Extending the Task-Technology Fit Model in an E-Collaborative English Learning Context

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ABSTRACT

Superstar Learning System is a popular e-collaborative learning app especially in English reading learning. This study randomly selected 2061 out of around 2500 students in a public university. Through a large-scale questionnaire survey and some semi-structured in-depth interviews, the study collected plentiful data to extending the task-technology fit model in an e-collaborative English learning context. It is concluded that in an e-collaborative English learning context (a) system quality, information quality, service quality, compatibility, actual usage, and user satisfaction exert a significant influence on TTF at the significance level .05 in an e-collaborative English learning context; (b) TTF exerts a significant influence on performance impact at the significance level .05; and (c) significant correlations are revealed between system quality, information quality, service quality, compatibility, actual use, user satisfaction, and TTF at the significance level .05. This study initiates the model extension, which is beneficial to researchers and practitioners.

KEYWORDS

E-Collaborative English Learning, Goodness of Fit, Superstar Learning System, Task-Technology Fit Model

INTRODUCTION

Superstar Learning System

Superstar Company was established in 1993. There are more than 40 branches and offices in China and the United States. The business scope of the company includes technology development, technology promotion, technical consultation and technical services, computer technology training, data processing, etc. Superstar Company (http://www.chaoxing.com/) has launched a mobile app learning platform, namely Superstar Learning System, which is a convenient app to learn whenever or wherever. Teachers can upload all the teaching resources on the app through computers or smartphones. Students may have an easy access to mass learning resources and learn collaboratively with peers.

Superstar Learning System, designed and developed by Superstar Company, is a professional mobile learning platform for smart phones, tablets and other mobile terminals. Users can borrow books, inquire about information, collect data from the library, search electronic resources, download learning resources, search and browse information from the library, learn a course, conduct peer or

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group discussion, read electronic books or journals, view the information of organizations, have access to various kinds of newspapers, articles, or books in many languages. It can also provide a learning platform to provide users with convenient and fast mobile learning services. Students can also implement collaborative learning through Superstar Learning System.
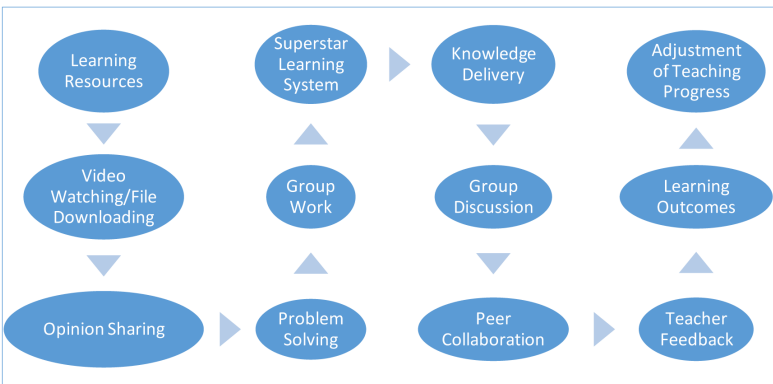
Compared with other learning technologies, e.g. Rain Classroom and Kahoot!, Superstar Learning System realizes the whole process of student learning and teacher-student interaction, data recording, analysis, and application, which allows learners to view the details of any activity. Superstar Learning System can also encourage student participation, and assist teachers to carry out data analysis and make timely teaching adjustments (Kang, 2017). It realizes a mixed teaching model, stimulates the student-centered teaching, breaks through the traditional teacher-centered pedagogical model, and improves students' learning autonomy (Wang, Liu, & Gu, 2019). However, very few researchers have been committed to the Task-Technology Fit (TTF) Model of this mobile learning device. It is thus meaningful to explore the TTF Model of Superstar Learning System.

E-COLLABORATIVE LEARNING

The e-collaborative learning style indicates the learning model where students collaborate with peers or teachers in form of teams or groups to achieve learning goals (Jaime et al., 2013), through which learners could share opinions and learning resources through an online platform (Szewkis et al., 2011). During this special COVID-19 pandemic, the teaching model is changing and the traditional teaching model can no longer cater to the needs of learners and teachers. The type of pedagogical reform makes the information exchange between teachers and students faster and more convenient. In today's education model of network popularization, Superstar Learning System integrated into mobile phone comes into being, conducive to an e-collaborative English learning style.

An e-collaborative English language learning style was constructed based on the use of Superstar Learning System (Figure 1). The e-collaborative style was implemented through both students and teachers. On one hand, Superstar Learning System could provide a sea of learning resources on the online platform, where students could download and share them with peers. They could watch videos to learn English language knowledge either with their peers or on their own. They can share opinions with an aim to solving difficult problems. Through group work, students could continue to learn and have access to the online platform of Superstar Learning System. On the other hand, teachers could deliver knowledge through the platform. Students could acquire the knowledge through group discussion and peer collaboration. Teachers could provide timely feedback to any issue raised by the students. Teachers could then adjust the teaching progress based on students' learning outcomes.

