

Assessing and Improving K-12 Digital Learning Readiness: A Review and Roadmap for Future Research

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Abstract: Student readiness for K–12 online learning is a dynamic, multidimensional construct encompassing cognitive, behavioral, and affective competencies that shape whether learners can persist in digital environments. This article synthesizes literature on readiness assessment, gatekeeping, and support design. We review key instruments—most prominently the Educational Success Prediction Instrument (ESPRI)—showing that while predictive validity for success is reasonably strong, these tools systematically underidentify at-risk students and inadequately account for contextual variables such as parental involvement and self-regulation. We examine how readiness data have been applied both to restrict access and inform supportive onboarding, arguing that gatekeeping uses risk perpetuating inequities. The Academic Communities of Engagement (ACE) framework is advanced as an organizing structure for translating readiness profiles into coordinated support systems. The article concludes with a research agenda centered on instrument validation, equity-focused implementation, and rigorous evaluation of ACE-aligned onboarding interventions.

Introduction

Following the release of *Bridging the Gap between Research and Practice: A DLAC Research Agenda – Phase One* (Barbour et al., 2025a), the research team surveyed the K-12 digital learning community about ten identified research themes. Seventy-five percent of responding practitioners rated student readiness as “important” or “extremely important.” Follow-up surveys and interviews surfaced three recurring concerns: accurately assessing readiness, developing students’ soft skills, and preventing readiness instruments from functioning as gatekeeping devices rather than as guides for tailored, sustained support from enrollment through course completion. The growth of digital and online education has sharpened the need to understand what it means for students to be ‘ready’ to learn at a distance. Readiness is multidimensional, encompassing cognitive, behavioral, and affective capacities that together determine whether a student can thrive without the structural scaffolding of a physical classroom. Instruments such as the Educational Success Prediction Instrument (ESPRI) (Roblyer & Marshall, 2002) emerged to assess these capacities, yet readiness remains a complex, evolving construct that resists reduction to a single score or checklist. Understanding readiness requires attention to student perspectives, contextual conditions, and the dynamic interplay between learner skills and available supports.

While technical proficiency is necessary, soft skills are equally foundational for online success. Students must navigate learning environments that demand autonomy and self-direction without the daily rhythm of a physical classroom. Despite this reality, many readiness frameworks have been constructed from teacher perspectives rather than student experiences, overlooking what learners themselves identify as engaging and supportive. This gap reinforces the need to cultivate both academic competencies and the interpersonal and intrapersonal skills that sustain motivation and resilience in digital learning spaces. The Academic Communities of Engagement (ACE) framework (Borup et al., 2020) offers a theoretically grounded model for understanding and supporting K-12 online learner readiness. ACE frames readiness as the capacity to engage across affective, behavioral, and cognitive domains, sustained by both course-based communities (teachers, peers, program staff) and personal communities (parents, local mentors). Because these domains are interdependent and shaped by learner characteristics as well as instructional and external conditions, readiness is not a fixed prerequisite but a developmental state that can be cultivated through deliberate course design and coordinated support. The ACE framework thus reorients readiness from a screening criterion to a foundation for ongoing student development.

A central tension concerns how readiness data are used: some programs deploy assessments as gatekeeping mechanisms that reproduce existing inequities, while others use them to inform targeted supports. Online learning is not a transaction between a student and content alone—parents, teachers, and on-site mentors all play integrated roles in student success, precisely the personal communities the ACE framework recognizes. This article examines readiness assessment, gatekeeping, and support design in relation to the ACE framework, extending the “Student Readiness and Preparation” section of *Bridging the Gap between Research and Practice: A DLAC Research Agenda* (Barbour et al., 2025b) and concludes with a research agenda addressing gaps in instrument validation, personalized onboarding, sustained support, and equity-focused implementation.

Measuring Online Readiness and Utilizing the Data

Digital learning environments remove the implicit structure of physical classrooms—schedules, peer presence, immediate teacher feedback—requiring students to demonstrate stronger self-regulation, time management, and persistence. Recognizing this, researchers and schools developed instruments to assess whether students possess these capacities before enrolling in online courses.

