outcomes (Lin et al., 2016; Sun & Qiu, 2017; Wu & Liu, 2013). Prior studies comparing the learning effectiveness of a BEL approach and a traditional classroom regarding English proficiency development have reported higher achievement and attitude levels among instructors and students participating in BEL. As the benefits of BEL applications contributing to students' learning effectiveness of English proficiency development is continuously being observed and expanding, more research efforts have explored the impacts of applying the BEL approaches on students' learning behaviors in EFL classrooms (Lin et al., 2016; Miyazoe & Anderson, 2010).

## *2.2 Social cognitive theory*

Initiated by Bandura (1986), social cognitive theory (SCT) is rooted in a view of human agency in which individuals are agents proactively engaged in their own development and can make things happen by their actions. The theory is a widely accepted and empirically validated model for understanding and predicting human behavior and identifying methods in

which behavior can be changed. Bandura (2001) denoted that SCT accords a central role to cognitive, vicarious, self-regulatory, and self-reflective processes. An extraordinary capacity for symbolization provides humans with a powerful tool for comprehending their environment and creating and regulating environmental events that touch virtually every aspect of their lives. The symbolic environment occupies a major part of people's everyday lives in modern society. People are self-organizing, proactive, self-reflecting, and self-regulating, not just reactive organisms shaped and shepherded by environmental events or inner forces (Eom, 2012; Shea & Bidjerano, 2010). Human self-development, adaptation, and change are embedded in social systems. Therefore, personal agency operates within a broad network of socio-structural influences. Most external influences affect behavior through cognitive processes rather than directly. Much of the social construction of reality and shaping of public consciousness occurs through electronic acculturation (Bandura, 2011).

SCT argues that the meta-progress of a human being occurs through consecutive interactions with the outside environment and the environment must be subjected to one's cognition process before they affect one's behavior. It proposes that a triadic reciprocal causation among cognitive factors, environmental factors, and human behavior exists. Human behavior is affected by both cognitive factors and environmental factors (Wood & Bandura, 1989). Cognitive factors refer to the personal cognition, affect and biological events. Regarding environmental factors, there is ample educational literature and research that shows the learning environment affects an individual's behavior and performance. Environmental factors stand for the social and physical environments that can affect an individual's behavior (Bandura, 2001). Environments influence an individual's behavior through his/her cognitive structure.

Bandura's theory can be seen as a paradigm shift within the individualistic approach, although it emphasizes the social environment in human learning processes. The social context is considered as a determinant for the individual human being. Traditionally, a learning environment was defined in terms of the physical and social environments in a classroom setting. The learning environment can be defined as a combination of the environmental determinants and behavioral determinants the learner can be interacting with (Wu et al., 2010). The change of focus from teaching to learning has often been called a paradigm shift in education. SCT implies that a learner's behavior is partially shaped and controlled by the influences of his/her learning environment and cognition (Bandura, 2011). It can be inferred that student learning occurs in a social context (i.e. a BEL environment in this study) with a triadic, dynamic, and reciprocal interaction of individual cognitions, behaviors, and the social environments. Piccoli et al. (2001) expanded the traditional definition of learning environment and identified five environmental factors that clarify how an e-learning environment differs from classroom-based education, including technology, content, interaction, learning model, and learner control. Wu et al. (2010) further classified the five environmental factors into two categories (technological and social environment factors) that particularly are relevant to BEL environments. The first category relates to the technological environment that includes technology and content. The second category relates to social environments that include interaction, learning model, and learner control. Based

upon Wu et al.'s taxonomy, this study identifies three critical affecting factors of technical-vocational university students' active participation and learning effectiveness of English proficiency development in BEL: e-learning self-efficacy (individual cognitive factor), social influence (social environment factor) and BEL system characteristics (technological factor).

### *2.3 The effects of active participation in BEL*

The BEL environment for EFL learning can provide students a more comfortable environment which may effectively reduce their anxiety induced by the usage of BEL system platforms and English learning tasks and further result in confidence reinforced to improve their English proficiency. In such a learning environment supported by BEL technologies, students may benefit from the non-threatening environment to support their English learning. The learning effectiveness can be derived from individual judgments regarding valuable learning outcomes that can be obtained through a requisite learning behavior (Islam, 2013). In this study, learning effectiveness of English proficiency development is defined as the degree to which a student believes that participating in a BEL environment will help him or her to attain gains in English learning performance. Students are more likely to engage in BEL for English proficiency development and perform learning behaviors that they believe will result in positive benefits than those which they do not perceive as having favorable consequences.

In addition, active participation, which is akin to self-involvement, is a psychological state experienced as a consequence of focusing one's attention on a coherent set of related activities and stimuli (Wenger et al., 2010). Theorists and researchers have suggested that some degrees of active participation are important in a BEL environment (Hsu, 2013; Johnson & Marsh, 2014; Liang & Bonk, 2009). This is because students may better learn how to learn through making instructional choices and may feel more motivated to learn, which lead to better learning performance (Wu, et al., 2011; Yang, 2011). Consequently, students are actively involved in the learning process and may feel more competent, self-determining, self-regulating, and intrinsically more interested in learning (Eom, 2012; Shea & Bidjerano, 2010). Prior research (e.g., Goggins & Xing, 2016; Mohammadyari & Singh, 2015) in education or e-learning has found that students' active participation is positively related to their learning effectiveness of English proficiency development. The more opportunity of active participation in a learning environment, the more positive learning outcomes the students would gain. Thus, we conceptualize the student's active engagement into a BEL environment may result from aggregating all the benefits that a student receives from using a BEL system. The following hypothesis is proposed.