Figure 1. E-collaborative English learning aided with Superstar Learning System
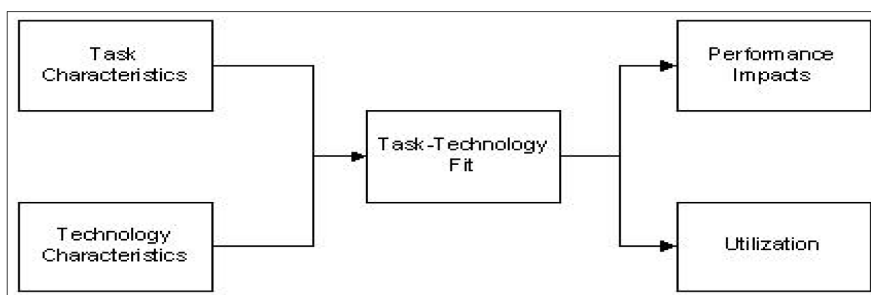
THE SIGNIFICANCE OF THIS STUDY

Superstar Learning System could improve the e-collaborative teaching and learning effectiveness. Teachers can present lectures by showing PPT on the Superstar Learning System platform. They can also project a large number of learning resources to a screen originating from the Internet, peer sharing, and lecturing, etc. Learners can take down notes and read many books, articles, and other publications on the platform. Although e-collaboration has experienced long-time practice and rich theories, few studies have examined how to improve it through Superstar Learning System based on a model. This study, aiming to investigate a model improving e-collaboration, is meaningful and timely.

LITERATURE REVIEW

The TTF Model

The model of TTF maintains that information technology (IT) possibly exerted a positive influence on learners' performance and was accepted if the given IT could meet the needs of necessary tasks (Goodhue & Thompson, 1995). The TTF model holds that characteristics of both task and technology greatly influenced TTF, which exerted a great influence on Performance Impacts through the utilization of certain IT (Figure 2).

Figure 2. The TTF model (Goodhue & Thomson, 1995)

Revisions of the TTF Model

Technology-to-Performance Chain (TPC) Model (Goodhue & Thompson, 1995) was proposed, which integrated attitudes and behaviors of users and their personalities. Users' characteristics indicate the easiness and quality of technology that could lead to differences in personal use. In terms of users of technology, the factors are reflected on the individual psychological level. In fact, they form attitudes towards the personal ability to complete a certain task. Researchers collectively call these factors self-efficacy.

The technology acceptance model (TAM) aimed to investigate the acceptance of mobile learning devices (e.g. Yu & Yi, 2020). The TTF model can make up for the inefficiency of TAM, but the earliest TTF model intends to strike a balance between the use of technologies and requirements of the task. Nevertheless, when users are performing tasks, they tend to consider community members users of technology and undertakers of tasks. Therefore, the organization-technology fit greatly influences task-technology adaptation. Organizational-technical adaptation means that the specifications of community support should be consistent with technology requirements.

Besides, a growing number of studies on technology user behavior integrate TTF with TAM, which is popular in many research areas. The behavior, psychology, and final results of users' acceptance and the use of technology are not exhaustive in which one model is applicable. In the next study, innovative concepts and elements are constantly combined, leading to consistency between the TTF model and applications.

Many scholars extended the model (e.g. Yu, 2020). For example, Alrajawy et al. (2018) extended the TAM (Davis, 1989) by including users' characteristics such as the characteristic of anxiety. Aldholay et al. (2018b) extended The DeLone and McLean Model of Information Systems Success (DMISM) (Delone & Mclean, 1992) by including individual characteristics, i.e. self-efficacy. Aldholay et al. (2018b) extended the DMISM by adding institutional characteristics such as leadership. This study, aiming to extend the TTF model by including constructs that have seldom been included, is considered meaningful and worthwhile to researchers and practitioners.

Extending the TTF Model

Constructs influencing TTF included System Quality, Information Quality, Service Quality, User Satisfaction, subjective norm, and task characteristic. System Quality refers to the quality of the learning systems. Information Quality refers to the quality of information provided through the learning systems. Service Quality refers to the quality of services provided by teachers, designers, and developers. User Satisfaction refers to the extent to which learners are satisfied with the learning systems. Subjective norm refers to the social behavior accepted by a certain group of learners or students. Task characteristic refers to the characteristics of a given learning task.