Instruments that Measure Readiness

Although a wide range of instruments exists in higher education, their applicability to K-12 contexts is limited. In higher education, the Online Self-Regulated Learning Questionnaire measures self-regulatory behaviors associated with online course success and the Motivated Strategies for Learning Questionnaire assesses motivational orientations and learning strategies that predict performance in virtual environments (Bruso & Stefaniak, 2016). The Purposeful Interpersonal Interaction (PII) tool (Mehall, 2020) integrates the five elements of the Rubric for Assessing Interactive Qualities of Distance Courses (Roblyer & Wiencke, 2003)—social and rapport-building designs, instructional designs, technology interactivity, learner engagement, and instructor engagement—to assess meaningful online interaction. Because of developmental differences between adult and K-12 learners, the direct applicability of these instruments to younger populations remains constrained. Despite this breadth, there remains a shortage of reliable, validated instruments designed specifically for K-12 online learning contexts.

The most extensively studied K-12 readiness instrument is the Educational Success Prediction Instrument (ESPRI), developed by Roblyer and Marshall (2002). ESPRI evaluates five dimensions: two course variables under instructor control (social interaction design and instructional interaction design), technology interactivity, learner engagement, and instructor engagement. Since its development, ESPRI has demonstrated strong predictive validity across K-12 online environments. Ferdig et al. (2005) reported that ESPRI correctly predicted outcomes for all 202 students in an 18-course study, though face-to-face students rated collaboration and collegiality higher, signaling a social dimension of digital learning warranting further attention. Roblyer et al. (2008) subsequently refined the instrument into ESPRI-V2, which correctly predicted pass/fail outcomes for 80% of over 2,000 students. However, this version proved significantly more accurate at identifying likely successes than likely failures, and researchers found that only 25 of 60 items contributed meaningfully to prediction. Siko (2014) applied the 25-item version in a K-12 hybrid context with a small sample and achieved 90% accuracy. Rankin (2013) incorporated GPA and internet access alongside the four ESPRI-V2 factors—achievement beliefs, instructional risk-taking, organizational strategies, and technology self-efficacy—achieving a 98% overall prediction rate, but correctly identifying only

27.8% of students who ultimately failed. Sparks (2017) and Goad (2018) extended these findings to secondary and higher education populations, respectively, with Goad identifying GPA, class standing, hours worked outside school, and organizational habits as significant predictors of success in online physical education. Taken together, these studies affirm ESPRI's utility while exposing a persistent limitation: the instrument is considerably better at predicting success than at detecting risk of failure.

Other instruments have produced mixed or inconclusive results. Lowes and Lin (2015) found that locus-of-control surveys poor predictors. Kim et al. (2014) found that negative emotions can outweigh self-efficacy benefits and that enrollment motivation influences outcomes independently of skill levels. Collectively, these findings indicate that single-dimension readiness measures cannot capture the full complexity of online learning success. A core reason existing instruments fall short is that student success in K-12 digital learning is shaped by a broad array of contextual factors that most readiness tools do not capture. Parental involvement is among the most consistent predictors of virtual school achievement, and specific instruments have been developed to measure its dimensions (Liu et al., 2010). Student engagement and academic expectations also shape online outcomes (Knoster & Empson, 2022), as does self-regulation, which is associated with substantially improved performance in online courses (Roblyer & Davis, 2008; Wang et al., 2023). The literature indicates that most current instruments are insufficiently sensitive to at-risk students and inadequately account for the environmental and relational factors that mediate online learning success.

Two themes emerge from this body of literature. First, instruments reliably identify students likely to succeed but routinely miss those likely to struggle—a critical blind spot, since early identification of at-risk students is precisely where targeted intervention could yield the greatest benefit. Second, context matters: learning in digital environments is shaped by factors both internal and external to the student. Programs should therefore treat readiness instruments as one component in a multi-source assessment strategy, triangulating survey results with prior achievement data, counselor input, and environmental factors such as device access and scheduling flexibility. Rather than using rigid cut scores to determine enrollment eligibility, educators can use subscale profiles to design individualized, ongoing support plans responsive to each student's strengths and needs.

Gatekeeping in Online Courses

Although readiness instruments are frequently framed as student supports, they have also been deployed—explicitly or implicitly—to restrict access to online courses. Many K-12 programs currently present “Is online learning right for you?” quizzes or discussions on enrollment pages¹. Districts have also implemented formal prerequisites—minimum GPAs, teacher endorsements, or prior honors enrollment—that can function as structural barriers. Enrollment practices may steer students toward or away from virtual options through counselor guidance or policies that prioritize certain populations (e.g., credit recovery versus acceleration). Participation in virtual schooling has been shown to vary by race, income, and language status, suggesting that implicit gatekeeping operates even in the absence of explicit exclusionary policies (Rose et al., 2015). When readiness data inform these decisions without compensatory support commitments, assessments designed to help students end up functioning as exclusionary screens. Gatekeeping also operates through student self-selection. Research from rural Newfoundland and Labrador illustrates this dynamic: students in small, remote schools where online courses are the only pathway to graduation often opted out of advanced online coursework, effectively accepting a more limited curriculum to avoid the perceived burdens of distance learning (Mulcahy et al., 2016). While high-achieving students with post-secondary ambitions enrolled in online courses, the broader student population avoided them due to concerns about insufficient local, in-person support. Self-selection effects of this kind can silently concentrate online enrollment among already-advantaged students.

