*International Journal of Learning, Teaching and Educational Research*
*Vol. 24, No. 12, pp. 497-522, December 2025*
*https://doi.org/10.26803/ijlter.24.12.22*
*Received Sept 17, 2025; Revised Nov 2, 2025; Accepted Nov 5, 2025*

# Self-Efficacy in University Learning and Teaching: A PRISMA-Guided Systematic Review of its Multifaceted Dimensions

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**Abstract.** This paper presents a systematic review of empirical research from 2020 to 2024 related to self-efficacy to illustrate the various roles of self-efficacy as an independent, mediating, and dependent variable in various aspects of university learning and teaching. Seventy-five peer-reviewed studies were selected following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline and analysed through a combined narrative and thematic approach. The final findings reveal that various forms of self-efficacy, namely, academic, digital, research, and entrepreneurial, could consistently predict positive academic achievement, engagement, and self-regulation. Self-efficacy is a significant mediator between instructional design, pedagogical support, learning environments, individual motivation, and performance, although these connections have not been thoroughly explored. The improvement of self-efficacy is influenced by educational, technological, and social factors in the digital and post-pandemic environment. In theory, these findings suggest that self-efficacy should be embedded in larger motivational and situational frameworks. In practice, the importance of gaining experience, formative feedback, digital abilities, and supportive institutional atmospheres is emphasised. However, current literature is limited by cross-sectional methods, conceptual ambiguity between specific domain structures, and limited cross-cultural perspectives. Addressing these methodological, conceptual, and contextual gaps will provide a more comprehensive and integrated

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explanation for the development of self-efficacy and its interaction as a predictor, mediator, and outcome in higher education systems.

**Keywords:** self-efficacy; university learning and teaching; systematic review; PRISMA

## 1. Introduction

With the changes in global education and technology, there is a need to investigate the psychological component behind the change, as this knowledge may help individuals perform more confidently. The success of higher education lies not only in students' cognitive ability but also in their adaptability and endurance. With the advent of digital, entrepreneurial, and interdisciplinary areas, the question of why certain individuals is more energetic and resilient than others have gained great interest among educators and researchers.

Among the constructs explaining these differences is self-efficacy, which is rooted in Bandura's social cognitive theory (Bandura, 1977). Self-efficacy has become a core psychological factor in learning and performance. It profoundly influences human motivation, performance, and mental health (Bandura, 2006) as well as the perseverance to make decisions, exert effort, overcome difficulties, and turn emotional responses such as anxiety into confidence (Bandura & National Inst of Mental Health, 1986).

Self-efficacy is relevant in education (Schunk, 1981), which is why offline and online learning environments need to be explored in relation to how self-efficacy can cultivate autonomy, competence, participation, and learning outcomes in different educational backgrounds (Demirelli & Karacay, 2024; Gupta & Prashar, 2024; Ma et al., 2024). In higher education, these efficacy beliefs can shape students' motivation, effort patterns, and perseverance in handling obstacles and emotional experiences (Schunk & DiBenedetto, 2020). Therefore, self-efficacy has become a key explanatory variable for academic engagement, performance, and well-being.

Over the past five years, particularly during and after the COVID-19 pandemic, studies have diversified the concept from general self-efficacy to broader academic, online/computer, and entrepreneurial self-efficacy (Ajala et al., 2023; Alismail, 2024; Arias et al., 2024; Yesmin et al., 2024). In addition, studies have continued to explore self-efficacy among university instructors, indicating that partner universities, the quality of online learning, and prior experience with learning management systems significantly predict instructors' self-efficacy in online teaching (Alamri, 2023). Therefore, these studies have suggested that self-efficacy enhances individual motivation and persistence or is shaped in specific systems and contexts, although these vary in conceptual scope and methodological rigour.

Despite the growing attention to self-efficacy in education, current research remains fragmented and theoretically dispersed. Existing studies tend to examine self-efficacy with isolated perspectives, offering different but disconnected

insights. Few studies have systematically compared its distinct but interrelated functions, especially as a predictor shaping learning and behavioural outcomes, a mechanism mediating relationships between contextual or instructional factors and performance, as well as an outcome shaped by personal, environmental, or pedagogical influences. Overall, current evidence and methodology remain fragmented theoretically, and the literature is concentrated in specific contexts empirically. Such fragmentation and incoherence have, to some degree, prevented a holistic understanding of how self-efficacy operates dynamically in higher education systems, which in turn restricts further theoretical development and effective educational practice.

Seeking to bridge theoretical, methodological, and practical gaps, this review therefore aims to synthesise empirical evidence to clarify the development and function of self-efficacy over the last five years. Theoretically, this review mainly examines the role of self-efficacy as a predictor, mechanism, and outcome. Methodologically, it synthesises related general trends, geographical distribution, and methodological approaches as well as research limitations and new directions for future research. Practically, this review can make a great contribution to improving theoretical application and educational practice. Table 1 summarises the core research objectives and questions.

**Table 1: Research focus, research objectives, and research questions**

| Research focus | Research objective | Research question |
|---|---|---|
| Predictor role | RO1. To review how self-efficacy predicts learning or behavioural outcomes | RQ1. How does self-efficacy predict learning or behavioural outcomes? |
| Mechanistic role | RO2. To synthesise empirical evidence on mediating variables of self-efficacy in linking different factors to learning or behavioural outcomes | RQ2. In what ways does self-efficacy mediate the relationship between different factors and learning or behavioural outcomes? |
| Outcome role | RO3. To review antecedents and influencing factors that shape self-efficacy | RQ3. How do various factors determine or influence self-efficacy? |

## 2. Methodology

This review was conducted by following the PRISMA 2020 framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Page et al., 2021) to guarantee research rigour, process transparency, and reproducibility. The PRISMA approach involved four main procedures, namely, inclusion and exclusion criteria, systematic literature search, quality appraisal, as well as data extraction and synthesis.

### 2.1 Inclusion and Exclusion Criteria

Explicit and standard inclusion and exclusion criteria followed PRISMA 2020 and JBI methodological standards (see Table 2 below) (Aromataris et al., 2015).

