

Influence of Blended Learning on Students' Self-Efficacy: An Empirical Study Based on Cesim Simulation Course

Feng Zhang^{1,*}, Ting Jiang²

¹*Qingdao Vocational and Technical College of Hotel Management, Qingdao, Shandong, China*

²*School of Culture and Tourism, University of Jinan, Jinan, Shandong, China*

**Corresponding Author.*

Abstract: Blended learning is gaining increasing prominence within the field of education, yet there remains a notable scarcity of research dedicated to this subject. This study places its focus squarely on students who are actively engaged in a blended teaching program utilizing the CESIM simulation as a foundational element. Its primary objective is to delve into the profound influence that the blended teaching mode wields over students' self-efficacy, all while considering emotional arousal as a pivotal mediating variable. The results of this study vividly demonstrate that the situational components and reference variables embedded in blended learning yield a positive impact on students' self-efficacy by evoking positive emotional responses. Furthermore, the practice of collaboration emerges as a direct and unequivocally positive contributor to students' self-efficacy. Evaluation, on the other hand, proves effective in stimulating positive emotions in students but lacks a direct impact on self-efficacy. In light of these findings, it is incumbent upon educational institutions and educators to commit to the enhancement of blended learning methodologies. By doing so, they can create a classroom environment that nurtures positive emotions among students and, in turn, bolsters their self-efficacy, thereby enriching their overall learning experience.

Keywords: Blended Learning; Self-Efficacy; Cesim Simulation; Emotional Arousal; Hospitality

1. Introduction

The evolution of information and technology has brought about substantial transformations in learning approaches. It has shifted from the

conventional face-to-face format to an online network mode, progressing further to incorporate a blended learning methodology [1]. Research by López-Pérez et al [2] has demonstrated the favorable impact of blended learning on educational outcomes. Notably, in the context of the worldwide COVID-19 pandemic, blended learning has exhibited superior effectiveness compared to exclusively virtual instruction, as evidenced by the findings of Finlay et al [3].

However, in the existing research literature, the primary focus has been on curriculum development using the blended learning approach and evaluating it in foundational university courses [4]. Challenges such as student engagement and teacher technology utilization have also been identified [5]. Some researchers have found that online learning platforms can enhance students' satisfaction with their courses by promoting engagement [4].

Considering the nature of applied disciplines, hospitality courses must align with industry needs. Therefore, simulation platforms are integrated into the blended learning system to enhance student satisfaction [6]. Simulation platforms, in conjunction with critical incidents, significantly enrich students' learning experiences [7]. Simulations, as opposed to case studies, lead to substantial improvements in self-efficacy [8]. However, limited empirical research has explored how a blended learning approach, centered around a simulation platform, impacts students. Consequently, this study aims to investigate the effects of blended learning on students' learning experiences, using the international online simulation platform, CESIM. The research questions (RQs) are as follows:

RQ1: Does a blended learning approach, incorporating simulation platforms, influence students' positive emotions?

RQ2: Does the blended learning approach, utilizing a simulation platform, affect students' self-efficacy?

This study seeks to advance research on the outcomes of blended learning approaches and expand the understanding of dynamic factors influencing self-efficacy. Furthermore, it aims to contribute to the reform and enhancement of teaching methods in higher education by fostering positive emotions in students and improving their self-efficacy, providing valuable guidance.

2. Literature Review and Hypothesis

2.1 The Concept and Dimensions of Blended Learning

Blended learning, also known as blended teaching, refers to an instructional approach that combines the strengths of traditional teaching with web-based online teaching [8,9]. This approach spans various fields in education and has become the standard in modern education. Graham provided a systematic introduction to the blended learning model, discussing its emerging trends and challenges [1]. Blended learning is rooted in the principles of effective teaching, interactive learning, and knowledge visualization [10]. The term "blended" in this model not only signifies the integration of traditional and online teaching but also represents the harmonious blend of teaching methods and student-centered mentoring [11]. In the blended teaching model, educators play a pivotal role in guiding, inspiring, and monitoring students' learning, while also encouraging students to take initiative, cultivate enthusiasm, and express creativity in their educational journey [9].