The Florida Virtual School (FLVS) represents a contrasting model. Johnston and Barbour (2013) documented that FLVS has maintained open-access policies, allowing enrollment in Advanced Placement courses without GPA thresholds or teacher recommendations, and that students frequently cited flexible pacing and anytime access as key motivators. FLVS also explicitly prioritizes underserved student populations, though selection effects and differential access to support can still shape outcomes even within nominally open-access systems. At the structural level, availability of supervised work time, reliable internet and devices, and trained on-site mentors all function as practical gatekeepers: students lacking these resources are considerably more likely to withdraw

¹ For examples of these instruments, see <https://michiganvirtual.org/resources/program-self-assessment/>, <https://www.connectionsacademy.com/support/resources/article/making-the-choice-is-virtual-school-right-for-my-child/>, or <https://www.floridashines.org/online-readiness>

(Roblyer & Davis, 2008). Demographic analyses of virtual school participation reveal persistent retention disparities by race and income, evidencing systemic rather than merely policy-driven gatekeeping. Readiness instruments must therefore be coupled with explicit equity commitments—ensuring that low scores trigger additional supports and opportunities, not exclusion.

Using Readiness Data to Design Orientation and Ongoing Supports

Repositioning readiness assessments as support tools rather than screening mechanisms reframes their purpose. Rather than denying access to students who score low, readiness profiles can identify specific skill gaps to address during onboarding and throughout a course. Traditional orientation models have focused primarily on technical navigation: how to use the learning management system and access support. Research by Zweig et al. (2022), however, demonstrated that orientation modules improve outcomes most when they explicitly develop self-regulation, time management, and academic navigation skills, are structured to encourage completion, and are integrated into ongoing support systems involving mentors and instructional staff. The ACE framework provides a structural blueprint for this kind of coordinated support. ACE maps specific supports from the course community (teachers, staff, peers) and the personal community (parents/guardians) onto the affective, behavioral, and cognitive dimensions of student engagement (Borup et al., 2014; Borup et al., 2020)

Within an ACE framework, teachers scaffold behavioral engagement through pacing charts and proactive outreach; peers support affective engagement through structured collaboration; and parents monitor progress and provide organizational support at home. Readiness instrument results can directly activate these supports. A low score in time management, for instance, can trigger school-day work sessions with a local mentor, weekly dashboard check-ins with parents, and teacher-designed micro-goals tied to course milestones. Low technology self-efficacy scores can cue just-in-time technical tutorials delivered with on-site facilitator guidance. Critically, these interventions should persist beyond initial onboarding, with periodic pulse checks that revisit readiness subscales and adjust supports in response to changing student needs. A current limitation of the ACE framework is the absence of validated instrumentation to measure student readiness across its specific engagement dimensions, underscoring a key area for future instrument development.

Directions for Future Research

Despite meaningful progress, several critical gaps remain. The following recommendations address both what schools can do now and what researchers must pursue next. First, programs should adopt validated readiness instruments such as ESPRI-V2 and use results to build personalized onboarding rather than to screen students out. Clear governance policies should specify who can access subscale scores, how long data are retained, and how results inform support decisions, as recommended by Siko (2014). The instrument's well-documented weakness in identifying at-risk students makes triangulation with GPA, counselor input, and environmental data (device access, scheduling flexibility) especially important. Second, the ACE framework offers a coherent structure for organizing multi-actor support systems that respond to readiness data without restricting access. Schools should implement regular pulse-check routines with clear protocols specifying when and how teachers, mentors, peers, and families should respond to early warning signals such as missed deadlines. Communication with families should emphasize growth and frame readiness as a developmental snapshot, not a fixed label, highlighting the student's agency and the concrete supports available. Schools must also monitor for unintended consequences, including self-fulfilling prophecies from low readiness scores, and audit whether supports are distributed equitably across student subgroups. Third, district policy can amplify or undermine readiness-informed supports by creating conditions for mentoring and self-regulation practices associated with improved outcomes (Roblyer & Davis, 2008). Programs that guarantee such time are likely to show smaller success-rate disparities across socioeconomic groups than those that assign online coursework exclusively outside school hours. Readiness instruments can complement open-access policies like those at FLVS (Johnston & Barbour, 2013) by ensuring that students who opt in receive tailored supports from day one, protecting against preventable withdrawal without restricting enrollment.