The system quality, knowledge quality, and Service Quality could exert a direct influence on User Satisfaction and could positively influence TTF (Yuce et al., 2019). Users' perceptions of system quality were positively related to their forecast performance (Smith & Mentzer, 2010). Thus, system quality might also exert a significant influence on TTF in an e-collaborative learning context. The quality of information systems, service, and information could be positively related to the use of information technologies (Gebauer et al., 2010), most likely as well as to TTF. The quality of information systems, information, and service could exert a positive and significant influence on student satisfaction and continuance intention of information technology, thus could possibly do so on TTF (Zheng et al., 2013). However, the TTF model did not include the critical constructs such as the quality of system, service, and information (Wu & Tian, 2021). This study aims to complement this missing link. Based on the previous findings, we raised the following research hypotheses:

H1. System quality significantly influences TTF in an e-collaborative English learning context.
H2. Information Quality significantly influences TTF in an e-collaborative English learning context.
H3. Service Quality significantly influences TTF in an e-collaborative English learning context.

Compatibility is defined as the degree to which a given information system can meet user's requirements and educational values and be appropriated applied to educational practice (Alamri et al., 2020b). Compatibility of assigned tasks might influence the utilization of information systems, which might in turn influence TTF (Rahma, 2018). Compatibility is positively correlated with the utilization of technology. The relationship between utilization and compatibility could positively influence performance. TTF is also positively correlated with performance (Teo & Men, 2008). Accordingly, we propose the following research hypothesis:

H4. Compatibility significantly influences TTF in an e-collaborative English learning context.

TTF could greatly influence the effectiveness of Actual Use of the virtual reality, but technology itself could not improve its effectiveness. Actual Use such as reflective thinking should be first enhanced so that technology could be effective enough. However, TTF failed to moderately influence both correlations between VR and quality of technology and correlations between VR and easiness of technology access. VR can exert an impact on deep thoughts and promote learning performance (Zhang, Jiang, & Patricia, 2017).

Performance impact indicates the success of a given task completed by an individual user of a certain information technology (Hsieh & Lin, 2020). However, the dominant factor was User Satisfaction (Diar, Sandhyaduhita, & Budi, 2018). User behavior greatly influenced User Satisfaction, TTF, and the Performance Impact. User Satisfaction greatly influenced Performance Impact. TTF positively and greatly influenced User Satisfaction and Performance Impact. Both User Satisfaction and TTF mediated the relationships between user behavior and Performance Impact (Isaac, Abdullah, & Ramayah, 2017).

TTF could exert a positive influence on Performance Impact (D'Ambra & Wilson, 2004). Actual usage refers to the behavior of users who are devoted to technology-assisted learning. The tenet of the TTF model is in conformity with actual usage. Actual Usage greatly influenced User Satisfaction, TTF, and the Performance Impact. We thus propose two research hypotheses as follows:

H5. Actual Usage significantly influences TTF in an e-collaborative English learning context.
H6. User Satisfaction significantly influences TTF in an e-collaborative English learning context.
H7. TTF significantly influences Performance Impact in an e-collaborative English learning context.

CORRELATIONS OF FACTORS INFLUENCING TTF

Performance Impact is positively correlated with TTF, Actual Use, and User Satisfaction (D'Ambra & Wilson, 2004). TTF positively and greatly influenced User Satisfaction and Performance Impact (Rahi et al., 2021). Positive relationships were revealed between Actual Use, User Satisfaction, System Quality, Service Quality, and TTF (Smith & Mentzer, 2010). Information Quality is positively correlated with user's performance (Aljukhadar et al., 2014), thus possibly as well as with TTF. Both TTF and Compatibility could positively influence user' performance (Alamri et al., 2020a), which might indicate the positive relationship between TTF and Compatibility. User satisfaction is positively correlated with their Performance Impact on educational outcomes (Alamri et al., 2020b).

Considering the previous research, one of the purposes of this study is to explore the correlations of the above-mentioned constructs in the TTF model, e.g. System Quality, Information Quality, Service Quality, Compatibility, Actual Usage, and User Satisfaction. We thus propose the following research hypothesis:

H8. There are significant correlations between System Quality, Information Quality, Service Quality, Compatibility, Actual Use, User Satisfaction, and TTF in an e-collaborative English learning context.

RESEARCH METHODS

This research collects data through a questionnaire among students and lecturers who used Superstar Learning System for one semester, as well as a semi-structured interview with a view to merging both qualitative and quantitative methods. The questionnaires could quantitatively reflect participants' opinions on the constructs, while the interviews could provide open-ended questions qualitatively. The qualitative data could expand the significance and reduce the inflexibility caused by the mechanical data, while the quantitative data could precisely measure the constructs. The combination of both quantitative and qualitative data could enhance the reliability and validity of the research findings.

Participants

We randomly selected 2073 tertiary students from around 2500 students in a faculty of foreign studies of a public university. This indicates that the sample accounts for the majority of the population, ensuring the representative function. They majored in various disciplines, e.g. English Language, Italian Language, Chinese Language and Literature, International Relations, and Human Resources, etc. They came from various areas of China, e.g. Beijing, Henan Province, Hebei Province, Shanxi Province, Shandong Province, Guizhou Province, Hunan Province, Anhui Province, Guangxi Province,

Shanxi Province, and Tianjin City. There are in total 306 males (14.76%) and 1767 females (85.24%) among them. Most of them (N=2066) reported that they were at a normal psychological state, while 7 reported abnormal and 5 did not complete valid questionnaires. Therefore, the 12 respondents' results were deleted. The final number of valid participants totaled 2061.

