


Article

Students' Intention toward Self-Regulated Learning under Blended Learning Setting: PLS-SEM Approach

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Abstract: This research explores the influencing factors of students' attitude toward self-regulated learning (SRL) within blended learning setting (BLS). The theoretical model is developed based on the Theory of Planned Behavior (TPB) and two dimensions are proposed: major satisfaction (MS) and perceived teacher support (PTS). It studies how these variables affect students' attitude toward SRL within BLS, directly or indirectly. The proposed model is validated by employing a partial least squares structural equation modeling approach (PLS-SEM) based on the valid data collected from 604 students from three private universities in China. The results suggest that (a) the constructs, including the PTS and TPB (attitude, subjective norm and perceived behavior control), have a positive impact on student attitude toward SRL within BLS; (b) SRL attitude has a positive intermediary effect on the relationship between PTS and SRL intention, and between MS and SRL intention, respectively; (c) perceived behavior control (PBC) has a positive intermediary effect on the relationship between MS and SRL intention; (d) subjective norm (SN) has a positive intermediary effect on the relationship between PTS and SRL intention. The findings have useful implications for teachers, higher institution administrators, researchers, and higher education policy-makers in enhancing students' learning within the blended learning context.

Keywords: theory of planned behavior; blended learning setting; self-regulated learning; perceived teacher support; major satisfaction; partial least squares structural equation modeling



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1. Introduction

With the increasing improvement and popularization of online learning technology, blended learning has been the standard in higher education across the world [1]. Blended learning integrates the methods of traditional face-to-face classroom learning and online learning, and has been confirmed as a student-centered, flexible and self-regulated method of learning for university students [2], which blends various times and spaces. With its distinct features of being flexible, convenient, and independent [3], it has been proven as one solution to improve student learning and engagement, enhance access and flexibility, and make students lead their own learning through different methods [1]. Previous researchers have indicated that students are facing more challenges in the learning processes within the blended learning context, such as higher engagement and self-regulation [4], so more emphasis should be put on increasing learner control and enhancing self-regulated learning (SRL) [5]. Schunk [6] defined to SRL in relation to self-generated awareness, feelings and behaviors, which are oriented towards achieving students' own goals systematically. That is to say, learners within BLS will be responsible for their own study by building and

setting goals, and adopting individual learning strategies. Therefore, they can monitor, regulate and control the various factors that influence the learning process. As a result, learners under blended learning setting will not rely on others or the contextual features in a learning situation, and SRL is acknowledged as efficient for use in a student learning process in blended learning contexts [7,8]. Many studies have proven the advantages of SRL in the learning process, whether used in online or face-to-face models, and the beneficial outcomes of SRL within blended learning settings (BLS), such as grades of courses, grade point average and marks of final exams [7]. Yükseltürk and Bulut [8] also claimed that the effect of self-regulation on students' academic achievement was statistically significant. Other researchers have proven that students need to obtain self-regulation abilities so as to excel and be more efficient in blended learning environments [9].

According to Boelens et al. [4], individuals' active learning behavior or even successful academic outcomes, to a great degree, result from relatively positive intentions toward the certain learning behavior. Therefore, within BLS, students' learning intentions play a big role for the improvement of SRL effectiveness, and the promotion of individualized SRL. The questions remain, though: What elements will directly or indirectly influence learners' intention toward SRL within BLS? What kinds of influencing relationships exist among the various factors? This is an important part of blended learning effectiveness analysis. However, studies regarding the factors affecting students' intention toward SRL in blended learning contexts are rarely conducted. Hence, it is worth exploring what factors influence students' intention toward SRL in blended learning settings.

While according to Theory of Planned Behavior (TPB), an individual's intention toward the certain behavior can be influenced by individual's positive attitude, the supports from people around, and the perception of the ability to control the situation [10]. In spite of the fact that TPB has been previously used to explain the learning behavior in several researches [11], it has not yet been validated in SRL under blended learning setting, and also not validated in the context of private higher institutions in China.

In 2022, there are 768 private higher education institutions in China, accounting for 28.25% of the total number across the country, and the number of students registered in private higher institutions has reached more than 8 million, which plays an indispensable role in Chinese higher education. Further, as for China's private higher education, the professionalism of teaching staff and factors concerning the major setting of each institution are the main factors affecting students' achievements, thus influencing the thriving of students as well as the development of private higher education [12]. Therefore, when studying the learning intentions and behaviors of students in private universities, the factors of teacher support and student majority must be considered. Additionally, the Ministry of Education in China has put forward higher expectations and requirements for private institutions, and the education mode combining online and offline will be the main development trend of private universities in the next 5–10 years [13].

By doing this research in private universities in China, we can understand the influence of psychological factors (through TPB) and external factors (major satisfaction and perceived teacher support) on SRL intention within BLS in the context of China from different dimensions. Therefore, this study develops a theoretical model for SRL intention in BLS through the extension of TPB determinants, alongside two different factors, including major satisfaction and perceived teacher support. The influencing factors of students' intention toward SRL within BLS, as well as the way these variables affect students' intention toward SRL, directly or indirectly, is what this research addresses.

2. Literature Review and Hypotheses

2.1. Self-Regulated Learning (SRL) under Blended Learning Setting (BLS)

Blended learning, a term that is based on constructive learning theory, focuses on student-centered learning, under which the knowledge and abilities are achieved by learners in the process of active construction. Although we can see little debate over the definition of the terms "face-to-face learning" or "online learning", the definition of the

term “blended learning” has changed over time [13]. Before technology was integrated into education, blended learning was seen as an instructional approach in which various teaching strategies or theories are adopted to support learning free from technology. As e-learning, or online learning, was embraced as a way to support face-to-face traditional teaching, the definition of blended learning shifted [13]. According to Gurley’s view [14] (p. 200), blended learning integrates traditional face-to-face (F2F) and online learning, “with at least 30% to 79% of the course materials and activities delivered online”. However, Nortvig et al. [12] (p. 48) defined blended learning as the learning process in which a course has “50% of total course time dedicated to F2F instruction”. Horn and Staker also proposed a different definition of blended learning, referring to an instruction method free of the constraints of time spent online or in a face-to-face classroom context; “blended learning is any time a student learns in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace” [15] (p. 3). However, the generally accepted definition of blended learning is an integration of face-to-face class time and online learning within the same course, as is adopted in this research [14,16–18].