H1. Students' active participation in BEL will positively affect their learning effectiveness of English proficiency development.

### *2.4 The effects of e-learning self-efficacy*

Drawing from a considerable stream of basic research and SCT, Bandura and others have advanced the concept of self-efficacy. Bandura (1986) defined perceived self-efficiency as



people's judgments of their capabilities to organize and execute courses of action required to attain designed types of performances. It can enhance human accomplishment and well-being, help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of adverse situations. This increasingly recognized psychological construct deals specifically with the control of human action through people's beliefs in their capabilities to affect the environment and produce desired outcomes by their actions (Stajkovic & Luthans, 1998).

According to social cognition theory (SCT), self-efficacy is the key factor to judge whether or not an individual could successfully complete a task based on current capability. The concept of self-efficacy played a critical role in predicting human performance in several areas of human effort, but self-efficacy theory has rarely been applied in the field of EFL learning in BEL. For the past two decades, researchers in the MIS field have found that self-efficacy could be applied to a web-based technology context as an important determinant of a variety of user perceptions of innovative technologies. Based on social cognitive theory (SCT), Compeau et al. (1999) substantiated that computer self-efficacy influenced one's favorable behavioral outcomes. Prior e-learning research (Chen, 2014; Karim & Behrend, 2013; Noe et al., 2010) has also confirmed that self-efficacy had a significant positive influence on user behaviors. Several studies in the context of the traditional classroom have found that self-efficacy is linked to indices of achievement. Students with higher self-efficacy not only set higher, more productive mastery goals (Walker & Greene, 2009), but they also choose to engage in more challenging tasks (Shea & Bidjerano, 2010). Adapted from the general definition of self-efficacy into BEL context, in this study, we define e-learning self-efficacy as the confidence in student's ability to perform English learning tasks in BEL. The capacity to shape e-learning self-efficacy in positive ways is crucial given the connection between self-efficacy beliefs, active participating effort and learning performance/effectiveness of English proficiency development. In short, university students' e-learning self-efficacy is a powerful construct that may explain differences in their active learning and academic achievement in English proficiency development.

Given that e-learning self-efficacy plays a substantial role in predicting student engagement, motivation and learning performance, it is evidently essential to describing and explaining self-regulated, active, and successful learners (Liu et al., 2016; Puzziferro, 2008). Shea and Bidjerano (2010) signified the existence of a positive relationship between effective teaching and learning presence, supportive social presence, better self-efficacy and thus better ratings of cognitive presence. Prior research (e.g., Alshibly, 2014; Chu, 2010; Chien, 2012; Tarhini et al., 2014) has also shown that increases in e-learning self-efficacy improve initiative and persistence, which lead to improved performance or learning effectiveness. In that sense, in the context of BEL, e-learning self-efficacy could reduce learning barriers in using a BEL system. If university students have higher e-learning self-efficacy and can control a BEL system effortlessly, they will perceive the BEL system's usefulness and value, which in turn motivates their active participation in BEL. Empirical evidence also indicates that increases in e-learning self-efficacy can improve students' confidence in their e-learning capabilities, which in turn leads to positive learning outcomes of English proficiency

development (Chien, 2012; Mbarek & Zaddem, 2013; Wu et al., 2011). Accordingly, the following hypotheses are proposed:

H2. E-learning self-efficacy will positively affect students' learning effectiveness of English proficiency development.

H3. E-learning self-efficacy will positively affect students' active participation in BEL.

### *2.5 The effects of social influence*

Social influence theory proposes that individual behavior will be affected by compliance process. The construct of social influence reflects the effect of significant others' opinions on a user's behavior. The effect of social influence on an individual's behavior is attributed to his or her belief about the necessities of performing certain behavior for the reason that someone who is important or holds an influential position in the decision making process would think he/she should do it regardless of the consequential outcomes (Fulk, 1993; Fulk et al., 1990). In addition, both the theory of reasoned action (TRA) and theory of planned behavior (TPB) have argued that social influence affects behavioral intention (Fishbein and Ajzen, 1975; Ajzen, 1991). This argument has received support from extant research. There are a variety of definitions and associated operations of social influence which have been proposed and explored in e-learning research (e.g., Bhuasiri et al., 2012; Cheng, 2011; Garrison, 2011; Hernandez et al., 2011; Sun et al., 2008). Based upon the perspective of Ajzen and Fishbein (1980), in this study, social influence was defined as a student's perception of the social pressures put on him to perform or not perform the specific behaviors in BEL. When most people that are important to a student recommend him/her to participate in BEL, he/she will comply with their opinions.

In virtual learning environment design, there is an increasing focus on facilitating social influence factors in a BEL context (Al-Hunaiyyan et al., 2008; Mueller & Strohmeier, 2011; Wang & Chiu, 2011). Prior research (Pituch & Lee, 2006) shows that social influence has a direct effect on the usage of an e-learning system. The social influence effects among students, between faculty, relatives and friends and learning collaboration are the keys to learning process effectiveness. For example, Venkatesh and Davis (2000) proposed a revised technology acceptance model, TAM2, which included social influence as one of the critical normative beliefs of behavioral intentions and indicated social influence may play a significant role in affecting behaviors (Liu et al., 2010; Tselios et al., 2011; Venkatesh et al., 2003). Considering the social learning and interaction nature of the virtual community in producing interpersonal influence (Zhou, 2011), we also include peer influence to complement TAM. This research denotes a significant role for social influence in a mandatory BEL usage context.

