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Student Success in Online Education: Investigating the Influence of Digital Competence, Learning Engagement, and Instructor Support

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Abstract

The rapid integration of artificial intelligence, learning analytics, intelligent tutoring systems, adaptive assessment, and connected learning technologies is reshaping higher education learning environments. However, research often examines smart learning environments, adaptive technologies, personalized learning, and student experience as separate domains, limiting an integrated understanding of their educational impact. This paper brings these perspectives together by identifying five recurring mechanisms: smart-environment infrastructure, learner modelling, adaptive content and assessment, feedback and learning visualization, and learner agency and self-regulation. The synthesis indicates that adaptive systems are most consistently associated with improved learning fit, engagement, self-regulation, and perceived usefulness when adaptation is timely, interpretable, and aligned with meaningful learning tasks. However, technological capability alone does not ensure better learning experiences; outcomes depend on how learner data support pedagogical decisions, the level of learner control, instructor involvement, and attention to privacy, transparency, and equity. Based on these findings, the paper proposes the Smart Personalized Learning Experience Framework (SPLEF), which connects smart-environment capabilities and adaptive technologies with personalization quality, learner processes, and learning experience outcomes. The framework provides a design-oriented basis for advancing learner-centred, data-informed, adaptive, and ethically responsible personalization in higher education.

1. Introduction

Online education has evolved from a supplementary delivery mode into an established component of higher education. Digital learning environments now combine learning management systems, asynchronous resources, videoconferencing, discussion forums, online assessment, social communication tools, and analytics-supported activities. The expansion of these technologies has improved the flexibility of study, but access alone does not guarantee that students will learn effectively, persist through difficult periods, or complete their courses. Research on learning analytics, online readiness, and engagement repeatedly suggests that successful participation depends on what students can do within the digital environment, how actively they participate, and how effectively instructors create a supportive learning presence (Ifenthaler & Yau, 2020; Joosten & Cusatis, 2020; Bond et al., 2020).

A central issue is therefore the difference between being connected to an online course and being equipped to succeed in it. Students can possess internet access and still struggle to manage digital information,

communicate effectively online, organize learning activities, evaluate sources, use learning technologies, or recover from technical and motivational problems. Digital competence is consequently broader than basic digital literacy. Techataweewan and Prasertsin (2018), for example, identified cognitive, thinking, collaboration, and awareness dimensions in undergraduate digital literacy, while Pettersson (2018) emphasized that digital competence should be interpreted in relation to educational contexts, organizational conditions, and learning practices. These perspectives support the view that competence is a prerequisite for meaningful engagement, not merely a technical convenience.

Engagement provides a second explanatory layer. In online education, engagement is visible through participation in learning activities, interaction with instructors and peers, interaction with course materials, task completion, discussion contributions, and sustained attention to course requirements. Bond et al. (2020) showed that student engagement is a major field within educational technology research and that behavioral indicators are frequently used to examine online participation. More importantly, engagement has a direct relationship with course completion and academic performance. Soffer and Cohen (2019), for instance, found that completers in online courses displayed higher activity across a broad set of learning variables and that course engagement predicted completion and examination success. Rajabalee et al. (2020) similarly examined the relationship between engagement and academic performance in an e-learning environment.

Instructor support constitutes the third pillar of the proposed model. Unlike face-to-face learning, where social and instructional cues are continually visible, online students can experience reduced connection, uncertainty about expectations, and delayed responses. Instructor presence can partly compensate for these challenges through clear communication, active facilitation, feedback, monitoring, and opportunities for interaction. Van Wart et al. (2020), in a large study of online-learning perceptions, identified instructional support and teaching presence among the factors students considered important. Park and Kim (2020) further connected perceived instructor presence with student learning experience, including engagement and satisfaction. Muir et al. (2020) found that social, managerial, and technical facilitation strengthened instructor presence and student involvement, while d'Alessio et al. (2019) reported substantial differences in student performance associated with instructor interaction and feedback.

Despite this extensive body of research, the three constructs are often studied separately. Digital competence is commonly framed as a readiness or skill issue; engagement is examined as a participation or behavioral outcome; and instructor support is treated as a feature of teaching presence or course design. The resulting literature is rich but fragmented. A more useful account of online student success should explain how these constructs operate together. The central proposition of this paper is that digital competence creates the capability to participate effectively, engagement converts capability into sustained learning activity, and instructor support strengthens both the quality and continuity of that participation.

The paper therefore asks four questions: (1) How is digital competence related to successful participation in online education? (2) How does learning engagement contribute to achievement, persistence, and course completion? (3) How does instructor support shape engagement and online learning experiences? and (4) What integrated framework best explains the interaction among digital competence, engagement, instructor support, and student success?