Specifically, empirical, peer-reviewed journal articles published between 2020 and 2024 were included, while reviews, theoretical papers, dissertations, book chapters, and grey literature were excluded. The time frame was selected to guarantee the latest development during and after the COVID-19 pandemic. Studies written in English were selected, reflecting the dominance of English in academic publishing while acknowledging potential language bias.

**Table 2: Inclusion and exclusion criteria**

| Inclusion | Exclusion |
|---|---|
| Empirical studies | Reviews, theoretical papers, book chapters, dissertations, and grey literature |
| Peer-reviewed literature | Non-peer-reviewed literature |
| Higher education context (2020–2024) | Other contexts outside the context and time frame of this study |
| English language | Non-English publications |

### 2.2 Systematic Literature Search

This review employed internationally recognised databases, namely, Web of Science and Scopus, as its primary sources. Both databases provided comprehensive, high-quality coverage of peer-reviewed journals across disciplines and indexed by transparent inclusion standards, frequently recommended in PRISMA-based systematic reviews (Falagas et al., 2008; Mongeon & Paul-Hus, 2016).

A systematic search strategy was developed by following the PRISMA guidelines and best evidence-based practices for information retrieval (Rethlefsen et al., 2021). Boolean operators ("AND", "OR") and controlled keywords were employed to ensure both precision and recall, a method widely used for improving the transparency and reproducibility of a system search (Cooper, 2015; Page et al., 2021). The search strategy was limited to the TITLE in the Web of Science and Scopus databases. This expedited citation screening for scoping searches and rapid review under the condition that the research concept was narrow and terminology stable, which could ensure higher precision and relevance (Rathbone et al., 2017). The final search was performed in December 2024 with the following search queries:

1. Web of Science: TI = ("self-efficacy" AND ("university" OR "college" OR "higher education"))
2. Scopus: TITLE ("self-efficacy") AND (TITLE ("university") OR TITLE ("college") OR TITLE ("higher education"))

The database search initially identified 323 records. After removing duplicate and irrelevant resources, 140 articles remained. A manual review was conducted using an Excel checklist to reduce the sample size to 75 articles (Aromataris et al., 2015), ensuring the reliability of the final full-text review and synthesis. The process of identification, screening, eligibility, and inclusion followed the PRISMA 2020 flowchart, as shown in Figure 1.

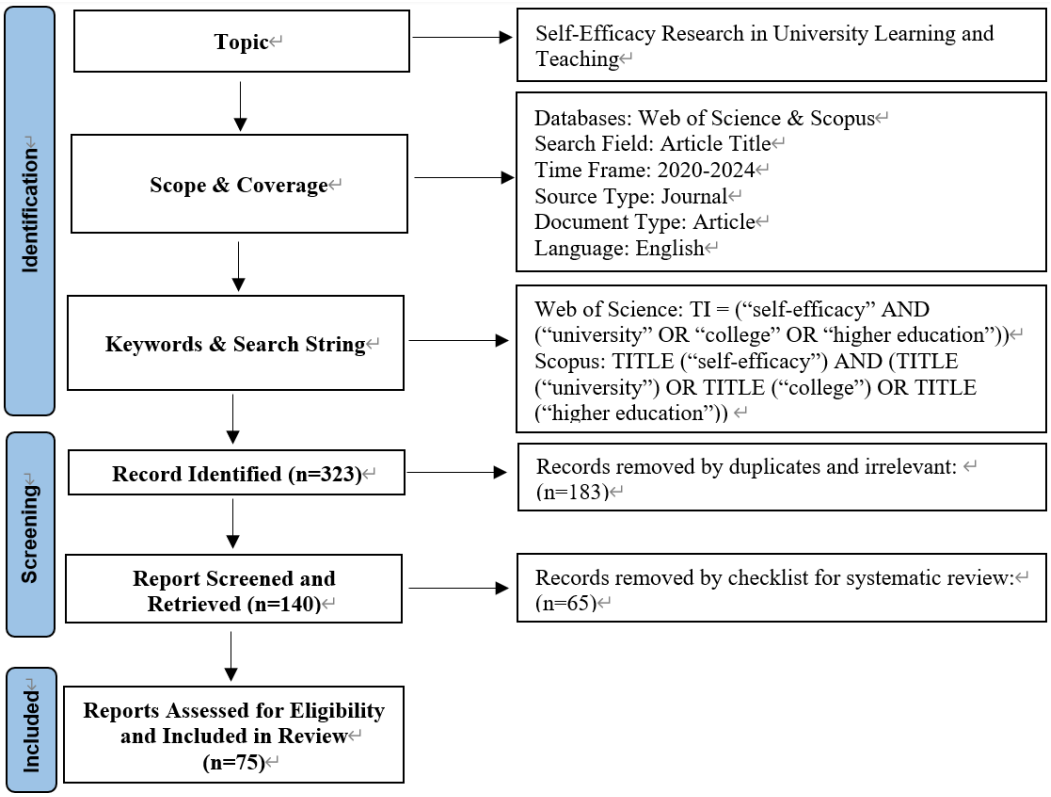


**Figure 1: Flow diagram of search strategy**

### 2.3 Quality Appraisal

To guarantee a rigorous methodology, all articles were evaluated by two reviewers following the principles of the JBI system evaluation framework. The quality of each study was evaluated using the JBI Checklist for Systematic Reviews and Research Syntheses (Aromataris et al., 2015). The two reviewers independently evaluated article quality, reaching substantial agreement. Any discrepancies between the two reviewers were identified and resolved through discussion until full consensus was reached. Overall, this consensus-based approach ensured transparency, consistency, and reliability according to JBI recommendations (Aromataris et al., 2024).

### 2.4 Data Extraction and Synthesis

A structured literature matrix was created using Excel to systematically extract important information, such as author, publication year, country, geographic location, sample, methods, types and roles of self-efficacy, as well as main findings. Narrative synthesis was employed by adopting the six-stage thematic analysis approach by Braun and Clarke (2006). This process involved data familiarisation, coding, topic identification, refinement, definition, and synthesis. This narrative and thematic synthesis technique was employed to better explain how self-efficacy has been recognised and studied in higher education, identifying research gaps and under-researched backgrounds.