There is significant empirical evidence that the learning processes facilitated by social influence are necessary for students' active participation in English learning activities. The advanced cognitive learning outcomes in English are more likely to appear when students are proactively engaged in specific interaction situations (peer-to-peer interaction, minority influence, active participation in virtual social networks, etc.), whereas other and more



diffused social influence are more likely to promote superficial information inquiry and active learning engagement (Karim & Behrend, 2013; Liu et al., 2016; Noe et al., 2010; Walker & Greene, 2009). In our research context of a BEL environment for English learning, students sought the approval of their instructors and peers; therefore, perceived encouragement from their instructor and/or peers to use a system was regarded as social persuasive information that may motivate students to actively participate in BEL. In that sense, it is reasonable to assume that students' active participation will be affected by social influence. Thus,

H4. Social influence will positively affect students' active participation in BEL.

### *2.6 The effects of BEL system characteristics*

System characteristics can influence users' intentions to use and usage behaviors. For example, Davis et al. (1989) proposed that system characteristics exhibit effects on usage intentions or behaviors through their relationships with perceived usefulness and perceived ease of use. Davis (1993) showed that perceived usefulness and perceived ease of use mediates the effects of system characteristics on usage behaviors. Prior studies (e.g., Alshibly, 2014; Liu et al., 2010; Padilla-Meléndez et al., 2013; Tarhini et al., 2014; Mohammadi, 2015) also applied different constructs of system characteristics as antecedents affecting perceived ease of use and perceived usefulness by extending TAM and found significant relationships between the critical variables and the belief constructs in e-learning.

In a BEL environment, the key elements of learning processes are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from student active participation (Liang & Bonk, 2009; Wu et al., 2011). The quality and reliability of a BEL system, as well as easy access to appropriate educational technologies, material content, and course-related information are important determinants of system success (Bhuasiri et al., 2012; Tomlinson & Whittaker, 2013; Lin & Wang, 2012). Thus, system characteristics are identified as a critical technological factor for a BEL system. They are expected to influence the learner to use and accept a blended e-learning systems. Prior research has shown that system characteristics significantly affected user beliefs in various computer-related contexts (Venkatesh & Davis, 2000). For instance, research findings showed that specific system characteristics are a critical factor that influences e-learning system usage (Pituch & Lee, 2006). Pituch and Lee (2006) defined system characteristics as the perceived ability of an e-learning system to provide flexible access to instructional and assessment media. Accordingly, we define BEL system characteristics as the extent of perceived ability of a BEL system platform to provides supportive learning functions and flexibilities, allows them to control over their learning activities, and realize the key points with content-rich design for English proficiency development.

System characteristics have the potential to directly affect students' active participation in BEL and learning effectiveness of English proficiency development. In BEL, various web-based e-learning applications integrate with FTF classrooms to form a click-and-mortar learning environment to facilitate students' active participation. Students' active participation can be asynchronous or synchronous. As a result, there is no time and space constraint for

students to engage in discussions on diverse topics with facilitators and peers. The availability of interactive web-based applications (e.g., discussion forums, chat systems, e-mail, and more recently, social software and desktop conferencing systems) can thus facilitate students' active participation in BEL. Hence, system characteristics are expected to be one of the critical influencing factors that may affect student active participation in BEL context. In addition, there is also a significant relationship between BEL system characteristics and learning effectiveness. In a BEL environment, the diverse system functionalities can be delivered and accessed depending upon the support of appropriate system characteristics a BEL system facilitated (Pituch & Lee, 2006; So et al. 2008). Pituch & Lee (2006) argued that system characteristics affect the effectiveness of e-learning. Also, Hrastinski (2008) found that students' grades are highly correlated with students' active participation. Students perceiving a higher level of system characteristics in a BEL environment will lead to a higher level of learning performance and outcomes for their English proficiency development. Thus, we consider that students' active participation in BEL and learning effectiveness of English proficiency development highly depend on the power and quality of BEL system characteristics. Therefore, the following hypotheses are proposed:

H5. BEL system characteristics will positively affect students' active participation in BEL.

H6. BEL system characteristics will positively affect students' learning effectiveness of English proficiency development.

Based on the above discussions, we consider that the social cognitive theory is applicable to the BEL context. Accordingly, three factors: learners' cognitive factor (e-learning self-efficacy), technological environment factor (BEL system characteristics), and social environment factor (social influence) are identified and elucidated as the primary antecedents of technical-vocational university students' active participation and learning effectiveness of English proficiency development within a BEL environment, as shown in Figure 1.

