ISSN: 2790-170X Vol 1, No. 3, 2023

# Development of Chinese Danmaku Video Sites based on Self-Directed Learning (CDSDL) Model for Undergraduate Students in TAM Model

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## Abstract

*In an increasingly complex and uncertain learning environments, self-directed learning is an essential skill for living and working.The notion of self-directed learning emerged from the adult education profession, and experts emphasize the need of examining that the self-directed learning competence may be developed among university students.However, little research has been conducted to investigate the factors that influence Chinese Danmaku video sites for self-directed learning strategies intention and adoption as sustainability. The current study seeks to determine whether and to what extent the factors influence Chinese Danmaku video sites for self-directed learning intention and adoption as sustainability in relation to the two stages. And, it presents a research framework for combining the technology acceptance model (TAM) for adoption with Facilitating conditions (FC), individual cultural characteristics, social influence (SI) and the task fit technology model (TTF) for utility. In addition, to encourage higher education universities to ensure their long-term viability (sustainability) by using Chinese Danmaku video sites for self-directed learning, student satisfaction measures when students succeed in their studies and are satisfied with their overall experience.*

## Keywords

*Self-directed learning,CDSDL, TAM, TTF .*

## 1. Introduction

The 21st century is the era of information globalization. The innovative achievements of information technology are continuously integrated with various fields of the economy and society, and each technological innovation will have a profound impact on human society. Online education is the product of the integration of information technology and education, which has brought about great changes in the way of human learning. In recent years, with the rise of massive open online course (MOOCs), online education has shown a booming trend (Zhang et al., 2019). In the twenty-first century, all colleges and universities have fully utilized modern information technologies, including computer and multimedia network technologies. The teaching model emphasizes student centrality in the educational process and teacher leadership in instruction parts (Alam, et al., 2021).The number of Chinese universities and

universities students have grown fast in recent five years. Until 2022, the number of university students is 41.83million and the number of university students is 3013. In 2017, the number of university students is 26.95 million and the number of university is 2759 (Chen et al., 2022). Universities teachers from different fields can't keep up with rapidly changing real-world needs, then large-class formal education and instruction doesn't fit students' personalities. On one side, the students' need for growth and diversification is clear (Toh & Kirschner, 2020).In short, self-directed learning addresses the needs of college students at various phases of study for knowledge acquisition and the development, and helps them adapt to future employment and enhanced liquidity (Bergamin, Bosch, Du Toit, Goede, Golightly, Johnson & van Zyl, 2019).

Many researchers (Ferdinand & Zuhroh, 2021; Van Zyl, 2020; Lasfeto, 2020) have studied self-directed learning (SDL) and network contexts extensively. Its meanings, model, features, constituent aspects, and scale are frequently discussed (Ferdinand & Zuhroh, 2021). The measurement, improvement, and fostering students' autonomy have been examined (Van Zyl, 2020). The current research status of self-directed learning in networked learning environment is still poor, and the factors that influences of varied professional university students for self-directed learning strategy intention and adoption is inadequate. On this premise, it is valuable to investigate the current status of various professional college students in the network learning environments, as well as the relationship between many dimensions, and recommended solutions for increasing their knowledge (Lasfeto, 2020).

## 2. Backgrounds

The benefits of SDL are best seen in the learners it produces (Ferdinand, 2021;Ferdinand & Zuhroh, 2021;Chirag, Rathod, & Durgesh, 2021;Heng, Ferdinand, Afifah, & Ramadania, 2020). University students appreciate learning by themself and they are interested in using new things to learn knowledge (Alsufyani, Aboshaiqah, Moussa, Baker, Aljuaid, & Alshehri, 2020). They are also determined, self-disciplined, self-assured, and goal-oriented. Self-directed learning makes students better learners and social beings (Kumar, Singh & Buyya, 2021). Self-directed learners can examine several books for information, use diverse tactics to attain goals and portray concepts in various ways (e.g. drawing and writing). Self-directed learning can enable students to build their own norms and leadership styles for learning (Loeng, 2020).