## 3. Analysis of the Articles

The 75 selected articles were summarised according to three key factors: publication trends, geographical distribution, and methodological approach.

### 3.1 Publication Trends

As shown in Figure 2, the publication trend fluctuated significantly. During the COVID-19 pandemic, from 2020 to 2022, the research theme shifted from general and academic fields to career decision-making and online learning self-efficacy. The number of publications began to rise steadily in 2021 and peaked in 2023 and 2024. The rising trend shows that new fields, such as entrepreneurial self-efficacy (Yesmin et al., 2024), had raised growing interest, reflecting the influence of post-pandemic educational and economic contexts. Recent studies on research self-efficacy (Ndiango et al., 2023) and crisis self-efficacy (Nguyen et al., 2022) demonstrate a conceptual broadening and thematic diversification. Therefore, this publication trend reveals that while general and academic self-efficacy continue to serve as the theoretical core, research is progressively extending towards more specialised and contextually grounded domains.

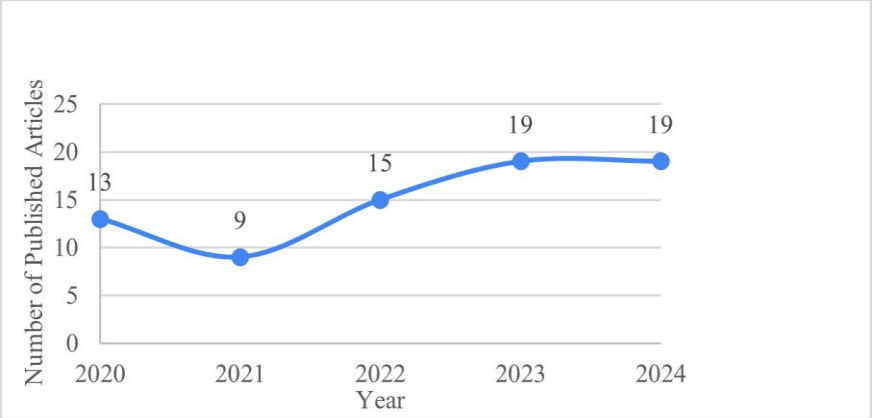


**Figure 2: Number of published articles in the study period**

### 3.2 Geographical Distribution

This review demonstrated a broad geographical distribution of the study sample, covering over 30 countries, as shown in Figure 3, which proves the global significance and relevance of self-efficacy research. Roughly 10% of the publications originated from seven European countries, where scholars primarily examined general and academic self-efficacy (Sagone & Indiana, 2023; Tomás et al., 2023). Around 20% of the studies were conducted in the Americas and Africa, with an emphasis on research, system, and digital self-efficacy with the growing digitalisation of changing higher education (Ajala et al., 2023; Iraola-Real et al., 2023; Mtebe, 2020; Ndiango et al., 2023).

In comparison, Asian countries, especially China, Iran, Saudi Arabia, Turkey, and Malaysia, accounted for over 60% of the total sample, with a strong focus on entrepreneurial, career, and crisis-related self-efficacy (Li, 2024; Luo et al., 2022; Nguyen et al., 2022; Yusoff et al., 2024). These findings indicate that the nature of research varies by region due to differences in education systems and reforms after the pandemic. Nonetheless, such research still promotes an understanding

of how self-efficacy can help students' motivation, performance, and professional development in higher education environments to be more inclusive and globally responsive.

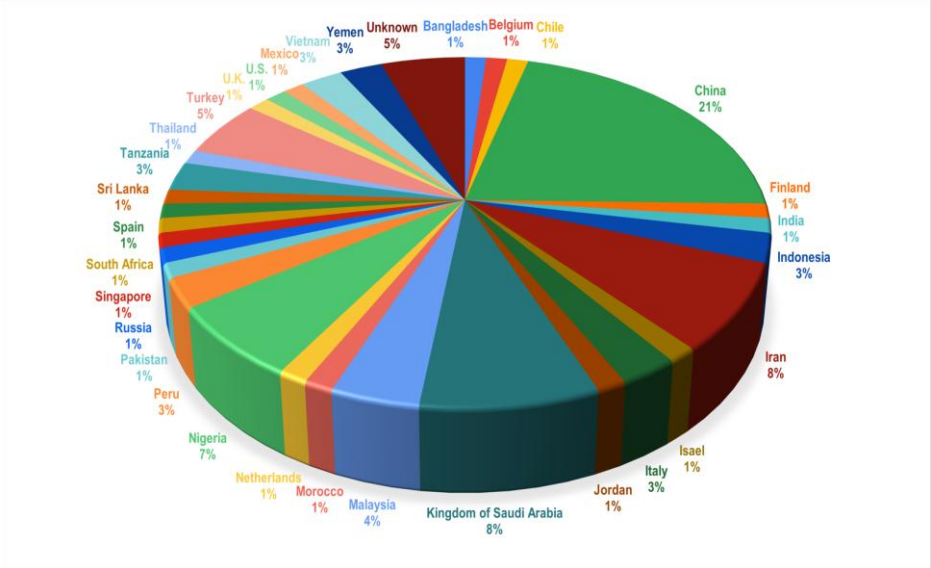


**Figure 3: Geographical location of the selected articles**

### 3.3 Methodological Approach

As shown in Figure 4, most of the selected publications employed a quantitative research design, with a relatively small proportion using qualitative methods. The use of quantitative methods indicates an emphasis on examining the relationships between variables and quantifying the magnitude of effects, with self-efficacy as an independent, mediating, or dependent variable. Although most articles were quantitative, qualitative research provided supplementary and procedural insights.

Students with enhanced self-efficacy in academic writing believed that they were more familiar with subject conventions (Mendoza et al., 2022), suggesting the significance of contextual learning experiences. In addition, the role of online peer coaching in fostering entrepreneurial self-efficacy during and after the pandemic has been proven (Pradana & Susanti, 2024). These qualitative findings reveal mechanisms and contextual factors that statistical models alone may not capture.