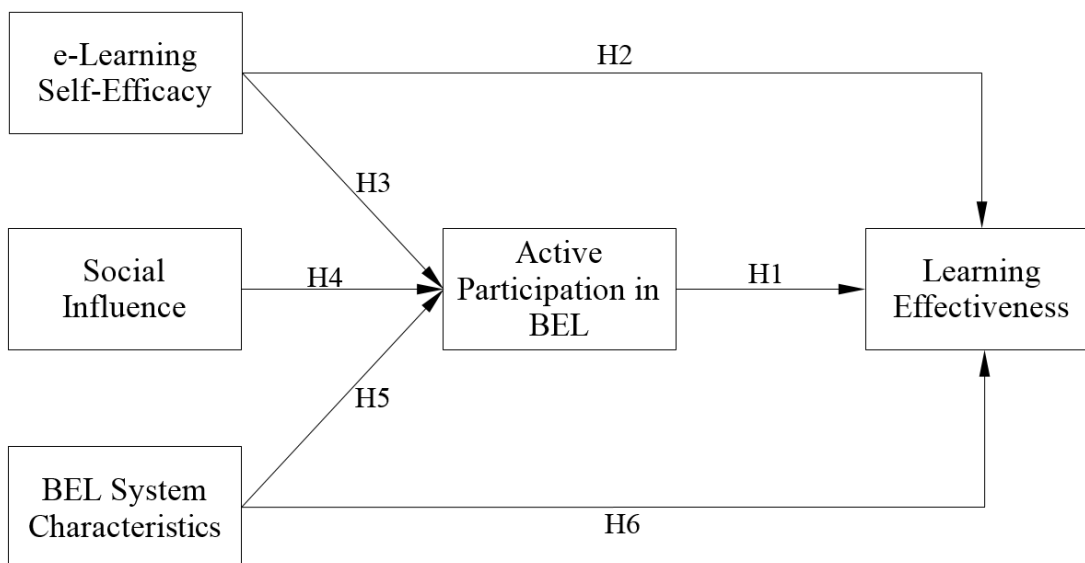


Figure 1: The research model

### 3. Research Design

#### 3.1 Instrument Development

Constructing the survey instrument began with developing the related influencing factors of college students' student active participation and learning effectiveness of English proficiency development and generating the corresponding scale items. Previous research was reviewed to ensure that a comprehensive list of items was developed. The majority of the scale items were adopted from prior works of e-learning literature but modified slightly for our research context. Those items regarding e-learning self-efficacy were integrated and adapted from Garavan et al. (2010), Kim and Frick (2011), Padrós et al. (2011), Shen et al. (2013) and other related prior e-learning literature. The measures for social influence were adapted from Guo and Stevens (2011), Mohammadi (2015), and Padilla-Meléndez et al. (2013). The scale items for BEL system characteristics were taken from Küçük et al. (2010), Tan et al. (2012) and Tshabalala et al. (2014). The items for active participation in BEL were modified from Blasco-Arcas et al. (2013), Cheng and Chau (2016), Hussein (2015), Zacharis (2015). The measures for learning effectiveness of English proficiency development were adapted from Ahmed (2010), Banerjee (2011), Chen (2014), Shih (2011) and other prior literature.

Once the item list for the initial questionnaire was generated, an iterative personal interview process was conducted to refine the draft instrument. These interviews enabled the researcher to gauge the clarity of the tasks, assess whether the instrument captured the desired phenomena, and verify that important aspects have not been omitted. This process continued until no further modifications to the questionnaire were necessary. Feedback from the interview processes served as the basis for correcting, refining, and enhancing the experimental scales. For instance, scales were eliminated if they represented the same aspects with only slightly different wording and modified if the semantics were ambiguous in order to enhance the psychometric properties of the survey instrument. Then, after completing the development of the related scale items, several small-scale pretests were conducted with a small group of respondents to ensure the completeness and appropriateness of the scale items developed. A self-administered survey instrument was then developed and used to collect the data for this study.

The finalized questionnaire for the study consisted of two parts: respondents' demographic data and responses to the research questions. The subjects' demographic information included gender, age, academic major, frequency and experience of Internet usage, experience in English learning and frequency of using the BEL system, etc. The second part assessed the subjects' perceptions of each variable in the proposed research model as shown in Figure 1. It included items for each construct. All items are measured via a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale items for each of the major constructs encompassing the research model are listed in Table 2.

#### 3.2 Participants

The empirical data was gathered using a self-administered questionnaire. At first, students

were comprehensively told to respond to the survey as candidly as possible; there were no right or wrong answers regarding the items in the questionnaire, and that their participation in the survey was irrelevant to his or her final grade for the course. This study was focused on assessing their perceptions regarding usage of blended e-learning. The participants were self-administered the 25-item questionnaire after the final-term examination of an EFL course to ensure that they have actually used the BEL system. For each question, respondents were asked to circle the response which best described their level of agreement.

As mentioned above, the approach taken to test the relationships posited in the proposed research model and the research hypotheses was a field study using a survey methodology for data collection. The study was conducted at a technical-vocational college, located in southern part of Taiwan. All of the students who had ever taken the EFL course with BEL were qualified to be invited to participate in the survey. As a result, 728 students in this college had to enroll in the EFL course with BEL. Participants for this study were students that had the opportunity to take courses via BEL. 368 questionnaires were returned. Seventy responses were incomplete and had to be discarded. This left 298 valid responses for the statistical analysis, and a valid response rate of 40.93% of the initial sample. The targeted population for the study consisted of all students enrolled in the blended e-learning courses in this college. This the EFL course with BEL was a compulsory course for the students in the night college and the affiliated continuous college of this institute. The potential non-response bias was assessed by comparing the early versus late respondents that were weighed on several demographic characteristics. The results indicated that there were no statistically significant differences among demographics between the early and late respondents. The respondent profiles are shown in Table 1.