All of them, who have learned the English language for over 10 years, received English reading instruction assisted with Superstar Learning System for one semester. They were all psychologically normal and had tertiary literacy based on their self-reports. Most of them ranged from 16 to 27 years old in age. Those below 18 years old accounted for 30.90% (N=637); those from 19 to 21 years old accounted for 68.92%; a few respondents aged from 22 to 24 years old, and the lecturer over 27 years old. The lecturer delivered lectures by the use of Superstar Learning System during the whole semester.

Research Instruments

Eight Scales

Eight scales including three question items for each were designed to determine eight constructs, i.e. System Quality, Information Quality, Service Quality, Compatibility, Actual usage, User Satisfaction, TTF, and Performance impact. Each question item was followed by a five-point Likert Scale, ranging from *strongly agree, agree, unknown, disagree* to *strongly disagree*. Participants obtained *5* to *1* points for the above five responses respectively.

A Semi-Structured In-Depth Interview

A semi-structured in-depth interview was mainly associated with the lecturer and students. To obtain qualitative research data, we formed a conversation with the lecturer who conducted the Superstar Learning System-assisted English reading instruction, as well as 51 students who attended the class for one semester.

Since the interview aims to search for more detailed information, the qualitative interviews generally differ from quantitative survey-based questions (Eysenbach, & Kohler, 2002). We asked the interviewees to recall a personal narrative about their experiences of using Superstar Learning System. We did not stipulate any specific order to them narrate. Rather, interviewees could choose any individual style they preferred.

To obtain as much information as possible, we included some prepared interview questions and topics. We attempted to create a relaxing atmosphere and conduct an informal conversation. We sometimes raised extra questions about an unexpected but relevant area that arose so that interviewees could be encouraged to tell more information about the use of Superstar Learning System.

The open-ended questions we asked were quite informal and free of professional terms so that they could be answered with a simple *yes* or *no*. Rather, interviewees should organize the language by themselves and freely disclose the information they know. In case that the interviewees deviated from the topic, we would ask questions to lead it to the related topic. If interviewees had nothing more to say or did not know how to express themselves, we would encourage them to continue by asking related questions or by giving some hints.

We used to use prompt words to remind the interviewees of details that might be included. For example, the question "When did you first use Superstar Learning System?" might be annotated with optional prompts such as "Why did you use Superstar Learning System?", "Were you worried about the functions of Superstar Learning System?", "Did anyone else use Superstar Learning System?", "When did you begin to use Superstar Learning System", or "How did you use Superstar Learning System before/after/in class?". Prompt words might enable interviewees to reveal the information interviewers would like to solicit.

Although the in-depth interview seems naturalistic, it differs from a daily conversation (Legard, Keegan, & Ward, 2003). The reliable data always source from relaxed and comfortable discussions. In the interviews, we raised an easy question as the first one to ease the interviewees into the interviews
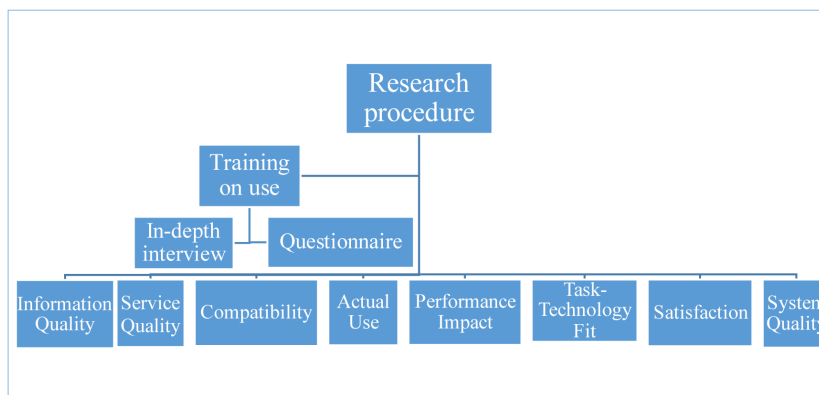
and make them adapted to the question-answer format. We tried to form a discussion with the interviewees when necessary by sharing our own potential opinions.

Research Procedure

All of the participants received English reading course instruction delivered by an experienced English lecturer, a Ph.D. holder in Foreign Linguistics and Applied Linguistics. The lecturer and students received special training on how to use Superstar Learning System. After one semester, a questionnaire aiming to determine eight variables, i.e. System Quality, Information Quality, Service Quality, Compatibility, Actual Use, User Satisfaction, TTF, and Performance Impact, was administered to randomly selected participants, who received proper rewards after they completed the questionnaire.

