The Impact of Smart Classrooms on Academic Self-Efficacy of Chinese Higher Vocational Students: Analysis and Countermeasures based on Henan Province

Juan Zhang[1,2], Yali Zhang[2]

[1]Durham University, Durham, United Kingdom. [2]Henan Vocational College of Light Industry, Zhengzhou, China

Research Domains

Technical, Professional and Vocational Higher Education (TPV)

Abstract

This study examines the impact of smart classrooms on the academic self-efficacy of higher vocational students in Henan Province in China. Utilising a mixed-method approach with surveys and online interviews, data from 3090 valid questionnaires were analysed using IBM SPSS Statistics. Results indicate that students' academic self-efficacy is moderate, with significant room for improvement. Key factors influencing self-efficacy include students' perceptions of their learning abilities and behaviours. While smart classrooms offer benefits like enhanced engagement and interactive learning, challenges such as student self-control and network stability persist. The study suggests strategies to boost students' self-efficacy, including creating a collaborative digital resource environment and providing targeted teacher training to enhance students' confidence and promote effective educational practices.

Full paper

Academic self-efficacy plays a crucial role in students' autonomous learning and overall academic performance (He et al., 2024; Niittylahti et al., 2023; Scott et al., 2023; Tao, 2025; Zwart et al., 2020). This study explores the influence of smart classrooms on the academic self-efficacy of Chinese vocational students in Henan Province. Smart classrooms integrate AI-integrated technology to create interactive and engaging learning environments, potentially enhancing students' confidence in their academic abilities.

Previous research has emphasised the significance of academic self-efficacy in educational contexts (e.g. He et al., 2024; Scott et al., 2023)). Bandura's definition of self-efficacy highlights an individual's belief in their ability to complete tasks and control their learning behaviour (Kiikeri et al., 2024; Niittylahti et al., 2023). Studies by Xu et al. (2021) and Wang et al. (2018) have provided similar definitions, underscoring the subjective judgment of one's learning capabilities.

The study employs a mixed-method approach, combining questionnaire surveys and online interviews. A total of 3175 questionnaires were distributed, with 3090 valid responses collected from Chinese students across various higher vocational institutions in Henan Province. The survey included items on basic student information, academic burnout, self-efficacy, and semi-open questions about smart classrooms and academic self-efficacy. Data analysis was conducted using IBM SPSS Statistics, ensuring high reliability with a Cronbach's alpha of 0.890 (Table 1 below).

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.890	0.897	42

Table 1: Questionnaire Reliability Statistics

The data analysis in Table 2 below revealed that vocational students' overall academic self-efficacy is moderate, with an average score of 3.307. Factors influencing self-efficacy include students' perceptions of their learning abilities and behaviours. Our study found that students have a moderate level of confidence in their learning abilities, with an average score of 3.43. Less than half of the students believe they can achieve good grades (48.89%), and about one-third are willing to undertake challenging tasks (35.69%) or put in extra effort for difficult tasks that offer learning opportunities (37.67%). This suggests that students lack confidence in their learning abilities, despite the support of smart classrooms and advanced technology.

	M	SD	EE&M	LA	IBUS	SE-LA	SE-LB	AS
Emotional Exhaustion and Misbehaviour (EE&M)	3.379	0.796	1					
Low sense of achievement (LA)	3.231	0.512	0.241**	1				
IBUS	3.327	0.586	0.954**	0.520**	1			
self-efficacy on learning ability (SE-LA)	3.431	0.754	0.433**	0.388**	0.500**	1		
Self-efficacy on learning behaviour (SE-LB)	2.968	0.833	-0.332**	-0.157**	-0.340**	0.112**	1	
Academic self-efficacy (AS)	3.307	0.619	0.267**	0.290**	0.325**	0.934**	0.459**	1

Note: ** indicates significance at the 1% level, N=3090

Table 2: Descriptive Statistics and Correlation Analysis

Regarding learning behaviours, students scored lower, with an average of 2.97, indicating a lack of confidence in their learning behaviours. Specifically, approximately one-fourth of the students exhibit significant deviations in learning behaviors, such as not understanding the essence of practical training (23.24%), failing to summarise the main points of reading materials (23.78%), not paying attention in class (22.23%), and rote memorisation of knowledge points (19.71%).

The impact of smart classrooms on academic self-efficacy is complex and polarised. Approximately 52% of students find smart classrooms more engaging and beneficial for creating a free and equal learning environment, which positively influences their self-

efficacy. However, nearly 50% of students face challenges such as poor interaction, network issues, and low self-control, which negatively affect their self-efficacy. Despite the advantages of modern technology and optimised learning environments, over half of the students (61.42%) feel they cannot fully understand the content they are supposed to learn.

Our study concludes that the fundamental issue lies with the students themselves, and technological solutions alone cannot resolve the low academic self-efficacy (Blayone, 2019; Cigdem & Oncu, 2024; Tao, 2025). Chinese vocational students in Henan Province have moderate self-efficacy with significant potential for improvement. Furthermore, smart classrooms offer benefits that increase engagement and promote interactive learning (Cigdem & Oncu, 2024; Niittylahti et al., 2023). However, challenges persist, including issues with student self-control and network stability(Niittylahti et al., 2023) . The study found a strong correlation between academic burnout and self-efficacy, suggesting that enhancing self-efficacy may help mitigate burnout.

Our study proposes several strategies to enhance the academic self-efficacy of vocational students. Schools should develop collaborative digital resource environments and provide regular training for teachers on smart classroom technologies (Tao, 2025). Encouraging positive teacher-student interactions and fostering a supportive learning atmosphere are crucial (Tian et al., 2023). Additionally, setting realistic learning goals and providing timely feedback can boost students' confidence and motivation(Cigdem & Oncu, 2024; Kiikeri et al., 2024) .

This study was limited to students from higher vocational colleges in Henan Province. Due to regional differences, the findings may not be generalisable to other regions in China. Future research should include a more diverse sample to enhance the generalizability of the results.