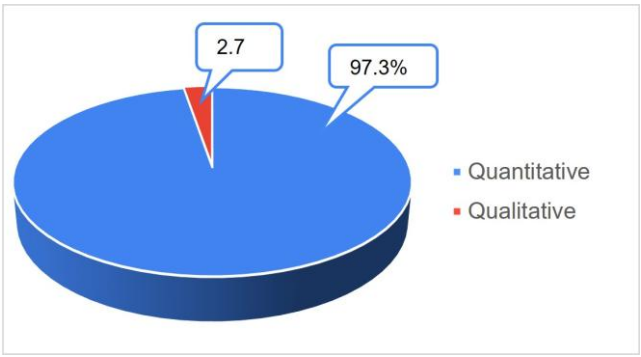


**Figure 4: Methodology of the selected articles**

## 4. Results

In addition to reviewing the publication trends, geographical distribution, and methodological approaches of the reviewed articles, the 75 articles were systematically reviewed to determine how self-efficacy in higher education functions as an independent, mediating, and dependent variable, reflecting its dynamic and multi-dimensional nature. The three research questions are answered in the following sections.

### 4.1 RQ1: How Does Self-Efficacy Predict Learning or Behavioural Outcomes?

The empirical studies answering RQ1 primarily focused on the predictive power of self-efficacy across cognitive, affective, and behavioural outcomes in higher education.

#### *4.1.1 Self-efficacy as an independent variable*

The studies treating self-efficacy as having an independent role most frequently examined general self-efficacy and academic self-efficacy, followed by increasing attention to digital and domain-specific forms, as summarised in Table 3.

**Table 3: Research on self-efficacy as an independent variable**

| Main domains of self-efficacy as an independent variable | Supporting publications |
|---|---|
| General self-efficacy | Alkhutaba (2022), Apridayani and Teo (2021), Covarrubias Apablaza et al. (2024), Gazo et al. (2020), Hussein Alkhatib (2020), Lin et al. (2022), Liu (2023), Omotunde (2022), Tak et al. (2023), Wang et al. (2024), Xiao and Song (2022) |
| Academic self-efficacy | Al-Qadri et al. (2024), Erzen and Ozabaci (2021), Neroni et al. (2022), Sagone and Indiana (2023), Tugrul and Sona (2021) |
| Online self-efficacy | Ulfatun et al. (2021) |
| Online information retrieval self-efficacy | Rasheed and Ahmed (2024) |
| Computer self-efficacy | Ajala et al. (2023) |
| Computer & Internet self-efficacy | Punjani and Mahadevan (2022) |
| Internet self-efficacy | Hamdan et al. (2021) |
| e-Learning self-efficacy | Bubou and Job (2022) |
| Digital self-efficacy | Iraola-Real et al. (2023) |
| Social self-efficacy | Gazo et al. (2020) |
| English language self-efficacy | Gan et al. (2020) |
| Instructor self-efficacy | Scott et al. (2023) |
| Entrepreneurial self-efficacy | Elnadi and Gheith (2021), Yesmin et al. (2024) |
| Research self-efficacy | Ndiango et al. (2023) |

The review showed that general self-efficacy exerts broad positive influences on academic goals, performance, and reasoning (Apridayani & Teo, 2021; Covarrubias Apablaza et al., 2024; Lin et al., 2022; Tak et al., 2023). Beyond these influences, general self-efficacy was also found to be positively related to broader psychosocial constructs, including problem-solving disposition, group-level or self-level regulation, social intelligence, and positive thinking (Hussein Alkhatib, 2020; Lin et al., 2022; Liu, 2023; Wang et al., 2024), suggesting that self-efficacy enhances not only cognitive performance but social and emotional resilience as well.

However, negative associations were observed with learning obedience (Xiao & Song, 2022) and maladaptive behaviours, such as Internet addiction and loneliness (Gazo et al., 2020). Some studies even reported a non-significant relationship with job performance (Omotunde, 2022), implying potential contextual boundaries to the generalisability of self-efficacy effects. Academic self-efficacy also positively predicts favourable learning outcomes, such as academic commitment (Al-Qadri et al., 2024) and academic performance (Tugrul & Sona, 2021). In addition, it could predict self-regulatory outcomes such as decisional procrastination (Sagone & Indiana, 2023) and academic adjustment (Erzen & Ozabaci, 2021). Nevertheless, results were inconsistent in that no predictive effect was found on academic success (Neroni et al., 2022), suggesting that self-efficacy impact might depend on task type, institutional context, or cultural settings.

Since the COVID-19 pandemic, research attention has increasingly shifted towards online and computer-related self-efficacy. Online and digital self-efficacy predicted stronger self-regulated learning (Ulfatun et al., 2021), e-learning readiness (Bubou & Job, 2022), and enhanced virtual educational performance (Iraola-Real et al., 2023). However, mixed effects were also found. While online and computer self-efficacy improved library and online education satisfaction (Hamdan et al., 2021; Rasheed & Ahmed, 2024) as well as digital resource usage (Ajala et al., 2023), partial or even full negative effects on net benefits in online learning have also been reported (Punjani & Mahadevan, 2022). In addition, domain-specific forms, such as social (Gazo et al., 2020), English language (Gan et al., 2020), entrepreneurial (Elnadi & Gheith, 2021; Yesmin et al., 2024), research (Ndiango et al., 2023), and instructor self-efficacy (Scott et al., 2023), have impacted corresponding behavioural outcomes.

In summary, these findings suggest that research on self-efficacy has indicated an expansion from general and academic self-efficacy to highly specialised constructs. This reflects both the versatility and fragmentation of the concept as well as highlights the importance of task specificity and contexts, which echoes Bandura's argument that efficacy beliefs are domain-bound rather than universally transferable (Bandura, 1997).