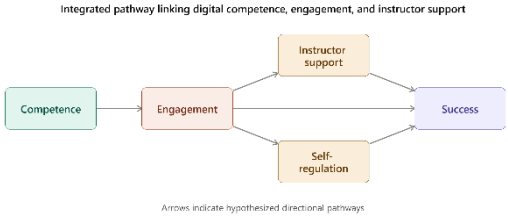

Figure 1. Integrated conceptual pathway linking digital competence, learning engagement, instructor support, and online student success

2. Literature Review

2.1 Student success in online education

Student success is a broader construct than grades alone. Ifenthaler and Yau (2020) reviewed learning-analytics research and showed that study success can range from completion of individual learning tasks to successful completion of a higher-education degree. Within online learning, success is therefore better understood as a multidimensional outcome that includes academic achievement, persistence, course completion, satisfaction, continued participation, and the successful completion of learning tasks. This broader definition is useful because online students may perform adequately while experiencing weak belonging, low satisfaction, or high risk of withdrawal, and a course can generate high satisfaction without producing strong academic achievement.

Empirical studies reinforce the multidimensional view. Soffer and Cohen (2019) found that course completion and final-exam success were related to observable engagement patterns, including assignment submission and interaction with course materials. Hartley et al. (2020) linked smartphone-supported self-regulated learning with student success,

emphasizing the role of learners' capacity to organize and monitor learning activities. Abuhassna et al. (2020) developed a model connecting online learning platform use, interaction, autonomy, satisfaction, and academic achievement. Together, these studies indicate that successful online learning depends on an interaction between student capabilities, learning behaviors, and the design of the online environment.

2.2 Digital competence as a foundation for online participation

Digital competence refers to the ability to use digital technologies purposefully, critically, safely, and effectively for learning and other activities. It includes functional skills but extends to information evaluation, communication, collaboration, content creation, problem solving, ethical behavior, and the ability to adapt when digital environments change. Pettersson (2018) argues that digital competence in education should not be separated from organizational infrastructure and contextual conditions. Techataweewan and Prasertsin (2018) developed a student-focused framework that included cognition, analysis, evaluation, creativity, collaboration, networking, sharing, ethical awareness, and safeguarding. Jiménez-Cortés et al. (2017) similarly showed that ICT learning strategies and forms of independent and collaborative learning influence digital competence development.

Online-learning readiness provides a bridge between digital competence and actual participation. Joosten and Cusatis (2020) examined online-learning readiness as a set of student characteristics related to outcomes in online courses. Bovermann et al. (2018) showed how online learning readiness and motivational factors interact within gamified online learning. Wild and Schulze Heuling (2020) identified differences in digital competence across student groups, reinforcing the idea that students do not enter online learning environments with identical capabilities. Maphosa and Bhebhe (2019) argued specifically that digital literacy is a necessary condition for open, distance, and e-learning students because their learning depends heavily on information and communication technologies.

2.3 Learning engagement as the behavioral and cognitive pathway

Engagement refers to the extent to which students invest attention, effort, emotion, cognition, and time in learning. In online settings, engagement is particularly important because digital environments require students to initiate and sustain many learning activities with less immediate external structure. Kahn et al. (2017) examined engagement in fully online environments and emphasized reflexivity and learners' active interpretation of their learning context. Schindler et al. (2017), in a critical review, demonstrated that computer-based technology can support multiple dimensions of engagement but that the effect depends on how technologies are pedagogically implemented. Bond et al. (2020) further showed that the field has examined behavioral, affective, and cognitive engagement through a wide range of digital tools.

The relationship between engagement and success is particularly visible when actual learning activity is examined. Soffer and Cohen (2019) reported that completers showed substantially greater activity than non-completers across most of the measured engagement variables. Their results also showed that assignment submission, course-material interaction, and forum reading could predict completion and examination success. Hussain et al. (2018) similarly used an e-learning system to predict student engagement and connect it with assessment performance. Rajabalee et al. (2020) explicitly investigated engagement and academic performance in an e-learning environment. These findings support the proposition that engagement is not merely a desirable course experience; it is one of the mechanisms through which online learning produces outcomes.

2.4 Instructor support, teaching presence, and interaction

Instructor support includes the instructional, social, managerial, and technical actions used to guide learners through an online course. The Community of Inquiry tradition distinguishes teaching presence, social presence, and cognitive presence, and this framework provides a useful explanation of why instructor behavior matters. Dempsey and Zhang (2019) revisited the construct validity and relationships among teaching, cognitive, and social presence, supporting the use of presence as a structured way to understand online interaction. Van Wart et al. (2020) empirically identified instructional support and teaching presence among the critical factors in students' perceptions of online learning.