Four research priorities stand out. First, the field needs continued refinement and validation of K-12 readiness instruments across diverse contexts and demographics. Longitudinal studies should examine how readiness changes over time and how well instruments detect students at risk of failure, with findings replicated across underserved populations and varying program structures. Second, rigorous studies are needed on integrating

readiness instruments into personalized onboarding. Randomized or quasi-experimental designs comparing ACE-aligned onboarding pathways triggered by specific subscale scores against standard orientations would establish a stronger evidence base, and mixed-methods designs can capture the contextual nuances of implementation. Third, more research is needed on tailored, sustained in-course supports and how these affect affective, behavioral, and cognitive engagement over time. Implementation studies should evaluate whether ACE-informed support cycles reduce disparities in persistence and achievement across student subgroups. Fourth, psychometric studies should examine measurement invariance across grade bands and linguistic backgrounds, instrument sensitivity when supports are introduced, and common outcome measures beyond course grades. Researchers should embed PII-aligned routines to foster social presence and help-seeking (Mehall, 2020), audit access and outcomes by demographic subgroup, and ensure engagement studies are designed with student goals as a central organizing variable (Mulcahy et al., 2016).

Conclusion

K-12 digital learning has matured from an access solution into a mainstream modality that demands careful attention to student readiness and support. Instruments like ESPRI offer valuable snapshots of students' skills and beliefs, but their greatest potential lies in informing developmental supports rather than restricting access. When embedded in ACE-aligned systems that coordinate teachers, peers, families, and on-site mentors, readiness data can power personalized onboarding and sustained interventions that promote equitable persistence and achievement. The practical steps outlined here—protected school-day time, differentiated orientation, pulse-check routines, and transparent family engagement—translate research into implementable practice. While this synthesis cannot capture the full variability across states, providers, and post-pandemic contexts, and future work should integrate behavioral analytics alongside self-report measures, centering readiness as a developmental construct and operationalizing support through ACE offers a practical pathway to expand access while raising success in K-12 digital learning.

References

- Barbour, M. K., Borup, J., DeBruler, K., Azukas, M. E., Beck, D., Hodges, C., Rice, M., Rose, R., Short, C. & Siko, J. (2025a). *Bridging the gap between research and practice: A DLAC research agenda - Phase one*. The Community Advancing Digital Learning. <https://www.deelac.com/insight/a-dlac-research-agenda-phase-one/>
- Barbour, M. K., Borup, J., DeBruler, K., Azukas, M. E., Beck, D., Hodges, C., Rice, M., Rose, R., Short, C., Siko, J., Adelstein, D., Archambault, L., Cuccolo, K., Deschaine, M., Elmendorf, D., Garrett Dikkers, A., Pratt, K., Wilson, E. V., & Woo, L. (2025b). *Bridging the gap between research and practice: A DLAC research agenda*. DLAC – The Community Advancing Digital Learning. <https://www.deelac.com/insight/a-dlac-research-agenda-final/>
- Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. J. (2020). Academic Communities of Engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research and Development*, 68(2), 807-832. <https://doi.org/10.1007/s11423-020-09744-x>
- Borup, J., West, R. E., Graham, C. R., & Davies, R. S. (2014). The adolescent community of engagement framework: A lens for research on K-12 online learning. *Journal of Technology and Teacher Education*, 22(1), 107-129. <https://www.learntechlib.org/primary/p/112371/>
- Bruso, J. L., & Stefaniak, J. E. (2016). The use of self-regulated learning measure questionnaires as a predictor of academic success. *TechTrends*, 60(6), 577-584. <https://doi.org/10.1007/s11528-016-0096-6>
- Ferdig, R. E., DiPietro, M., & Papanastasiou, E. (2005). *Teaching and learning in collaborative virtual high schools*. Unpublished manuscript.
- Goad, T. (2018). *Predicting student success in online physical education* [Doctoral dissertation, West Virginia University]. WVU Campus Repository. <https://researchrepository.wvu.edu/etd/5684>
- Johnston, S., & Barbour, M. K. (2013). Measuring success: Examining achievement and perceptions of online Advanced Placement students. *American Journal of Distance Education*, 27(1), 16-28. <https://doi.org/10.1080/08923647.2013.755072>