Within the blended learning context, various formats are integrated into learning process mixing theories and practices of online learning with traditional learning, such as blended offline and online learning, self-regulated and cooperative learning, and structured and unstructured learning, which combine the effects of classroom face-to-face learning and online learning, providing students with more learning experiences, and enhancing independent, group, and collaborative learning for learners [7,19]. Especially for learners who engage in study independently or for self-regulated learners, this model is very practical and effective, as asynchronous models can make learning more flexible, promoting their learning motivation and interest [20,21].

Self-regulated learning (SRL) is viewed as “self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals” [22] (p. 14). Within the blended learning setting, self-regulated students schedule their studying process and plan their learning goals, then engage in strategies to achieve the learning goals. Their learning processes are controlled and monitored through evaluation and reflection, so as to improve the progression toward goal attainment. Self-regulated learners are motivated, persistent, manage their time sufficiently in blended learning settings, and seek help when necessary [22]. Previous research also shows that there are four shared assumptions for SRL models: (a) learners have positive roles and they can determine their learning goals and strategies; (b) learners are able to control the SRL elements such as monitoring, behavior, environment, self-efficacy, self-evaluative judgments, motivation and control of cognition; (c) learners can assess their learning behavior against goals, criteria and standards they set before; (d) SRL is determined by individual qualities or attributes and the environment, as well as learners’ cognition, motivation and behavior [23]. Behavioral theories in SRL have a backdrop of focusing mainly on students’ self-control mechanisms (e.g., self-mentoring, self-reinforcement, self-evaluation, self-correction, and self-instruction), instead of the learners’ internal features (e.g., emotions, motivations, thoughts, and beliefs) [24].

SRL is related to learners’ academic achievements in both the classroom learning [25] and online learning contexts, which improves time management, meta-cognition, effort regulation, critical thinking for learners [7,8], and self-efficacy [26]. The self-regulated learners can monitor, evaluate, and control their learning behaviors effectively, so that they may save much time in finishing assignments, and are able to regulate time and learning processes more effectively. Research has also verified that the individual features attributed to self-regulated learners coincide with those attributed to students with high-performance and high-ability characteristics, as opposed to those with low performance or low abilities, who present a deficiency in these aspects. As for the effects of SRL in the blended learning setting, studies indicate that successful students generally adopt SRL strategies, and the impact of self-regulation on students’ academic success is statistically significant [8].

From the aspect of social cognitive theory, as learner's self-regulation is enhanced through a bi-directional interaction among three key elements (self-observation (to monitor the actions), self-judgment (to evaluate the performance), and self-reactions (to respond to performance outcomes) [6,27], SRL is amenable to development over time through the interaction of personal, behavioral, and environmental element, and even learners with poor performance are able learn to enhance their SRL strategies within the right environment [7,28], which means that the attitude and attention toward SRL play big roles in the achieving of learning goals.

2.2. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), which is based on the Theory of Reasoned Action, was proposed by Ajzen [10] to explain the fact that a person could decide whether or not to conduct a certain behavior according to his or her own free will or attention. That is to say, a person's behavioral intention is the perfect predictor of certain behaviors. Accordingly, Ajzen added three constructs, perceived behavior control (PBC), attitude toward behavior (ATT) and subjective norm (SN), by extending the Theory of Reasoned Action, which means that a more positive attitude, greater supports from people around, and a stronger perception of the ability to control the situation result in an increase in an individual's intention toward a certain behavior [29].

Under the Theory of Planned Behavior, a person's behavioral intention refers to the subjective probability of conducting a certain behavior, that is, the stronger the behavioral intention of an individual, the smaller the expected hindrance is, and the person is more likely to perform the behavior [30], which also means that the PBC is stronger. PBC refers to whether a person faces some obstacles or difficulties in performing a certain behavior, and to what extent that behavior can be controlled, that is, the degree of ease or difficulty the individual perceives. When a person has sufficient resources or opportunities, e.g., to use a particular system or adopt a certain learning method, the person is likely to have a stronger behavioral intention, resulting in frequent or active behaviors, or both [31]. In short, an individual's intention toward a certain behavior is seen as the most proximal predictor of the behavior [32].

While intention describes the guiding goal in performing a certain behavior, attitude in TPB presents a person's positive or negative thinking about the practice of the action [29]. The relationship between behavioral attitude and intention has been widely validated by different researchers [33]. In the Theory of Planned Behavior, subjective norms can be described as an influential environmental element, that is, the perceived social pressure to perform or not to perform the behavior [30]. When a person makes a decision or shows an intention towards a certain behavior, the person is likely to take the expectations of the other people around into account, which will lead to normative pressure [30]. So, in the learning process, learners tend to perform a particular behavior if they perceive support or encouragement from their important relationships (such as teachers, families, and peers) [31]. Other researchers, such as Bamberg et al. [34], also found that the subjective norm of the learner have a positive and important influence on intention toward a certain learning behavior.

Various researchers have empirically confirmed TPB in their studies of classroom-based learning and online learning [35]. However, there are not many studies focusing on blended learning with TPB, and research on SRL in BLS with TPB is especially rare. In this study, the variable of intention refers to the force of the purpose of student's behavior regarding SRL within BLS, while the variable of attitude refers to the student's positive or negative feelings about SRL within BLS. Subjective norm represents the social pressure that students perceive to engage in SRL within BLS. Finally, PBC is described as the perception that students have of the ease or difficulty of SRL within BLS.

Based on the above research thread of TPB, combined with what we know about SRL and BLS, the current study proposes the following hypotheses:

Hypothesis 1. *Students' SRL attitude positively affects SRL intention in BLS;*

Hypothesis 2. *Students' PBC positively affects SRL intention in BLS;*

Hypothesis 3. *Students' SN positively affects SRL intention in BLS.*

2.3. Major Satisfaction (MS)

The major is essential for students during their university journey, since a satisfying major, to some extent, may predict the success of their academic pursuits, as well as the undertaking of a prosperous future career. However, researchers indicate that undergraduate students' major choice may be influenced by many factors, such as the people around (e.g., family members, friends or teachers), expected career path following the major, lifestyle outcomes because of a major, and their understanding of the major itself [36], and more often students are forced to make the decision on their majors when they are in a very young stage of their life, or when they lack sufficient realistic information about their university journey or career to make better decisions on it. Therefore, a lot of university students queried were not very satisfied with their initial choice of undergraduate major.