*4.1.2 Self-efficacy as a mediating variable*

When conceptualised as a mediating variable, research has shown how various individual or contextual self-efficacy factors impact learning and behavioural

outcomes. General self-efficacy transmits effects from entrepreneurship education to entrepreneurial intention (Hoang et al., 2020), and from socioeconomic status to mental health (Huang & Wang, 2023). Similarly, academic self-efficacy mediates between engagement and achievement (Pang & Veloo, 2024) and between life orientation and motivation (Akanni, 2022). Within technology-driven teaching and learning, digital and online self-efficacy has been observed to bridge technological competence with online engagement and deep learning (Sun & Shi, 2024), though weaker mediation has been observed for satisfaction (Tomás et al., 2023).

These patterns have demonstrated that self-efficacy serves as a psychological mechanism that partially explains educational effects, but its mediating strength varies by domain and learner characteristics. Consequently, self-efficacy functions as an outcome of contextual support and an active channel translating individual and environmental input into learning gains.

*4.1.3 Self-efficacy as a dependent variable*

When viewed as a dependent variable, self-efficacy reflects how psychological, instructional, and contextual elements shape learners' beliefs. Supportive environments, emotional intelligence, and feedback have been found to enhance general efficacy (Panadero et al., 2023; Sarani et al., 2020; Yüce, 2023). Academic self-efficacy also increases through empowerment, critical thinking, and leisure engagement (Alismail, 2024; Cho & Lee, 2023). Intervention studies have also suggested that domain-specialised training, such as writing and design workshops, could enhance targeted self-efficacy (En-Chong, 2021; Shaikh et al., 2023), while a rigid or low-interactive instruction situation limits its improvement (Arias et al., 2024).

In summary, the reviewed articles indicate that self-efficacy is the primary determinant of learning and behavioural outcomes, and these influences vary across different domains and settings. As independent variables, general and academic self-efficacy can strongly predict academic achievement and psychosocial health, while context-specific variants, such as digital, entrepreneurial, and research self-efficacy, tend to influence technology-based and professional learning. However, occasional null or negative links with maladaptive behaviours suggest context-dependent boundaries. Consequently, these findings emphasise the dynamic nature of self-efficacy, acting as a predictor, mechanism, and outcome of higher education experiences and integrating personal, contextual, and behavioural dimensions of learning.

**4.2 RQ2: In What Ways Does Self-Efficacy Mediate the Relationship between Different Factors and Learning or Behavioural Outcomes?**

Studies related to explaining RQ2 shifted attention from the direct predictive role of self-efficacy to its underlying mechanism in linking educational factors with learning and behavioural outcomes.

*4.2.1 Self-efficacy as an independent variable*

Self-efficacy acting independently captured how educational interventions indirectly shape behaviour through enhanced self-beliefs. General and academic

efficacy predicted motivation, goal commitment, and achievement with the help of pedagogical experiences (Al-Qadri et al., 2024; Lin et al., 2022). Similarly, e-learning self-efficacy connected technology-enhanced instruction with online engagement (Bubou & Job, 2022). Therefore, even when treated as a direct predictor, self-efficacy often represents the psychological transmission of educational effects on learning outcomes.

*4.2.2 Self-efficacy as a mediating variable*

Studies conceptualising self-efficacy as a mediator most frequently addressed general self-efficacy, entrepreneurial self-efficacy, and academic self-efficacy, with a growing interest in online learning and technology self-efficacy, as presented in Table 4.

**Table 4: Research on self-efficacy as a mediating variable**

| Main domains of self-efficacy as a mediating variable | Supporting publications |
|---|---|
| General self-efficacy | Deng et al. (2023), Hoang et al. (2020), Huang and Wang (2023), Makhitha (2024), Van Canegem et al. (2023) |
| Entrepreneurial self-efficacy | Al-Qadasi et al. (2024), Li (2024) |
| Academic self-efficacy | Akanni (2022), Arianfar and Seyf (2020), Pang and Veloo (2024) |
| Online learning self-efficacy | Sun and Shi (2024) |
| Information and communication technology self-efficacy | Tomás et al. (2023) |

The empirical evidence consistently supports different forms of self-efficacy as having a central role linking educational program-related factors with learning behaviour outcomes. General self-efficacy mediates relationships between program choice and outcomes (Van Canegem et al., 2023), entrepreneurship education and entrepreneurial intention (Hoang et al., 2020), and socioeconomic status and various mental health outcomes (Huang & Wang, 2023). Also, it could mediate the relationship between detailed physical activity and life satisfaction (Deng et al., 2023). However, its mediating role is not universal; for instance, it fails to mediate the link between career education and entrepreneurial orientation (Makhitha, 2024). These inconsistencies suggest that the explanatory power of self-efficacy may be contingent upon the strength of alternative mechanisms.

Entrepreneurial self-efficacy showed similarly sophisticated results. While it could explain the pathway between entrepreneurial intentions and entrepreneurship, it is less strongly predicted by attitudes (Al-Qadasi et al., 2024), with some studies finding no mediating effect between cyber-entrepreneurship courses and entrepreneurial intentions (Li, 2024). These findings reinforce the view that self-efficacy is not always the dominant psychological mechanism in entrepreneurial development, which is worth further exploring.

Academic self-efficacy often acts as a mediator between engagement and achievement (Pang & Veloo, 2024), life orientation and engagement (Akanni, 2022), and future orientation use and academic self-regulation (Arianfar & Seyf, 2020). However, the extent of mediation varies, with some studies reporting only partial effects. The reviewed studies from the COVID-19 and post-pandemic era show that online learning self-efficacy mediates the relationship between information and communication technology self-efficacy and deep learning outcomes (Sun & Shi, 2024), although its predictive value for academic satisfaction proves relatively weak (Tomás et al., 2023). This indicates that while online self-efficacy may facilitate the conversion of technological skills into learning achievements, it contributes less directly to students' sense of satisfaction.

Therefore, as a mediating variable, self-efficacy thus provides conditional explanatory insight. It frequently conveys the effects of individual, pedagogical, and contextual determinants; however, it does not always represent the principal route of influence. These findings emphasise the need for models that integrate self-efficacy with other psychological constructs, such as motivation or resilience, to better capture the dynamic and multifactorial nature of learning and entrepreneurship.