The evidence also indicates that instructor support is more than a matter of responsiveness. Jackson (2019) linked student questioning with engagement and social presence, suggesting that communication is part of the learning process itself. Muir et al. (2020) showed that social, managerial, and technical facilitation strategies increased instructor presence and encouraged student involvement. Park and Kim (2020) examined the effects of perceived instructor presence on learning experience, reporting relationships with engagement and satisfaction. d'Alessio et al. (2019) provided particularly strong evidence because the course materials remained nearly identical across several semesters while variations in instructor interaction and

feedback coincided with marked differences in student performance.

2.5 Interaction among competence, engagement, and support

The three constructs are theoretically complementary. Digital competence determines whether students can navigate and exploit the technological environment; engagement determines whether they actually invest sustained effort in learning; and instructor support influences the social and instructional conditions in which that effort occurs. Digital competence without engagement may produce technically capable but passive participation. Engagement without competence may lead to effort that is undermined by difficulties with platforms, information, communication, or digital tasks. Competence and engagement without instructor support may still be weakened when expectations are unclear or students experience isolation and delayed feedback.

The literature therefore points toward a conditional and relational model. Digital competence supports readiness and effective participation; engagement transforms readiness into sustained activity; and instructor support strengthens the quality and persistence of that activity. This interpretation is consistent with the literature on online readiness, engagement, teaching presence, and learning analytics (Ifenthaler & Yau, 2020; Joosten & Cusatis, 2020; Bond et al., 2020; Van Wart et al., 2020).

Table 1: Core constructs and their roles in online student success

Construct	Definition used in this paper	Expected role
Digital competence	Ability to use digital technologies effectively, critically, safely, and purposefully for learning.	Foundational capability and readiness.
Learning engagement	Behavioral, cognitive, and affective investment in online learning activities.	Primary mechanism connecting participation to outcomes.
Instructor support	Teaching presence, facilitation, communication, feedback, and guidance.	Direct contributor and contextual enabler.

3. Methodology

3.1 Review design

This study uses a structured integrative review design. The purpose is not to calculate a pooled statistical effect size, because the included studies use heterogeneous definitions, measures, samples, and methods. Instead, the review identifies recurring relationships across the literature and integrates them into a conceptual explanation of online student success. The evidence corpus contains 30 open-access or openly accessible studies and reviews published no later than 2020. The study deliberately applies a pre-2021 boundary so that the framework represents the state of evidence immediately before the subsequent expansion of emergency online education research.

3.2 Evidence selection and eligibility

The evidence base was assembled around combinations of the terms online education, online learning, digital competence, digital literacy, student engagement, online student engagement, instructor support, teaching presence, online learning readiness, academic achievement, course completion, persistence, and student success. Priority was given to peer-reviewed journal articles with open full text or a stable openly accessible version. Studies were included when they directly addressed at least one of the three central constructs or provided evidence about online student success through closely related concepts such as learning readiness, self-regulation, teaching presence, or learning analytics.

Studies published after 2020 were excluded from the evidence synthesis. The review also excluded papers centered exclusively on non-educational digital skills, purely technical system design without a student-learning outcome, and studies where online learning was incidental rather than central. The final corpus was then coded according to publication year, primary construct, educational context, evidence type, and reported relationship to student success.

Table 2: Analytic coding scheme for the evidence synthesis

Coding dimension	Categories
Publication year	2015, 2017, 2018, 2019, 2020
Primary theme	Digital competence/readiness; engagement; instructor support/presence; student success/analytics
Outcome domain	Achievement; completion; persistence; satisfaction; participation; learning quality

Evidence type	Empirical quantitative; empirical qualitative/mixed; review; conceptual/measurement
Mechanism	Competence; engagement; presence/support; self-regulation; interaction
Context	Higher education; open/distance learning; online course; secondary/pre-university context where directly relevant

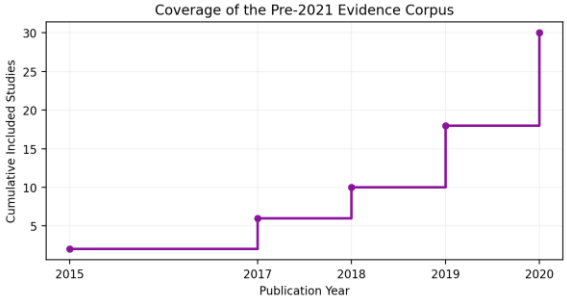

Figure 2. Cumulative publication coverage of the 30-study evidence corpus, using the publication years represented in the reviewed literature.