Furthermore, an in-depth interview was conducted with the lecturer and 51 randomly selected students. We obtained consent from them prior to the interview, which lasted between 1 and 1.5 hours. The interviews, conducted in Chinese, were recorded and transcribed for further analysis (Figure 3).

Figure 3. Research procedure

RESULTS

Testing Internal Reliabilities

To determine the reliabilities, we calculated Cronbach's Alphas. Eight variables, i.e. System Quality (α=.756), Information Quality (α=.856), Service Quality (α=.790), Compatibility (α=.946), Actual Use (α=.938), User Satisfaction (α=.950), TTF (α=.928), and Performance Impact (α=.930) are all considered internally consistent since their Cronbach's Alphas all reached satisfactory levels. The item-total Cronbach's Alpha (α=.975) reached an excellent level. Therefore, it is concluded that the questionnaire is internally consistent and thus reliable.

Testing the Correlations

Pearson's correlation coefficient is a measure of linear association. The relationships between eight variables are linear, thus it is valid to test their correlations via Pearson's correlation coefficients. A bivariate correlation analysis was operated, whose results are shown in Table 1.

In the above correlation matrix, Pearson's correlation coefficients are revealed that indicate the strengths of the relationship. The significance is shown through asterisks right next to the correlation coefficient. A double star shows that correlation is significant at the level .01. From Table 1, it is found that the correlation coefficients between System Quality, Information Quality, Service Quality,

Table 1. Correlations

		SYSQ	INFQ	SERQ	CMP	USE	SAT	TTF	PI
SYSQ	Pearson Correlation	1							
	Sig. (2-tailed)								
INFQ	Pearson Correlation	.810**	1						
	Sig. (2-tailed)	.000							
SERQ	Pearson Correlation	.592**	.534**	1					
	Sig. (2-tailed)	.000	.000						
CMP	Pearson Correlation	.667**	.714**	.714**	1				
	Sig. (2-tailed)	.000	.000	.000					
USE	Pearson Correlation	.613**	.775**	.537**	.797**	1			
	Sig. (2-tailed)	.000	.000	.000	.000				
SAT	Pearson Correlation	.578**	.668**	.561**	.881**	.746**	1		
	Sig. (2-tailed)	.000	.000	.000	.000	.000			
TTF	Pearson Correlation	.627**	.719**	.645**	.916**	.857**	.919**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		
PI	Pearson Correlation	.732**	.797**	.660**	.857**	.808**	.891**	.899**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
N	2061		2061	2061	2061	2061	2061	2061	2061
**. Correlation is significant at the 0.01 level (2-tailed).									

Notes: System Quality-SYSQ; Information Quality-INFQ; Service Quality-SERQ; Compatibility-CMP; The Actual Usage-USE; User Satisfaction-SAT; Performance Impact-PI

Compatibility, Actual Use, User Satisfaction, TTF, and Performance Impact are all marked with double stars, i.e. $r =.810^{**}$, $r =.592^{**}$, $r =.667^{**}$, $r =.613^{**}$, $r =.578^{**}$, $r =.627^{**}$, $r =.732^{**}$, $p<.01$), which indicates that the correlations are significant and positive at the level $.01$. Therefore, we rejected the proposed eight null hypotheses and accepted the eight alternative hypotheses (Table 2).

Table 2. KMO and Bartlett's test

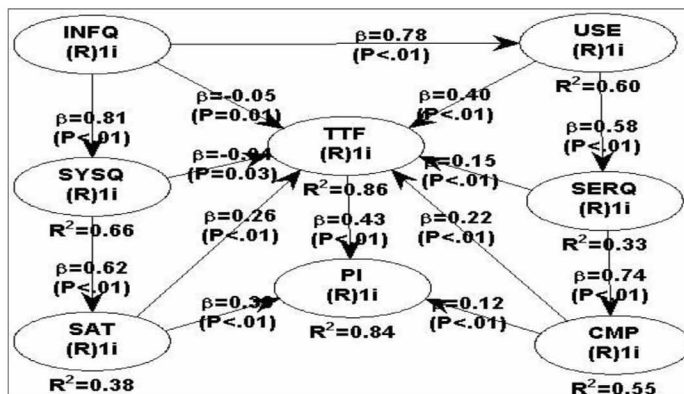| Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.899**
Bartlett's Test of Sphericity	Approx. Chi-Square	86017.527
	df	276
	Sig.	.000

Bartlett's Test is used to test whether the correlation matrix is a unit matrix and whether each variable is independent. In the factor analysis, if the original hypothesis is rejected, it means that factor analysis can be conducted. If the original hypothesis is not rejected, it means that these variables may provide some information independently and are not suitable for factor analysis. Before factor analysis, KMO test and Bartlett sphere test are carried out first. When the KMO test coefficient is > 0.5 and p < 0.05, the questionnaire will have structural validity and factor analysis can be carried out. As shown in Table 2, the questionnaire has a satisfactory degree of structural validity (KMO = .899, p < .01).

