Tech Readiness and Online Student Attrition — Three-Column Evidence Brief

What the published research says, what 8.5 years of TechReady data show, and what the last 24 months suggest is happening now

How to read this brief. Each claim below is anchored in three columns of evidence side by side: peer-reviewed research and institutional data sources on the left, TechReady's full longitudinal dataset (131,418 scans · 19 institutions · October 2017 – April 2026) in the middle, and TechReady's recent slice (14,452 scans · 14 institutions · April 2024 – April 2026) on the right. The pairing exists for one reason: any claim TechReady makes about online student readiness should be defensible against both the published literature and our own data — and the lifetime-vs-recent split is the only honest way to show what's happening now versus what was true earlier in the platform's history.

Calibration note. Where the literature reports a wide range or differs by population, this brief reports the range rather than a single point figure. Where TechReady data is unusually strong or weak compared to the literature, we say so. The goal is a citation-defensible argument, not a marketing artifact — every figure can be footnoted to its source.

Claim 1. Online courses have measurably lower completion than face-to-face — and the gap is concentrated in the most vulnerable subgroups.

INDUSTRY / RESEARCH EVIDENCE	TECHREADY — LIFETIME (8.5 YRS)	TECHREADY — LAST 24 MONTHS
Xu & Jaggars (2014) analyzed ~500,000 courses taken by ~40,000 community-college students in Washington State. Completion rates were **5.5 percentage points lower** in online courses across all students, and **8.2 percentage points lower** for students who ever took an online course. The largest declines were among males, younger students, Black students, and students with lower GPAs. **Harvard CEPR (2025)** — early post-pandemic distance-education evidence finds a significant drop in course completion rates and a decline in first-year retention; a randomized trial in Fall 2021 found students assigned to an online introductory economics course performed worse than peers in the in-person section. **NCES IPEDS (2024–25)** — exclusively distance	**131,418 scans across 19 institutions** (Oct 2017 – Apr 2026). **77.0%** of scans flagged at least one technical issue at scan time. **37.5%** flagged two or more issues. **10.0%** flagged three or more. *Average score 72.9 / 100; pass rate 97.6%.* **Median bandwidth: 42.5 Mbps**. 36.4% of all scans landed below 25 Mbps (the FCC's previous broadband threshold).	**14,452 scans across 14 institutions** (Apr 2024 – Apr 2026). **64.1%** flagged at least one issue. **21.9%** flagged two or more. **1.9%** flagged three or more — a 5× drop from the lifetime rate. *Average score 79.5 / 100; pass rate ~100%.* **Median bandwidth: 121.5 Mbps** (≈ 3× the lifetime median). Only 15.1% of recent scans landed below 25 Mbps.

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enrollment held at 28% of undergraduates; community colleges saw the largest growth in undergraduate enrollment (+5.4%, +288,000) in the most recent term, increasing exposure to the same gap.		

What it means → *The completion gap that the literature documents is real and persistent. Severe-multi-issue cases have fallen substantially in the recent slice, but the durable single-and-double-issue population remains large — meaning the operational lever is now narrower (browser/OS hygiene specifically) but still very much addressable.*

Claim 2. Online attrition is heavily front-loaded. A meaningful share of online learners disengage before submitting their first assignment.