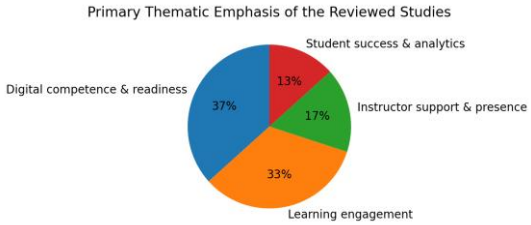

Figure 3. Primary thematic emphasis assigned during the synthesis coding process. Categories are mutually exclusive primary labels; several papers contribute evidence to more than one construct.

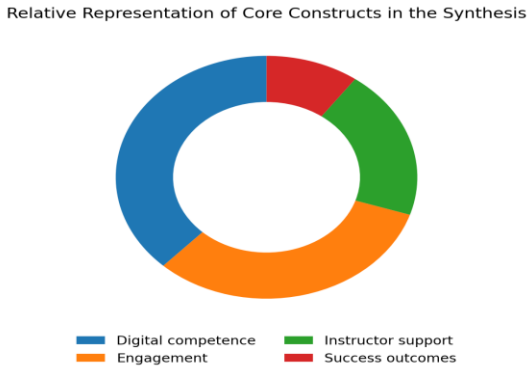

Figure 4. Relative conceptual representation of the four domains used to organize the synthesis. This figure is an author-coded visualization, not an effect-size estimate.

4. Results

4.1 Profile of the evidence corpus

The evidence corpus is concentrated in the later years of the review window. Two papers were published in 2015, four in 2017, four in 2018, eight in 2019, and twelve in 2020. This pattern reflects the increasing scholarly attention given to online learning, engagement, digital competence, and technology-supported education as digital learning became more established in higher education. The corpus includes both review studies and empirical investigations, which is useful for triangulation: reviews provide construct-level synthesis while empirical studies demonstrate how the constructs operate in specific online-learning contexts.

The corpus also reveals a shift from technology-centered questions toward learner-centered questions. Earlier studies frequently focused on digital literacy, technology-supported engagement, and measurement, whereas later studies more often examined online learning readiness, instructor presence, learning analytics, and success indicators. The shift does not indicate that technology became less important; rather, it suggests that technology was increasingly examined as part of a broader learning system.

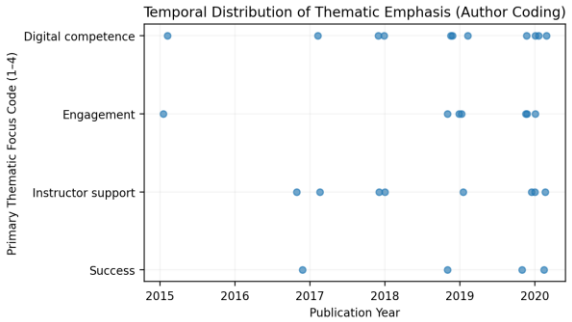

Figure 5. Temporal distribution of thematic emphasis in the corpus. The numeric focus codes are used only to visualize author coding of the primary construct in each study.

4.2 Digital competence and readiness

The reviewed literature consistently positions digital competence as a prerequisite for effective online participation. Techataweewan and Prasertsin (2018) identified multiple dimensions extending from cognitive and technical operations to analysis, creativity, collaboration, and awareness. Jiménez-Cortés et al. (2017) likewise linked ICT learning strategies with digital competence, while Wild and Schulze Heuling (2020) demonstrated that digital competence differs across student groups and learning contexts. Maphosa and Bhebhe (2019) emphasized the special importance of digital literacy for open and distance learners because of their reliance on technology-mediated information access.

The readiness literature adds an important motivational and behavioral layer. Joosten and Cusatis (2020) associated online-learning readiness with student outcomes, while Bovermann et al. (2018) examined readiness alongside motivation and satisfaction in gamified online learning. The combined evidence suggests that digital competence should not be treated as a static set of software skills. Successful online students need a flexible combination of technical operation, information literacy, communication, collaboration, awareness, and self-directed learning behaviors.

4.3 Learning engagement and performance

Engagement emerges as the most immediate behavioral explanation for online success. The evidence map of Bond et al. (2020) demonstrates how widely engagement has been studied across technology-supported higher education, while Schindler et al. (2017) emphasizes that technology influences engagement through the design and pedagogical use of tools. The empirical studies in the corpus consistently connect active participation with stronger outcomes. Soffer and Cohen (2019) found that completers were more active across most learning variables and that selected engagement indicators predicted completion and examination performance. Hussain et al. (2018) similarly showed the value of predicting engagement from learning-system activity.