Testing the Model Fitness and Quality Indices

We obtained a fit TTF model in terms of System Quality, Information Quality, Service Quality, Compatibility, Actual Use, User Satisfaction, and Performance Impact by using WarpPLS 6.0.

As shown in Figure 4, correlations between eight variables are explored. System Quality exerts a significant influence on TTF in an e-collaborative English learning context *(β=-.04, p=.03)*. Considering the bivariate correlation results, the fit model, and the minor difference in the *p* value, we believe that System Quality exerts a significant influence on TTF in an e-collaborative English learning context. Information Quality exerts a significant influence on TTF in an e-collaborative English learning context *(β=-.05, p=.01);* Service Quality exerts a significant influence on TTF in an e-collaborative English learning context *(β=.15, p<.01);* Compatibility exerts a significant influence on TTF in an e-collaborative English learning context *(β=.22, p<.01);* Actual Use exerts a significant influence on TTF in an e-collaborative English learning context *(β=.40, p<.01);* User Satisfaction exerts a significant influence on TTF in an e-collaborative English learning context *(β=.30, p<.01);* TTF exerts a significant influence on Performance Impact in an e-collaborative English learning context *(β=.43, p<.01).*

Figure 4. The TTF model

Based on the statistical results, we accepted all the proposed eight research hypotheses (Table 3). We conclude that there are significant correlations between System Quality, Information Quality, Service Quality, Compatibility, Actual Use, User Satisfaction, and TTF in an e-collaborative English

Table 3. Results of testing research hypotheses

N	Alternative research hypothesis	Result
1	System Quality significantly influences TTF in an e-collaborative English learning context.	Accepted
2	Information Quality significantly influences TTF in an e-collaborative English learning context.	Accepted
3	Service Quality significantly influences TTF in an e-collaborative English learning context.	Accepted
4	Compatibility significantly influences TTF in an e-collaborative English learning context.	Accepted
5	Actual Use significantly influences TTF in an e-collaborative English learning context.	Accepted
6	User Satisfaction significantly influences TTF in an e-collaborative English learning context.	Accepted
7	TTF significantly influences Performance Impact in an e-collaborative English learning context.	Accepted
8	There are significant correlations between System Quality, Information Quality, Service Quality, Compatibility, Actual Use, User Satisfaction, and TTF in an e-collaborative English learning context.	Accepted

learning context. We find that System Quality, Information Quality, Service Quality, compatibility, actual use, and user satisfaction significantly influence TTF in an e-collaborative English learning context. We also reveal that TTF significantly influences Performance Impact in an e-collaborative English learning context.

As shown in Figure 4, the Task-Technology Model is fit since most of the indices meet the following criteria (See Figure 4) (Kock, 2018). Average path coefficient (APC)=0.398, P<0.001; Average R-squared (ARS)=0.603, P<0.001; Average adjusted R-squared (AARS)=0.603, P<0.001; Average block VIF (AVIF)=6.787, acceptable if <= 5, ideally <= 3.3; Average full collinearity VIF (AFVIF)=7.518, acceptable if <= 5, ideally <= 3.3; Tenenhaus GoF (GoF)=0.776, small >= 0.1, medium >= 0.25, large >= 0.36; Sympson's paradox ratio (SPR)=0.857, acceptable if >= 0.7, ideally = 1; R-squared contribution ratio (RSCR)=0.986, acceptable if >= 0.9, ideally = 1; Statistical suppression ratio (SSR)=1.000, acceptable if >= 0.7; Nonlinear bivariate causality direction ratio (NLBCDR)=1.000, acceptable if >= 0.7.

Results of the In-Depth Interview

We conducted and recorded the in-depth interviews with the lecturer of the English reading course and 51 students who attended the class. We obtained their oral consent before we launched the interviews. The lecturer is well experienced with English reading instruction assisted with Superstar Learning System. As she notes, students need around one week's practice to get familiar with Superstar Learning System, while most of them think they can easily learn how to use it. Students are generally satisfied with it due to its many advantages. They feel easier to complete assignments and keep pace with the teaching progress although the wireless connection is sometimes unstable. Most students can accept the Superstar Learning System although the lecturer does not think it can significantly improve their academic achievements. She also holds that students can learn how to use it and adapt themselves to the app-aided situation quickly. Despite that the lecturer does not like some functions, e.g. random roll call, she generally positively evaluate the functions.

It is worth mentioning that the lecturer does not think the service quality is satisfactory. She stresses that the online question-answer duration is dramatically delayed. Even sometimes, the submitted assignments are missing, which cannot be found by both the lecturer and the technician. This frustrated the users. However, she believes that advantages greatly outweigh disadvantages despite that nearly all of the students think the interface is too complicated to follow. Both students and lecturers determine to continue the Superstar Learning System-assisted pedagogical approach in the future. In general, the in-depth interview supports the TTF model of Superstar Learning System.

