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The Influence of Digital Learning Self-Efficacy and Academic Motivation on University Students' Learning Engagement

Mazou Issa[1]
[1] University of Maroua, Cameroon
email: issamazou03@gmail.com[1]

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Abstract

Digital learning self-efficacy and academic motivation are examined alongside university students' engagement, yet published investigations differ in construct definitions, settings, and analytical models. This study mapped secondary evidence and assessed the comparability of research addressing these relationships. A descriptive quantitative secondary evidence analysis classified peer-reviewed publications by participant population, sample size, focal constructs, and reported relationships. Six selected university-focused investigations supplied sample sizes ranging from 110 to 4,125 participants, displayed separately rather than combined into a respondent-level dataset. The analysis distinguished technology-specific self-efficacy from general academic self-efficacy, academic motivation from adjacent psychological factors, and engagement from satisfaction or achievement. Reviewed studies addressed relevant associations, but differences in measurement and the positioning of variables as predictors, mediators, or outcomes prevented estimation of a common effect. Comparative tables summarized evidence characteristics, analytical distinctions, and requirements for future primary research. The findings establish construct relevance without demonstrating the independent or combined influence of digital learning self-efficacy and academic motivation on engagement in a student population. Future investigations require matched student observations, documented instrument adaptation, consistent engagement measures, and prespecified statistical analysis. The study contributes an evidence map and identifies methodological conditions for defensible quantitative testing without presenting unobserved regression results or causal conclusions.

Keywords: *Academic Motivation, Digital Learning Self-Efficacy, Higher Education, Learning Engagement, Secondary Evidence Analysis.*

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INTRODUCTION

Digital learning environments have become integral to higher education, transforming how university students access instructional materials, interact with lecturers, and participate in academic activities. The expansion of digitally mediated instruction has also introduced questions concerning students' confidence, academic motivation, and sustained engagement across different learning environments. Digital technology attitudes, literacy, and self-efficacy have been examined as distinct factors associated with students' engagement in online higher education (Getenet et al., 2024). Research on hybrid learning similarly identifies digital literacy and academic self-efficacy as relevant dimensions for understanding student participation in technology-supported instruction (Jaya & Nurqamarani, 2023). Investigations of digital competence, academic self-efficacy, and emotional intelligence further demonstrate the range of individual characteristics considered when explaining academic engagement in digital higher education (Pratama & Sudibjo, 2026). Instructional research has also examined online critical reflection as an approach to strengthening students' confidence, motivation, and engagement in university learning (Awidi & Klutsey, 2025). These developments establish the need to distinguish students' perceived capability to perform digital learning activities from their motivation to pursue academic goals and their actual involvement in learning processes.

Contemporary research increasingly positions self-efficacy and academic motivation as interconnected psychological constructs associated with university students' learning engagement. Studies of digital higher education have examined academic self-efficacy as a mediating mechanism within relationships involving learning motivation and engagement (Agusnaya et al., 2024). Research integrating intrinsic motivation, academic self-efficacy, learning engagement, and test anxiety provides an additional perspective on the motivational and psychological characteristics of university learning (Santi et al., 2024). Investigations involving Indonesian undergraduate students have similarly

considered academic motivation alongside perceived creativity-supportive teaching behaviour when examining engagement in online courses (Setiamurti et al., 2023). Other analytical models position intrinsic motivation and learning engagement as mediating constructs in relationships between academic self-efficacy and academic burnout (Wang et al., 2024). These approaches indicate that self-efficacy, motivation, and engagement are theoretically related but occupy different positions across existing explanatory models, requiring careful consideration of their conceptual boundaries and analytical roles.

Despite growing scholarly attention, important conceptual and methodological differences remain in how digital learning self-efficacy, academic motivation, and student engagement are operationalized. Research examining digital technology self-efficacy alongside technological attitudes and literacy illustrates the importance of distinguishing confidence in technology-related activities from broader educational beliefs (Getenet et al., 2024). Studies conducted in hybrid learning environments similarly incorporate academic self-efficacy and digital literacy, although such combinations do not automatically isolate students' perceived capability to complete digitally mediated academic tasks (Jaya & Nurqamarani, 2023). Other investigations position classroom engagement as a mediating variable connecting self-efficacy, learning motivation, and academic satisfaction rather than examining engagement solely as the dependent outcome (Chahal et al., 2025). Research on online learning environments also investigates expectancy and task-value beliefs as mediating mechanisms associated with engagement, introducing motivational constructs that are related to but not identical to general academic motivation (Vo & Ho, 2024). These differences complicate direct comparisons because apparently similar relationships may involve different psychological measures, engagement dimensions, and analytical specifications. The research gap consequently concerns the limited comparability of published evidence that jointly examines digital learning self-efficacy and academic motivation as explanatory variables for university students' learning engagement within a consistent conceptual framework.

The distinction between digital learning confidence and academic motivation has substantial implications for designing effective university learning interventions. Research examining academic motivation and engagement among Indonesian undergraduates demonstrates the relevance of motivational characteristics within digitally delivered academic activities (Setiamurti et al., 2023). Investigations of digital competence and academic self-efficacy further indicate the importance of distinguishing technological capabilities from psychological beliefs when examining academic engagement (Pratama & Sudibjo, 2026). Research involving online critical reflection provides an additional basis for considering how instructional activities may influence students' confidence, motivation, and engagement (Awidi & Klutsey, 2025). Studies incorporating expectancy and task-value beliefs also suggest that engagement assessment should account for students' evaluations of learning activities rather than concentrating exclusively on technological access (Vo & Ho, 2024). University interventions developed without distinguishing these constructs may prioritize technical training when motivational difficulties are more relevant or emphasize motivational support without adequately addressing students' perceived capability to undertake digital academic tasks.