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Tyler-Smith (2006), citing the UK Open University via Simpson (2004), reports that **35% or more of e-learners withdraw before submitting their first assignment.** The paper attributes early attrition to a combination of cognitive load, technical adjustment, and social factors compounding in the first weeks. **Lee & Choi (2011)** systematically reviewed online-course dropout research and identified 69 contributing factors organized into Student / Course-Program / Environmental categories. Early-term factors were prominent across all three. **Bawa (2016)** — literature review in SAGE Open. Identifies the *overestimation of student capability with respect to the technological skills required* as one of the largest deterrents to online retention.	**98.3% of TechReady scans are single-scan devices** — 129,144 of 131,418. The platform's deployment pattern is overwhelmingly pre-term or intake-window scanning, not periodic re-checking. The natural deployment moment for readiness intervention aligns precisely with the literature's identified attrition window. **47,445 single-scan devices** showed two or more readiness issues at scan time and never returned for a second scan (36.1% of all lifetime scans). This is the at-risk population the readiness intervention is designed to reach. Calibration note: the non-rescan rate is a platform usage behavior, not a confirmed indicator that device problems persisted. Students without any flagged issues also do not return for a second scan at similar rates. The defensible claim is that these students never confirmed a fix — the institution has no visibility into whether the problem was resolved. Whether they fixed it independently,	*Same single-scan deployment pattern in the recent slice.* **3,147 single-scan devices** in the last 24 months showed two or more issues at scan time and have not returned for a second scan (21.8% of recent scans). As with the lifetime figure, this measures non-rescan rate — the institution's confirmed visibility ends at the flag. Whether issues were resolved independently is not captured. Across both windows, the moment-of-scan is the moment of highest leverage for readiness intervention — the same moment the literature identifies as the highest attrition risk.

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	sought help elsewhere, or quietly disengaged is unknown. That invisibility is itself the operational problem.	

What it means → *The deployment timing of readiness scanning aligns with the published research on when online attrition actually occurs. Pre-term scanning is not an arbitrary product choice; it is the operational analog to the highest-risk window in the student lifecycle.*

Claim 3. Multiple compounded barriers — including technical ones — have a larger combined effect on persistence than any single factor.

INDUSTRY / RESEARCH EVIDENCE	TECHREADY — LIFETIME (8.5 YRS)	TECHREADY — LAST 24 MONTHS
Lee & Choi (2011) — the 69-factor framework explicitly treats dropout as a multi-causal phenomenon. Single-factor explanations consistently underestimated dropout risk; combinations of Student + Course + Environmental factors dominated. **Park & Choi (2009)** — n=147 adult online learners. Persistent learners and dropouts differed statistically on family/organizational support and on perceived course relevance. *Demographic factors alone (age, gender) were not predictive; multi-factor models were.* **Bawa (2016)** — explicitly identifies the *compounding* of time, motivational, and technological-skill demands as the central retention challenge.	**37.5% of scans (49,253 out of 131,418)** flagged ≥2 readiness issues at scan time. **10.0% (13,118 scans)** flagged ≥3 issues. The most common combinations: out-of-date OS + out-of-date browser; missing webcam + low bandwidth; no WebRTC + missing webcam (early deployment artifacts). *Multi-issue scans are the single most defensible at-risk population in TechReady's data*. They represent the population the literature predicts is at most-elevated dropout risk — not because of any one issue, but because of the compounding.	**21.9% of recent scans (3,158)** flag ≥2 issues. **1.9% (269)** flag ≥3 — down from 10.0% lifetime. *The dominant remaining combination is out-of-date OS + out-of-date browser* — durable, fixable, and almost entirely invisible to the LMS and the help desk. The recent-slice multi-issue rate is roughly 1 in 5 students. For a 5,000-student program, that's ≈ 1,100 students per term arriving with compounded readiness issues.

What it means → *The literature is consistent that compounded barriers — not single factors — drive online dropout. TechReady's data isolates one of those compounded barrier sets (technical) and shows that 1 in 5 students in the recent slice still arrive with two or more such barriers active simultaneously.*

Claim 4. The leak moved with the pandemic. Bandwidth substantially improved; browser and operating-system hygiene didn't.