DISCUSSION

Superstar Learning System is a mobile learning professional platform for mobile terminals such as smartphones and tablets. Learners can access library collection, search and download electronic resources, browse library information, study school courses, conduct group discussions, view school addresses and obtain electronic books, newspaper articles, and Chinese and foreign literature. With Superstar Learning System, as noted by the interviewees, learners can enjoy convenient and fast mobile learning services.

Superstar Learning System has undergone sophisticated testing and experiments since its birth. Users can easily use it and flexibly interact with each other by providing a clear and understandable interface. Thus, students suggest making the interface more concise. System Quality is generally stable and satisfactory, which undoubtedly improves TTF.

It is reasonable that Service Quality of Superstar Learning System is positively correlated with TTF. Superstar Learning System is portable and provides services for learners whenever and wherever they feel convenient. The interviewees believe that the courses provided through Superstar Learning

System are of various forms such as audios, videos, and texts. Interactive communications are also easily conducted via Superstar Learning System. In this way, service quality positively influences TTF.

Information Quality is also a factor positively influencing TTF. Due to various information sources, Superstar Learning System provides up-to-date, accurate, and relevant information for learners, which can reasonably improve TTF. The lecturer reports that she can frequently upload a sea of resources in various forms.

The compatibility of the app is another construct that may exert a strong and positive influence on TTF. In case that Superstar Learning System is compatible with learners' values, they will be motivated to use it. Compatibility with learners' lifestyles is conducive to options of venues and time to use the app. Compatibility with learners' needs, e.g. preference and convenience, will encourage learners to use the app, which will increase the frequency of the use of the app. The interviewees also hold that Superstar Learning System is compatible with both the computer and smartphones perfectly.

As an essential factor, Actual Usage plays an important role in TTF. The frequent or long-time use of Superstar Learning System will increase the degree of TTF. As noted by the interviewees, when using Superstar Learning System, learners who concentrate will adapt themselves to the app better than those distracted.

User Satisfaction also significantly influences TTF. If learners feel that it is a wise option to select Superstar Learning System rather than traditional learning tools, they will be encouraged to overcome difficulties in the use of the app. Similarly, satisfaction and expectations will also play an encouraging role in TTF. The lecturer said that Superstar Learning System generally satisfied her and her students. The traditional learning may have limited students' learning venues and schedules, while Superstar Learning System-assisted English learning can provide flexible learning schedules and venues. Students can select places and time as they feel convenient. With Superstar Learning System, students may share their opinions, download learning resources, discuss difficult issues, and request feedback from teachers much more conveniently and rapidly. This may enhance user satisfaction and exerts a great influence on TTF.

TTF is an important construct that greatly influences Performance Impact. If Superstar Learning System well fits learners' learning styles and preferences or if learners feel it suitable for their learning improvements, the academic achievements or task completion will possibly be satisfactory, together with improved learning performance.

The eight factors, as noted by the interviewees, should be closely related. If learners feel the app is suitable for their learning and can improve their learning effect, they will make every effort to use it. They will be increasingly skillful in the use of Superstar Learning System and achieve better learning outcomes. This will by turn promote learners to use the app and form a benign cycle, where the app functions are developing and the learning effect is improving.

The task-technology fit model was constructed in the English learning context. System quality and information quality could provide high-quality services for users who would then feel satisfied with them. Users might be able to experience rapid service and timely information. Thus, the level of their satisfaction would improve due to their being content with the services, leading to higher performance impact. Higher information quality could encourage learners to use the learning system. Skillful use of the system could improve the quality of learning services and improve the system compatibility. In this way, the task-technology model could be fit and the performance impact could be enhanced. Improved satisfaction and compatibility could also enhance the performance impact in this model.

CONCLUSION

This final section concludes this study by summarizing and discussing findings, limitations, and future research.

Major Findings

Major findings in this study are at large consistent with past studies (e.g. Goodhue & Thompson, 1995; Alrajawy et al., 2018; Aldholay et al., 2018a; Daradkeh, 2019). The TTF model is composed of influencing constructs, i.e. System Quality, Information Quality, Service Quality, Compatibility, Actual Use, and User Satisfaction. TTF can positively influence Performance Impact. It is noteworthy to mention that the WarpPLS exploration finds that System Quality exerts an insignificant influence on TTF in an e-collaborative English learning context, which may be caused by random errors.

LIMITATIONS

Although Superstar Learning System is evidenced to fit the TTF model, there are still limitations of this application. As indicated by the interviewees, Service Quality, e.g. question-answer response duration, should be improved. Information Quality, e.g. digital capacity of transferred files, can be enlarged. The interface is somewhat too complicated. It would be easier to follow if it could be more concise. The findings of this study would be more reliable if the sample could be selected from different populations. The findings are not so sufficient that the proposed model is better than other models. Many advanced papers with more real time case studies-based discussions have been published, possibly reducing the innovations of this study.