The present research positions the relationship between digital learning self-efficacy, academic motivation, and learning engagement as its principal analytical concern while recognizing limitations in the comparability of existing empirical studies. Its proposed contribution lies in systematically distinguishing evidence involving direct construct correspondence from studies employing broader self-efficacy measures, alternative motivational constructs, or different engagement outcomes. Research examining the mediating role of academic self-efficacy in digital learning offers a relevant comparison for identifying how psychological variables are positioned within existing explanatory relationships (Agusnaya et al., 2024). Investigations assigning classroom engagement a mediating function provide a contrasting analytical specification in which engagement does not exclusively represent the final outcome (Chahal et al., 2025). Research involving intrinsic motivation, engagement, and academic burnout further illustrates the importance of identifying the direction and theoretical function of relationships among psychological and academic variables (Wang et al., 2024). Studies examining technology-specific self-efficacy and online engagement provide an additional basis for identifying closer correspondence with the digital learning construct examined in the present research (Getenet et al., 2024). The intended novelty is a structured descriptive evidence map that clarifies conceptual

alignment, measurement differences, and reported associations across selected university studies without presenting secondary evidence as newly estimated respondent-level causal relationships.

This study aims to examine the available published evidence concerning the influence of digital learning self-efficacy and academic motivation on university students' learning engagement. The research identifies studies that directly address the proposed variables and differentiates them from investigations employing adjacent psychological constructs or alternative analytical relationships. Its analytical objectives include documenting reported study populations, sample characteristics, measurement emphases, and relationships among the relevant constructs where such information is available. The assessment also distinguishes technology-specific learning confidence from general academic self-efficacy and separates academic motivation from related expectations, satisfaction, or achievement measures. A structured descriptive evidence map is used to organize study-level information and identify areas of conceptual correspondence, methodological variation, and unresolved empirical questions. The anticipated scientific contribution is a clearer basis for specifying theoretically consistent variables and measurement requirements in subsequent university-level investigations. The resulting interpretation remains limited to the published evidence and does not introduce original survey findings, pooled effect estimates, or causal conclusions unsupported by the available studies.

RESEARCH METHODS

This study employed a descriptive quantitative secondary evidence analysis using a purposively defined corpus of peer-reviewed publications examining digital learning self-efficacy, academic motivation, and university students' learning engagement. Source selection prioritized studies involving higher education populations and investigating at least one principal research construct, while studies examining related psychological or educational variables were considered for conceptual and measurement comparisons. The unit of analysis was the individual publication, with study-level information organized according to publication year, reported sample size, population characteristics, focal constructs, and relationships described by the original researchers. Research examining digital technology attitudes, literacy, self-efficacy, and online learning engagement provided relevant evidence for identifying technology-specific psychological constructs (Getenet et al., 2024). Studies investigating self-efficacy, learning motivation, and classroom engagement were also considered to distinguish alternative explanatory models and the analytical positions assigned to engagement (Chahal et al., 2025). Six university-focused publications containing independently reported participant counts were designated for descriptive sample-size comparisons, with all numerical information retained at the publication level rather than combined into an artificial respondent-level dataset.

Data extraction employed a common classification framework distinguishing digital learning self-efficacy, general academic self-efficacy, academic motivation, learning engagement, and related educational outcomes. Construct alignment was evaluated by examining the variables and analytical relationships reported in each publication, with particular attention to differences between technology-specific confidence and broader beliefs about academic capability. Evidence concerning academic motivation and engagement in online undergraduate learning was considered when identifying conceptual correspondence between motivational factors and student participation (Setiamurti et al., 2023). Research addressing digital competence, academic self-efficacy, and engagement in higher education provided an additional basis for distinguishing overlapping but theoretically separate explanatory constructs (Pratama & Sudibjo, 2026). Quantitative analysis was restricted to descriptive study counts and comparisons of reported sample sizes, without conducting regression analysis, hypothesis testing, statistical significance testing, or the estimation of new effect sizes. Analytical consistency was maintained by preserving the original authors' reported information and explicitly distinguishing differences in measurement, educational settings, and reporting completeness, while recognizing that the absence of harmonized respondent-level data prevented direct estimation of the proposed causal relationships.

RESULTS AND DISCUSSION

Evidence Characteristics and Construct Measurement

The selected publication-level evidence encompasses undergraduate, postgraduate, and internationally mobile university populations rather than a single institutional cohort. The analytical unit is the original publication, making differences in population characteristics and measurement

procedures central to interpreting the available findings. Research conducted among Australian first-year university students examines technology-related attitudes, literacy, self-efficacy, and different dimensions of online learning engagement (Getenet et al., 2024). A large investigation involving Chinese university students considers professional identity, academic self-efficacy, and learning engagement within a different institutional environment (Chen et al., 2025). Research involving Chinese master's students further extends the evidence to postgraduate learning and relationships between academic self-efficacy, engagement, and academic achievement (Zhang, 2025). These populations differ in educational level, institutional conditions, and learning requirements, which may influence the meaning and expression of engagement. Their inclusion supports comparative examination of construct coverage but does not establish a common population from which student-level relationships can be directly estimated.

Reported sample sizes provide a descriptive indication of the scale of individual investigations without demonstrating agreement between their findings. The selected numerical evidence includes six distinct studies reporting 110, 214, 300, 402, 446, and 4,125 participants. Research examining self-efficacy, learning motivation, and classroom engagement involved 446 university students in an investigation of academic satisfaction (Chahal et al., 2025). A study addressing digital learning fatigue, academic motivation, and engagement involved 300 undergraduate students in an Indonesian university setting (Masduki & Johari, 2025). Research on Indonesian students attending Malaysian universities involved 402 participants and concentrated on relationships between self-efficacy and learning motivation (Handrianto, 2026). These figures represent independent study populations, and their numerical combination would not produce a valid respondent-level dataset or establish the statistical representativeness of the reviewed evidence.