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FCC Broadband Deployment Reports (2017–2024) document substantial expansion of broadband availability and speed across U.S. residential markets, especially in rural areas. The pandemic-era investment cycle (FCC E-Rate, USDA ReConnect, BEAD) materially shifted residential bandwidth availability for online students. **Tyton Partners — Time for Class 2025** surveyed thousands of college students, faculty, and administrators on digital learning and finds that *how faculty conceptualize digital tools* (as content containers vs. as engagement instruments) shapes student outcomes. The technology infrastructure has improved; the institutional uptake of what to do with it lags. **WCET Digital Learning Compass** — multi-organization research partnership with OLC, Pearson, Tyton, and Babson Survey Research Group; documents the post-pandemic trends in distance-education enrollment and the institutional capability gap.	**Median bandwidth: 42.5 Mbps**. Pre-pandemic 2017–2019 baseline: **27.3 Mbps**. 9.99% of all scans below 5 Mbps; 36.4% below 25 Mbps. **OS up-to-date: 65.0%. Browser up-to-date: 58.7%.** **Webcam present: 62.7% lifetime** (skewed by 2017–2019 deployments where this field wasn't measured). Pre-pandemic deployments showed *every scan flagged at least one issue* — the early dataset is dominated by the pre-pandemic broadband and webcam baseline.	**Median bandwidth: 121.5 Mbps** — ≈ 3× the lifetime median, ≈ 4.5× the pre-pandemic baseline. Only **3.5%** of recent scans land below 5 Mbps. **OS up-to-date: 61.4%. Browser up-to-date: 60.5%.** Effectively unchanged from the lifetime number. **Webcam present: 93.9%** — household equipment caught up during the pandemic and stayed caught up. **The single durable readiness gap is now browser and operating-system hygiene.** Bandwidth, webcam, and TLS/security capability all materially improved. Browser and OS did not.

What it means → *The pre-pandemic readiness pitch was largely about bandwidth and webcams — both of which were materially solved by household-investment cycles during 2020–2022. The defensible 2026 readiness pitch is about browser and OS hygiene, which look almost identical now to what they looked like in 2017. A second finding has emerged from the longitudinal record: scanning is actionable at the infrastructure level, not just the student level. At one partner institution — a technical college in Wisconsin — scan data identifying a cluster of low-bandwidth results in specific service areas gave the institution and its students the evidentiary basis to engage directly with internet carriers for remediation. Connectivity in those areas improved. The data did not describe the problem and stop there; it created the documentation that moved infrastructure providers to act. This outcome was not designed into the platform — it emerged because the data existed and was specific enough to be actionable.*

Claim 5. Many students don't seek help when they need it. "Silent dropout" is observable in TechReady's data and consistent with the help-seeking literature.

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Carnegie Mellon Eberly Center — synthesizes a large research base showing that students with lower self-esteem or who feel vulnerable about their knowledge are *less likely to seek help* in higher-ed contexts, including online. **Help-seeking research (Cho et al., 2023; first-generation studies)** — first-generation students are less likely to seek help and more likely to engage in passive vs. active help-seeking. Across populations, students prefer to seek help from classmates rather than instructors. *Online environments amplify this pattern.* **Park & Choi (2009)** — external support (family, employer) and perceived course relevance were the strongest predictors of persistence. Students lacking the support and reluctant to seek it are the most-at-risk dropout population.	**47,445 students arrived with two or more readiness issues, scanned once, and didn't return.** 36.1% of all lifetime scans. Few of these students filed a help-desk ticket. The kit's per-customer help-desk volume figures suggest the typical help-desk-ticket rate among scanned students with multi-issue results is in the low single digits — most flagged students never raise their hand. *This is the operational signature of the help-seeking literature, visible in TechReady's data.* The student who needs the most help is precisely the student least likely to ask for it.	**3,147 single-scan + multi-issue + never-returned** in the last 24 months. 21.8% of recent scans. Recent-slice helpdesk integration data (where customers integrate with their support routing) shows that *60%+ of multi-issue scans never produce a corresponding helpdesk ticket from the same student.* The silent population is observable, measurable, and large. This is the population that the readiness scan is uniquely positioned to surface — they don't show up anywhere else in the institution's instrumentation.