Regarding the essence of the blended teaching model, researchers typically approach it from three perspectives: the technological perspective, the instructor's viewpoint, and the student's outlook. Feng Xiaoying, Wang Ruixue, and Wu Yijun, examining the conceptual evolution of the blended teaching model, have categorized its dimensions into two aspects: physical attributes and instructional characteristics [12]. Over time, the term has evolved to encompass a spectrum of five dimensions. These dimensions include the integration of offline and online learning, the amalgamation of self-paced and live

instruction, fostering collaborative learning, merging structured and unstructured learning, and combining customized content with off-the-shelf materials. This comprehensive perspective aligns with the insights provided by Singh [13]. In terms of instructional design, Carman [14] outlines the five fundamental elements in the blended learning process as live events, online content, collaboration, assessment, and reference materials. Expanding upon the theoretical frameworks laid out by earlier scholars, and drawing upon insights gleaned from interviews with four full-time instructors specializing in business simulation practice courses at colleges and universities, the present study articulates a definition of blended learning across five dimensions: live events, online content, collaboration, assessment, and reference materials. This nuanced interpretation builds upon the foundational work of Singh [13] and Carman [14].

2.2 CESIM Simulation Platform

The current approach to blended learning has garnered significant attention in the realm of foundational subjects such as college English, advanced mathematics, medicine, and various other fields [15]. However, its exploration within vocational curriculum education has been relatively limited. Presently, many colleges and universities have adopted a blended teaching method, utilizing simulation platforms to provide students with a comprehensive understanding of their major subjects through practical application [6,16]. One exemplary instance of such a business simulation platform is the CESIM simulation platform. Developed by CESIM, a leading institution in business simulation education, it enjoys widespread use across nearly 400 universities globally, including those in Europe and the United States. Students can access the platform via electronic devices with internet connectivity, allowing them to operate and study at their convenience from virtually anywhere. The business simulation games offered by the platform serve as invaluable tools for students to practice and enhance their business skills, encompassing business intelligence, financial and market analysis, operations management, decision-making, problem-solving, teamwork, communication, and leadership.

The platform spans a wide range of courses, encompassing strategic management, marketing, financial management, operations management, and more. With the aid of CESIM's simulation training courses, educators can delve into market dynamics, enabling students to make informed decisions regarding pricing strategies, staffing levels, raw material inventory, customer satisfaction, and employee engagement, all from the vantage point of corporate profitability and long-term sustainability.

The CESIM simulation platform provides students with the opportunity to apply theoretical knowledge and hone their decision-making skills within a simulated business environment. Moreover, it fosters collaboration and communication among students, fostering the development of teamwork and leadership abilities. Furthermore, the platform furnishes students with immediate feedback on their choices, facilitating learning from mistakes and the ability to make improvements for future scenarios. Ultimately, this approach equips students with a deeper comprehension of real-world business operations, preparing them for successful careers in their chosen fields.

2.3 Self-Efficacy

Bandura's theory of self-efficacy asserts that an individual's confidence in their ability to perform a specific task significantly shapes their behavior, motivation, and emotional well-being [17]. The development of self-efficacy is influenced by diverse factors, encompassing past experiences of success or failure, observations of others' achievements or setbacks, social encouragement, and emotional and physiological states [18]. Individuals endowed with high self-efficacy tend to confront challenges with assurance, invest more effort, and persist in the face of obstacles. Conversely, those with low self-efficacy may avoid challenges, contend with anxiety or self-doubt, and may be more predisposed to surrendering or experiencing failure [19].

Blended learning has demonstrated its positive impact on learners' outcomes, with self-efficacy emerging as a key determinant of learner behavior. Several scholars have explored the effects of blended teaching methods on students' performance in foundational applied courses at universities.

An illustrative case study conducted by Warren et al. [20] found that the implementation of blended learning approaches elevated students' self-efficacy in mathematics. In the realm of higher education, the effectiveness of blended learning courses in bolstering students' self-efficacy and overall satisfaction has been established [21]. Despite these findings, there is a noticeable gap in empirical research addressing how blended learning styles, particularly those employing simulation platforms, impact self-efficacy, especially in the context of vocational courses. Given that hospitality is a quintessential applied discipline, adopting a blended learning approach centered on the CESIM simulation platform may serve to enhance students' self-efficacy. Consequently, this study posits that the variables associated with blended learning have a substantial and positive impact on students' self-efficacy.