Engagement is also social and cognitive rather than merely behavioral. Kahn et al. (2017) emphasized reflexivity, while Shah and Cheng (2019) explored student engagement in open-access courses and highlighted the importance of belonging and barriers. O'Shea et al. (2015) provided qualitative insight into how online learners narrate their sense of connection to the university. These findings indicate that a student may be technically active but not deeply engaged if the experience lacks meaning, connection, confidence, or perceived institutional belonging.

4.4 Instructor support and teaching presence

Instructor support is repeatedly linked to engagement and learning experience. Van Wart et al. (2020) identified instructional support, teaching presence, cognitive presence, social comfort, and social presence as reliable factors in students' perceptions of online learning. Park and Kim (2020) connected perceived instructor presence to engagement and satisfaction. Muir et al. (2020) provided practice-level evidence by showing that social, managerial, and technical facilitation increased instructor presence and active student involvement.

The strongest implication concerns feedback and communication. d'Alessio et al. (2019) found that small variations in instructor communication and feedback coincided with substantial differences in student performance across otherwise similar online course offerings. This finding suggests that instructor support is not simply an affective add-on. It can affect whether students understand expectations, recognize problems, feel socially connected, and receive timely guidance when difficulties arise.

4.5 Integrated evidence pathway

Across the corpus, the most coherent pathway is a sequence of enabling and reinforcing mechanisms. Digital competence supports access to learning activities and reduces the cognitive burden of navigating the digital environment. Engagement determines the extent to which that capability is converted into sustained learning activity. Instructor support strengthens the conditions for engagement by making expectations visible, supplying feedback, maintaining social connection, and providing instructional structure. Student success emerges when these elements are aligned rather than when any single element is optimized in isolation.

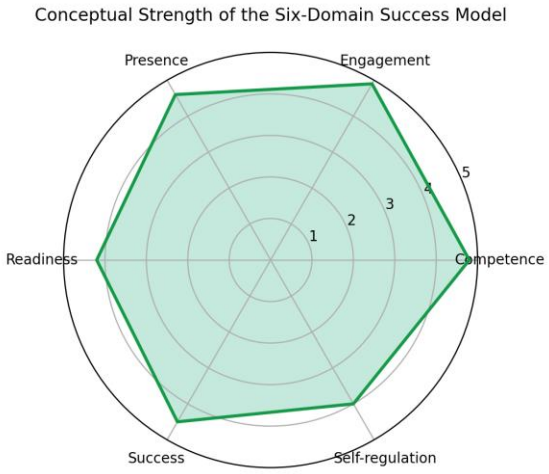

Figure 6. Conceptual strength of the six-domain model synthesized from the literature. Scores are author-coded synthesis ratings used to compare the prominence of constructs, not pooled statistics.

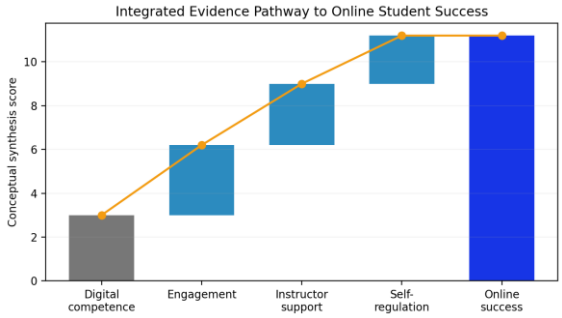

Figure 7. Integrated evidence pathway illustrating how digital competence, engagement, instructor support, and self-regulation jointly contribute to online student success. Values are illustrative synthesis scores.

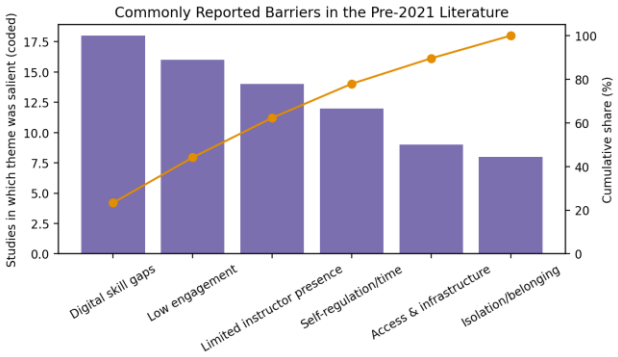

Figure 8. Common barriers identified across the reviewed literature. Counts represent author-coded salience in the 30-study corpus and should be interpreted as thematic frequencies rather than effect sizes.