The learning method for human has developed significantly with the ever-growing technological innovations. Unlike conventional video sites (e.g., Youtube.com) where videos and comments are shown in distinct locations (Lin, Huang & Cordie, 2018), the Danmaku system overlays comments as text for all current viewers or future viewers to see while they watch the video. As a consequence, readers do not need to scroll down to the comment section and read the remarks page by page. Hence, a sensation of high parallelism is experienced (video material and text comments are given at the same time), in which the users believe they are watching and talking with other viewers (Ferdinand & Zuhroh, 2021). Furthermore, remarks are presented as a "stream of consciousness" as they appear on the video connected to the video timeline. This also leads to the speedy transmission of comments(Stuss et al., 2019; Alhussain et al.,2020).


**Figure1** Screenshot of a sample video on Bilibili with default settings

Simply explained, the danmaku interface is a one-of-a-kind feature that enables viewers of internet videos to make "live" comments in a manner that is immediately superimposed onto the film. When a specific threshold is reached in terms of the total number of comments, the visual effect known as danmaku, which literally translates as "barrage" or "bullet curtain" in Japanese, is produced (Figure 1). According to Yang (2020), this feature produces a viewing experience that is more live, active, and socially engaging than any other commentary system. However, this also means that the meaning-making process on screen now involves a much more complex, if not chaotic, interplay of semiotic resources. It is interesting to note that with such a design, online viewers now have the ability to participate in social practices such as audiovisual translation, which are only possible when it is possible to superimpose texts on moving images. Other examples of such practices include subtitles and closed captioning.

Danmaku video sites have integrated online learning stargates and time-sync comments with similar function of social media. Understanding the risks of self-directed learning via Danmaku Video Sites is crucial. Due to social media, lecturers lose control over the teaching and learning process. Addiction to social media reduces time for studying. In addition, E-learning aims to enhance teaching methods and academic accomplishment (Islam, 2016). Several additional studies have examined the uptake of e-learning and its influence on student academic attainment (Alyoussef, Alamri & Al-Rahmi, 2019; Alalwan et al., 2019). Alqahtani and Rajkhan (2020) define e-learning as "any learning permitted online." It's conceivable they'll limit this approach to simply digital learning. This technology-assisted e-learning paradigm has produced an extended environment for learning at any time and from anywhere (Verdugo & Villarroel, 2021).

Social media 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. Social media is interactive and allows students to explore and study independently with the supervision of a lecturer. This helps them become lifelong and self-directed learners. Social media not only promotes peer learning but also facilitates communication between instructors and students. Content, collaboration, connection, and creativity are all areas where social media may help creative teaching and learning (Luo, Freeman & Stefaniak, 2020).

ISSN: 2790-170X Vol 1, No. 3, 2023
Malcolm Shepherd Knowles is credited with providing the description of self-directed learning (SDL) that is considered to be the most fundamental. Self-directed learning, according to Malcolm, is a process in which people take the initiative in evaluating their own learning requirements, developing learning objectives, and locating human and material resources for learning, with or without the assistance of others. Learners also choose and put into practice suitable learning techniques, while also assessing the results of their own learning (Brandt, 2021). They are able to choose, plan, manage, and evaluate their learning activities, which can be carried out at any place and at any time.

The development of Danmaku technology has made it possible for students to engage with one another while making use of online educational resources. The Danmaku video comment function allows users to superimpose comments into videos, which then flow from right to left across the screen. The fact that the Chinese language is written and read from left to right makes for an odd viewing orientation in China, but nonetheless, this does not make it difficult for people to watch the Danmaku at all. In contrast to the traditional commentaries, which are shown below the moving visuals, Danmaku is displayed immediately on the video screen (Wu et al., 2020). The time that the Danmaku message was sent is shown alongside the time axis of the video lecture when it is played again. Therefore, the contents of Danmaku are more directly tied to the content of the video, and they provide the sensation of synchrony. Danmaku features can be found on a wide range of Chinese websites, with http://bilibili.com being particularly popular among younger users (Ning and Dong, 2021). In addition to providing movies for amusement, http://bilibili.com also offers a significant number of video lectures. Figure 1 is a screenshot from a video lecture hosted on http://bilibili.com. It is a video lecture that is used for the English language portion of the national university entrance test (Yang, 2020). As can be seen, the video has a number of comments written in the Danmaku character, and these remarks range in both color and size. Users have the ability to decide whether or not the Danmaku feature is shown, giving spectators the ability to add their own contributions (Figure 1). It is essential to become a registered member of Bilibili.com in order to submit comments on Danmaku. Viewers who do not have membership may watch the videos on the website, but they cannot make comments. The use of Danmaku has dramatically enhanced the amount of interaction between students and instructors in online video courses. When compared to other interactive approaches, such as comments or messages at the bottom of videos, Danmaku shows the viewers' remarks immediately on the video, thus providing a coviewing experience. This may increase the learners' sense of presence and decrease feelings of loneliness (Cheng et al., 2021). As can be seen in Figure 1, Danmaku has both the benefit of relevance and the advantage of variety(Wu et al., 2019). According to the findings of previous research, Danmaku has the potential to increase both the performance and the efficiency of learners (Tian, 2020).