Previous studies have indicated that the learners' attitude or intention toward a particular learning behavior is likely to be impacted by some external factors, such as learning facilities, the instructors' methods, and their learning contents, which they are required to finish before graduating [37]. Therefore, learners' sense of satisfaction with their major will play a big role in their learning process, especially during the current era, when the blended learning setting is increasingly dominating educational instruction, wherein SRL more often under plays an indispensable part in the learning process. Under blended learning settings, major satisfaction (MS) would free students from the trouble of changing majors, therefore improving their learning process [38], and particularly enhancing learner's positive attitude and intention toward SRL.

Sense of satisfaction with the major is an essential part of students' satisfaction with their whole university experience, as their interest in their major has a big influence on their learning attitude and learning intention. When learners are not satisfied with their major, they are likely to lose their positive attitude toward learning, and especially toward SRL, which necessitates the automatic self-monitoring, self-evaluating, and self-controlling of the learning process; it thus may result in dropping out, transferring, or even speaking badly of their university or institution.

The better the students feel about their major, the smaller the expected hindrance or difficulties in their learning, which indicates that the stronger their PBC is, and the stronger the learning behavioral intention they obtain, the greater the possibility for them to perform the learning behavior [39]. Thus, within the blended learning environment, students' PBC toward SRL, which is described as the degree of ease or difficulty the learner perceives in their self-regulated learning process, will also positively impact the behavioral intention, namely, the intention to adopt self-regulated learning.

Therefore, based on the above research about major satisfaction and its relationship with the main determinants of TPB, the article proposes the following hypotheses:

Hypothesis 4. *Students' MS positively affects SRL intention in BLS;*

Hypothesis 5. *Students' SRL attitude has a positive intermediary effect on the relationship between MS and SRL intention in BLS;*

Hypothesis 6. *Students' PBC has a positive intermediary effect on the relationship between MS and SRL intention in BLS.*

2.4. Perceived Teacher Support (PTS)

Teachers or instructors play essential roles because their interactions with students may influence students' learning processes [40], promote a climate of support [41], and lead to academic adjustment [42]. Studies indicate that students' learning attitude and attention can be enhanced by building a safe learning environment where students receive the necessary support from their teachers, both in face-to-face and online settings [42,43]. Generally speaking, teacher support is described as the degree of students' trust in teacher values, and their relationship with teachers [44], which includes the support they receive in terms of emotion, instrument, appraise, and information. Among them, emotional support indicates students' experience of trust and love from the teacher, and teacher's empathy and care; instrumental support means students can obtain tangible help from teachers when in need; appraisal support means that teachers can provide behavioral evaluation feedback to students; in informational support, teachers provide guidance, suggestion and information to help students in solving problems [45]. Several studies on teacher support have confirmed the positive correlation between learning outcomes, learning engagement and teacher support [46,47].

Specifically, perceived teacher support is described as the degree to which students perceive their teachers as an available resource when they are in situations of need [48]. In the research by Metheny et al. [49], perceived teacher support was measured through scales of four sub-variables, which are adopted in this research: (a) "invested" refers to students' perceptions that teachers get involved in assisting behaviors geared toward their future achievement and success; (b) "positive regard" refers to students' perceptions that teachers are caring, and emotionally connected and available to students; (c) "expectations" means the perception of teachers expressing positive expectations regarding students' academic achievements; (d) "accessible" regards students' perception that the teacher is available and open when they seek support or information.

When students perceive high levels of teacher support, they are more likely to have more will to learn, regardless of whether they are in face-to-face classroom activities or online tasks. Perceived teacher support can positively predict learners' academic interest, while it can negatively predict their learning anxiety, thus it can be viewed as a valuable positive asset, especially for those self-regulated learners within BLS, in which it may help in overcoming difficulties or obstacles in planning, monitoring, controlling and evaluating their learning process. PTS acts as a kind of a learning environment [42], thus influencing the student learning process or outcomes, such as their academic achievements, academic motivation and academic effort [41,50].

Studies by Skinner and Belmont [51] have also indicated a significant relationship between students' PTS and their behavioral intention toward learning. A positive relationship between teachers and students in learning necessitates a high level of teacher support, which in turn improves their positive learning attitude as well as their behavior intention [52]. Based on Self-Determination Theory [53], if self-regulated students do not have a positive relationship with teachers when needed, that is, if there is no necessary relationship between learners and teachers in self-regulated learning, they may feel excluded, and perhaps not consider SRL as a useful learning model, which may hinder their intentions regarding SRL behavior.

As previous research has shown, in the process of learning (e.g., SRL within blended settings), students tend to perform the particular learning behavior or adopt a certain learning model (e.g., self-regulation) if they perceive pressure (such as support or encouragement) from their important relationships (such as teachers, families, and peers) [31], which is described as subjective norm (SN), an influential social element of the perceived social pressure to perform (or not) the learning behavior [30]. When a person makes a decision or presents an intention regarding a certain behavior, the person is likely to take the expectations of other people around them into account, resulting in normative pressure [30]. Thus, perceived teacher support in SRL under blended learning settings, which function as

an academic environment, will have a direct and positive impact on learner's subjective norms and their behavioral engagement.

In line with the above review of the study on perceived teacher support, and its relationship with the variables of TPB, this research proposes the following hypotheses:

Hypothesis 7. *Students' PTS positively affects SRL intention in BLS;*

Hypothesis 8. *Students' SRL attitude has a positive intermediary effect on the relationship between PTS and SRL intention in BLS;*

Hypothesis 9. *Students' SN has a positive intermediary effect on the relationship between PTS and SRL intention in BLS.*

Figure 1 presents the research framework of this study. It focuses on exploring the impact of how these variables affect students' attitude toward SRL under BLS, directly or indirectly based on an extended theoretical model of TPB.