Digital learning self-efficacy requires conceptual differentiation from general academic self-efficacy because the two constructs concern different domains of perceived capability. Technology-specific efficacy concerns students' confidence in undertaking learning activities involving digital platforms, technological resources, and online interaction. Research examining digital technology attitudes and literacy treats self-efficacy as a construct relevant to several dimensions of online engagement (Getenet et al., 2024). Investigations of informal digital learning and self-regulated learning similarly position self-efficacy within broader relationships involving technology-supported educational activities (Zheng & Xiao, 2024). Research on hybrid learning incorporates digital literacy and academic self-efficacy when examining student engagement, illustrating a different combination of technological and psychological variables (Jaya & Nurqamarani, 2023). Studies addressing learning management systems also associate students' self-efficacy with perceptions of online learning and digital educational environments (Udin et al., 2022). A construct measured through confidence in general academic achievement cannot automatically be treated as equivalent to confidence in completing specific digitally mediated learning tasks.

Academic motivation represents another measurement domain in which studies differ according to the conceptual dimensions and educational outcomes they investigate. Research involving Indonesian university students distinguishes intrinsic and extrinsic influences on independent English-language learning motivation (Baharuddin & Rustan, 2025). Investigations of Indonesian international students similarly examine self-efficacy alongside intrinsic and extrinsic motivation within a structural model of university learning (Handrianto, 2026). Research incorporating intrinsic motivation, academic self-efficacy, learning engagement, and test anxiety demonstrates that motivational constructs can be examined alongside several psychological characteristics (Santi et al., 2024). Such differences require attention because willingness to learn, perceived competence, and reasons for academic participation are related but conceptually distinguishable dimensions. Table 1 presents the characteristics and measurement alignment of six studies with reported participant counts, establishing a descriptive foundation for subsequent interpretation.

Table 1. Characteristics and Construct Alignment of Selected University Studies

Published Study	Participants (n)	Principal Constructs Examined	Alignment with Current Research
Getenet et al. (2024)	110	Digital self-efficacy and online learning engagement	Direct digital and engagement correspondence
Zhang (2025)	214	Academic self-efficacy, engagement, and achievement	General efficacy; engagement correspondence
Masduki & Johari (2025)	300	Digital learning fatigue, motivation, and engagement	Motivation and engagement correspondence
Handrianto (2026)	402	Academic self-efficacy and learning motivation	Efficacy and motivation; different outcome
Chahal et al. (2025)	446	Self-efficacy, motivation, engagement, and satisfaction	Related constructs; different model specification
Chen et al. (2025)	4,125	Professional identity, academic self-efficacy, and engagement	General efficacy; engagement correspondence

The evidence summarized in Table 1 indicates that the selected studies differ in the extent to which their variables correspond directly with digital learning self-efficacy, academic motivation, and engagement. The investigation by Getenet and colleagues provides comparatively close correspondence with technology-specific self-efficacy and multidimensional online engagement (Getenet et al., 2024). Research examining professional identity and academic self-efficacy offers relevant engagement evidence but addresses perceived academic capability more broadly (Chen et al., 2025). Investigations of resilience and emotional engagement in online learning demonstrate the importance of recognizing engagement as a psychological as well as behavioural phenomenon (Ge, 2025). Research concerning deep learning engagement and language performance introduces another distinction by positioning engagement as a predictor of academic self-efficacy and educational outcomes (Istiara et al., 2025). These different analytical arrangements prevent the direct substitution of one study's outcome measure for another study's predictor or mediator. Measurement correspondence must be established through the definition and operationalization of each construct rather than inferred from similarities in variable terminology.

Learning engagement is also represented through different educational outcomes, creating a potential source of conceptual inconsistency in secondary comparison. Research on classroom engagement and academic satisfaction distinguishes participation in learning activities from satisfaction with the educational experience (Chahal et al., 2025). Investigations of internet habits, e-learning self-efficacy, and academic achievement similarly involve outcomes that cannot be treated as direct measures of engagement (Bećirović et al., 2025). Studies of psychological and environmental influences on learning performance further demonstrate the relevance of educational outcomes beyond participation itself (Koesrini, 2026). Research on grit, academic motivation, self-regulated learning, and engagement introduces additional psychological processes that may explain variation in student participation (Obeng et al., 2025). These distinctions indicate that academic achievement, satisfaction, and engagement should remain separate categories within the evidence classification. Their statistical relationships may be examined within individual investigations, but the available publications do not justify treating their measurement scores as interchangeable.

Differences in sample composition also affect how confidently findings from one educational environment can be applied to another. Research on fear of failure, self-efficacy, and engagement among Indonesian university students illustrates the relevance of population-specific psychological characteristics (Aulia et al., 2026). A systematic review addressing the dimensions of self-efficacy in university learning and teaching provides a broader basis for recognizing variation in the operational meaning of efficacy beliefs (Xu et al., 2025). Studies conducted in hybrid environments may involve patterns of participation and technological exposure that differ from those of students enrolled in fully online courses. Research examining digital literacy and academic self-efficacy in hybrid learning supports attention to instructional modality when interpreting engagement relationships (Jaya & Nurqamarani, 2023). Differences in program structure, recruitment procedures, and institutional support also complicate direct comparison of descriptive sample characteristics. Large participant

counts do not independently establish measurement equivalence or eliminate potential sampling bias. A valid cross-study interpretation consequently requires distinctions between population coverage, measurement correspondence, and the evidentiary strength of individual findings.

The integrity of secondary quantitative analysis depends on preserving the provenance of published variables and recognizing the limitations of aggregated research information. Research presenting datasets on artificial intelligence adoption, learning expectations, attitudes, and motivation illustrates the importance of identifying the content and origin of educational variables before secondary use (Luthfi et al., 2025). Meta-analytical research examining motivation, self-efficacy, and achievement in online learning demonstrates a different synthesis approach that depends on the availability of compatible study information (Setiawan et al., 2025). Investigations of digital learning experience design additionally highlight the diversity of motivational characteristics considered when evaluating undergraduate learning behaviour (Wong & Hughes, 2023). The present descriptive evidence analysis retains publications as independent observations and distinguishes their reported constructs without estimating pooled relationships. This procedure supports transparent identification of relevant evidence while preserving the distinction between published associations and newly calculated statistical results. The principal measurement finding is that construct alignment and population comparability require explicit assessment before a unified quantitative model can be justified.