## 3. Research model and hypothesis develop

### 3.1. Attitudinal constructs

When it comes to studying and describing students' choices to incorporate new technologies into their learning environments, the technology acceptance model (TAM) is extensively

ISSN: 2790-170X Vol 1, No. 3, 2023
employed (Al-Nuaimi & Al-Emran, 2021). The TAM model, on the other hand, is exclusively based on users' attitudes toward utilizing a certain information technology tool, which are determined by the perceived utility and ease of use of the tool (Rafique et al., 2020). Some academics have supplemented the TAM with a variety of external elements in order to better understand the chance of online learning materials (e-learning, mobile learning, and Danmaku Video Sites) being accepted or used by students. For example, a study model based on the information systems continuation expectation-confirmation model is presented to investigate learning via Danmaku Video Sites, which is based on the information systems continuance expectation-confirmation model (Xiang & Chae, 2021). To integrate the theories of planned behavior (TPB) and self-determination theory (SDT) as a research framework, one study looked into the factors that influence students' decisions to use Danmaku Video Sites of Self-Directed Learning Strategies (Danmaku Video Sites of Self-Directed Learning Strategies) (Xu et al., 2022). Aside from that, the task-technology fit (TTF) model is a commonly used theoretical model for evaluating how information technology contributes to performance, analyzing use implications, and determining if the task and technology features are compatible. Both task features and technology attributes may have an impact on the task-technology fit, which in turn impacts how well people perform and how often they utilize technology. Since its inception, TTF has been the subject of much study and has been used to a broad variety of information systems (Alyoussef, 2021). Although it addresses long-term beliefs and attitudes, the TAM is only concerned with short-term beliefs and attitudes before to or after acceptance of Danmaku Video Sites of Self-Directed Learning Strategies. When a good match between the job and the technology is accomplished, as is the case with Danmaku Video Sites, a beneficial result is expected. This is the emphasis of the task technology fit model.As a result, task technology adaptation theory has the potential to compensate for the TAM's shortcomings in this regard. More to the point, despite the fact that TTF has been studied in a variety of situations, little study has been done in Danmaku Video Sites of Self-Directed Learning Strategies in China. The question of whether a good task-technology fit would affect a user's adoption of Chinese Danmaku Video Sites of Self-Directed Learning Strategies and how well it will influence a student's adoption remains unanswered as of this writing. The TTF model is founded on the notion of maintaining an acceptable match between capabilities and task circumstances, which ultimately results in improved performance of the system. Combining the two models will result in a more complete knowledge of Chinese Danmaku video sites of self-directed learning strategies as a result of resolving their respective constraints. Because of this, Elçi and Abubakar (2021) found that the combination of models of technology acceptance and task technology fit explained more variation in IT use than either the TAM or TTF models alone. The TTF model does not take into account Facilitating conditions (FC), Social Influence (SI), and individual cultural characteristics in the context of Chinese Danmaku Video Sites of Self-Directed Learning Strategies, which may restrict its prediction potential in the setting of Danmaku with social networking technologies in China. To overcome this constraint, it is necessary to combine it with Facilitating conditions (FC), Social Influence (SI), and other individual cultural characteristics, which draws on ideas from Facilitating conditions (FC), Social Influence (SI), and other individual cultural characteristics (power distance, uncertainty avoidance, collectivism and masculinity).

