

Research on the Integration of TAM and TTF Models in CSDSL Model

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Abstract: With the advent of the information age, video-led interactive methods (Bouncer) have become popular. Due to the unique functions and outstanding performance of "danmaku" on the Internet, it has been quickly adopted by several major domestic mainstream media (Bilibili, Youku, Tencent, etc.). Chinese college students conduct self-directed learning on Chinese danmaku video sites. Call it "CSDSL". The CSDSL model combines the TAM model and the TTF model. This paper will analyze in detail how CSDSL integrates the TAM model and the TTF model through comprehensive analysis, literature reading and other research methods. The research conclusion is that the TAM model and the TTF model are suitable for the construction of the CSDSL model, which provides effective help for subsequent research on the influencing factors of the CSDSL model.

Keywords: Chinese Danmaku Video Sites; Self-directed Learning; TAM; TTF.

1. Introduction

As the Internet develops rapidly, the Danmaku video, an emerging function supporting time-sync comments while watching is being brought into the field of online learning. Danmaku video sites not only provides students with digital skills but also keeps them connected to the world and other students, allowing them to access information at any time and anywhere. This helps them become lifelong and self-directed learners. Content, collaboration, connection, and creativity are all areas where Danmaku video sites may help creative teaching and learning (Luo, Freeman & Stefaniak, 2020). This technology-assisted e-learning paradigm has produced an extended environment for learning at any time and from anywhere.

This study aims to integrate the TAM and TTF models to explore the influencing factors of college students' use of Chinese Danmaku video websites for self-directed learning, and the theoretical premise of the study is theoretically based on pedagogical theories and acceptance theories and related models, thus, sorting out and clearly defining the relevant theories of the Technology Acceptance Model (TAM) is crucial for this study.

2. Technology Acceptance Model (TAM) and its Extended Models

Technology Acceptance Model (TAM) is a model used to explain and predict the adoption and use of new technologies by users, which was originally proposed by Fred Davis in 1986, summarizing the experience of previous researchers, and is a theory proposed to explain and predict the acceptance level of information technology (IT) by users based on the factors of individual beliefs, subjective attitudes, behavioural intentions, and external variables. A theoretical model proposed when explaining and predicting users' acceptance of information technology (Gao Furong, 2010). Later extended and improved by several researchers, the TAM model consists of the following two core factors: perceived usefulness and perceived ease of use (Figure 1). These two factors influence

users' attitude and willingness to adopt new technologies. If users perceive a new technology as useful and easy to use, they are more likely to accept and use it.

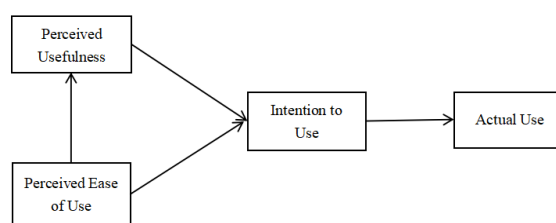


Figure 1. Technology Acceptance Model (TAM)

The technology acceptance model (TAM) is one of the most often used models for analyzing and categorizing students' choices to incorporate new technologies into their learning environments (Al-Nuaimi & Al-Emran, 2021). By contrast, the TAM model is entirely reliant on users' attitudes toward a particular information technology tool, which are determined by the instrument's perceived utility and ease of use. No other kind of information technology tool is compatible with the TAM model (Rafique et al., 2019). Despite the fact that TAM has shown itself to be a strong, powerful, and parsimonious model for understanding technological adoption, it has to be updated with other theoretical frameworks in order to be effective. An integrated TAM, TTF framework is used in this research for the purpose of explaining the uptake of video technology and contents for educational purposes. This integrated approach utilizes TAM as a source for the flavor of technological adoption, while TTF is utilized to describe the match between the technology and the tasks. According to Alyoussef (2021), the users' attitude toward using any technology or service is determined by two primary perceptions: the perceived utility of the technology, and the perceived simplicity of employing the service.

Perceived usefulness and perceived ease of use have been consistently identified as key mediating variables that influence users' acceptance and usage behavior of technologies in education (Almaiah et al., 2018). PU and

PEOU capture users' salient beliefs about using a technology, which determine attitudes and intentions. In education, if students believe a technology will improve their learning performance (PU) and will not require significant effort (PEU), they are more likely to accept and use it.