Relationships Between Self-Efficacy, Academic Motivation, and Learning Engagement

The selected literature provides evidence of relationships involving self-efficacy, motivation, and learning engagement, although the direction and interpretation of these relationships differ across study designs. Research examining technology-specific self-efficacy reports associations between students' perceived digital capabilities and several dimensions of online learning engagement (Getenet et al., 2024). The investigation distinguishes cognitive, behavioural, emotional, collaborative, and social engagement rather than treating online participation as a single undifferentiated outcome. Research involving Chinese master's students similarly examines academic self-efficacy and learning engagement, although its measures concern broader academic capabilities rather than specifically digital learning tasks (Zhang, 2025). These investigations provide related evidence concerning perceived competence and educational participation but employ different populations and construct specifications. Their findings support the theoretical relevance of self-efficacy to engagement without establishing a common effect magnitude across university learning environments. The current secondary analysis consequently interprets reported relationships as characteristics of the original studies rather than newly estimated associations derived from a shared respondent dataset.

Academic motivation constitutes a second explanatory dimension because students' reasons for pursuing learning activities may influence how they allocate attention, effort, and persistence. Research involving Indonesian undergraduates examines relationships between academic motivation, perceived creativity-supportive teaching behaviour, and engagement in an online statistics course (Setiamurti et al., 2023). Research incorporating intrinsic motivation, academic self-efficacy, and learning engagement likewise positions motivational processes within university students' psychological experiences (Santi et al., 2024). Investigations involving academic grit and self-regulated learning extend this perspective by considering academic motivation as part of a more complex explanatory structure for engagement (Obeng et al., 2025). These approaches indicate that motivation cannot be interpreted independently of the educational conditions and psychological characteristics included in the original analytical models. The available evidence supports motivation as a relevant explanatory construct but does not establish that its relationship with engagement is identical across courses, institutions, or instructional modalities.

Differences in model specification constitute a major limitation when synthesizing published relationships between efficacy beliefs, motivation, and engagement. Research on self-efficacy, learning motivation, and academic satisfaction positions classroom engagement as a mediating variable rather than the exclusive final outcome of the analytical model (Chahal et al., 2025). Other investigations examine intrinsic motivation and engagement as sequential mediators within relationships involving academic self-efficacy and academic burnout (Wang et al., 2024). Research involving professional identity and learning engagement instead positions academic self-efficacy as a mediating mechanism connecting psychological identification with educational participation (Chen et al., 2025). These alternative specifications indicate that the same constructs may function as predictors, mediators, or

outcomes depending on the theoretical structure adopted by researchers. A statistical relationship estimated under one specification cannot automatically be transferred to another model with a different direction of explanation. Interpretation of the proposed influence of digital learning self-efficacy and academic motivation on engagement must therefore recognize the distinction between theoretically specified relationships and empirical effects actually estimated in the original studies. The descriptive evidence map preserves these differences rather than constructing an unsupported common causal pathway.

Digitally mediated learning introduces further explanatory conditions that complicate relationships between psychological beliefs and academic engagement. Research involving informal digital learning, self-regulated learning, and course satisfaction examines how self-efficacy operates within broader technology-supported educational relationships (Zheng & Xiao, 2024). Investigations of digital feedback, self-efficacy, autonomy, and motivation similarly position learning-related confidence alongside instructional conditions and personal agency (Li & Alharbi, 2025). Research concerning digital learning fatigue demonstrates the relevance of psychological exhaustion when examining academic motivation and engagement among university students (Masduki & Johari, 2025). These studies indicate that digital learning experiences involve conditions beyond students' perceived competence and reasons for academic participation. Table 2 classifies the principal relationships represented in the literature and identifies the limits of interpretation imposed by differences in measurement and analytical design.

Table 2. Published Relationships and Their Analytical Interpretation

Relationship Examined	Representative Studies	Published Analytical Focus	Interpretation Boundary
Digital self-efficacy and engagement	Getenet et al. (2024)	Technology-specific efficacy and multidimensional online engagement	No transferable coefficient for a new university population
Academic self-efficacy and engagement	Chen et al. (2025); Zhang (2025)	General academic efficacy and participation	General efficacy is not equivalent to digital task confidence
Academic motivation and engagement	Setiamurti et al. (2023); Santi et al. (2024)	Motivational characteristics and learning participation	Relationships depend on construct definitions and study settings
Self-efficacy and motivation	Handrianto (2026)	Intrinsic and extrinsic motivation associated with efficacy beliefs	Engagement is not the principal outcome
Engagement as a mediating construct	Chahal et al. (2025); Wang et al. (2024)	Engagement within indirect explanatory pathways	Mediating relationships cannot be converted into direct effects
Digital learning conditions and engagement	Masduki & Johari (2025); Vo & Ho (2024)	Digital fatigue, expectancy beliefs, task value, and participation	Alternative predictors prevent attribution to self-efficacy alone

The relationships summarized in Table 2 demonstrate that the published evidence is conceptually connected but statistically heterogeneous. Research involving Indonesian students attending Malaysian universities examines relationships between academic self-efficacy and intrinsic and extrinsic learning motivation, providing evidence from an internationally mobile university population (Handrianto, 2026). An investigation involving registered nurses examines online learning self-efficacy, achievement motivation, flow, and learning engagement within a professional learning population (Zhou et al., 2025). These studies offer relevant conceptual comparisons but cannot be regarded as interchangeable samples because their educational roles and principal outcomes differ. Figure 1 presents the reported sample sizes of six university-focused studies and illustrates the considerable variation in the scale of the original investigations. The larger participant count of an individual study does not establish that its measures are more directly aligned with the proposed digital

learning model. Sample-size variation also cannot establish differences in effect strength, statistical precision across unlike models, or the generalizability of findings beyond their respective populations.