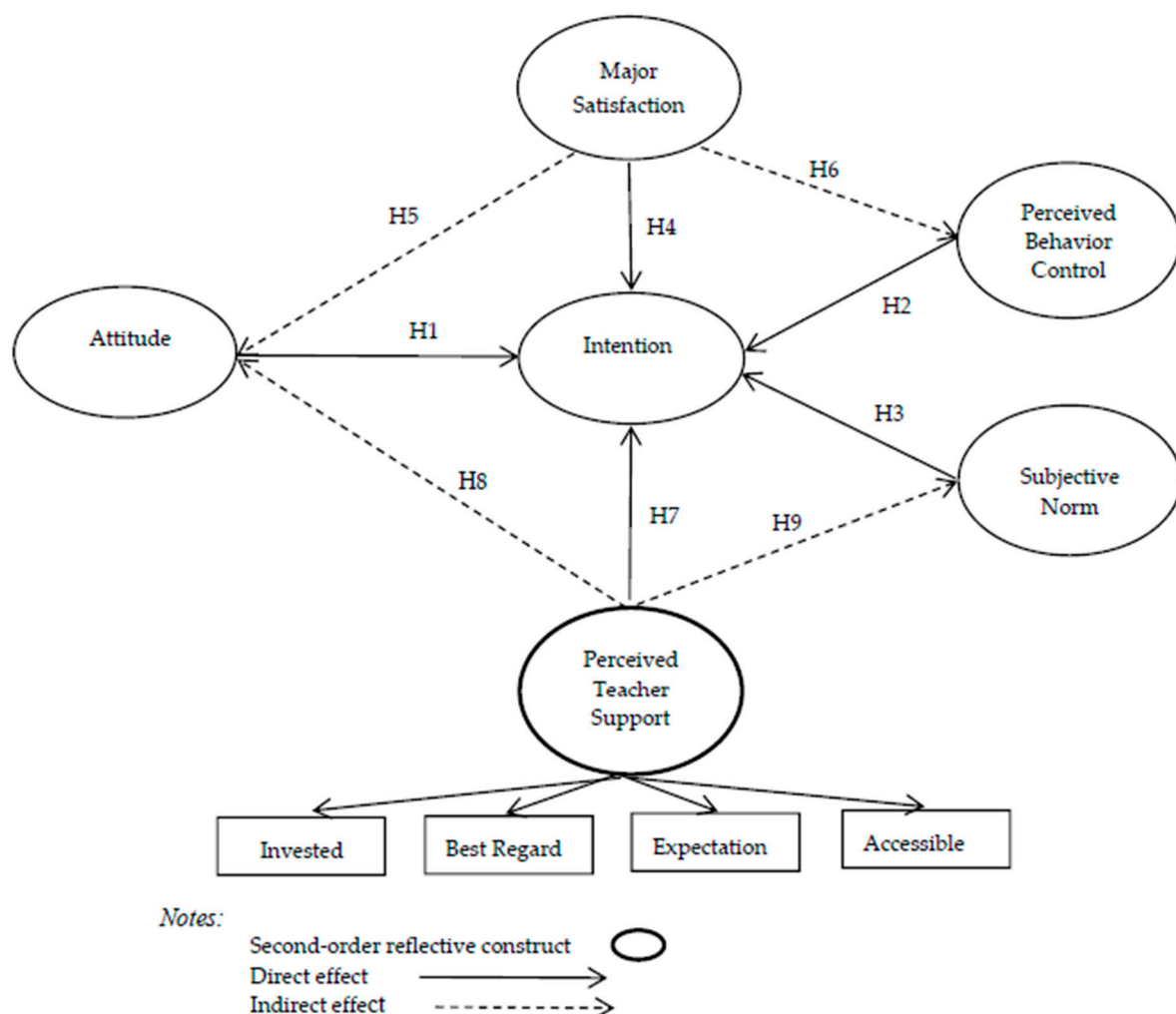


Figure 1. Conceptual framework of the research.

3. Methodology

3.1. Participants and Procedure

The data of the research were gathered through a questionnaire via the medium of an online survey. The target respondents were the students enrolled at three private universities in several provinces and a city of China, including Hunan province, Henan

province and Chongqing city. The research purpose and survey link were sent to the concerned students mainly by posting on the university's relevant social networking groups, and some students received the link by email. Students' participation in the survey was totally voluntary, and the questionnaire survey period was from 7 March 2022 to 15 April 2022. Altogether, 625 questionnaires were collected, 604 of which were valid. In line with the requirements of sample size [54], the sample size in this study was sufficient. It is imperative to report that the valid questionnaires were from students involved in at least one blended learning course in their university.

Two sections were established in this online survey to study the factors influencing students' intention toward SRL in BLS. One of the sections includes questions designed to obtain the participants' personal information, and the other section includes questions specified to measure the constructs established within the research model. The students were allowed sufficient time to complete the questionnaire in their native language, i.e., Chinese, as the questionnaire was translated to Chinese for students to fill out.

The items of each construct were measured by a seven-point Likert scale, with values ranging from "1 = Strongly disagree" to "7 = Strongly agree". The items used for measuring the constructs were adapted from the existing literature. It is imperative to report that the construct of PTS was measured by the scales of the sub-constructs: invested, best regard, expectation and accessibility [49]. Considering the validity of the adapted items, the questionnaire was sent to five experts in the field before the actual survey was carried out, in order to ask for an evaluation of its appropriateness and advice for improvement. The items were revised several times following experts' advice and pretests, then the new scales were adapted to suit the current setting under study.

3.2. Variable Measurement and Data Analysis Method

The operational definitions of all the constructs in this research have been confirmed via the above literature review. The questionnaire items in the research are shown in Table 1.

The theoretical model used in this research has been analyzed by partial least squares-structural equation modeling (PLS-SEM) through Smart PLS V.3.2.8 software [55]. Compared with other methods, PLS-SEM is viewed as the least restrictive approach, as it focuses on the explained variance of the criterion variable [56–59]. As this study concentrates on the exploration of factors affecting the behavioral intention toward SRL rather than its confirmation, PLS-SEM is considered to be an appropriate tool [60].

Table 1. Questionnaire items and references.

Dimensions	Questions	References
Major Satisfaction	MS1: I feel good about the major I've selected.	[36,61]
	MS2: The major has met the expectations I had prior to enrolling.	
	MS3: The academic instruction, personnel, and facilities in my major are of high quality.	
	MS4: I think I made a good decision in choosing the major and would select the major again, if given another chance.	
	MS5: I will praise the major to others and encourage them to choose it.	

Table 1. Cont.