Table 1: Respondents Profile (N=298)

Demographics	Classification	Freq.	%	Demographics	Classification	Freq.	%
Gender	Male	90	30.2	Frequency of Internet usage	Less than once a month	20	6.71
	Female	208	69.8		About once a month	11	3.69
Age	Under 20	35	11.74		A few times a month	29	9.73
	20-29	128	42.95		A few times a week	72	24.16
	30-39	70	23.49		About once a day	64	21.48
	40-49	56	18.79	Several times a day	102	34.23	
	50-60	9	3.02	Experience of	Less than 1 year	80	26.85

Major	Gemology	24	8.05	English learning	1-2 years	55	18.46
	Business mgmt.	57	19.13		2-3 years	40	13.42
	Early childhood	28	9.4		3-5 years	32	10.74
	Information mgmt.	49	16.44		5-7 years	30	10.07
	Beauty science	50	16.78		7-10 years	23	7.72
	Social work	90	30.2		More than 10 years	38	12.75
Experience of Internet usage	Less than 1 year	16	5.37	Frequency of BEL system usage	Less than once a month	58	19.46
	1-2 years	23	7.72		About once a month	44	14.77
	2-3 years	38	12.75		A few times a month	71	23.83
	3-5 years	73	24.5		A few times a week	91	30.54
	5-10 years	100	33.56		About once a day	21	7.05
	More than 10 years	48	16.11		Several times a day	13	4.36

### 3.3. Analysis Methods

Structural equation modelling (SEM) techniques such as LISREL, AMOS, EQS and partial least squares (PLS) are second generation data analysis techniques that can be used to perform path analytic modelling with latent variables and test the extent to which IS research meets recognized standards for high quality statistical analysis (Chin, 1998). Because of the greater flexibility that a researcher has for the interplay between theory and empirical data, SEM-based procedures have substantial advantages over first-generation techniques such as principal components analysis, exploratory factor analysis, discriminant analysis, or multiple regression. Such techniques offer social scientists with the flexibility to model nomological relationships among multiple predictor and criterion variables, construct unobservable latent variables, model errors in measurements for observed variables and statistically validate a priori theoretical assumptions against empirical data (Chin, 1998). We chose this approach because PLS's ability to assess the measurement model within the context of its theoretical mediated model makes it superior to multiple regression, especially when using new scales. PLS employs component-based estimation (Lohmöller, 1989), thereby maximizing the variance explained in the dependent variable. It does not require the data to have multivariate normality (Gefen et al., 2011) and it can handle formative constructs (Chin et al., 2003). Furthermore, it imposes fewer requirements on the sample size, unlike other structural



equation modelling (SEM) methods, which is recommended for confirmatory analysis and requires a more stringent adherence to distributional assumptions (Chin, 1998). In general, PLS is better suited for explaining complex relationships as it avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell & Larcker, 1981). Because of the aforementioned reasons, SmartPLS 2.0 M3 (Ringle et al., 2005) was applied to the data analysis. The evaluation of the model fit was conducted in two stages (Chin, 1998; Gefen & Straub, 2005). First, the measurement validation is assessed, in which construct validity and reliability of the measures are assessed. The structural model with hypotheses is then tested. The statistical analysis strategy involved a two-phase approach in which the psychometric properties of all scales were first assessed through CFA and the structural relationships were then validated using bootstrap analysis.

#### **4. Data Analysis and Results**

##### *4.1 Measurement Properties*

All the constructs in the conceptual model were modeled as reflective and were measured using multiple indicators. The measurement model relating the scale items to their latent constructs was analyzed by SmartPLS 2.0 M3 (Ringle et al., 2005). The assessment of item loadings, reliability, convergent validity, and discriminant validity was performed for the latent constructs through a CFA. Reflective items should be unidimensional in their representation of the latent variables, and therefore correlated with each other. Factor loadings of scale items should be above 0.707, showing that over half of the variance is captured by the constructs (Gefen & Straub, 2005). Also, all constructs in the measurement model should exhibit good internal consistency as evidenced by their composite reliability scores. The composite reliability coefficients of all constructs and the AVE in the proposed conceptual framework were also checked for the adequacy. As shown in Table 2, the factor loadings for all constructs with reflective measures were well above the 0.707 guideline and statistically significant, indicating satisfactory item reliability for the reflective measures. These results collectively suggest good measurement properties for all constructs.

All constructs in the measurement model exhibit good internal consistency as evidenced by their composite reliability scores. The composite reliability coefficients of all constructs in the proposed conceptual model are more than adequate. There are two requirements used in assessing discriminant validity: (1) indicators should load more strongly on their corresponding construct than on other constructs in the model; and (2) the square root of the average variance extracted (AVE) should be larger than the inter-construct correlations (Chin, 1998). The amount of variance explained by a construct is given by its average variance extracted (AVE). The discriminant validities of the major constructs of the conceptual framework are also assessed using the PLS analytical method.

Table 2: Composite reliability and inter-correlations among major constructs

Construct	Item#	Scale item	Mean	Loading
E-learning self-efficacy (ELSE)	ELSE1	I could use the BEL system for English learning if there was no one around to tell me what to do as I go.	3.57	0.837
	ELSE2	I could use the BEL system for English learning if I had never used a package like it before.	3.42	0.847
	ELSE3	I could use the BEL system for English learning if I had just the built-in help facility for assistance.	3.54	0.911
	ELSE4	I could use the BEL system for English learning if I had just the system operation manual for assistance.	3.57	0.907
	ELSE5	I could use the BEL system easily to do what I want it to do.	3.59	0.883
Social influence (SI)	SI1	My friends would think that I should attend the BEL course for English learning.	3.59	0.914
	SI2	My classmates would think that I should attend the BEL course for English learning.	3.58	0.928
	SI3	My teachers would think that I should attend the BEL course for English learning.	3.63	0.908
	SI4	My brothers and sisters would think that I should attend the BEL course for English learning.	3.47	0.900
	SI5	My parents and elders would think that I should attend the BEL course for English learning.	3.55	0.889
BEL system characteristics (SC)	SC1	The BEL system allows me to control over my English learning activities.	3.91	0.844
	SC2	The BEL system offers flexibility in English learning as to time and place.	4.10	0.808
	SC3	The BEL system enables my full participations in English learning.	3.90	0.899