PU and PEOU mediate the effects of external variables on acceptance. Factors like system quality, computer self-efficacy, and facilitation conditions impact intention/usage by influencing PU and PEOU. For instance, high-quality learning software enhances students' PU, which boosts their adoption intention. PU and PEOU are more proximal determinants of user acceptance compared to external variables (Almaiah et al., 2018). External factors like training and support mainly work through PU and PEOU. Students' perceived ease of use of an e-learning system has a stronger direct effect on intention than just the availability of support. PU and PEOU are believed to be fairly stable across different technologies and users (Abdullah & Ward, 2022). This makes them useful mediators accounting for a significant portion of variance in usage intentions. Students' PU and PEOU of using Zoom for online classes can predict their adoption similarly to using Canvas for learning. There is extensive empirical evidence demonstrating the mediating role of PU and PEOU in educational technology acceptance research employing TAM (Merhi et al., 2021). PU and PEOU have been consistently shown to mediate between external variables and key outcomes like intention, attitude, satisfaction, and usage. In Tarhini et al. (2014), this study investigates factors affecting e-learning acceptance, using an extended TAM model. It identifies lecturer attitude and quality of work life as two independent variables. Gender and age are modeled as moderators. Perceived usefulness and perceived ease of use are mediators. Intention to use e-learning is the dependent variable. Structural equation modeling analysis confirms the effects of independent variables on intention are mediated by PU and PEOU. Moderating effects of gender and age are also supported. In summary, TAM posits PU and PEOU as core cognitive beliefs that determine technology acceptance. Their stability, ability to capture salient beliefs, and extensive empirical support make them central mediating variables that transmit the effects of external factors to shape users' technology acceptance attitudes and behaviors in education.

To improve the accuracy of the Technology Acceptance Model (TAM) in predicting behavioral intention to use Chinese Danmaku video sites for self-directed learning strategies (CDS DL) in the Chinese context (Zhu, Bonk, & Doo, 2020), the sustainability of CDS DL adoption in China is evaluated using an extended TAM model that incorporates Task-Technology Fit (TTF), Facilitating Conditions (FC), Individuals' Cultural Values, and individual cultural characteristics such as power distance, uncertainty avoidance, masculinity, and collectivism. This research investigates the role of TTF, TAM, and other factors on Chinese CDS DL for student satisfaction and educational sustainability.

3. Task-Technology Fit (TTF)

Goodhue & Thompson (1995) proposed the theory of task technology matching model on the basis of TPC (Technology to Performance Chain), which argues that the degree of matching between information technology and user's work tasks determines the timing of the user's use of the technology and the user's performance on the job, and that the characteristics of the user's work tasks and the system's technological characteristics jointly affect the task technology

matching. (Figure 2)

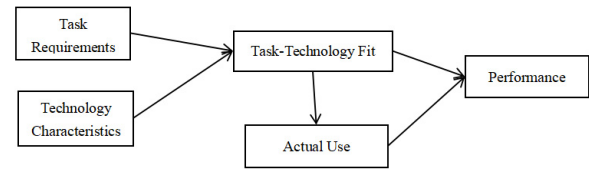


Figure 2. Original TTF model

4. Research Related to the Integrated Model of TAM and TTF

In the study of usage behaviour in the field of online learning, Wu and Chen (2017) proposed an integrated model integrating the TAM model, the TTF model, MOOC features and social motivation theory to study the persistent willingness to use MOOCs, and the results showed that the research framework integrating the TAM and TTF models can provide a more comprehensive understanding of the usage behaviour of MOOCs; Leong et al. (2018) used an integrated model of TAM and TTF to study students' willingness to use mobile social network-based learning, and the results showed that perceived task-technology matching was an important factor influencing users' willingness to use and perceived usefulness, and confirmed that user experience did not have a positive moderating effect on willingness to use; Dishaw et al. (2019) based on an integrated model of TAM and TTF examined the effect of two models of support for student writing to create and edit reports for an introductory information systems course. The research model included two independent variables: task characteristics and functional characteristics, and three dependent variables: perceived collaborative effort, perceived usefulness, and perceived ease of use. Task characteristics were held constant so that the two treatment groups performed the same task; functional characteristics differed by requiring one treatment group to use a combination of Microsoft Word and email and the other to use a Wiki; and task-technology matching measured the interaction between the two independent variables. The results indicated that the combination of Microsoft Word and email was more useful and easier to use than Wiki when students completed the project; Rai and Selnes (2019) conceptualised the theoretical underpinnings explaining task-technology matching, and the impact task-technology matching has on motivation to use digital learning, and confirming that task-technology matching positively affects perceived usefulness and ease of use, and social influence positively affects users' usage behaviour.