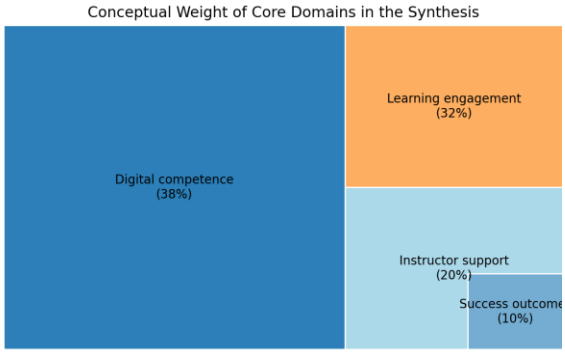

Figure 9. Conceptual weighting of the four domains used to organize the evidence synthesis.

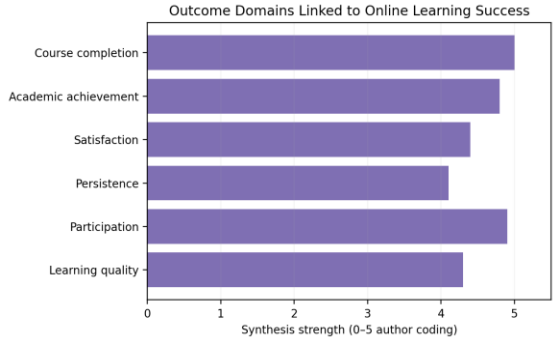

Figure 10. Outcome domains most consistently associated with online learning success in the reviewed literature. Bars represent author-coded synthesis strength.

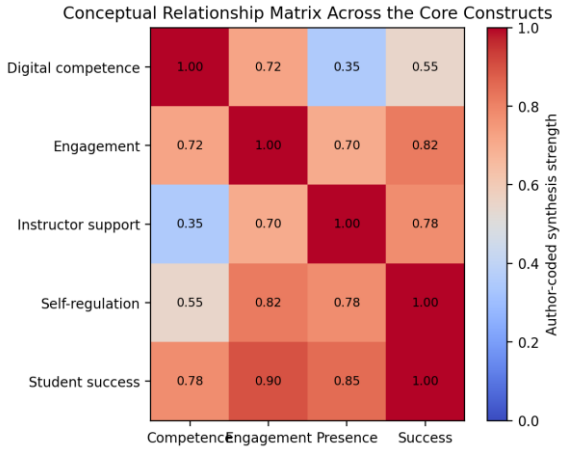

Figure 11. Conceptual relationship matrix among the core constructs. Cell values indicate author-coded synthesis strength and are not empirical correlation coefficients.

Table 3: Representative evidence linking the three central constructs to success

Evidence domain	**Representative studies**	**Synthesis interpretation**
Digital competence/readiness	Jiménez-Cortés et al. (2017); Techatawee wan & Prasertsin (2018); Pettersson (2018); Joosten & Cusatis (2020); Wild & Schulze Heuling (2020)	Competence supports effective navigation, communication, information use, collaboration, and readiness for online learning.
Learning engagement	Dixson (2015); Kahn et al. (2017); Schindler et al. (2017); Soffer & Cohen (2019); Rajabalee et al. (2020); Bond et al. (2020)	Active behavioral, cognitive, and affective engagement is associated with persistence, completion, and achievement.
Instructor support	Dempsey & Zhang (2019); d'Alessio et	Teaching presence, feedback, communicatio

	al. (2019); Park & Kim (2020); Muir et al. (2020); Van Wart et al. (2020)	n, and facilitation strengthen interaction and learning experience.
Student success	Ifenthaler & Yau (2020); Hartley et al. (2020); Abuhassna et al. (2020); Soffer & Cohen (2019)	Success is multidimensional and includes completion, achievement, persistence, satisfaction, and successful task performance.

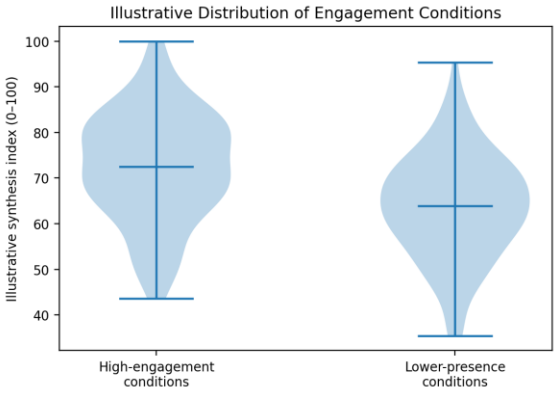

Figure 12. Illustrative distribution of engagement conditions used to demonstrate the visual form of the supplied violin plot. The values are schematic and do not represent a pooled dataset.