Dimensions	Questions	References
Invested	INV1: My teachers expect me to work hard at school. INV2: My teachers try to answer my questions in my study. INV3: My teachers are interested in my growth. INV4: My teachers take the time to help me get better grades. INV5: My teachers think I am a hard-working student. INV6: My teachers are helpful when I have questions about study. INV7: My teachers are helpful when I have questions about school issues. INV8: My teachers would praise me before others when I perform well at school.	[49]
Positive Regard	PR1: My teachers push me to gain good academic achievement. PR2: My teachers challenge me to think about my goals of my study. PR3: My teachers believe I am smart so that I can study well by myself. PR4: My teachers help me understand my strengths in study. PR5: My teachers want me to do well in school.	
Expectation	EXP1: My teachers enjoy having me as their student. EXP2: My teachers care about what happens to me at school. EXP3: My teachers encourage me to learn. EXP4: My teachers think I should study continuously. EXP5: My teachers support my goals for my study.	
Accessible	ACC1: My teachers will listen if I want to talk about a problem in my study. ACC2: My teachers are easy to talk to about my school things. ACC3: My teachers are easy to talk to about things beside school.	
Attitude	ATTI1: I Look forward to those aspects of self-regulated learning. ATTI2: I like self-regulated learning. ATTI3: Self-regulated learning is a good idea. ATTI4: I have a generally favorable attitude toward self-regulated learning. ATTI5: Overall, self-regulated learning is beneficial.	d
Attention	ATTEN1: I intend to do self-regulated learning to improve my academic achievements. ATTEN2: I intend to continue doing my self-regulated learning frequently. ATTEN3: I will strongly recommend my peers to do self-regulated learning. ATTEN4: I will always try to do self-regulated learning on a daily basis. ATTEN5: Overall, I intend to continue self-regulated learning in my future learning.	[11,62–67]
Subjective Norm	SN1: My parents will encourage me to do self-regulated learning. SN2: My teachers will support me to do self-regulated learning. SN3: My peers think that I should do self-regulated learning. SN4: My school management suggest that I should do self-regulated learning. SN5: Overall, my school supports my self-regulated learning all round.	
Perceived Behavior Control	PBC1: It is always possible for me to do my self-regulated learning. PBC2: If I want, I always could do self-regulated learning. PBC3: It is mostly up to me whether or not to do self-regulated learning. PBC4: I have control over how to do self-regulated learning. PBC5: I have the necessary knowledge to do self-regulated learning.	

4. Research Results

4.1. Descriptive Analysis

In this survey, there were 289 females and 315 males within the 604 valid responses retained, all of whom were students from three private universities based in different cities in China. The majority of participants surveyed were aged from 18 to 22 years old, at 95%, ranging from grade 1 (Freshman) to grade 4 (Senior). Those who were involved in blended learning in two to five courses represent the majority of participants, accounting for 83.4%. It is also imperative to report that only 14.1% of the students surveyed were involved in blended learning in only one course (see Table 2).

4.2. Measurement Model Assessment

According to Mehmood and Najmi [68], convergent validity refers to the degree to which two measures of constructs that theoretically should be related are related. In Table 3, we can see the values of Cronbach's alpha, composite reliability, and average variance extracted. The constructs' reliability is evaluated by examining the Cronbach's alpha and composite reliability (CR) [69]. The results in Table 3 indicate that the Cronbach's alpha values fall between 0.924 and 0.968, which exceeds the suggested threshold value of 0.7. Additionally, the CR values fall between 0.943 and 0.975, which exceeds the threshold value of 0.7 [70], and as per the readings in Table 3, the AVE values fall between 0.754 and 0.900, which exceeds the suggested threshold value of 0.5. We can also see in Table 3 that the factor loadings of all constructs are above the threshold value of 0.7. All the results confirm that the reliability and convergent validity are valid, according to the criteria stated by Hair et al. [69].

The discriminant validity deals with the extent to which a set of items can distinguish a variable from other variables. To measure the discriminant validity, two predominant methods, namely, the Fornell–Larcker criterion and heterotrait-monotrait ratio (HTMT), are adopted. For the analysis of the Fornell–Larcker criterion, the validity of the discriminant is obtained if the square root of AVE of every construct is more significant than its bi-variate association with other constructs, and if the load of the indicator is higher on its respective constructs when compared to the remaining indicators. Hair et al. [58] has stated that the higher the value of diagonal line settling, the greater the validity of the discriminant. The results of the Fornell–Larcker criterion in Table 4 suggest that the discriminant validity is achieved, as the square root of AVE of every construct (the bold numbers) is more significant than its bi-variate association with other constructs (see Table 4). Further, the discriminant validity does not face a serious problem when the values of HTMT are lower than the suggested value of 0.90 [71], and all values presented in Table 5 shows the HTMT values between the constructs are all below the 0.90 threshold. Therefore, the research results indicate the acceptable validity of the discriminant.

As a result, not only are the reliability and convergent validity confirmed in this research, but the discriminant validity is also established. We adopted the standardized root mean square residual (SRMR) to evaluate the model fit. The recommended value of SRMR is less than 0.08, which can show a good model fit [72]. The results of the PLS analysis in this research indicate that the SRMR value for the saturated model is 0.052, and that of the estimated model is 0.055, which are both less than the suggested value of 0.08; thus, a good model fit is confirmed.

Table 2. Participants' demographics.

Measure	Items	Number	Percentage
Universities	University1	206	34.1
	University2	195	32.3
	University3	203	33.6
Gender	Male	315	52.1
	Female	289	47.9
Age	>22	12	2
	18–22	574	95
	<18	18	3
Grade	Freshman	173	28.7
	Sophomore	159	26.3
	Junior	142	23.5
	Senior	130	21.5
Blended Learning Courses	>5	15	2.5
	2–5	504	83.4
	=1	85	14.1

Table 3. Reliability and validity results.