2.4 Positive Emotional Arousal

Emotions represent subjective experiences capable of influencing attitudes and behaviors. Positive emotions have the potential to enhance enthusiasm and adaptability in the learning process, while negative emotions may diminish attention [22]. Emotional arousal, which is the reaction to external stimuli, can have a significant impact on self-efficacy and memory [23]. Positive emotional arousal has been shown to boost memory retention and facilitate students' learning experiences [24]. Therefore, this study posits that the blended learning model, anchored in the CESIM platform, holds the potential to evoke and harness positive emotions in students, ultimately leading to an enhancement in their self-efficacy.

Building upon these interrelated assumptions, a conceptual model illustrating the influence of blended learning on students' self-efficacy, utilizing the CESIM simulation platform, is presented in Figure 1.

3. Research Design

3.1 Variable Measurement

To assess the impact of blended teaching on students' self-efficacy, this study identified five independent variables: contextualized items, online content, collaboration, evaluation, and reference materials. Positive emotional arousal

was considered as the mediating variable. The General Self-Efficacy Scale, developed by Schwarzer, was employed to measure students' self-efficacy. The study also drew upon the research conducted by Carman and scholars in the field, focusing on the five key components

of blended instructional design. It utilized literature research methods and expert interviews to define the relevant concepts of the variables and establish corresponding observational variables.

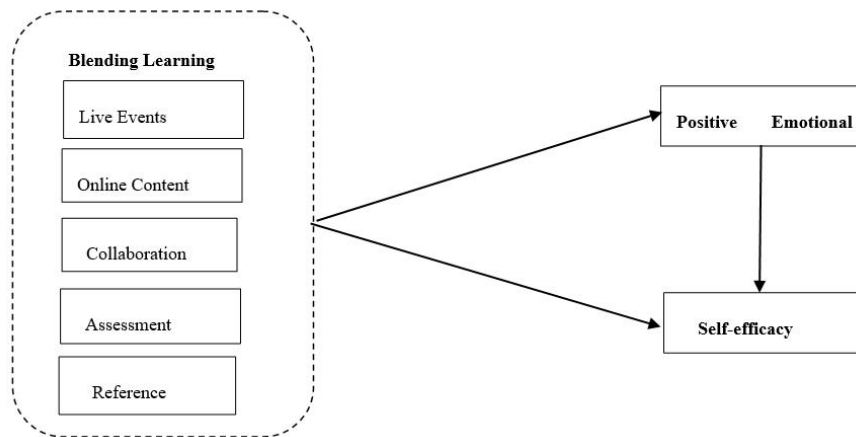


Figure 1. A Conceptual Model of the Influence of Blended Learning on Students' Self-efficacy

3.2 Questionnaire

In this study, we employed convenience sampling. From April to May 2020, we distributed 320 questionnaires online to students from four colleges and universities offering CESIM simulation operation courses in Shandong, Tianjin, and Shanghai. We received 277 completed questionnaires, resulting in a recovery rate of 86.6%. After excluding 27 incomplete questionnaires, we were left with 250 valid responses, yielding an effective rate of 90.1%.

Data analysis reveals that the sample consisted of 77 males, constituting 30.8% of the total, and 173 females, making up 69.2%. The majority of respondents fell within the age range of 18-25, accounting for 98.8% of the sample. The survey included 134 undergraduate students, representing 53.6%, and 116 vocational college students, accounting for 46.4%. Furthermore, the sample encompassed 12 freshmen, 100 sophomores, 86 juniors, and 52 seniors, which aligns with the current demographic distribution.

4. Research Results

4.1 Reliability and Validity Analysis

In the present study, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were executed utilizing SPSS Statistics 23 and Amos 21.0 software,

respectively. To evaluate the reliability of the questionnaire, Cronbach's α was employed, which yielded values exceeding 0.8 for all five research variables within the blended teaching model: contextualized items, online content, collaboration, assessment, and reference materials. These results indicated good reliability and internal consistency among the questionnaire items. Additionally, Cronbach's α for positive emotional arousal and self-efficacy were reported as 0.862 and 0.911, respectively.

The study also investigated both convergent validity and discriminant validity of the questionnaire. The standardized factor loadings for each questionnaire item surpassed 0.5, with an ideal range between 0.61 and 0.88. Additionally, the Composite Reliability (CR) values for each variable exceeded 0.8, falling within the range of 0.801 to 0.909, affirming robust reliability. Moreover, the squared differences' extraction values for each research variable surpassed 0.5, ranging ideally from 0.710 to 0.817. These results affirm the questionnaire's reliability and establish its sound convergent and discriminant validity.