Technological capabilities and academic confidence should also be distinguished from the learning behaviours they are intended to explain. Research examining internet habits and e-learning self-efficacy incorporates technological activity and academic achievement into its structural analysis (Bećirović et al., 2025). Investigations of hybrid learning similarly address digital literacy and academic self-efficacy when examining educational engagement (Jaya & Nurqamarani, 2023). Research involving digital competence, academic self-efficacy, and emotional intelligence provides another analytical configuration through which academic engagement is investigated (Pratama & Sudibjo, 2026). These studies demonstrate that digital competence and perceived academic capability can be considered related but distinct explanatory characteristics. The presence of technological skills does not independently establish students' confidence in applying those skills to demanding learning activities. A construct-aligned model must consequently distinguish digital literacy, digital learning self-efficacy, and engagement at the measurement stage.

Instructional characteristics represent another source of variation in the relationships between motivation and engagement. Research examining online critical reflection investigates the use of structured reflective activities to support students' confidence, motivation, and educational engagement (Awidi & Klutsey, 2025). Studies of online learning environments incorporate expectancy and task-value beliefs when analysing students' involvement in university learning activities (Vo & Ho, 2024). Research concerning digital media and learning experience design likewise examines instructional approaches intended to influence motivational characteristics supporting student learning behaviours (Wong & Hughes, 2023). These perspectives suggest that educational engagement may reflect interactions between individual psychological characteristics and the organization of learning experiences. Their inclusion also indicates why engagement cannot automatically be attributed to either self-efficacy or academic motivation without considering relevant learning conditions. Published evidence about instructional arrangements does not establish the effectiveness of a particular intervention in an unobserved university population. The secondary comparison therefore identifies instructional design as a relevant contextual dimension without treating it as a newly tested moderating or mediating variable.

The available publications support the conceptual plausibility of relationships among efficacy beliefs, academic motivation, and engagement while leaving their combined student-level effects unresolved. Research examining learning motivation, self-efficacy, and learning strategies illustrates the potential complexity of relationships involving psychological and behavioural characteristics in undergraduate education (Liu & Sun, 2025). A systematic review of self-efficacy in university teaching and learning further emphasizes the multidimensional character of efficacy beliefs across educational settings (Xu et al., 2025). Meta-analytical work concerning motivation, self-efficacy, and academic achievement also provides an adjacent synthesis framework that cannot be substituted for an engagement-specific quantitative estimate (Setiawan et al., 2025). The reviewed publications do not supply harmonized respondent-level observations or a common set of directly comparable coefficients for the three constructs specified in the research title. The principal analytical finding is a pattern of theoretically related but differently operationalized relationships rather than a newly demonstrated causal influence of two predictors on university students' engagement.

Methodological Implications for Quantitative Model Development

The evidence comparison identifies several methodological requirements for examining digital learning self-efficacy and academic motivation as predictors of university students' learning engagement. A valid student-level quantitative model requires observations in which the relevant constructs are measured among the same respondents within an explicitly defined educational population. Research examining technology-specific self-efficacy and online engagement demonstrates the importance of matching psychological constructs with the activities through which engagement is operationalized (Getenet et al., 2024). Investigations of learning motivation and classroom engagement illustrate the need to specify the theoretical positions of predictors, mediators, and outcomes before statistical estimation (Chahal et al., 2025). Research concerning fear of failure, self-efficacy, and engagement among Indonesian university students further indicates the relevance of clearly identifying psychological variables within predictive educational models (Aulia et al., 2026). These considerations

establish requirements for a future primary-data investigation rather than statistical procedures completed in the present secondary analysis. The available study-level information cannot reproduce the joint distribution of self-efficacy, motivation, and engagement that would be necessary for estimating their independent and combined relationships.

Measurement development requires operational definitions that distinguish confidence in using digital learning resources from broader perceptions of academic competence. Research involving learning management systems provides a relevant basis for identifying how perceived self-efficacy is associated with students' experiences of online learning technologies (Udin et al., 2022). Studies examining hybrid learning environments likewise demonstrate the need to differentiate digital literacy from academic self-efficacy when measuring psychological and technological characteristics (Jaya & Nurqamarani, 2023). Research involving self-regulated learning and informal digital learning highlights the importance of separating perceived capability from the strategies through which students manage educational activities (Zheng & Xiao, 2024). A systematic review of self-efficacy in university education reinforces the importance of recognizing differences among the dimensions through which efficacy beliefs are investigated (Xu et al., 2025). Future instrument development should consequently prioritize clearly defined digital learning tasks, documented item sources, and empirical assessment of whether the selected indicators represent the intended construct.

Academic motivation also requires explicit operationalization because different motivational dimensions may represent distinct reasons for initiating and sustaining learning activities. Research incorporating intrinsic motivation and academic self-efficacy indicates the importance of distinguishing motivational processes from beliefs concerning academic competence (Santi et al., 2024). Investigations of independent English learning identify intrinsic and extrinsic motivational factors that may vary according to educational objectives and learning circumstances (Baharuddin & Rustan, 2025). Research involving academic grit and self-regulated learning demonstrates that motivation can occupy a specific explanatory position among related psychological characteristics (Obeng et al., 2025). Studies of Indonesian undergraduates in online courses provide additional evidence for considering academic motivation as a variable relevant to student engagement (Setiamurti et al., 2023). These distinctions suggest that a future quantitative model should define whether academic motivation is represented through a general construct or separately measured motivational dimensions. The available publications do not establish measurement equivalence between their motivational instruments or justify combining differently defined scales into a common numerical score. Clear operational boundaries would improve the interpretability of estimated relationships and reduce the risk of attributing effects to conceptually overlapping variables.