	SC4	The BEL system help me realize the key points with content-rich design for English learning.	3.72	0.843
	SC5	The BEL system provides helpful learning functions for English learning.	3.92	0.883
Active participation (AP) in BEL	AP1	I actively search for English learning information in BEL.	3.85	0.886
	AP2	I actively exchange information, opinions, experiences in BEL.	3.80	0.921
	AP3	I actively develop friendships with other members in BEL.	3.72	0.911
	AP4	I actively spend a lot of time interacting with classmates in BEL.	3.74	0.904
	AP5	I actively communicate with some classmates in BEL.	3.71	0.913
Learning effectiveness (LE) of English proficiency development	LE1	Through BEL I can effectively increase my English learning productivity.	3.87	0.912
	LE2	Through BEL I can effectively enhance my English learning performance.	3.77	0.913
	LE3	Through BEL I can effectively improve my English learning efficiency.	3.79	0.900
	LE4	Through BEL I can effectively develop my English skills.	3.66	0.850
	LE5	Through BEL I can effectively enhance my effectiveness for English learning.	3.74	0.890

Table 3 shows the composite reliability, average variance extracted (AVE) and square root of the AVE, as well as the correlations between the constructs. The composite reliability values for all constructs were above the recommended level of 0.70, indicating adequate internal consistency (Hair et al., 2005). Convergent validity is demonstrated as the AVE values for all constructs and is higher than the suggested threshold value of 0.50. Comparing the square root of the AVE (bold figures on the diagonal) with the correlations among the constructs, the result indicates that each construct was more closely related to its own measures than to those of other constructs, so discriminant validity was therefore supported (Chin, 1998; Hair et al., 2005). All constructs share more variance with their indicators than with other constructs. Thus, the convergent and discriminant validity of all constructs in the proposed research model can be assured.

Table 3: Composite reliability and inter-correlations among major constructs

Constructs	ELSE	SI	BELSC	AP	LE
e-learning self-efficacy (ELSE)	0.88*				
Social influence (SI)	0.43	0.91			
BEL system characteristics (BELSC)	0.58	0.52	0.86		
Active participation (AP) in BEL	0.53	0.57	0.71	0.91	
Learning effectiveness (LE)	0.57	0.53	0.79	0.74	0.89
Composite reliability (CR>0.7)	0.94	0.96	0.93	0.96	0.95
Cronbach's alpha coefficient ( $\alpha$ >0.7)	0.93	0.95	0.91	0.95	0.94
Average variance explained (AVE>0.5)	0.77	0.82	0.73	0.82	0.80

\* *Diagonal elements are the square roots of average variance explained (AVE).*

As with all self-administered survey data the potential for common method bias (CMB) exists. In accordance with Podsakoff and Organ (1986), we performed statistical analyses to assess the severity of CMV. First, we applied the Harmon one-factor test (Podsakoff et al. 2003) to validate the eight conceptually crucial variables in our theoretical model. The analysis results signified that the principal latent variables are present and the highest covariance that is explained by one factor is 25.32 percent, indicating that common method biases may not contaminate our analysis results. Then, following the prior work of Liang et al. (2007), we included in the PLS model a common method factor with all the principal constructs' indicators. The variances explained by the principal construct and by the method of each indicator were both examined. The analysis results showed that all of the method factor loadings are not significant. Given the small magnitude and insignificance of method variance, we contend that the CMB is unlikely to be a serious concern for this study.

#### 4.2 Hypotheses Testing

For the proposed hypotheses testing in the second phase of PLS analysis, the structural model is assessed to confirm the causal relationships specified by the proposed model are consistent with the empirical data. The PLS method does not directly provide significance tests and path coefficient confidence interval estimates in the proposed model. A bootstrapping technique was used to estimate the significance of the path coefficients. Bootstrap analysis was performed with 500 subsamples and the path coefficients were re-estimated using each of these samples. The parameter vector estimates was used to compute parameter means, standard errors, significance of path coefficients, indicator loadings and indicator weights.

This approach is consistent with recommended practices for estimating significance of path coefficients and indicator loadings (Löhmoeller, 1989) and has been used in prior information systems studies (Chin & Gopal, 1995; Hulland, 1999).

Hypotheses and corollaries testing were performed by examining the size, the sign, and the significance of the path coefficients and the weights of the dimensions of the constructs, respectively. Results of the analysis for the structural model are presented in Figure 2. The estimated path coefficient (standardized) and its associated significance level are specified next to each link. The  $R^2$  statistic is indicated next to the dependent construct. The statistical significance of weights can be used to determine the relative importance of the indicators in forming a latent construct. We found that all specified paths between constructs in our research model had significant path coefficients. The results provide good support for our model. One indicator of the predictive power of path models is to examine the explained variance or  $R^2$  values (Chin & Gopal, 1995).  $R^2$  values are interpreted in the same manner as those obtained from multiple regression analysis. They indicate the amount of variance in the construct that is explained by the path model (Barclay et al., 1995).