*4.2.3 Self-efficacy as a dependent variable*

Self-efficacy, conceptualised as an outcome variable, often emerged as the result of educational interventions, suggesting that learning experiences and instructional settings indirectly shape performance through strengthened self-efficacy. Studies suggest that service learning, exploratory pedagogy, feedback mechanisms, and emotional intelligence training substantially enhance students' self-efficacy (Alrashed, 2023; Panadero et al., 2023; Sarani et al., 2020).

Likewise, domain-oriented interventions, such as writing training and designing collaboration, both enhance individuals' academic self-efficacy, which in turn predicts higher levels of engagement and performance (En-Chong, 2021; Shaikh et al., 2023). Therefore, self-efficacy not only has a mediating effect between teaching practice and learning outcomes, but also an intermediate outcome in strengthening future achievements and self-regulation behaviour.

In summary, the reviewed evidence suggests that self-efficacy has a mediating and dependent role, linking educational variables with learning and behavioural outcomes. This pattern demonstrates how teaching strategies and situational support can trigger stronger self-efficacy, thereby improving students' motivation and achievement. When self-efficacy is a mediating variable, general, academic, entrepreneurial, and online self-efficacy generally exhibit changes in engagement and performance related to instructional design, digital abilities, and learning environment.

However, the strength of this mediating effect varies depending on the situation, and some studies even show a weak or no significant mediating effect. This suggests that self-efficacy and other mechanisms, such as motivation or resilience, conditionally influence each other, and self-efficacy can also be guided by supportive feedback and domain-specific assistance. Cultivating self-efficacy

requires a polyhedron associated with personal, teaching, and situational factors that affect students' engagement and achievement.

**4.3 RQ3: How Do Various Factors Determine or Influence Self-Efficacy?**

RQ3 concerns self-efficacy as a dynamic role, with the research on this question explaining how personal attributes, situations, and teaching practices interact to enhance self-efficacy in different educational fields.

*4.3.1 Self-efficacy as an independent variable*

From a causal perspective, the research regards self-efficacy as having an independent role and considers it an important predictor of learning persistence and performance. Higher self-efficacy is the result of previous achievements and supportive technological and institutional environments, and is the driving force for increasing participation, motivation, and academic outcomes in all fields (Gan et al., 2020; Ndiango et al., 2023; Ulfatun et al., 2021). Therefore, self-efficacy is a key predictor of how individuals cope with challenges and continue to exert effort in complex learning environments.

*4.3.2 Self-efficacy as a mediating variable*

In its mediating role, self-efficacy is shaped by instructional and individual inputs, in turn regulating subsequent learning and performance outcomes. For example, entrepreneurship education and program quality enhance entrepreneurial self-efficacy, which subsequently predicts entrepreneurial intention (Hoang et al., 2020; Makhitha, 2024). Similarly, ICT training boosts online learning self-efficacy, which in turn enhances deep learning engagement (Sun & Shi, 2024). Consequently, these models indicate that self-efficacy is dynamically formed through learning experiences, reflecting reciprocal determinism between educational inputs and self-beliefs.

*4.3.3 Self-efficacy as a dependent variable*

Studies positioning self-efficacy as having a dependent role represented the largest group and covered the broadest thematic range, as summarised in Table 5. Four major clusters emerged, including general self-efficacy, academic self-efficacy, career/entrepreneurial self-efficacy, and other domain-specific forms.

The review revealed that general self-efficacy is positively predicted by individual characteristics, such as personal attributes (Carter, 2022) as well as gender and language background (Chathuranga et al., 2024). Similarly, psychosocial capacities, such as emotional intelligence (Sarani et al., 2020), were shown to enhance self-efficacy. In addition, the learning environment, for example, a supportive learning climate (Yüce, 2023), favourable teaching environment (Farshad et al., 2023), and extracurricular engagement (Griffiths et al., 2021), also plays a crucial and positive role.

Additionally, rubric-guided feedback (Panadero et al., 2023) could also increase students' self-efficacy. Finally, some teaching methods, such as the service-learning approach (Alrashed, 2023), exploratory education (Kong et al., 2021), and enhanced social support (Wang et al., 2020), strengthen learners' self-efficacy.

**Table 5: Research on self-efficacy as a dependent variable**

| Main domains of self-efficacy as a dependent variable | Supporting publications |
|---|---|
| General self-efficacy | Alrashed (2023), Arias et al. (2024), Carter (2022), Chathuranga et al. (2024), Griffiths et al. (2021), Jeffords et al. (2020), Kong et al. (2021), Panadero et al. (2023), Sarani et al. (2020), Wang et al. (2020), Yüce (2023), Zeidi et al. (2020) |
| Academic self-efficacy | Abanto-Ramirez et al. (2024), Aldarmahi et al. (2023), Aldayel (2022), Alismail (2024), Cho and Lee (2023), Mana et al. (2020), Mousavi-Nasab and Shamsi Nezhad (2020) |
| Reading self-efficacy | Li et al. (2022) |
| Writing self-efficacy | En-Chong (2021) |
| Self-efficacy for academic writing | Mendoza et al. (2022) |
| Design self-efficacy | Shaikh et al. (2023) |
| Career decision-making self-efficacy | Farhang et al. (2020), Plakhotnik et al. (2020) |
| Career self-efficacy | Yusoff et al. (2024) |
| Employment self-efficacy | Kanar and Bouckenooghe (2021) |
| Entrepreneurial self-efficacy | Chu et al. (2024), Luo et al. (2022), Oulhou and Ibourk (2023), Pradana and Susanti (2024) |
| Teaching self-efficacy | Michael et al. (2020) |
| System self-efficacy | Mtebe (2020) |
| Computer self-efficacy | Sendogdu and Koyuncuoglu (2021) |
| Emotional and social self-efficacy | Alshaikh (2023) |
| Crisis self-efficacy | Nguyen et al. (2022) |
| Exercise self-efficacy | Liu et al. (2021) |

Nevertheless, some methods, such as computer-supported cooperative learning, are instructively innovative but have insignificant effects (Arias et al., 2024), suggesting that pedagogical novelty may not improve learners' self-efficacy. Some experimental and psychological elements, such as psychological inflexibility (Jeffords et al., 2020) and group conditions (Zeidi et al., 2020), could shape an individual's level of self-efficacy, which is a multi-dimensional and complex construct formed by the interaction between the individual, situational support, instructional design, and situational conditions.

