ENROLLMENT TRENDS IN ADULT ESL CLASSES IN WISCONSIN TECHNICAL COLLEGES

By

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Abstract

This study examined enrollment trends in adult English as a Second Language (ESL) programs within the Wisconsin Technical College System (WTCS), focusing on the six participating colleges, with primary analyses covering 2020–2024 and select pre-2020 data included for historical context. The study assessed the extent to which online and hybrid instructional modalities expanded access for rural learners. Enrollment data disaggregated by ZIP code, academic year, and modality were obtained from participating colleges. Learner residence was classified using Rural–Urban Commuting Area (RUCA) codes (via learner ZIP code)—Urban 1–3, Large Rural 4–6, Small/Isolated 7–10—following the WWAMI RUCA framework and the USDA ERS ZIP-code approximation file (U.S. Department of Agriculture, Economic Research Service, 2020; WWAMI Rural Health Research Center, n.d.). Quantitative analyses included descriptive statistics, cross-tabulations, and chi-square tests to assess associations among modality, rurality, and learner demographics; spatial mapping was used to visualize ZIP-level patterns over time (including post-2020 “new-ZIP” participation where applicable). Findings indicate that while urban centers continued to account for most enrollments, rural participation in online and hybrid increased after 2020, with the magnitude modest and varying by college. Colleges serving more Small/Isolated areas showed clearer proportional gains in rural online participation, whereas urban-heavy districts saw proportionally greater growth among urban learners. Distance analyses did not show online learners living farther from campuses; where measured, online learners lived slightly closer on average than in-person learners.These results highlight the role of digital modalities in targeted mitigation of geographic barriers to adult ESL participation, while in-person instruction remains central. The findings provide policy-relevant guidance for program planning, resource allocation, and digital equity initiatives within WTCS and similar regional systems.

Keywords: adult ESL, Wisconsin Technical College System, RUCA (Urban 1–3; Large Rural 4–6; Small/Isolated 7–10), online learning, hybrid instruction, rural access, enrollment trends

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Introduction

The role of Adult English as a Second Language (ESL) goes beyond providing immigrant and refugee adults the English language instruction necessary for social, educational, and economic integration in the United States; these programs support learners in pursuing further education, improving employment opportunities, and integrating in their communities. Despite these benefits, enrollment rates remain disproportionately low relative to the need. Tens of millions of adults nationwide report that they are still developing English proficiency, yet only a fraction access adult ESL services (Heller & Slungaard Mumma, 2024).

The Wisconsin Technical College System (WTCS) provides the majority of state-funded adult ESL instruction and consistently outperforms national averages in skill gains, employment outcomes, and credential attainment among learners. Given the importance of these programs to the state's workforce development and community integration efforts, understanding enrollment trends within WTCS is essential for sustaining their impact. Such trends can reveal inequities in access among specific geographic or demographic groups. This is especially relevant for rural learners, who may face compounded barriers related to transportation, broadband, and digital access and skills.

The COVID-19 pandemic in 2020 led to a rapid expansion of online and hybrid instructional modalities across WTCS adult ESL programs. While these modalities have the potential to mitigate geographic barriers and increase flexibility for learners, their actual impact on rural access has not been systematically measured. Research on adult ESL often examines national enrollment trends or larger urban programs, but there is limited empirical evidence—particularly using enrollment data—on how the introduction of online and hybrid course modalities has affected enrollment among rural learners within a state technical college system. Local implementation mirrored this statewide pivot—for example, Milwaukee Area Technical College publicly announced a mixed in-person/online approach in August 2020 and later moved most services online in November 2020; Northcentral Technical College

likewise planned a limited on-campus return while adjusting services in mid-2020 (Milwaukee Area Technical College, 2020a, 2020b; Northcentral Technical College, 2020a, 2020b). However, the impacts of these institution-level decisions on adult ESL enrollment have not been systematically examined within WTCS.

Purpose

The purpose of this study is to examine enrollment trends in adult English as a Second Language (ESL) courses across the six participating colleges within the Wisconsin Technical College System (WTCS) from 2014–2024, with particular emphasis on the post-2020 expansion of online and hybrid instructional modalities. Through quantitative analysis of enrollment and demographic data—complemented by qualitative insights from program faculty and staff—the study aims to assess whether online and hybrid modalities have measurably increased access for rural learners and to identify persistent access barriers and emerging opportunities in the delivery of adult ESL instruction at participating colleges. This research is grounded in the belief that equitable access to high-quality ESL programming is critical not only for individual learner success, but also for Wisconsin's broader workforce, civic, and community development goals. This study is guided by the following research questions:

1. What are the enrollment trends in adult ESL classes within Wisconsin Technical Colleges from 2014–2024, and how have learner demographics shifted during this period?

2. To what extent has the post-2020 expansion of online and hybrid ESL courses expanded access for rural learners, as reflected in enrollment patterns and geographic distribution (measured via RUCA classification using learner ZIP codes)?

3. What are the demographic correlates (age, ethnicity, education, employment) of modality participation (in-person, online, hybrid) among adult ESL learners during this period?