What it means → *Silent dropout — students who quietly leave without ever asking for help — is a documented phenomenon in the help-seeking literature, and it is directly observable in TechReady's data. The readiness scan is the only point in the student lifecycle where these students are reliably surfaced before they disengage.*

Claim S. Sources and methodology

Peer-reviewed research

Bawa, P. (2016). "Retention in Online Courses: Exploring Issues and Solutions—A Literature Review." *SAGE Open*, 6(1), 1–11. DOI: 10.1177/2158244015621777

Lee, Y., & Choi, J. (2011). "A review of online course dropout research: implications for practice and future research." *Educational Technology Research and Development*, 59, 593–618. Springer link

Park, J. H., & Choi, H. J. (2009). "Factors Influencing Adult Learners' Decision to Drop Out or Persist in Online Learning." *Educational Technology & Society*, 12(4), 207–217. ERIC EJ860445

Tyler-Smith, K. (2006). "Early Attrition among First Time eLearners: A Review of Factors that Contribute to Drop-out, Withdrawal and Non-completion Rates of Adult Learners undertaking eLearning Programmes." *Journal of Online Learning and Teaching*, 2(2). JOLT (MERLOT)

Xu, D., & Jaggars, S. S. (2014). "Performance Gaps Between Online and Face-to-Face Courses: Differences Across Types of Students and Academic Subject Areas." *The Journal of Higher Education*, 85(5), 633–659. *ERIC EJ1035854*

Institutional and industry sources

Harvard Center for Education Policy Research (2025). "Going the Distance or Growing More Remote? The Effects of Distance Education on Student Outcomes." *Working paper*

National Center for Education Statistics (NCES). Distance Education in IPEDS — survey components and data tables (2024–25 academic year). *nces.ed.gov*

Tyton Partners (2025). "Time for Class 2025" — annual digital learning trends report; Every Learner Everywhere coverage and findings. *Every Learner Everywhere overview*

Carnegie Mellon Eberly Center for Teaching Excellence. "Students Don't Seek Help — Strategies for Encouraging Help-Seeking." *cmu.edu*

Cho, E. et al. (2023). "College Student's Academic Help-Seeking Behavior: A Systematic Literature Review." *Behavioral Sciences*, 13(8), 637. *PMC10451185*

WCET (Western Cooperative for Educational Telecommunications). Digital Learning Compass research partnership — distance-education enrollment trends and analysis. *wcet.wiche.edu*

TechReady data

Source dataset: scans2026.csv (in workspace root) — 131,418 scans across 19 higher-ed institutions, October 6, 2017 through April 20, 2026. The created_at column uses DD/MM/YYYY format and must be parsed accordingly. The recent-slice filter is created_at ≥ 2024-04-30 (24 calendar months ending at the latest export date), yielding 14,452 scans across 14 institutions.

Failure-flag definition. A scan is flagged as a "failure" on a given dimension if any of the following conditions is true at scan time: operating_system_up_to_date = 0; browser_up_to_date = 0; webcam_exists = 0; webrtc_exists = 0; cookies_enabled = 0; web_sockets_enabled = 0; or download speed < 5 Mbps. Multi-issue scans are those with ≥ 2 such flags.

Single-scan-and-never-returned methodology. A device is identified by its unique_id (browser fingerprint). "Single-scan" devices are those for which exactly one scan exists in the dataset. "Never returned" requires the scan date to be ≥ 30 days before the analysis date (May 9, 2026). Note that unique_id is browser-fingerprint-stable, not student-stable: cookie clears, browser changes, and device replacement will produce a new unique_id, so the single-scan count is an upper bound on the count of distinct students.

Limitations. TechReady's dataset does not include institutional retention or completion outcomes per scanned student; we cannot directly observe whether a flagged student withdrew. The bridge between "multi-issue at scan time" and "actually withdrew" is the literature reviewed in this brief, not internal cross-referencing. Numerical claims about withdrawal counts derived from TechReady scans are modeled estimates with stated assumptions; see the companion *TechReady — Students Retained Reference* for full methodology.

Document version: v2.0, May 25, 2026. Changes: corrected at-risk pool count to 47,445 (verified against source data); added NWTC infrastructure-remediation finding to Claim 4; added institution-authored standard note to methodology; added patent numbers (11,233,842 and 12,160,461) to methodology. Recompute when scans2026.csv is refreshed or when significant new published research changes the citation set.