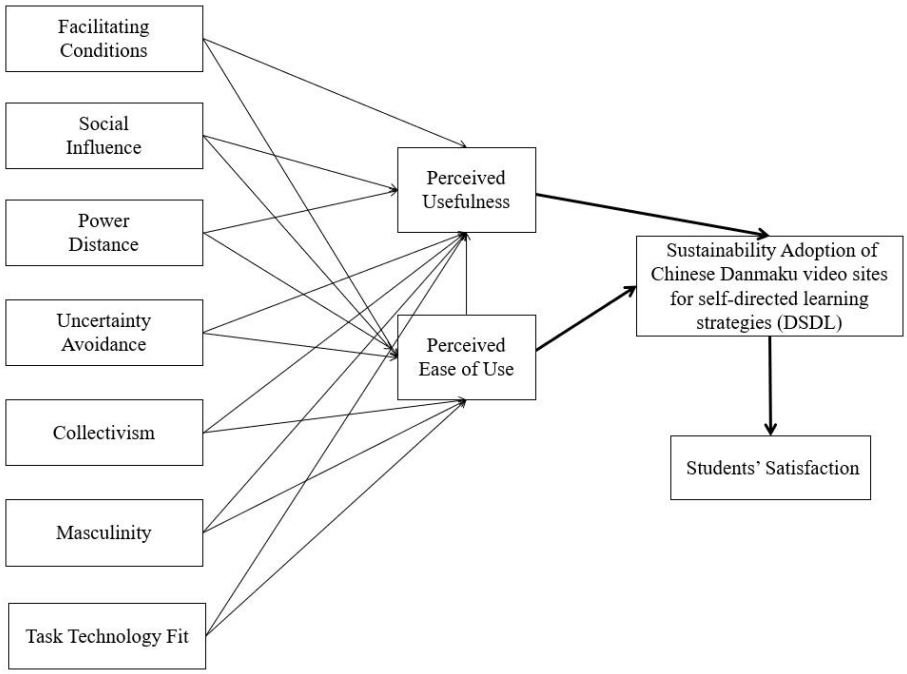


**Figure 2** The framework of the study

## 3.2. Hypotheses

Perceived Usefulness (PU): This construct assesses the participants' perception of how useful Chinese Danmaku video sites based on self-directed learning are for achieving sustainability learning. This study builds on earlier research by examining how people's perceptions of CDSDL's utility affect their behavioral intentions to utilize it as sustainability. Those who believe Chinese CDSDL will help them reach their goals are anticipated to use it more regularly. The following hypothesis were therefore proposed for this study:

**H1: Perceived usefulness will positively influence students intention to sustainability adoption for Chinese CDSDL in Chinese higher education universities.**

Perceived Ease of Use (PEOU): This construct evaluates participants' perception of how easy it is to use Chinese Danmaku video sites based on self-directed learning.SDML are supposed to be easier to use for students. A user-friendly interface encourages people to accept new technology. They are more likely to find SDML beneficial and to use it. The following hypotheses were therefore proposed for this study:

**H2a: Perceived ease of use will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL in Chinese higher education universities.**

**H2b: Perceived ease of use will positively influence students intention to sustainability adoption for Chinese CDSDL in Chinese higher education universities.**

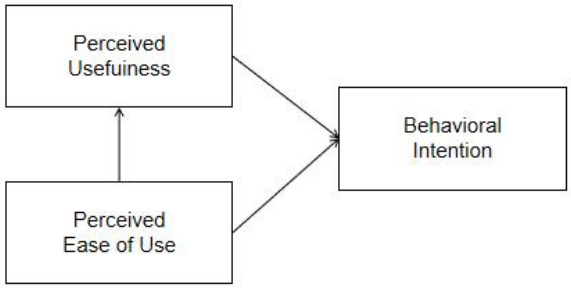


**Figure 3** Original TAM Framework
Note. Model of Technology Acceptance (adapted from Kamal et al., 2020)

Facilitating Conditions (FC): This construct examines the availability of resources and knowledge necessary for using Chinese Danmaku video sites based on self-directed learning. The following hypotheses were therefore proposed for the study

**H3a: Facilitating conditions will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**
**H3b: Facilitating conditions will positively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Social Influence (SI): This construct investigates the influence of others on participants' perception of using Chinese Danmaku video sites for self-directed learning. The following hypotheses were therefore proposed for the study

**H4a: Social influence will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**
**H4b: Social influence will positively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Power Distance (PD): This construct assesses participants' beliefs and attitudes toward the power dynamics between teachers and students. The following hypotheses were therefore proposed for the study