Learning engagement requires comparable methodological attention because behavioural participation, cognitive investment, emotional involvement, and social interaction may represent distinct dimensions of university learning. Research examining resilience and online emotional engagement demonstrates the relevance of psychological experiences that extend beyond observable academic participation (Ge, 2025). Investigations involving deep learning engagement and language performance illustrate the importance of specifying whether engagement functions as an outcome or an explanatory variable (Istiara et al., 2025). Research on online learning environments further indicates that motivational expectations and perceived task value are relevant when conceptualizing student engagement (Vo & Ho, 2024). A future measurement framework should identify the engagement dimensions under investigation and determine whether their indicators justify separate scores or a combined construct. Table 3 summarizes the methodological implications derived from the secondary evidence comparison and specifies the information required for subsequent quantitative testing.

Table 3. Methodological Requirements for a Construct-Aligned Quantitative Model

Research Component	Identified Methodological Issue	Required Information for Primary Research	Proposed Analytical Output
Digital learning self-efficacy	Digital task confidence differs from general academic efficacy	Clearly defined digital learning indicators and documented instrument sources	Construct validity and reliability results

Academic motivation	Intrinsic, extrinsic, and related motivational measures are not interchangeable	Consistent motivational dimensions and respondent-level responses	Descriptive statistics and construct measurement results
Learning engagement	Engagement encompasses several behavioural and psychological dimensions	Specified engagement indicators and matched observations	Engagement scores and measurement assessment
Sampling framework	Published cohorts differ in population and educational setting	Target population, recruitment procedures, and sample characteristics	Sample profile and participation information
Statistical relationships	Available publications do not provide harmonized respondent-level data	Matched measurements for the proposed predictors and outcome	Estimated associations, confidence intervals, and relevant model statistics
Analytical transparency	Studies differ in variable definitions and reporting completeness	Data dictionary, analysis specifications, and documented procedures	Reproducible analytical records

The methodological framework presented in Table 3 emphasizes the importance of data provenance and consistency between the proposed research model and the variables actually available for analysis. Research presenting a higher education dataset on artificial intelligence adoption, expectations, attitudes, and motivation illustrates the value of documenting the origin and content of educational survey variables (Luthfi et al., 2025). Investigations of digital feedback, self-efficacy, and autonomy demonstrate that related educational datasets may contain motivational constructs without necessarily measuring the specific engagement outcome required by another model (Li & Alharbi, 2025). Research examining digital literacy, communication confidence, English exposure, and learning motivation similarly illustrates the diversity of explanatory variables employed in digitally supported educational research (Jumatriadi et al., 2026). The presence of relevant psychological indicators is insufficient to establish that a dataset contains the same constructs, measurement periods, and respondent records required for a particular analytical specification. A transparent data dictionary should identify variable definitions, item origins, scale coding, missing observations, and the relationships between source instruments and the proposed analytical constructs. The secondary evidence examined here does not provide a harmonized microdataset containing all three principal variables. Its contribution is consequently restricted to describing available evidence and identifying the information required for a valid subsequent quantitative investigation.

Sampling considerations also influence the interpretation and potential generalizability of a quantitative model examining psychological predictors of learning engagement. Research involving 4,125 Chinese university students provides an example of a comparatively large empirical investigation of academic self-efficacy and engagement (Chen et al., 2025). Research among Chinese master's students involves a smaller and more educationally specialized population, illustrating differences in study scale and degree level (Zhang, 2025). Investigations of psychological and environmental factors influencing university learning performance further indicate that educational characteristics beyond the principal psychological variables may warrant attention (Koesrini, 2026). These differences demonstrate why sample size alone cannot establish representativeness, measurement equivalence, or the applicability of results to all university students. Subsequent primary research should identify its intended population, recruitment procedures, instructional setting, and relevant participant characteristics before estimating relationships among the selected variables.

Practical implications for university teaching must also distinguish evidence supporting instructional considerations from evidence establishing the causal effects of particular interventions. Research examining online critical reflection considers how structured instructional activities can support students' confidence, motivation, and engagement (Awidi & Klutsey, 2025). Investigations of instructional modules integrating motivation and self-regulated learning provide another perspective on designing educational activities that address psychological learning characteristics (Widari & Jazadi, 2026). Research on digital learning experience design similarly examines how instructional media can

influence motivational traits and learning behaviours in undergraduate online courses (Wong & Hughes, 2023). Evidence concerning digital learning fatigue indicates that students' psychological responses to digitally mediated learning may also involve difficulties not captured by self-efficacy or motivation measures alone (Masduki & Johari, 2025). These studies suggest that university learning support should consider instructional organization, motivational experiences, and perceived technological capability as potentially distinct areas of concern. The reviewed evidence does not justify concluding that increasing either predictor would necessarily produce a specified improvement in engagement among students who have not been directly studied. Intervention recommendations should consequently remain provisional until appropriate longitudinal, experimental, or other causally informative evidence becomes available.

The descriptive evidence analysis establishes a conceptual basis for examining digital learning self-efficacy and academic motivation while identifying limitations in the current capacity to estimate their combined relationships with engagement. Research involving digital competence, academic self-efficacy, and emotional intelligence illustrates the importance of maintaining conceptual distinctions among psychological predictors of academic engagement (Pratama & Sudibjo, 2026). Investigations examining academic self-efficacy within relationships involving motivation and engagement provide additional support for considering alternative theoretical specifications rather than assuming one universally applicable model (Agusnaya et al., 2024). Research involving online learning self-efficacy, achievement motivation, and engagement among registered nurses further illustrates why findings from professional learning populations require careful consideration before being applied to university degree programs (Zhou et al., 2025). The reviewed publications provide evidence of relevant constructs, methodological variation, and study-specific relationships, but they do not establish independent predictor effects or a combined explanatory coefficient for the proposed university student model. Future investigations should employ construct-aligned instruments, matched respondent observations, transparent sampling procedures, and prespecified statistical analyses to evaluate the relationships directly. The scientific contribution of the present study lies in clarifying the evidentiary boundaries of existing research and specifying the methodological conditions necessary for a defensible quantitative assessment of university students' learning engagement.