In the academic context, self-efficacy is influenced by various cognitive and psychological factors. The results indicate that critical thinking (Abanto-Ramirez et al., 2024), psychological empowerment (Alismail, 2024), and leisure experiences (Cho & Lee, 2023) improve learners' confidence and perceived ability, revealing the role of both cognitive dispositions and affective resources (Aldarmahi et al., 2023). However, not all theories proved to be effective. For instance, accommodation theories proved to be indirectly related to self-efficacy (Mana et al., 2020), suggesting that its explanatory power in educational contexts may be limited.

Beyond general predictors, domain-specific variations became more evident. The review revealed that writing self-efficacy improves through detailed feedback and a positive self-concept (En-Chong, 2021; Mendoza et al., 2022), while reading strategies show a limited effect (Li et al., 2022). In addition, design self-efficacy is significantly boosted by digital collaboration and practical experience, particularly in the post-COVID-19 context (Shaikh et al., 2023). Moreover, contextual and temporal factors exert a significant influence. Amid the COVID-19 pandemic, technology-driven interventions (Aldayel, 2022) and sustained interest in one's field of study (Mousavi-Nasab & Shamsi Nezhad, 2020) played a central role in maintaining self-efficacy. Therefore, these findings confirm that academic self-efficacy is a multi-dimensional construct, shaped by the interaction of psychological dispositions, domain-specific practices, and contextual conditions across time.

Similarly, career and employment-related and entrepreneurial self-efficacy emerged as multiple factors. While involvement in case competitions (Plakhotnik et al., 2020) and individual learning styles (Farhang et al., 2020) show limited predictive power for career decision-making self-efficacy, personal characteristics (e.g., age, race), career readiness modules (Yusoff et al., 2024), and extracurricular activities (Kanar & Bouckenooghe, 2021) enhance career and employability self-efficacy. Entrepreneurial self-efficacy, in particular, is further strengthened by STEM learning (Chu et al., 2024), entrepreneurial intention (Oulhou & Ibourk, 2023), entrepreneurial environment and competence (Luo et al., 2022), as well as real-world business engagement (Pradana & Susanti, 2024). Therefore, outcomes vary across intervention types and learner profiles, underscoring the necessity of pedagogical strategies with contextual and learner-specific factors.

In addition to the areas identified above, recent studies expanded into specialised forms of self-efficacy, reflecting the increasing breadth of the construct. Examples include exercise self-efficacy (Liu et al., 2021), teaching self-efficacy (Michael et al., 2020), and emotional and social self-efficacy (Alshaikh, 2023). More specialised applications have also emerged, such as system self-efficacy among instructors (Mtebe, 2020), computer self-efficacy (Sendogdu & Koyuncuoglu, 2021), and crisis management self-efficacy during COVID-19 (Nguyen et al., 2022).

In summary, the reviewed studies suggest that personal, environmental, and pedagogical influences jointly shape the development of different forms of self-efficacy within higher education. Individual attributes such as emotional intelligence, psychological empowerment, and critical thinking dynamically

interact with environmental factors such as supportive climate, formative feedback, and innovative instructional design, aiming to strengthen students' self-efficacy. Moreover, optimised experience in certain specific fields, such as technical or entrepreneurial tasks, can also enhance self-efficacy, promote participation, and improve academic performance. However, the effects of these interventions vary greatly.

The results achieved by collaborative and computer-assisted learning methods are not the same or very limited, indicating that the development of self-efficacy largely depends on the environment and is not universally transferable. Consequently, self-efficacy proves to be a multifaceted construct with constant changes. It can also be found in the continuous interaction between personality, teaching process, and situational inspiration, which can be reflected in academic, entrepreneurial, and professional learning aspects.

## 5. Discussion

This section summarises the key findings, discusses the findings from a theoretical and a practical perspective, analyses existing limitations and possible directions, and, finally, elaborates on the direction of future research in educational practice.

### 5.1 Summary of Major Findings

This systematic review included 75 empirical studies from 2020 to 2024, with self-efficacy in university learning and teaching as independent, mediating, and dependent variables. In an independent role, general self-efficacy and academic self-efficacy have been powerful predictors of students' academic performance and behaviour. Recently, variants in specific fields, such as digital, entrepreneurial, and research self-efficacy, have received increasing attention, indicating that the scope of self-efficacy in technology-driven learning environments is also constantly expanding. However, several of the reviewed studies revealed contextual constraints, such as negative associations with obedience, Internet addiction, or poor performance, suggesting that self-efficacy effects are contextually bounded rather than universally beneficial.

The review regarding self-efficacy as a mediating variable explained the mechanisms through which educational factors such as pedagogical design, feedback, or technology integration affect learning outcomes. The data also indicate that self-efficacy transmits the effects of entrepreneurship education on entrepreneurial intention, technological competence on engagement, and socioeconomic status on mental health. However, the mediation strength varies across domains and contexts, implying that self-efficacy operates conditionally with other psychological constructs, such as motivation or resilience.

As a dependent variable, self-efficacy has been shaped by a range of individual, contextual, and instructional antecedents. Emotional intelligence, critical thinking, empowerment, and supportive climates can enhance self-efficacy, and domain-specific interventions such as service learning, writing training, and digital collaboration can also promote domain-targeted self-efficacy. However, some innovations, such as computer-supported collaboration, yield limited or

inconsistent effects, indicating that the gain in efficacy may not be solely attributable to pedagogical innovations. These findings have confirmed that self-efficacy in higher education is multi-dimensional, context-bound, and dynamically interactive, functioning together as a predictor, mechanism, and outcome of learning processes.