4.2 Structural Models and Hypothesis Testing

Based on the model fit indices, it can be concluded that the structural model is well-suited to the data. The chi-square value (χ^2) reflects the disparity between the observed

data and the values predicted by the model, while the degree of freedom (df) corresponds to the number of estimated parameters. The χ^2/df ratio serves as an indicator of how well the model aligns with the data, and a value between 1 and 3 is typically considered indicative of a good fit. In this instance, the χ^2/df ratio is 1.577, suggesting a favorable fit. The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) both assess the alignment between the model and the data, with values exceeding 0.9 signifying a good fit. In this study, both CFI and TLI values surpass 0.9, indicating a robust fit between the structural model and the data. Supplementary indicators, such as the Parsimonious Comparative Fit Index (PCFI) and Parsimonious Normed Fit Index (PNFI), also contribute to assessing model fit, with values exceeding 0.5 considered acceptable. In this study, both PCFI and PNFI values exceed 0.5, further supporting the model's good fit. Overall, these indices collectively affirm the effectiveness of the structural model in fitting the data.

It is worth highlighting that the outcomes related to the influence of online content and collaboration on positive emotional arousal did not produce statistically significant results. As discussed earlier, the personalization and individual preferences intrinsic to online content could have played a role in shaping this outcome, making it complex to exert a substantial impact on positive emotional arousal. In a parallel manner, diverse individual communication styles and varying levels of participation might have influenced collaboration, leading to a less pronounced positive effect on emotional arousal. These variables merit careful attention and consideration when devising blended teaching models and evaluating their effectiveness. The acknowledgment of these nuanced influences is pivotal for refining and optimizing the design of instructional approaches that incorporate both online content and collaborative elements. In essence, a comprehensive understanding of the intricate interplay between personalization, communication dynamics, and collaborative engagement is essential for enhancing the overall efficacy of blended teaching models in educational settings.

Moreover, the study suggests that the impact of online content and assessment on students' self-efficacy did not attain statistical significance. This occurrence may be ascribed to the highly customizable nature of online content within the CESIM simulation platform, resulting in diverse effects on self-efficacy among individuals. Additionally, the study proposes that assessments designed with scientific rigor and reasonability may exhibit greater objectivity and reduced reliance on personal preferences, potentially elucidating their relatively muted impact on self-efficacy compared to other influencing factors. The degree to which students actively engage with the content could also factor into determining the influence of online content and assessment on self-efficacy. Furthermore, a more thorough exploration of the nuanced dynamics between individual engagement levels and the impact of online content and assessments could provide deeper insights into the multifaceted nature of these influences on students' self-efficacy. This comprehensive understanding is pivotal for refining educational strategies that integrate online content and assessments effectively, contributing to the continual improvement of educational practices.

4.3. Mediation Test

The Bootstrap method stands as a statistical methodology utilized to gauge the sampling distribution of a given statistic, whether it be the indirect or direct effect in the context of a mediation analysis. In the course of this particular study, we opted to employ the Bootstrap method to evaluate the mediating impact of positive emotional arousal concerning the influence exerted by the blended teaching model on students' self-efficacy. To be more specific, we defined the sample size for the Bootstrap method at 5000, thereby generating 5000 resamples from the initial sample data with the objective of establishing a 95% confidence interval.

Having conducted a thorough analysis and performed tests to examine both the indirect and direct effects utilizing questionnaire data, our research outcomes indicate that positive emotional arousal plays a partial mediating role in the impact of the blended teaching model on students' self-efficacy. Our findings emphasize that emotional arousal, nevertheless, does not function as a mediator in the association between collaboration and self-efficacy. This leads to the conclusion that,

while positive emotional arousal emerges as a significant factor in explaining the connection between the blended teaching model and students' self-efficacy, it may not fully elucidate the influence of collaboration on self-efficacy. It is imperative to recognize the nuanced interplay between these variables and consider the multifaceted nature of their effects when designing educational models and interventions. A more intricate understanding of these dynamics will contribute to the refinement and enhancement of instructional approaches in fostering students' self-efficacy in diverse learning environments.