The explanatory power of the task-technology matching (TTM) model in terms of users' acceptance of IT usage behaviour has been validated in subsequent studies and has been greatly enhanced by later researchers' innovative integration of the TTF model with other theoretical models. Dishaw and Strong (1999) integrated the TTF theory with the TAM model to derive an integrated model of the TAM and the TTF which is now widely used. Dishaw and Strong (1999) integrated the TTF theory with the TAM model to derive the TAM and TTF integration model, which is now widely used.

Task-Technology Fit (TTF) also influences student satisfaction and the long-term viability of online learning resources in higher education (Alyoussef, 2021). However, the role of TTF as an independent variable in evaluating the sustainability of educational adoption has not been extensively explored in relation to the acceptability of

Chinese Danmaku video sites for self-directed learning strategies in various contexts. Therefore, the aim of this study was to integrate TAM and TTF, along with Facilitating Conditions (FC), Social Influence (SI), and other individual cultural characteristics. Approximately 340 university students were surveyed using structural equation modeling (SEM) to understand CDSDL as a strategy for ensuring the sustainability of higher education adoption. The perceived ease of use affects the perceived usefulness of CDSDL as a sustainability strategy in higher education. Therefore, higher education institutions should support the use of CDSDL in learning activities to ensure its sustainability and student satisfaction.

Overall, evaluating user behavior and the sustainability of Chinese Danmaku video sites for self-directed learning is crucial for understanding the factors influencing their adoption and success. By integrating TAM, TTF, and other relevant factors, this research aims to provide insights into the acceptance and sustainability of CDSDL in higher education contexts. The findings can guide educational institutions in effectively utilizing these platforms to enhance student learning experiences and promote educational sustainability.

The characteristics that are likely to impact the adoption of Chinese Danmaku video sites for self-directed learning strategies in China are summarized in this literature review. Due to the lack of prior research on the acceptance of Chinese CDSDL in Chinese higher education universities, this study aims to explore the factors influencing the adoption of Chinese CDSDL and other technologies in general. To gain a better understanding of adoption behaviors, this study employs the Technology Acceptance Model (TAM). Specifically, this section elaborates on the two variables of TAM: perceived usefulness and perceived ease of use. The model's predictive power also takes into account external factors such as task-technology fit, enabling environmental conditions, and social impacts. Building upon this, the chapter concludes by presenting a theoretical framework that explains how the characteristics investigated in this study affect students' perceptions of usefulness, ease of use, and their behavioral intention to adopt Chinese CDSDL for sustainability. This study aims to contribute to the existing literature by addressing the limited research on how the identified characteristics influence students' willingness to adopt Chinese CDSDL.

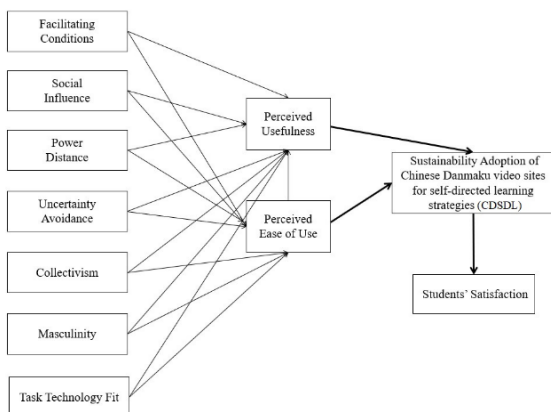


Figure 3. Theoretical Framework for the Study

Furthermore, there is a scarcity of research specifically focusing on these aspects within the context of Chinese Danmaku video sites for self-directed learning strategies in Chinese higher education universities. Although numerous

studies have been conducted on developed countries or more high-performing developing countries like China, the integrated Technology Acceptance Model (TAM) is rarely used to understand the adoption of Chinese CDSDL in general. Figure 3 illustrates the theoretical framework of the study, depicting the proposed relationships between the variables.

5. Conclusion

In summary, self-directed learning on danmaku video sites is a highly personalised and interactive learning mode. Learners have the flexibility to choose content that meets their needs and interests, and continue to improve their learning outcomes through interaction and reflection. This approach to learning requires self-directed learning, critical thinking and problem-solving skills that enable learners to effectively acquire knowledge and skills from danmaku video sites. Users use the CDSDL platform to complete learning tasks and improve learning performance. Willingness to use will be affected by the technology match between platform tasks. Therefore, it has certain theoretical support to embody the technology in the TTF model into the technical characteristics of the CDSDL platform and incorporate the task technology matching theory and its related variables into the study of CDSDL platform users' intention to use.

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