Constructs	Items	Factor Loading	Cronbach's Alpha	rho_A	Composite Reliability	AVE
ACC	ACC1	0.917	0.944	0.944	0.964	0.900
	ACC2	0.963				
	ACC3	0.965				
ATT	ATT1	0.937	0.968	0.969	0.975	0.888
	ATT2	0.940				
	ATT3	0.956				
	ATT4	0.962				
	ATT5	0.915				
BR	BR1	0.933	0.952	0.953	0.963	0.839
	BR2	0.932				
	BR3	0.942				
	BR4	0.902				
	BR5	0.869				
EXP	EXP1	0.878	0.933	0.936	0.950	0.790
	EXP2	0.923				
	EXP3	0.906				
	EXP4	0.834				
	EXP5	0.901				
INT	INT1	0.902	0.959	0.959	0.968	0.858
	INT2	0.944				
	INT3	0.918				
	INT4	0.929				
	INT5	0.938				
INV	INV1	0.853	0.953	0.954	0.961	0.754
	INV2	0.870				
	INV3	0.886				
	INV4	0.882				
	INV5	0.797				
	INV6	0.891				
	INV7	0.886				
	INV8	0.881				
MS	MS1	0.89	0.924	0.924	0.943	0.768
	MS2	0.893				
	MS3	0.784				
	MS4	0.923				
	MS5	0.885				
PBC	PBC1	0.898	0.953	0.954	0.964	0.841
	PBC2	0.922				
	PBC3	0.899				
	PBC4	0.944				
	PBC5	0.923				
SN	SN1	0.900	0.932	0.933	0.949	0.788
	SN2	0.902				
	SN3	0.807				
	SN4	0.911				
	SN5	0.914				

Note: ACC = accessible; ATT = attitude; BR = best regard; EXP = expectation; INT = intention; INV = invested; MS = major satisfaction; PBC = perceived behavior control; SN = subjective norm; PTS is a second-order reflective construct, so no estimation is given here.

Table 4. Fornell–Larcker criterion.

	ACC	ATT	BR	EXP	INT	INV	MS	PBC	SN
ACC	0.948								
ATT	0.584	0.942							
BR	0.865	0.607	0.936						
EXP	0.886	0.611	0.926	0.989					
INT	0.648	0.862	0.665	0.679	0.926				
INV	0.838	0.591	0.901	0.883	0.655	0.869			
MS	0.578	0.475	0.634	0.614	0.516	0.646	0.876		
PBC	0.677	0.689	0.728	0.740	0.776	0.719	0.536	0.917	
SN	0.593	0.787	0.616	0.645	0.842	0.624	0.534	0.748	0.888

Note: ACC = accessible; ATT = attitude; BR = best regard; EXP = expectation; INT = intention; INV = invested; MS = major satisfaction; PBC = perceived behavior control; SN = subjective norm; PTS is a second-order reflective construct, so no estimation is given here.

Table 5. Heterotrait–monotrait ratio (HTMT).

	ACC	ATT	BR	EXP	INT	INV	MS	PBC
ACC								
ATT	0.611							
BR	0.813	0.633						
EXP	0.843	0.643	0.881					
INT	0.681	0.695	0.696	0.718				
INV	0.882	0.615	0.746	0.735	0.685			
MS	0.615	0.500	0.673	0.659	0.546	0.686		
PBC	0.713	0.717	0.764	0.783	0.812	0.754	0.569	
SN	0.633	0.829	0.655	0.693	0.891	0.663	0.574	0.794

Note: ACC = accessible; ATT = attitude; BR = best regard; EXP = expectation; INT = intention; INV = invested; MS = major satisfaction; PBC = perceived behavior control; SN = subjective norm; PTS is a second-order reflective construct, so no estimation is given here.

In line with H1, H2, H3 and H7, the results show that the SRL attitude ($\beta = 0.041$, $t = 10.983$), perceived behavior control ($\beta = 0.041$, $t = 4.453$), subjective norm ($\beta = 0.048$, $t = 6.320$) and perceived teacher support ($\beta = 0.036$, $t = 2.310$) positively affect SRL learning intention. Therefore, H1, H2, H3 and H7 are supported. As opposed to the proposed hypothesis in H4, the results indicate that major satisfaction ($\beta = 0.024$, $t = 0.498$) has an insignificant relationship with SRL learning intention. Hence, H4 was rejected (see Table 6).

Table 6. Path coefficients.

Hypothesis	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	p Values	Decision
H1	ATT → INT	0.454	0.454	0.041 ***	10.983	0.000	Supported
H2	PBC → INT	0.183	0.182	0.041 ***	4.453	0.000	Supported
H3	SN → INT	0.301	0.301	0.048 ***	6.320	0.000	Supported
H4	MS → INT	−0.012	−0.011	0.024	0.498	0.618	Rejected
H7	PTS → INT	0.082	0.082	0.036 *	2.310	0.021	Supported

Note: ATT = attitude; INT = intention; MS = major satisfaction; PBC = perceived behavior control; SN = subjective norm; PTS = perceived teacher support; *** $p < 0.001$; * $p < 0.10$.

4.3. Structural Model Assessment

To assess the structural model, the bootstrapping procedure of 5000 re-samples is adopted, and the standard beta (β), t-values, and coefficient of determination (R^2) [69] were obtained. The hypothesis testing results are presented in Table 6, Table 7 and Figure 2, and all the hypotheses are supported, with the exception of hypothesis 4, which is rejected.

Consistent with H5 and H6, SRL attitude is found to have a positive intermediary effect on the relationship between major satisfaction and learning intention ($\beta = 0.023$,

$t = 2.257$), and perceived behavior control has a positive intermediary effect on the relationship between major satisfaction and learning intention ($\beta = 0.022$, $t = 2.438$). Hence, H5 and H6 are supported. As suggested, SRL attitude is found to have a positive intermediary effect on the relationship between perceived teacher support and SRL intention ($\beta = 0.031$, $t = 7.936$), and subjective norm has a positive intermediary effect on the relationship between perceived teacher support and SRL intention ($\beta = 0.032$, $t = 6.079$). Thus, H8 and H9 are also accepted (see Table 7).

Table 7. Specific indirect effects.

Hypothesis	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	p Values	Decision
H5	MS -> ATT -> INT	0.053	0.053	0.023 *	2.257	0.024	Supported
H6	MS -> PBC -> INT	0.098	0.098	0.022 ***	4.438	0.000	Supported
H8	PTS -> ATT -> INT	0.249	0.249	0.031 ***	7.936	0.000	Supported
H9	PTS -> SN -> INT	0.196	0.196	0.032 ***	6.079	0.000	Supported

Note: ATT = attitude; INT = intention; MS = major satisfaction; PBC = perceived behavior control; SN = subjective norm; PTS = perceived teacher support; *** $p < 0.001$; * $p < 0.05$.