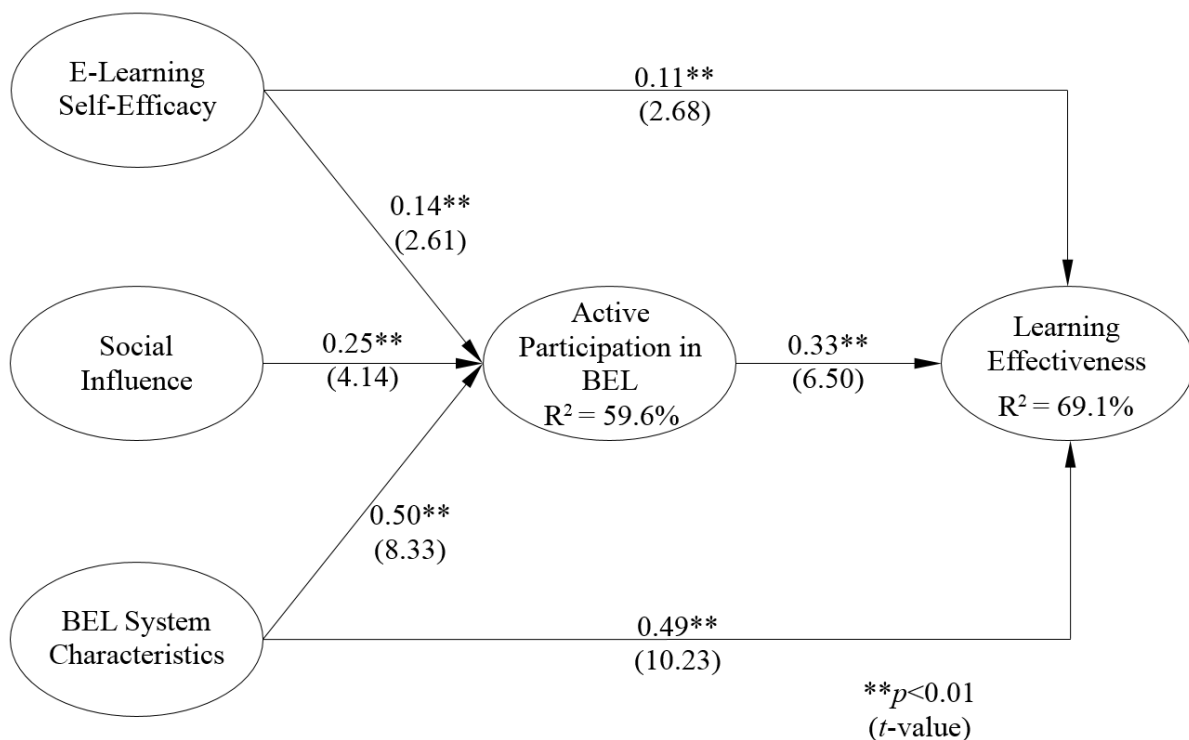


Figure 2. PLS analysis results

As shown in Figure 2, the analysis results indicate that the model explained 69.1 percent of the variance in the construct of learning effectiveness of English proficiency development in BEL. Similarly, 56.9 percent of the variance in active participation in BEL were explained by the related antecedent constructs. The magnitude and significance of these path coefficients provides further evidence in support of the nomological validity of the research model. The hypothesis, drawn from active participation in BEL to learning effectiveness of English



proficiency development (H1), is also confirmed by the significant path coefficient of 0.33 (t-value = 6.50,  $p < 0.01$ ). Explicitly, active participation in BEL will have direct effect on learning effectiveness of English proficiency development. As for the hypotheses effectively drawn from e-learning self-efficacy to learning effectiveness of English proficiency development in BEL (H2) and active participation in BEL (H3) are supported by the significant path coefficients of 0.11 (t-value = 2.68,  $p < 0.01$ ) and of 0.14 (t-value = 2.61,  $p < 0.01$ ), respectively. That is, students who had higher e-learning self-efficacy will be more active to participating in the BEL environment and are more likely to gain higher learning effectiveness of English proficiency development.

For the influence of social influence factor, the hypothesis, H4, drawn from social influence to students' active participation in BEL is determinedly supported by the significant path coefficient of 0.25 (t-value = 4.14,  $p < 0.01$ ). Thus, it can be reasonably inferred that the influence contributed by the construct of social influence has strong significant effect on students' active participation in BEL. Namely, the construct of social influence is substantiated to be a significant external predictor for students' actively behavior to participate in a BEL environment. In addition, regarding to the effects caused by the functionality of a BEL system, the analysis results also confirm the proposed hypothesis drawn from BEL system characteristics to active participation in BEL (H5). Pertaining to the aspect of BEL technological factors, the plausible hypotheses drawn from BEL system characteristics to active participation in BEL (H5) and learning effectiveness of English proficiency development (H6) are supported by the significant path coefficients of 0.50 (t-value = 8.33,  $p < 0.01$ ) and of 0.49 (t-value = 10.23,  $p < 0.01$ ), respectively. That is, BEL system characteristics significantly influence technical-vocational university students' active participation and learning effectiveness of English proficiency development in BEL.

As a whole, the PLS analysis results show that e-learning self-efficacy, social influence, and BEL system characteristics will have direct effects on students' active participation in BEL. Likewise, e-learning self-efficacy, active participation in BEL, and BEL system characteristics will have salient impacts on student learning effectiveness of English proficiency development. Among them, the construct of BEL system characteristics provide the greatest contribution to technical-vocational university students' active participation in BEL and learning effectiveness of English proficiency development. The significant path coefficients, effect size and the value of the  $R^2$  reinforce our confidence in the hypotheses testing results and provide support for the proposed conceptual framework in the BEL setting.