CONCLUSION

The descriptive secondary evidence analysis indicates that digital learning self-efficacy, academic motivation, and learning engagement are closely related research concerns but are not measured consistently across university studies. The six university-focused investigations included in the numerical comparison reported participant counts of 110, 214, 300, 402, 446, and 4,125, each representing an independent study population. These figures describe the scale of published investigations rather than a pooled respondent-level dataset. The evidence mapping identifies differences between technology-specific and general academic self-efficacy, between motivational dimensions, and between learning engagement and related outcomes such as academic satisfaction or achievement. The reviewed studies also assign different analytical roles to engagement, including its treatment as a dependent variable or mediating construct. These methodological differences prevent the estimation of a common regression coefficient or the independent and combined effects of digital learning self-efficacy and academic motivation from the available publication summaries. The study contributes a structured understanding of construct correspondence, measurement variation, and the evidentiary limitations of existing research without claiming newly established causal relationships.

Future quantitative investigations should measure digital learning self-efficacy, academic motivation, and learning engagement within the same clearly defined university student population. Research procedures should specify the target population, participant recruitment, instrument sources, operational definitions, and analytical specifications before statistical estimation. Digital learning self-efficacy should be distinguished from general academic confidence, while motivational dimensions and engagement indicators require consistent measurement and transparent reporting. Appropriate instrument evaluation and respondent-level statistical analysis would enable researchers to estimate relationships among the proposed variables and report their statistical uncertainty. Longitudinal or experimental research would provide stronger evidence for evaluating the direction and potential causal nature of these relationships. Educational interventions intended to improve technological confidence, academic motivation, or learning participation should be supported by direct empirical evidence rather

than inferred from heterogeneous secondary findings. The present study provides a conceptual and methodological foundation for subsequent investigations while preserving the distinction between publication-level evidence, reported statistical associations, and independently verified student-level effects.

REFERENCES

Agusnaya, N., Wahid, A., Akbar, M., Hidayat, W., Sanatang, S., Soeharto, S., & Lavicza, Z. (2024). Enhancing digital learning in higher education: The mediating role of academic self-efficacy in motivation and engagement. *Online Learning in Educational Research, 4*(2), 167–183. https://doi.org/10.58524/oler.v4i2.505

Aulia, L. A., Kelly, E., Chusnah, A., Safitri, A. R., & Indasah, I. (2026). The role of fear of failure and self-efficacy in student engagement among Indonesian university students: A predictive-correlational study. *FIKROTUNA: Jurnal Pendidikan dan Manajemen Islam, 15*(2), 662–681. https://doi.org/10.32806/jf.v15i02.2135

Awidi, I. T., & Klutsey, J. Q. (2025). Using online critical reflection to enhance students' confidence, motivation, and engagement in higher education. *Technology, Knowledge and Learning, 30*, 1499–1534. https://doi.org/10.1007/s10758-024-09751-4

Baharuddin, A. F., & Rustan, D. R. H. P. (2025). Investigating intrinsic and extrinsic factors influencing English self-learning motivation among Indonesian university students. *Jo-ELT (Journal of English Language Teaching), 12*(1), 103–116. https://doi.org/10.33394/jo-elt.v12i1.15386

Bećirović, S., Dervic, M., & Mattoš, B. (2025). Exploring the factors affecting students' internet habits, self-efficacy in e-learning, and academic achievement: Structural equation modeling approach. *SAGE Open*. https://doi.org/10.1177/21582440251339286

Chahal, A., Kadian, R., Yadav, R., & Prakash, C. (2025). Self-efficacy, learning motivation and academic satisfaction of university students: Mediating role of classroom engagement. *Journal of Applied Research in Higher Education*. https://doi.org/10.1108/JARHE-06-2024-0305

Chen, C., Sun, Y., & Zhu, Y. (2025). The mechanism of academic self-efficacy in the relationship between professional identity and learning engagement among university students. *Scientific Reports, 15*, Article 10640. https://doi.org/10.1038/s41598-025-95556-z

Ge, D. (2025). Resilience and online learning emotional engagement among college students in the digital age: A perspective based on self-regulated learning theory. *BMC Psychology, 13*, Article 326. https://doi.org/10.1186/s40359-025-02631-1

Getenet, S., Cantle, R., Redmond, P., & Albion, P. (2024). Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. *International Journal of Educational Technology in Higher Education, 21*, Article 3. https://doi.org/10.1186/s41239-023-00437-y

Handrianto, C. (2026). Learning motivation and self-efficacy of Indonesian international students in Malaysian universities: A structural equation modeling approach. *Journal of International Students*. https://doi.org/10.32674/9msrh666

Istiara, F., Sutrisno AB, J., Tama, O. H., Mahrunnisya, D., Ajeng, G. D., Adijaya, N., Saputra, D. W., & Hadi, M. S. (2025). Deep learning engagement as a predictor of academic self-efficacy and language performance. *TARBIYA: Journal of Education in Muslim Society, 12*(1), 115–126. https://doi.org/10.15408/tjems.v12i1.46710

Jaya, F., & Nurqamarani, A. S. (2023). Understanding student engagement in hybrid learning: An analysis impact digital literacy and academic self-efficacy. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran, dan Pembelajaran, 9*(3), 833–845. https://doi.org/10.33394/jk.v9i3.7947

Jumatriadi, J., Alfarisi, S., Bakri, U., Satria, O., & Rijnan, R. (2026). Examining the structural relationships among digital literacy, communication confidence, English exposure, motivation, and EFL proficiency. *JOLLT Journal of Languages and Language Teaching, 14*(4), 1315–1329. https://doi.org/10.33394/jollt.v14i4.19952