Practical and Managerial Significance

The functions of Superstar Learning System, as the interviewees said, are limited. Future research could be devoted to the development of more functions, e.g. reminders of response delay, savings of submitted files, and improvements of wireless connection. Future research could pay special attention to the issue regarding interface complexity since both teachers and students feel it is far from friendly. Researchers could also pay enough attention to the drawbacks of the system to improve it towards a perfect platform in teaching and learning. In general, future research into Superstar Learning System needs interdisciplinary cooperation, combination with TAM, and consideration of other constructs and factors.

Future research could pay much attention to other constructs that could be integrated into the TTF model. Based on TTF theory, Wipawayangkool & Teng (2016) put forward the Individual-TTF including knowledge self-efficacy, preference for personalization knowledge management (KM) strategy, availability of appropriate KM systems, and task variety. By combining information system continuance theory with TTF, it was found that perceived technology fit and satisfaction could greatly influence the intention of using virtual learning system to achieve individual performance (Lin, 2012). Constructs in TTF and the theory of planned behavior (TPB) models could improve e-learning user performance (Yu & Yu, 2010). TTF influenced learning either directly or indirectly via the use of Learning Management Systems (LMS). TTF strongly influenced the influence of LMS on learning effectiveness, while weakly influenced students' academic achievements. However, improving learning conditions and contextual criteria failed to influence the effect of LMS. Instructor ability strongly influenced the effect on learning outcomes by use of LMS (Mcgill & Klobas, 2009).

Future research could integrate TTF into TAM, which would provide in-depth perceptions. Numerous studies have reported that various factors could greatly influence TTF, and various factors could in turn influence TAM. Task, technology, compatibility (Isaac, Aldholay, Abdullah, & Ramayah, 2019), and user characteristics greatly influenced TTF, which also exerted a great influence on perceived usefulness and perceived ease of the use of visual analytics systems. The perceived usefulness and perceived ease of use greatly influenced users' intention to use visual analytics systems, and positive correlations were also revealed between perceived ease of use and perceived usefulness of visual analytics systems (Daradkeh, 2019). It was also revealed that in online learning, task characteristics, and technology characteristics greatly influenced TTF that exerted a positive influence on users' intentions. Social recognition, perceived competence, as well as perceived

relatedness greatly and positively influenced behavioral intentions. Perceived reputation had a greatly moderating effect on usage behavior (Khan, Hameed, Yu, Islam, Sheikh, & Khan, 2018).

The integration of the TTF model into TAM demonstrates that perceived usefulness and attitude greatly influence users' intention to continue the use of MOOCs. The TTF model could exert a positive influence on learners' attitudes towards mobile learning technologies (Tu et al., 2021). TTF and performance could directly influence Actual Use of mobile learning technologies (Sununthar et al., 2021). Perceived usefulness could significantly mediate the effect of perceived ease of use, task technology fit, reputation, social recognition, and social influence on continuance intention. Perceived ease of use, TTF, reputation, social recognition, and social influence exert a great influence on continuance intention. Individual-technology fit, TTF, and openness greatly influence the perceived ease of use. However, no great influence of perceived ease of use and social influence have been revealed on attitude, and individual-technology and openness fail to greatly influence perceived usefulness (Wu & Chen, 2017). Future designs of technologies such as Superstar Learning System could focus on how to enhance perceived ease of use, perceived usefulness, continuance intention, users' attitudes, TTF, etc.

Future research could also attach importance to user continuance intention of using technologies, as well as task-related constructs and other factors. Task non-routineness, task interdependence, collaboration, mobility, and personalization positively influenced TTF that exerted a great and positive influence on users' intention to use cloud-based collaborative learning technologies (Yadegaridehkordi, Iahad, & Ahmad, 2016). Future research could facilitate the quality, flexibility, and interactions of tasks and improve convenience, collaboration, and intention of users in technology application. Annotation, navigation, and output were included as core dimensions of the TTF constructs, where task, technology, and individual characteristics played an important role in the application of electronic books to academic contexts (D'Ambra, Wilson, & Akter, 2013). Therefore, future research could focus on how to improve the coordination between task characteristics, technological adaptation, and users' personalities with a view to enhancing TTF.

Future research could examine the effects of teaching quality, perceived values, platform quality, flow experience, and self-efficacy on TTF. Teaching quality could enhance the TTF and the platform quality could improve the perceived values of online learning. TTF and perceived values could enhance learning experiences and learner satisfaction (Shang & Lyv, 2022). Flow experience played the most important role in fitting TTF in online learning contexts. learners' self-efficacy could also greatly influence learners' intention to use online learning platforms or technologies (Huang & Wang, 2022).

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