## **5. Discussions and Conclusion**

As a powerful alternative for e-learning applications in English proficiency development, BEL environments combine the advantages of traditional and online learning and are widely applied to support English learning as well as responding to English learner needs. It is progressively becoming one of the most conspicuous instructional delivery solutions in English proficiency development in Taiwan. In order for the success and effective implementations of a BEL environment, it is crucial for researchers to cumulate efforts from the continuations of rigorous scientific approaches, educational theories, and well-targeted

procedures and techniques in the area of e-learning. This study presents a theoretical model to examine the impacts of key determinants on technical-vocational university students' active participation in BEL and learning effectiveness of English proficiency development in a BELS environment. The results provide strong evidence for the nomological validity of each construct and the effects on learning effectiveness of English proficiency development, as shown in Figure 2.

The findings of this study demonstrated that e-learning self-efficacy, social influence and BEL system characteristics are three critical antecedents of active participation in BEL. Besides, the social influence factor provided an indirect contribution to learning effectiveness of English proficiency development via active participation in BEL. Also, the four influencing factors of e-learning self-efficacy, social influence, BEL system characteristics and active participation in BEL will collectively contribute to students' learning effectiveness of English proficiency development. As a consequence, as technical-vocational university students become more confident of learning with BEL, positive perceptions on social influence, active participation in BEL and more accustomed to the BEL learning environments with superior BEL system characteristics, they will likely expect more benefits from the use of BEL. These findings provide initial insights into those factors that are likely significant antecedents for planning and implementing BEL environment to enhance student learning effectiveness of English proficiency development.

Drawn from the empirically results, this study provided interesting insights into the applicability of some of the related constructs in implementing a BEL environment. The research findings suggested general adequacy and applicability of the proposed conceptual framework in the context of BEL settings. This study employed a rigorous scale development procedure to establish an instrument to weigh up university students' active participation in BEL and their learning effectiveness of English proficiency development. The main contributions and implications of this study could be specified in the many aspects. Firstly, technical-vocational education institutions should provide sufficient supports and learning resources to enhance university students' e-learning self-efficacy. The empirical results demonstrate that e-learning self-efficacy have a significant impact on university students' active participation in BEL and their learning effectiveness of English proficiency development. This implies that university students should have the basic e-learning literacies necessary to operate BEL system to control over their English learning activities and facilitate active engagement into the BEL environment. Therefore, English instructors and administrators of technical-vocational universities/colleges should provide sufficient English learning materials and the interrelated resources to enhance their e-learning self-efficacy; and thereby encourage students to actively participate in BEL for English learning and achieve great learning effectiveness of English proficiency development.

Secondly, a BEL environment should take the advantage of social influence to facilitate students' active participation in BEL and instructors should motivate peer to peer interaction widely. The results demonstrate that social influence had a significant positive influence on university students' active participation in BEL. This findings suggest that when implementing BELS courses, the instructors should motivate the positive social influence of

students to increase participant communication and collaborative learning via the BEL environment. In general, a positive social influence can inspire students to actively participate in BEL for English learning. Thus, if BEL could create a good social influencing environment to facilitate the student-to-student and student-to-instructor interactive communication and collaborative learning, students will be more likely to actively participate in English learning through BEL, so as to foster greater learning effectiveness for their English proficiency development.

Thirdly, BELS should offer superior system characteristics and/or functionalities. The results show that system characteristics have a significant influence both on university students' active participation in BEL and their learning effectiveness of English proficiency development. These findings suggest that BEL system should provide instrumental functions with flexible learning and content-rich system design that satisfy students' needs. Also, various types of content presentation, customized functions to allow university students control over their English learning activities, and flexible access to fit various students' learning needs of full participations in BEL.

Finally, a BEL environment should inspire students to actively participate in English learning through BEL. Our findings indicate that university students' active participation in BEL provide a salient contribution to their learning effectiveness of English proficiency development. This suggests that English instructors should take advantage of BEL approaches to enhance students' active English learning behaviors that would be able to improve the learning outcomes with better English proficiency. Accordingly, if students believe that active participation in BEL is meaningful, valuable and stress-free, they will be more likely to achieve greater English proficiency development.

Even though the current research provides insights into what determines student learning effectiveness of English proficiency development in a BEL environment, it has several limitations that also represent opportunities for future research. First, the model was validated using sample data gathered from the target universities in Taiwan. The fact that the participants come from one country limits the generalizability of the results. Other samples from different nations, cultures, and contexts should be gathered to confirm and refine the findings of this study. Second, given the self-report instrument used, therefore, the typical shortcomings associated with self-report measures must be recognized when interpreting the results. In addition to making an overall assessment, the instrument developed in this study can be adapted to compare different e-learning contexts (e.g., adaptive e-learning, Interactive e-learning, mixed/augmented/virtual reality e-learning, collaborative e-learning, etc.) with other specific factors (e.g., learner interaction, virtual learning community, digital content features, and anxiety, etc.). The proposed conceptual framework might also be tailored to counterpart the specific research or practical needs of specific BEL environments for different learning purposes. The generality of the results can also serve as a useful theoretical basis for the comparative analyses in the future. Third, this research sets a timely stage for future research in understanding the determinants of learning effectiveness of English proficiency development in a BEL environment. It would be interesting to use a longitudinal design to examine the relationships among the identified research variables might be a useful extension

to the current study. Finally, the results cannot be exhaustive and future works should endeavor to uncover additional determinants of student learning effectiveness of English proficiency development in BEL.

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