**H5a: Power distance will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**
**H5b: Power distance will positively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Uncertainty Avoidance (UA): This construct explores participants' preference for clear instructions, rules, order, and structure in a course.The following hypotheses were therefore proposed for the study

**H6a: Uncertainty avoidance will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**
**H6b: Uncertainty avoidance will positively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Collectivism (COL): This construct investigates participants' orientation towards group work, loyalty, and self-interest in a course.The following hypotheses were therefore proposed for the study

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**H7a: Collectivism will negatively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**

**H7b: Collectivism will negatively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Masculinity (MASC): This construct explores participants' beliefs and attitudes related to professional careers, teacher preferences, academic achievements, problem-solving approaches, and the importance of achievements and material success.

**H8a: Masculinity will positively influence perceived usefulness of sustainability adoption for Chinese CDSDL.**

**H8b: Masculinity will positively influence perceived ease of use of sustainability adoption for Chinese CDSDL.**

Task-technology Fit (TTF): This construct explores participants' belief in the compatibility between using Chinese Danmaku video sites and the content delivery in sustainability learning.

**H9a: The TTF has a positive effect on the perceived usefulness of sustainability adoption for Chinese CDSDL.**

**H9b: The TTF has a positive effect on the perceived ease of use of sustainability adoption for Chinese CDSDL.**

# 4. Methodology

## 4.1. Participants

Students from Chinese higher education universities, particularly Bilibili, who were above the age of 18 years old were selected as representative samples for the study.Through the use of Wechat advertising, the researchers were able to recruit participants for this study. Because of the way Wechat advertising works, it is possible to target prospective responses based on their Wechat profile (Kosinski et al. 2015, as cited in Forgasz et al., 2017). Participant availability for this survey is determined by the fact that it is self-administered, and participants are drawn from three Chinese universities. For the reason that Chinese universities recruit students from 31 provinces throughout the whole country, all of the students participating in the research may be considered representative of Chinese university students, and the samples picked have general features. It is accomplished by specifying the features of the target Chinese higher education universities students population in relation to CDSDL students.

## 4.2. Instrument

To make the survey questionnaire easier, the Wenjuanxing was used to create a web-based questionnaire. Because of its successful computerized questionnaire method, Wenjuanxing was chosen as the survey design instrument in this study (Wenjuanxing, 2018). It is absolutely free for Wechat users in China, and it includes a variety of capabilities for creating a questionnaire. Wenjuanxing supports a broad variety of question kinds, including unique questions that require scale and grid, which are not available in other questionnaire tools. Importantly, Wenjuanxing forms are mobile-friendly, allowing respondents to submit responses using their smartphones. Apart from content management, Wenjuanxing also offers

basic and analytical features that can be gathered for all responses in a spreadsheet that can then be exported for data analysis.The survey measured participants ' perceptions with a 5-point Likert scales, ranging from totally disagree to totally agree. Higher scores on

this instrument indicated more positive perceptions toward m-learning. All data were collected by online survey. The approach of Structural Equation Modeling (SEM) was used in order to conduct the analysis on the data that was gathered for the research. The use of statistical methods that enable the evaluation of multivariate and complicated models is what's known as structural equation modeling (Weston & Gore Jr., 2006). Combining the elements of factor analysis with multiple regression analysis is what structural equation modeling does. This gives the researcher the ability to not only summarize the connections between the variables but also evaluate the hypothesized connections between the structures (Hair et al., 2019). In the present investigation, a structural equation modeling analysis was performed with the assistance of the IBM SPSS Amos 22 software. The dataset for the Amos program was prepared with the assistance of the IBM SPSS 20 program.

## 4.3. Data Analysis

Prior to applying any statistical process to the data, it is necessary to conduct a data screening procedure as a first step. Obtaining the data is followed by encoding, modification, and conversion in order to arrive at a set of conclusions. Starting with the coding procedure, which includes data screening and cleansing, the process progresses further. It is a necessary step in order to guarantee that mistakes are eliminated from SPSS. There are a few cleaning tests that are performed at the beginning of the process. These include checking for entry errors and missing values, removing outliers, detecting common method bias, and testing assumptions for multivariate analysis. These tests include the data normality test, the multicollinearity test, and the homoscedasticity test. Following cleaning, the descriptive analysis is carried out using the SPSS program, and the inferential analysis is carried out using the SMART PLS software.