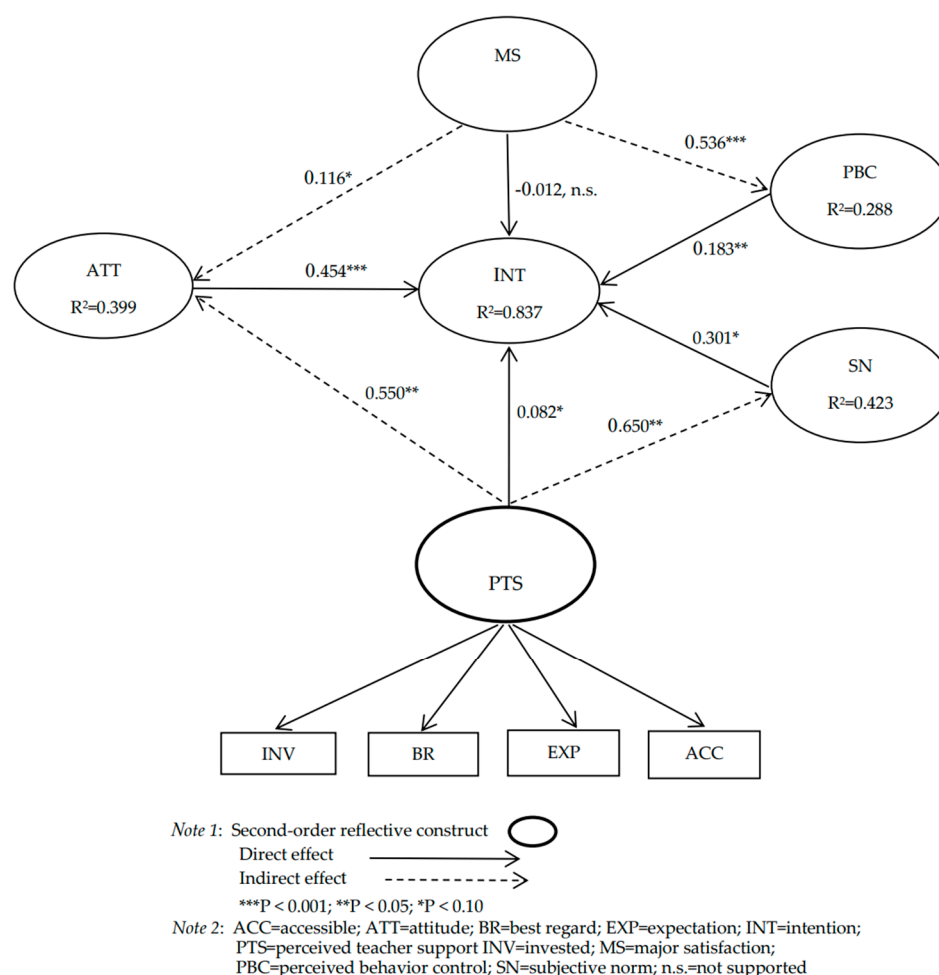


Figure 2. PLS algorithm results.

Regarding the (R^2) results in Figure 2, it can be noticed that major satisfaction and perceived teacher support together explain 39.9% of the variance in SRL attitude. Further, SRL attitude, perceived teacher support, perceived behavior and subjective norm together explain 83.7% of the variance in attention toward SRL. Moreover, major satisfaction explains

28.8% of the variance in perceived behavior control and perceived teacher support explains 42.3% of the variance in subjective norm. According to the recommended values of (R^2) [73], the observed (R^2) values in this study are considered to be acceptable.

5. Discussion

This study focuses on the factors influencing students' intention toward SRL within BLS, as well as the way these variables affect students' intention toward SRL, directly or indirectly. Nine hypotheses are proposed, and eight of them are supported, but one hypothesis is rejected after the data collection and analysis by empirical research.

First of all, the results show that SRL attitude has a significant relationship with student intention toward SRL within a blended learning setting (H1). Further, perceived behavior control and subjective norm are also strong predictors of student intention toward SRL within the blended learning context (H2, H3). These findings are in line with TPB, as well as being consistent with the other relevant literature review, in which the association between attitude and behavioral intention has been widely confirmed by a variety of researchers [33]. On the other hand, the results are also in line with previous studies by Ajzen [29] (who found that the stronger the perceived behavior control and the smaller the expected hindrance, the more likely the behavior is to be performed) and by Taylor and Todd [31] (who stated that when an individual has ample resources or opportunities, e.g., to use a particular system or adopt a certain learning method, they are likely to have a stronger behavioral intention, resulting in frequent or positive experiences, or both). Therefore, we speculate that students who hold positive attitudes toward SRL will have an increased intention to get involved in SRL, such that they will take active behaviors towards SRL. Additionally, when students perceive that they are supported by their teachers, they are more willing to take part in SRL within a blended learning context, to avoid not meeting teachers' expectations. We can also speculate that only if the students do not view SRL as difficult will they actively participate in the learning process, and the perceived pressure or perceived encouragement from the people around them, such as peers, teachers, parents, or even from the school management, will play a very important role in pushing them to get involved in SRL in a blended learning context.

Second, the results indicate that major satisfaction has a moderate impact on student SRL intention through the mediators of SRL attitude (H5), while it has a strong impact through the mediator of perceived behavior control (H6). Likewise, many researchers have stated that, within a blended learning context, students' major satisfaction is likely to improve their learning process [38], by enhancing their positive learning attitude or even their intention toward SRL, and help to free them of the trouble of changing majors. So, students' satisfaction with their major, and their interests in the major, have a great impact on their SRL attitude, and even their learning intention. Once learners become unsatisfied with their major, they are likely to lose their positive attitude toward learning, especially toward self-regulated learning, which requires self-monitoring, self-evaluating, and self-controlling, and it thus may lead to dropping out, transferring, or even speaking badly of their educational institution. On the other hand, the better the learners feel about their major, the smaller the expected hindrance to their learning seems to become, which indicates that the stronger the perceived behavioral control they feel, and the stronger the obtained learning behavioral intention, the greater the probability of them performing the learning practice. Thus, within the blended learning context, the perceived behavioral control of students' SRL, which is described as the degree of ease or difficulty the learner perceives in their self-regulated learning process, indirectly positively influences the behavioral intention; that is, the intention to adopt self-regulated learning is indirectly impacted by major satisfaction through the mediator of perceived behavior control. However, although major satisfaction can impact students' intention toward SRL through the mediator of attitude, it cannot positively influence their intention directly (H4). This result is in line with that of Zhao et al.'s study [74], in which they found that facilitative conditions could not directly or easily impact individual's intentions regarding a certain behavior. The

satisfaction with the major can also be viewed as a kind of condition that is likely to facilitate the students' motivation or intention toward a particular behavior.