- Kim, C., Park, S. W., & Cozart, J. (2014). Affective and motivational factors of learning in online mathematics courses. *British Journal of Educational Technology*, 45(1), 171-185. <https://doi.org/10.1111/j.1467-8535.2012.01382.x>
- Knoster, T., & Empson, D. (2022). *Enhancing student engagement by virtually establishing, teaching, and reinforcing desired behavior* (1st ed.). Brookes Publishing.
- Liu, F., Black, E., Algina, J., Cavanaugh, C., & Dawson, K. (2010). The validation of one parental involvement measurement in virtual schooling. *Journal of Interactive Online Learning*, 9(2), 105-125. <https://www.ncolr.org/jiol/issues/pdf/9.2.2.pdf>
- Lowes, S., & Lin, P. (2015). Learning to learn online: Using locus of control to help students become successful online learners. *Journal of Online Learning Research*, 1(1), 17-48. <https://www.learntechlib.org/primary/p/149845/>
- Mehall, S. (2020). Purposeful interpersonal interaction in online learning: What is it and how is it measured? *Online Learning*, 24(1), 182-204. <https://doi.org/10.24059/olj.v24i1.2002>
- Mulcahy, D., Barbour, M. K., & Lahiri, M. (2016). The straight truth about online learning in the straits: An investigation into the nature of education in a rural and remote region of Newfoundland and Labrador. *Australian and International Journal of Rural Education*, 26(1), 27-41. <https://doi.org/10.47381/aijre.v26i1.4>
- Rankin, D. T. (2013). *Predictors of success for high school students enrolled in online courses in a single district program* [Doctoral dissertation, Virginia Commonwealth University]. VCU Scholars Compass. <https://doi.org/10.25772/KQNF-WC46>
- Roblyer, M. D., & Davis, L. (2008). Predicting success for virtual school students: Putting research-based models into practice. *Online Journal of Distance Learning Administration*, 11(4). <https://ojdla.com/archive/winter114/roblyer114.pdf>
- Roblyer, M. D., Davis, L., Mills, S. C., Marshall, J., & Pape, L. (2008). Toward practical procedures for predicting and promoting success in virtual school students. *American Journal of Distance Education*, 22(2), 90-109. <https://doi.org/10.1080/08923640802039040>
- Roblyer, M. D., & Marshall, J. C. (2002). Predicting success of virtual high school students: Preliminary results from an educational success prediction instrument. *Journal of Research on Technology in Education*, 35(2), 241-255. <https://doi.org/10.1080/15391523.2002.10782384>
- Roblyer, M. D., & Wiencke, W. R. (2003). Design and use of a rubric to assess and encourage interactive qualities in distance courses. *American Journal of Distance Education*, 17(2), 77-98. https://doi.org/10.1207/S15389286AJDE1702_2
- Rose, R. M., Smith, A., Johnson, K., & Glick, D. (2015). Ensuring equitable access in online and blended learning. In T. Clark & M. K. Barbour (Eds.), *Online, Blended, and Distance Education in Schools* (pp. 71-83). Routledge.
- Siko, J. P. (2014). Testing the waters: An analysis of the student and parent experience in a secondary school's first blended course offering. *International Journal of E-Learning & Distance Education*, 29(2). <https://www.ijede.ca/index.php/jde/article/view/882>
- Sparks (de Zantinga), L. M. (2017). *Educational success prediction instrument 2nd version: A foreign language perspective on readiness to take a beginner high school foreign language online course* (Publication No. 10621304) [Doctoral dissertation, ProQuest Dissertations & Theses Global]. <https://www.proquest.com/dissertations-theses/educational-success-prediction-instrument-2-sup/docview/1952289929/se-2>
- Wang, P., Wang, F., & Li, Z. (2023). Exploring the ecosystem of K-12 online learning: An empirical study of impact mechanisms in the post-pandemic era. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1241477>
- Zweig, J., Hanita, M., Stafford, E., & Khanani, N. (2022). Impact of an orientation on online students' course outcomes. *Journal of Research on Technology in Education*, 54(5), 655-678. <https://doi.org/10.1080/15391523.2021.1911007>