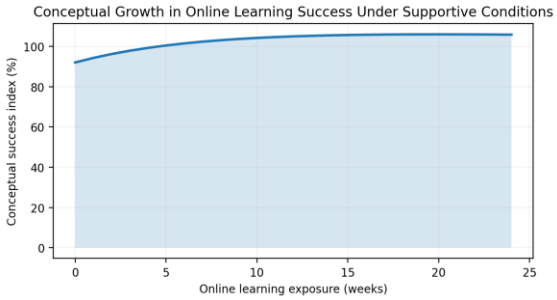

Figure 13. Conceptual trajectory showing how cumulative support and engagement could influence online learning success over time. This is a theoretical illustration, not observed longitudinal data.

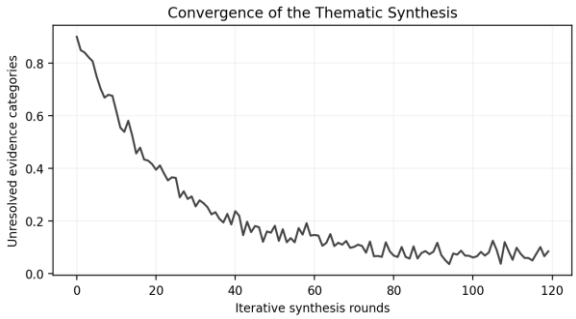

Figure 14. Convergence-style visualization of thematic synthesis refinement across iterative coding rounds. The curve is schematic and does not represent model training data.

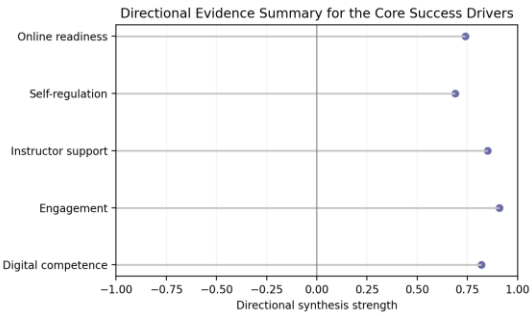

Figure 15. Directional evidence summary for the core success drivers. Points represent author-coded synthesis strength rather than statistical effect estimates.

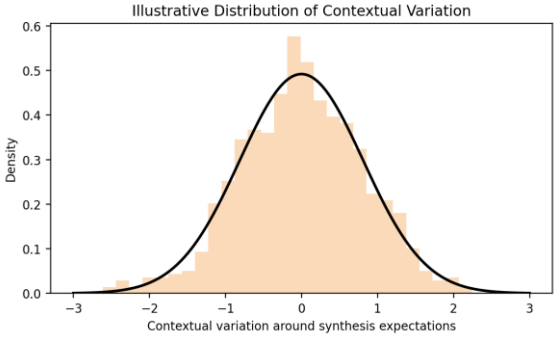

Figure 16. Illustrative contextual variation around the integrated model. The distribution is schematic and intended to visualize heterogeneity across online learning contexts.

5. Discussion

5.1 Student success is a system outcome

The central finding of this synthesis is that online student success is best understood as a system outcome rather than a single-variable effect. The evidence does not support a simple proposition that more technology produces better outcomes. Instead, online learning success emerges through alignment among student capability, learning activity, and

instructional support. This interpretation is compatible with learning-analytics research that conceptualizes study success across multiple levels and with online-learning studies that connect readiness, engagement, and teaching presence to outcomes (Ifenthaler & Yau, 2020; Van Wart et al., 2020).

5.2 Digital competence is necessary but insufficient.

Digital competence is necessary because students cannot fully benefit from online learning when they are unable to navigate platforms, search and evaluate information, manage digital materials, communicate online, or solve routine technical problems. Yet competence alone does not guarantee learning. A digitally skilled student can remain disengaged, fail to submit tasks, or struggle with motivation. The evidence therefore supports treating digital competence as an enabling condition that increases the probability of effective participation rather than as a direct substitute for pedagogical engagement.

5.3 Engagement is the mechanism that converts capability into learning

Engagement provides the bridge between what students can do and what they actually do. The strongest empirical evidence in the corpus is consistent with this interpretation. Soffer and Cohen (2019) found that engagement variables differentiated completers from non-completers and contributed to the prediction of final-exam success. Bond et al. (2020) and Schindler et al. (2017) demonstrate that engagement can be analyzed behaviorally, cognitively, and affectively. The implication for online education is that digital competence interventions should be designed to produce meaningful learning activity rather than simply increasing the number of tools students can operate.