**5.2 Interpretation of Findings**

The positive relationship between self-efficacy and performance is consistent with Bandura's social cognitive theory (Bandura, 1997), which positions self-efficacy as a proximal determinant of motivation and action. The study found that general and academic self-efficacy predict engagement, and behavioural outcomes reaffirm the core assumption of social cognitive theory that efficacy beliefs influence motivation and performance (Schunk & DiBenedetto, 2020), but recent evidence extends these effects into digital and online domains.

The proliferation of online learning self-efficacy since the COVID-19 pandemic suggests a transformation from traditional academic settings towards technology-mediated learning environments (Zimmerman & Kulikowich, 2016). However, inconsistent or negative findings, such as those linking self-efficacy with maladaptive online behaviours, reveal that excessive confidence without adequate regulation may lead to overestimation or risky learning patterns and achievement.

The mediating effect of self-efficacy is like building a psychological bridge between the teaching environment and learning outcomes. Research on entrepreneurship and online learning environments shows that self-efficacy can transform external support, such as teaching quality, feedback, and digital push, into intrinsic motivation and sustained engagement, partially regulating these relationships. However, these mediating effects are context sensitive. Self-efficacy can interact with other motivational and emotional factors, such as goal orientation, intrinsic motivation, and resilience (Honicke & Broadbent, 2016). Therefore, self-efficacy operates within an interconnected psychological system rather than following a linear causal path.

When tested as a dependent construct, self-efficacy is constructed in response to changes in learning conditions. A supportive atmosphere, emotional intelligence, and authentic feedback have been shown to significantly improve learners' self-efficacy. These results are consistent with Bandura's framework, which states that improvement in self-efficacy originates from mastery of experience and social persuasion. Also, an increasing emphasis on successful interventions in specific fields has proven that the development of self-efficacy is task-specific rather than universally transferable within learning contexts (Bandura, 1997; Schunk & DiBenedetto, 2020).

**5.3 Theoretical and Practical Implications**

Self-efficacy, with its predictor, mechanistic, and outcome roles, demonstrates the adaptability and interactivity of human performance dynamics. This review has examined the multi-level impact of personal, behavioural, and situational factors on self-efficacy. The findings have proven the domain dependence and contextual

sensitivity of self-efficacy. When the learning environment becomes digital, entrepreneurial, and research-oriented, self-efficacy becomes increasingly limited by the environment. In addition, self-efficacy serves as a conditional mediator that influences the learning process and outcomes along with motivation, resilience, and goal orientation. Such insights emphasise the importance of placing self-efficacy within a comprehensive framework of broader motivation and situational theories in higher education environments.

By implementing these insights, educational policies and pedagogy will undergo the following changes. For a more effective instructional design, it is advisable to integrate experiential learning, formative assessment, and peer modelling to enhance individual confidence and self-efficacy. In a technology-driven environment, digital efficacy is crucial for maintaining participation and purposefully supporting digital abilities.

In addition to formal guidance, experiential and authentic learning can improve entrepreneurial and professional efficacy and promote autonomy, belonging, and emotional health. In addition, institutional culture can also enhance individual resilience. These influences serve as a prompt to advocate for the creation of a comprehensive educational ecosystem that shapes self-efficacy in different learning areas and integrates cognitive, emotional, and situational resources.

**5.4 Limitations and Future Directions**

Although this review provides a comprehensive understanding of self-efficacy, there remain some limitations that can be addressed in future research directions. First, most of the reviewed studies adopted cross-sectional designs with few qualitative explanations, which may have limited the identification of how self-efficacy develops and interacts with motivation, participation, and performance. Future research can employ longitudinal, experimental, or mixed methods approaches to provide a better grasp of time and interaction. In addition, general self-efficacy, academic self-efficacy, and domain-specific self-efficacy are conceptually inconsistent, which can affect theoretical coherence and comparability across contexts.

Future research can define boundaries and create validated, context-sensitive tools to elucidate how general and domain-specific self-efficacy operates in higher education. Finally, the existing research is mainly limited to traditional general and digital backgrounds, but cross-cultural, disciplinary, and institutional differences have been slightly ignored. A deeper exploration into the multi-social, cultural, and teaching environments can demonstrate how cultural norms, institutional support, and disciplinary recognition affect the development of self-efficacy. Comparative or multi-level research may highlight the structural dynamics overlooked by single-point research.

In summary, addressing these methodological, conceptual, and contextual gaps will promote a more detailed and empirical understanding of self-efficacy as having a predictor, mechanism, and outcome role in contemporary higher education systems.

## 6. Conclusion

This review article summarised empirical research on self-efficacy in university learning and teaching over the past five years. The study analysed publication trends, geographical distribution, and methodological approach, and treated self-efficacy as a dynamic, reciprocal structure that serves as a predictor, mediator, and outcome in the complex university learning system. Empirical evidence has shown that self-efficacy can predict an individual's motivation, self-regulation, and performance as well as the effectiveness of teaching quality, social assistance, and digital engagement.

On the contrary, self-efficacy is influenced by instructional design, immediate feedback, and institutional environment, and its growth seems to be cyclical rather than gradual. This is due to the continuous cycle of individual self-efficacy, behavioural engagement, and environmental feedback, which conforms to the social cognitive theory of mutual determinism. Over time, these processes have turned self-efficacy into a multi-domain construct, reflecting learners' adaptability in academic, digital, and professional contexts as well as their sensitivity to situational demands. In theory, this synthesis has placed self-efficacy within a multi-layered educational ecosystem that integrates learner agency, social collaboration, and institutional conditions, driving social cognitive perspectives.

In practice, it has highlighted an important higher education environment, which integrates experiential learning, self-directed support, and inclusive technologies, to cultivate adaptive and self-regulated learning that develops and maintains self-efficacy. Ultimately, self-efficacy will exist as a solid base of effective learning and teaching in higher education, providing a mirror for understanding students' development and a lever for improving educational innovation in a quickly evolving academic ecosystem.

## 7. Acknowledgements

The authors wish to acknowledge the use of ChatGPT in the writing of this paper. This tool was used to help improve the language and grammar in the paper. The paper remains an accurate representation of the authors' work and intellectual contributions.

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