5. Conclusions

This study empirically investigates the impact of the business blended teaching model, based on the CESIM simulation platform, on students' self-efficacy. The contextualized items and reference variables of the blended teaching model positively influence students' self-efficacy through the induction of positive emotional arousal. Collaboration also directly contributes to enhancing students' self-efficacy. Assessment can trigger positive emotions in students, although it doesn't have a direct impact on self-efficacy. The research findings carry significant implications for teaching. Expanding upon the insights gained from this study, it becomes evident that the examination of the business blended teaching model, particularly when grounded in the CESIM simulation platform, provides valuable contributions to understanding its influence on students' self-efficacy. The contextualized items and reference variables embedded within the blended teaching model are observed to exert a positive impact on students' self-efficacy, achieved through the induction of positive emotional arousal. Furthermore, collaboration is identified as a direct contributor to the enhancement of students' self-efficacy. While assessment is noted for its ability to elicit positive emotions in students, it is highlighted that this factor does not exert a direct impact on self-efficacy. The research findings underscore significant implications for the field of teaching, offering valuable insights into optimizing instructional approaches and strategies.

Recommendations to enhance the effectiveness of blended teaching include:

Enhancing the development of contextualized projects within blended teaching classrooms is imperative. These projects offer students invaluable opportunities to fully engage with realistic market scenarios encompassing business operations and enterprise management. This immersive experience not only fosters positive emotions but also cultivates a profound sense of competence among students. The acquisition of such competencies plays a pivotal role in preparing them for prospective management roles in their professional journeys. This strategic emphasis on contextualized projects significantly contributes to the comprehensive development of students, aligning them with the dynamic requirements of future leadership positions.

Expanding the array of assessment methods employed at different junctures within the continuum of blended teaching is crucial. Incorporating a diverse range of assessment techniques that are not only varied but also reasonable and grounded in scientific principles has the capacity to emotionally engage students, enhance their motivation, and ultimately produce superior academic outcomes. The feedback and insights derived from these assessments play a pivotal role, empowering teachers to fine-tune their instructional approaches more effectively. This iterative process, informed by assessment results, contributes to the creation of an optimal learning experience for students within the realm of blended teaching. This strategic diversification of assessment methods aligns with the multifaceted nature of contemporary education, catering to the diverse learning needs and preferences of students.

Augmenting the richness of reference materials accessible within blended teaching classrooms and refining access methods constitutes a fundamental strategy to broaden the spectrum of students' learning content. The enhancement of this access plays a pivotal role in assisting students in delineating clearer learning objectives, fostering positive emotions in their learning experiences, bolstering self-confidence, and ultimately contributing to the improvement of self-efficacy. This concerted effort towards enriching reference materials aligns with the evolving landscape of education, catering to the diverse learning styles and preferences of students, thus

fostering a more inclusive and effective learning environment.

Promoting and fostering teacher-student as well as student-student interactions during the execution of the blended teaching model emerges as a critical imperative. While adult college students may logically understand the advantages of interpersonal interaction, the translation of this comprehension into positive emotional arousal might lag in practical application. Recognizing that collaborative interaction plays a direct role in augmenting students' self-efficacy, it becomes imperative to cultivate positive self-assessment of students' abilities. The deliberate design of interactive activities within this context can be exceptionally beneficial, contributing to a holistic educational experience that not only imparts knowledge but also nurtures emotional engagement and social interaction. This emphasis on fostering interactions aligns with contemporary educational paradigms, emphasizing the interpersonal dimensions of learning in the adult education landscape.

Giving precedence to enhancing students' enthusiasm and emotional engagement within blended teaching classrooms emerges as a pivotal priority. Positive emotions wield a substantial influence on the learning process, contributing to heightened interest, motivation, augmented self-confidence, and enhanced academic performance. The formulation and implementation of effective teaching plans that deliberately foster positive emotional arousal and actively encourage students' participation in classroom activities can yield a profound positive impact on their self-efficacy. This strategic emphasis on prioritizing emotional well-being aligns with contemporary educational philosophies, acknowledging the intricate interplay between emotions and learning outcomes in the context of blended teaching.

In summary, this study extensively explores the impact of blended teaching on students' self-efficacy, emphasizing the effectiveness of student-centered experiential learning. Beyond merely advancing the theoretical understanding of blended teaching, the research delves into the intricate mechanisms of self-efficacy influenced by positive emotional arousal. The study makes a substantial contribution to the development and optimization of professional teaching

methods in business education, adeptly bridging the gap between contemporary smart classrooms and traditional teaching environments. Future research endeavors will involve an expansion of the sample size and a comprehensive examination of self-efficacy mechanisms across diverse demographic variables. Additionally, the study aims to investigate blended teaching from the perspective of teachers, thereby further enriching the theoretical framework of blended teaching to align with the evolving landscape of teaching methods in the new era.

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