## 4.4. Model for Measurement

The PLS-SEM method may be broken down into two stages: the measurement model (also known as the outer model) and the structural model (also known as the inner model) (Hair et al., 2014). For the purpose of the reflecting model of this research, both the measurement model and the structural model will be analyzed. In the current investigation, the factor loadings, composite reliability, convergent validity, and discriminant validity of the measurement model were investigated with the assistance of SMART PLS 3.0. After that, the structural model indices are analyzed to determine the correlations between the variables, as well as the R2 coefficient of the determinant, the f2 effect size, and the predictive significance of Q2.

Confirmatory Component Analysis (CFA) is used to evaluate the measurement model, which is used to test each factor and the scales associated with it. The measurement model compares latent variables to their indicator variables, which reflect the theory, while the structural model depicts the link between latent variables and the other variables of the theory, as seen in the figure (Hair et al., 2014). As opposed to conventional route analysis, SEM employs latent variables that are either unobserved, unmeasured, or common across all cases. In social research, a latent variable is an example of a variable that is not immediately observable and is thus considered to be a hypothetical construct. Following the completion of the CFA

analysis, the internal consistency reliability, convergent validity, and discriminant validity of the measurement model are evaluated (Hair et al., 2014). Once all three studies had passed the requisite requirements, the structural model would be the next study to be performed.

# 5. Result

## 5.1. Structural Model

The structural model evaluation is the second step of the PLS-SEM and takes place after the measurement model assessment has been completed with appropriate quality.

Because they have been shown to be valid in the literature, the underlying constructs employed in this research, such as 'attitude' and 'study intention,' were predicted to be valid constructs for this model. The structural model will be put through its paces and will offer guidance for the variables via the use of collinearity analysis. Following that, the predictive capabilities of the model, such as the relevance of structural model relationship, are assessed by examining the Beta and t-values (hypothesis testing), the coefficient of determination (R2), the f2 effect size, predictive relevance (Q2), and the q2 effect, among other things.

## 5.2. Questionnaire

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **Perceived Usefulness (PU)** | | | | | |
| PU1: I (would) find Chinese Danmaku video sites based on self-directed learning useful in achieving my sustainability learning. | | | | | |
| PU2: Using Chinese Danmaku video sites based on self-directed learning enables (will enable) me to achieve my sustainability learning goals faster. | | | | | |
| PU3: Using Chinese Danmaku video sites based on self-directed learning increases (will increase) my sustainability learning productivity. | | | | | |
| PU4: Using Chinese Danmaku video sites based on self-directed learning will be beneficial for me in preparing for further education. | | | | | |
| PU5: Using Chinese Danmaku video sites based on self-directed learning would make it easier for me to gain desirable sustainability learning skills. | | | | | |

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **Perceived Ease of Use (PEOU)** | | | | | |
| PEOU1: I (would) find Chinese Danmaku video sites based on self-directed learning easy to use. | | | | | |
| PEOU2: Learning to use Chinese Danmaku video sites based on self-directed learning is (will be) easy for me. | | | | | |
| PEOU3: My interaction with Chinese Danmaku video sites based on self-directed learning (would be) is clear and understandable. | | | | | |
| PEOU4: It is (or would be) easy for me to become skillful at using Chinese Danmaku video sites based on self-directed learning. | | | | | |
| **Behavioral Intention (BI)** | | | | | |
| BI1: I intend to use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning. | | | | | |
| BI2: I would want to use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning. | | | | | |
| BI3: I predict that I would use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning. | | | | | |
| **Facilitating Conditions (FC)** | | | | | |
| FC1: I have the resources necessary to use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| FC2: I have the knowledge necessary to use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| FC3: Chinese Danmaku video sites based on self-directed learning is compatible with other technologies I use. | | | | | |