5.4 Instructor support shapes the quality of engagement

Instructor support appears to influence both the quantity and the quality of engagement. Clear expectations, timely feedback, facilitation, communication, and social connection reduce uncertainty and help students interpret the learning environment. The evidence from d'Alessio et al. (2019) is especially important because it shows that differences in instructor interaction can coincide with pronounced differences in academic performance even when course materials are highly similar. Muir et al. (2020) further demonstrates that specific facilitation practices can increase instructor presence and active involvement. Thus, instructor support should be incorporated into student-success strategies as a design feature, not treated as an optional interpersonal enhancement.

5.5 Implications for online course design

The integrated model has direct implications for course design. First, digital competence should be supported at the point of need through orientation, embedded tutorials, accessible instructions, and task-specific guidance. Second, engagement should be intentionally designed through meaningful activities, feedback cycles, interaction, and opportunities for self-regulation. Third, instructor presence should be visible and predictable through regular announcements, responsive feedback, discussion facilitation, and clear communication. Fourth, these elements should be coordinated so that a student's digital skill, engagement behavior, and access to instructional support reinforce one another.

5.6 Implications for institutions

Institutions should move beyond the assumption that providing a learning management system and digital resources constitutes online-learning readiness. Student-success initiatives should include digital-competence assessment, targeted support for students with lower readiness, analytics-informed outreach, and staff-development strategies that improve online facilitation. Ifenthaler and Yau (2020) show the potential of learning analytics to support study success, while Van Wart et al. (2020) demonstrate the importance of instructional support and teaching presence from the student perspective. Institutional quality systems should therefore evaluate both the technical environment and the human support architecture surrounding it.

5.7 Theoretical contribution

The paper contributes an integrative explanation in which digital competence functions primarily as an enabling capability, engagement as a mediating behavioral and cognitive mechanism, and instructor support as a direct and contextual influence. This framework brings together strands of research that are frequently separated. It also avoids reducing online learning to either student characteristics or instructional features alone. Success is presented as the result of an interaction between learner capability, learning activity, and instructional conditions.

6. Implications for Practice

- Universities should provide short, diagnostic digital-competence activities before or at the beginning of online courses and offer targeted support instead of assuming that all students possess equivalent skills.
- Online courses should use engagement-oriented learning design, including meaningful tasks, frequent low-stakes feedback, interaction, and opportunities for reflection and self-regulation.

- Instructor support should be operationalized through visible teaching presence, predictable communication, rapid clarification of difficulties, and facilitation of peer interaction.
- Learning analytics should be used for early support rather than surveillance, with indicators interpreted alongside student context and instructor judgement.
- Student-success initiatives should evaluate achievement, completion, persistence, satisfaction, and successful task performance together rather than relying on grades as the sole outcome.

7. Limitations

The study has several limitations. First, the evidence corpus is intentionally limited to research published no later than 2020, so the framework should be interpreted as a pre-2021 synthesis rather than a current state-of-the-art review. Second, the included studies use different definitions and measurement instruments, limiting direct quantitative comparison. Third, the visual synthesis figures marked as author-coded or schematic are designed to communicate patterns across heterogeneous studies and should not be interpreted as pooled effect sizes. Fourth, many online-learning studies are context-specific, meaning that findings may differ by discipline, student population, platform design, and institutional conditions. These limitations strengthen rather than weaken the case for a multidimensional model: online success is too context-sensitive to be explained by a single universal predictor.

8. Conclusion

Online education succeeds when students are able to participate effectively, remain engaged in meaningful learning activities, and receive sufficient instructional support to navigate the learning process. The reviewed evidence indicates that digital competence forms a foundation for effective participation, but competence alone is not enough. Learning engagement translates capability into sustained effort and is repeatedly associated with completion and achievement, while instructor support provides the teaching presence, feedback, communication, and facilitation required to keep learners connected to the course and its goals. The most useful interpretation of student success therefore lies in the interaction among these constructs.

The integrated model proposed in this paper suggests that universities should stop treating online student success as a technology-access problem alone. A stronger strategy combines digital-competence development, engagement-centered course design, and consistent instructor presence. When these elements are aligned, online learners are more likely to move from basic participation to sustained engagement and ultimately to successful learning outcomes. Future research should test the integrated model with longitudinal student data, comparable measures of digital competence and engagement, and multilevel designs that can distinguish student-level influences from course- and institution-level support.

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