Third, the results also suggested that perceived teacher support not only has a moderate impact on SRL intention directly (H7), but also has significant influence on it indirectly, through the mediators of SRL attitude (H8) and subjective norm (H9), respectively. Therefore, the findings are in accord with those of the previous studies, wherein teachers play a vital role, as their support for students may influence students' learning process [40], and students' learning attitude and attention can be promoted by generating a safe learning environment where students receive the necessary support from their teachers [43]. When students perceive their teachers' support, they will care more about their studies, as they want to live up to their teachers' expectations, thus this can be viewed as a valuable positive asset for self-regulated learners within the blended learning context, in which teacher support may help them handle difficulties or obstacles related to planning, monitoring, controlling and evaluating their learning process. Therefore, a good teacher–student relationship in SRL involves presenting a high level of teacher support, which in turn cultivates students' positive learning attitudes, as well as their behavior intention. On the other hand, as previous research has shown, in the process of studying (e.g., self-regulated learning under a blended setting), learners are more likely to perform a particular learning behavior or adopt a certain learning method (e.g., self-regulation) if they perceive support or encouragement within their important relationships (such as those with teachers, families, and peers) [31], which is described as a subjective norm, an influential social factor, or the perceived social pressure to perform or not to perform the behavior [30]. While making a decision or presenting an intention to enact a particular behavior, a person is likely to incorporate the expectations of other people around them. Thus, perceived teacher support in SRL within the blended learning setting, which functions as an academic environment, will have an indirect impact on the learner's intention through the mediating of subjective norms.

It is imperative to notice that PTS has a significant effect through ATT and SN; however, the direct effect has a lower impact. These results indicate the significant function of attitude and subjective norm within an individual's behavioral intention, which has been confirmed by previous researchers' studies, such as those of Kim et al. [33], Ajzen [30] and Taylor [31]. Therefore, teachers' persuasion, encouragement and recommendations arouse students' interest in, and build their attitude toward, self-regulated learning, which in turn enables them to engage more deeply in the learning process and learning behavior. As Kukulska-Hulme [75] (p. 252) pointed out, "higher education teachers play a salient role in supporting learners to exercise considerable self-management, self-monitoring, self-awareness, and meta learning." When students perceive that they are supported by their teachers, it suggests they have obtained the subjective norms at a higher level, which will make them more willing to take part in SRL within the blended learning context. Therefore, in order to activate the full potential effect of teacher support on students' learning intention toward SRL in a blended setting, the mediating role of students' positive attitude and the degree of the subjective norms should not be ignored.

6. Conclusions and Limitations

The outcomes of the present study shed light on the factors influencing student self-regulated learning intention based on TPB in blended learning settings. The results suggest that (a) the constructs, including perceived teacher support and TPB (attitude, subjective norm and perceived behavior control), have a positive impact on student intention toward self-regulated learning within a blended learning setting; (b) attitude toward self-regulated learning has a positive intermediary effect on the relationship between perceived teacher support and attitude toward self-regulated learning, and between major support and attitude toward self-regulated learning; (c) perceived behavior control has a positive intermediary effect on the relationship between major satisfaction and attitude toward self-

regulated learning; (d) subjective norm has a positive intermediary effect on the relationship between perceived teacher support and attitude toward self-regulated learning.

Thus, the current findings confirm the important role that the studied variables play in influencing students' intention toward SRL within a blended learning context, and particularly teacher support and major satisfaction. The findings from this study provide schools and policy-makers with further evidence that these factors can serve to improve students' learning processes. It is hoped that these elements studied can be cultivated and leveraged to help students enhance their learning process and improve their academic achievements.

The contributions of this study are as follows: first, empirical evidence concerning the relation of major satisfaction, perceived teacher support, attitude, subjective norm and perceived behavior control to SRL intention in a blended learning setting is provided. We found that students' willingness to use self-regulated learning methods within a blended learning setting is influenced by these elements. So, the key to making students more willing to engage in self-regulated learning in a blended learning setting lies in the influential factors, such as people around them (including teachers), their major satisfaction, as well as their own capabilities, such as their own understanding of the difficulties of SRL. It is not only necessary to strengthen the positive support for or influence on students so to improve their learning intention, but it is also essential to guide students to choose a satisfying major, or adapt to their current major so that they can actively take part in the learning process (especially SRL within a blended learning context) so as to achieve academic success. It is also advisable to help students improve their own learning capability, so that they feel more engaged in self-regulated learning within the current blended learning environment. Another contribution of the study to the SRL literature is the proposal of a new theoretical research model based on TPB that addresses both psychological (through TPB) and external (through major satisfaction and teacher support) aspects of adoption, as the proposed model goes beyond TPB by integrating some important factors with the greatest influencing effect on SRL within the blended learning context.

Although the present study contributes to the literature on factors influencing student intention toward SRL within a blended learning setting empirically and theoretically, some limitations should be highlighted. First, this research investigates the attitude toward SRL within blended learning settings in a private university environment, excluding students from public universities. The sample comprised 604 students from three private universities in three cities in China, and all the respondents were students studying for a bachelor's degree. It is suggested that future studies could expand the sample to public universities, students at different academic levels, as well as students from across the whole country or even from other countries, with different cultures or educational systems, so that the quantitative data can be used to derive more extensive inferences and yield more macro explorations, and thus improve the generalizability of the study. Second, it focused only on the functions of teacher support and major satisfaction as additional variables to the core components in the TPB model. The impacts of other significant elements relevant to the setting, such as educational policies, other facilitating conditions, school culture and self-efficacy, were not modeled. Future studies related to this research might explore this gap, and incorporate these constructs into the TPB to yield a comprehensive understanding of factors influencing students' attitude toward SRL within a blended learning context. Third, it is also suggested that qualitative research in this field can be adopted in the future, to further explore students' self-regulated learning intentions; further, the generalizability of the findings should not be overstated because of the non-representativeness of the sample taken from three private universities in China.

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