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| FC4: I can get help from others when I have difficulties using Chinese Danmaku video sites based on self-directed learning. | | | | | |
| **Social Influence (SI)** | | | | | |
| SI1: People who are important to me think I should use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| SI2: People who influence my behavior think I should use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| SI3: People whose opinions that I value think that I use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| SI4: People who have authority over me think I should use Chinese Danmaku video sites based on self-directed learning. | | | | | |
| **Task-technology fit (TTF)** | | | | | |
| TF1: I process learning well in Chinese Danmaku video sites based on self-directed learning. | | | | | |
| TF2: I believe that using Chinese Danmaku video sites based on self-directed learning is appropriate for sustainability learning. | | | | | |
| TF3: I believe that using Chinese Danmaku video sites based on self-directed learning matches the content delivery in sustainability learning. | | | | | |
| **Power Distance (PD)** | | | | | |
| PD1: Teachers should make most decisions without consulting students. | | | | | |
| PD2: Teachers should not ask the students for advice or opinions. | | | | | |

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| PD3: Teachers should not engage in social interaction with students. | | | | | |
| PD4: Teachers should not delegate important decisions to students. | | | | | |
| PD5: Students should not question or disagree with decisions made by their teachers. | | | | | |
| PD6: Teachers should always show authority and power when dealing with students. | | | | | |
| **Uncertainty Avoidance (UA)** | | | | | |
| UA1: It is important to have course requirements and instructions spelled out in detail so that I always know what I am expected to do. | | | | | |
| UA2: Rules and regulations are important to me in a course because they inform me of what the teacher expects of me. | | | | | |
| UA3: Order and structure are very important to me in a course. | | | | | |
| UA4: It is important to me to closely follow instructions and procedures in a course. | | | | | |
| UA5: Having instructions for the course is important for my learning. | | | | | |
| UA6: Standardized less flexible teaching and learning procedures are important for my learning. | | | | | |
| **Collectivism (COL)** | | | | | |
| COL1: Working as part of a group in a course is more important than working as an individual. | | | | | |
| COL2: Group success is more important than individual success. | | | | | |
| COL3: Being loyal to my group is more important individual gain. | | | | | |
| COL4: It is unlike me to abandon a group I belong to in the face of | | | | | |

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| difficulty. | | | | | |
| COL5: I am willing to sacrifice my self-interest for the good of my group. | | | | | |
| COL6: The welfare of my group is more important than any individual rewards I can get. | | | | | |
| COL7: It is more important for a teacher to encourage loyalty and sense of duty in students than to encourage individual initiative. | | | | | |
| **Masculinity (MASC)** | | | | | |
| MASC1: It is important to me to have a professional career. | | | | | |
| MASC2: It is preferable to me that my teacher is male rather than a female. | | | | | |
| MASC3: I am capable of excelling in any course. | | | | | |
| MASC4: Outstanding academic achievements are important to me in my studies. | | | | | |
| MASC5: I prefer to solve problems more logically than intuitively. | | | | | |
| MASC6: Achievements and material success matter to me more than relationships and quality of life. | | | | | |

The provided questionnaire consists of several constructs and items that aim to assess students' perceptions, intentions, and attitudes related to using Chinese Danmaku video sites based on self-directed learning for sustainability learning. By utilizing this questionnaire, researchers can gather data on students' perceived usefulness, ease of use, behavioral intentions, facilitating conditions, social influence, task-technology fit, as well as cultural dimensions within the context of using Danmaku sites for self-directed learning. The responses to these items can provide valuable insights into students' perceptions and attitudes towards this specific learning approach. However, it is essential to consider the context, sample, and the psychometric properties of the questionnaire to ensure its reliability and validity in measuring the intended constructs accurately.The provided questionnaire focuses on multiple constructs related to the perceived usefulness, perceived ease of use, behavioral intention, facilitating conditions, social influence, task-technology fit, power distance, uncertainty avoidance, collectivism, and masculinity.To conduct a thorough evaluation, it is important to consider factors such as the appropriateness of the items, clarity

of language, response options, potential biases, and cultural relevance. Additionally, the questionnaire should undergo pilot testing to assess its reliability and validity before being used in a research study.