Koesrini, J. (2026). Psychological and environmental factors shaping learning performance among university students. *Jurnal Ilmiah Pendidikan Profesi Guru, 9*(1), 77–85. https://doi.org/10.23887/jippg.v9i1.104334

Li, X., & Alharbi, W. M. H. (2025). Impact of digital feedback, self-efficacy, and autonomy on motivation and general English performance in online courses. *Learning and Motivation, 90*, Article 102121. https://doi.org/10.1016/j.lmot.2025.102121

Liu, S., & Sun, H. (2025). The relationship between learning motivation and English achievement among undergraduate non-English majors in China: The mediating role of self-efficacy and learning strategies. *SAGE Open*. https://doi.org/10.1177/21582440251388122

Luthfi, Z. F., Prasetiyo, W. H., Sari, B. I., Waldi, A., & Muttaqiin, A. (2025). Dataset of AI adoption usage, expectations, attitudes, perceptions, and motivations for learning in higher education. *Data in Brief, 63*, Article 112106. https://doi.org/10.1016/j.dib.2025.112106

Masduki, Y., & Johari, M. E. (2025). Digital learning fatigue and academic motivation in students at Ahmad Dahlan University Yogyakarta. *Tarbiyatuna, 16*(2), 219–234. https://doi.org/10.31603/tarbiyatuna.v16i2.15261

Masduki, Y., & Johari, M. E. (2025). Digital learning fatigue and academic motivation in students at Ahmad Dahlan University Yogyakarta. *Jurnal Tarbiyatuna, 16*(2), 219–234. https://doi.org/10.31603/tarbiyatuna.v16i2.15261

Obeng, P., Srem-Sai, M., Salifu, I., Amoadu, M., Arthur, F., Agormedah, E. K., Hagan, J. E., & Schack, T. (2025). Linking students' grit and academic engagement: Mediating role of academic motivation and self-regulated learning. *British Educational Research Journal, 51*, 2511–2535. https://doi.org/10.1002/berj.4185

Pratama, R., & Sudibjo, N. (2026). What drives academic engagement in digital higher education? The roles of digital competence, academic self-efficacy, and emotional intelligence. *PSIKODIMENSIA, 25*(1), 1–10. https://doi.org/10.24167/psidim.v25i1.15081

Santi, E. A., Gorghiu, G., & Pribeanu, C. (2024). The relationship between intrinsic motivation, academic self-efficacy, learning engagement, and test anxiety, as perceived by university students. *Problems of Education in the 21st Century, 82*(6), 892–903. https://doi.org/10.33225/pec/24.82.892

Setiamurti, A., Agoes Salim, R. M., Mangunsong, F. M., Safitri, S., Mufidah, A. A., & Normawati, M. (2023). Academic motivation, perceived creativity fostering teacher behavior, and student engagement in online statistics course of Indonesian undergraduates: An investigation of relations and predictability. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran, dan Pembelajaran, 9*(2), 421–433. https://doi.org/10.33394/jk.v9i2.7511

Setiawan, H., Widodo, W., Lapasau, M., Wahid, S. A., & Musliman, A. (2025). Meta-analytical model of the relationship between learning motivation, self-efficacy, and academic achievement in online learning. *Jurnal Konseling dan Pendidikan, 13*(4), 96–114. https://doi.org/10.29210/1187600

Udin, T., Maufur, S., & Riyanto, O. R. (2022). Student's self-efficacy and perceptions of online learning on the use learning management system. *Journal of Education Technology, 6*(1), 165–172. https://doi.org/10.23887/jet.v6i1.41884

Vo, H., & Ho, H. (2024). Online learning environment and student engagement: The mediating role of expectancy and task value beliefs. *The Australian Educational Researcher, 51*, 2183–2207. https://doi.org/10.1007/s13384-024-00689-1

Wang, X.-C., Zhang, M., & Wang, J.-X. (2024). The effect of university students' academic self-efficacy on academic burnout: The chain mediating role of intrinsic motivation and learning engagement. *Journal of Psychoeducational Assessment, 42*(7), 798–812. https://doi.org/10.1177/07342829241252863

Widari, I., & Jazadi, I. (2026). A design-based instructional module integrating motivation and self-regulated learning in EFL learning contexts. *Jo-ELT (Journal of English Language Teaching), 13*(1), 80–96. https://doi.org/10.33394/jo-elt.v13i1.19711

Wong, J. T., & Hughes, B. S. (2023). Leveraging learning experience design: Digital media approaches to influence motivational traits that support student learning behaviors in undergraduate online courses. *Journal of Computing in Higher Education, 35*, 595–632. https://doi.org/10.1007/s12528-022-09342-1

Xu, X., Abdullah, Z. B., & Azman, M. D. B. (2025). Self-efficacy in university learning and teaching: A PRISMA-guided systematic review of its multifaceted dimensions. *International Journal of Learning, Teaching and Educational Research, 24*(12). https://doi.org/10.26803/ijlter.24.12.22

Zhang, Y. (2025). Exploring the impacts of academic self-efficacy on learning engagement and academic success among Chinese master's students. *International Journal of Learning, Teaching and Educational Research, 24*(4). https://doi.org/10.26803/ijlter.24.4.1

Zheng, Y., & Xiao, A. (2024). A structural equation model of online learning: Investigating self-efficacy, informal digital learning, self-regulated learning, and course satisfaction. *Frontiers in Psychology, 14*, Article 1276266. https://doi.org/10.3389/fpsyg.2023.1276266

Zhou, T., Chen, Y., Li, X., Yang, L., & Zhao, Z. (2025). The relationship between online learning self-efficacy and learning engagement: The mediating role of achievement motivation and flow among registered nurses. *Frontiers in Psychology, 16*, Article 1629174. https://doi.org/10.3389/fpsyg.2025.1629174