| |
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| Perceived Usefulness (PU) (Nguyen, 2021)<br>PU1: I (would) find Chinese Danmaku video sites based on self-directed learning useful in achieving my sustainability learning<br>PU2: Using Chinese Danmaku video sites based on self-directed learning enables (will enable) me to achieve my sustainability learning goals faster<br>PU3: Using Chinese Danmaku video sites based on self-directed learning increases (will increase) my sustainability learning productivity<br>PU4: Using Chinese Danmaku video sites based on self-directed learning will be beneficial for me in preparing for further education<br>PU5: Using Chinese Danmaku video sites based on self-directed learning would make it easier for me to gain desirable sustainability learning skills |
| Perceived Ease of Use (PEOU) (Nguyen, 2021)<br>PEOU1: I (would) find Chinese Danmaku video sites based on self-directed learning easy to use<br>PEOU2: Learning to use Chinese Danmaku video sites based on self-directed learning is (will be) easy for me<br>PEOU3: My interaction with Chinese Danmaku video sites based on self-directed learning (would be) is clear and understandable<br>PEOU4: It is (or would be) easy for me to become skillful at using Chinese Danmaku video sites based on self-directed learning. |
| Behavioral Intention (BI) ( Tarhani et al.,2017)<br>BI1: I intend to use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning<br>BI2: I would want to use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning<br>BI3: I predict that I would use (continue using) Chinese Danmaku video sites based on self-directed learning for sustainability learning |
| Facilitating Conditions (FC) (Lai et al., 2016)<br>FC1: I have the resources necessary to use Chinese Danmaku video sites based on self-directed learning<br>FC2: I have the knowledge necessary to use Chinese Danmaku video sites based on self-directed learning<br>FC3: Chinese Danmaku video sites based on self-directed learning is compatible with other technologies I use<br>FC4: I can get help from others when I have difficulties using Chinese Danmaku video sites based on self-directed learning |
| Social Influence (SI) (Venkatesk et al.,2009)<br>SI1: People who are important to me think I should use Chinese Danmaku video sites based on self-directed learning<br>SI2: People who influence my behavior think I should use Chinese Danmaku video sites based on self-directed learning |

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| SI3: People whose opinions that I value think that I use Chinese Danmaku video sites based on self-directed learning<br>SI4: People who have authority over me think I should use Chinese Danmaku video sites based on self-directed learning |
| Task-technology fit (TTF) (Park et al., 2019)<br>TF1 I process learning well in Chinese Danmaku video sites based on self-directed learning.<br>TF2 I believe that using Chinese Danmaku video sites based on self-directed learning is appropriate for sustainability learning<br>TF3 I believe that using Chinese Danmaku video sites based on self-directed learning matches the content delivery in sustainability learning |
| Power Distance (PD) (Yoo et al., 2011)<br>PD1: Teachers should make most decisions without consulting students<br>PD2: Teachers should not ask the students for advice or opinions<br>PD3: Teachers should not engage in social interaction with students<br>PD4: Teachers should not delegate important decisions to students<br>PD5: Students should not question or disagree with decisions made by their teachers<br>PD6: Teachers should always show authority and power when dealing with students |
| Uncertainty Avoidance (UA) (Lai et al., 2016)<br>UA1: It is important to have course requirements and instructions spelled out in detail so that I always know what I am expected to do<br>UA2: Rules and regulations are important to me in a course because they inform me of what the teacher expects of me<br>UA3: Order and structure are very important to me in a course<br>UA4: It is important to me to closely follow instructions and procedures in a course<br>UA5: Having Instructions for the course is important for my learning<br>UA6: Standardized less flexible teaching and learning procedures are important for my learning |
| Collectivism (COL) (Lrite & Karahanna, 2006)<br>COL1: Working as part of a group in a course is more important than working as an individual<br>COL2: Group success is more important than individual success<br>COL3: Being loyal to my group is more important individual gain<br>COL4: It is unlike me to abandon a group I belong to in in the face of difficulty<br>COL5: I am willing to sacrifice my self-interest for the good of my group<br>COL6: The welfare of my group is more important that any individual rewards I can get<br>COL7: It is more important for a teacher to encourage loyalty and sense of duty in students that is to encourage individual initiative |
| Masculinity (MASC) (Larhini et al., 2017)<br>MASC1: It is important to me to have a professional career<br>MASC2: It is preferable to me that my teacher is male rather than a female<br>MASC3: I am capable of excelling in any course<br>MASC4: Outstanding academic achievements are important to me in my studies<br>MASC5: I prefer to solve problems more logically than intuitively |

| MASC6: Achievements and material success matter to me more than relationships and quality of life |
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