4. What challenges and opportunities do ESL staff identify regarding access to adult ESL courses for rural–urban learners?

Significance

This research is both timely and policy-relevant. As Wisconsin's workforce and communities become increasingly linguistically diverse, the ability of the technical college system to provide accessible, efficient, and effective ESL programming is more important than ever. The COVID-19 pandemic accelerated the adoption of online and hybrid learning modalities, but empirical evidence on their impact on rural participation and persistent access gaps remains limited. By providing robust, disaggregated data alongside staff perspectives, this study offers critical insight for state and institutional policymakers, WTCS administrators, and adult education advocates seeking to strengthen program reach, equity, and efficacy in a rapidly evolving educational landscape.

Scope

This study analyzes enrollment data from academic years 2014–2024 in adult ESL programs offered by the six participating colleges within the Wisconsin Technical College System (WTCS), with particular analytic emphasis on the post-pandemic period (2020–2024). The analysis is conducted at the population level for participating colleges, drawing on aggregated and disaggregated institutional datasets covering learner demographics, ZIP code of residence, and modality of instruction. Rurality is operationalized using the Rural–Urban Commuting Area (RUCA) code system, with learner ZIP codes mapped to RUCA classifications (via learner ZIP code) to allow for precise spatial and access analyses. Qualitative findings are drawn from faculty and staff interviews at selected colleges, providing institutional context to complement the quantitative analysis. The dataset does not include non-credit community ESL programs offered outside the WTCS system, nor does it seek to evaluate instructional effectiveness at the classroom level.

To address this gap, the present study analyzes WTCS adult ESL enrollment from 2020 to 2024, disaggregated by learner ZIP code, modality, and demographic characteristics. Learner residence is classified using Rural–Urban Commuting Area (RUCA) codes (Urban 1–3; Large Rural 4–6; Small/Isolated

7–10), following the WWAMI RUCA framework and the USDA ERS ZIP-code approximation file to enable precise geographic comparisons (WWAMI Rural Health Research Center, n.d.; U.S. Department of Agriculture, Economic Research Service, 2020). The study examines longitudinal enrollment trends, assesses modality-related differences across rural and urban classifications, and tests associations with learner demographics using descriptive statistics, cross-tabulations, and chi-square analyses. Spatial mapping is used to visualize geographic patterns and shifts in "access zones" over time. This study aims to inform WTCS policy and program planning while contributing to broader discussions about rural access to adult ESL classes in the United States.

Literature Review

Theoretical Framework

I organize the present study around four analytic lenses—andragogy, Community of Inquiry (CoI), Diffusion of Innovations (DoI), and a targeted telehealth analogy. Each helps answer a different question: why flexible delivery matters for adults (andragogy), how online learning actually works when it works (CoI), where and when adoption spreads (DoI), and why distance-sensitive services often register their biggest gains outside urban cores (telehealth parallel). I use these lenses to interpret modality shifts from 2020–2024, with rurality defined via RUCA (ZIP-code approximation) (Urban 1–3; Large Rural 4–6; Small/Isolated 7–10) (see Methods; RUCA grouping table used throughout).

Andragogy

Knowles' andragogy posits six assumptions about adult learning: self-direction, the use of prior experience, readiness linked to social roles, problem-centered orientation, internal motivation, and a need for immediate applicability (Knowles, 1984; Knowles, Holton, & Swanson, 2015). In adult ESL, those assumptions translate into design constraints more than preferences: time, place, and relevance govern participation. In practice, adults enroll and persist when instruction fits the day they actually live—shift work, caregiving, transit, healthcare appointments. That has a methodological consequence here: I do

not treat modality as a cosmetic delivery choice. Instead, I treat online and hybrid formats as potential access enablers that allow pacing, replays, and asynchronous catch-up. It follows that if access expands, it should be most visible among learners for whom the old constraints were binding (e.g., longer travel distances, irregular shifts).

Community of Inquiry (CoI)

CoI makes a simple claim with operational consequences: sustained learning in online environments emerges at the intersection of teaching presence (design, facilitation, direction), social presence (trust, cohesion, voice), and cognitive presence (iterative meaning-making) (Garrison, Anderson, & Archer, 2000; Garrison, 2011). For adult ESL, that means two things. First, "online" only works when teaching presence is visible (structured modules, clear language targets, timely feedback), social presence is engineered rather than hoped for (small-group talk, peer scaffolds), and cognitive presence is scaffolded (prompts, revisions, language noticing). Second—and this matters for interpreting results—modality growth is necessary but not sufficient. If a college expands online sections without visible presence(s), enrollment may increase while persistence and learning do not. I therefore interpret participation gains through CoI rather than assuming that "more online" automatically implies "better outcomes."

Diffusion of Innovations (DoI)

DoI explains why adoption is uneven. People and organizations move from awareness to decision to implementation to confirmation, and they do so at different speeds. Movement depends on five perceived attributes: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). In this study, the "innovation" is the shift to online and hybrid ESL—both for programs (design, scheduling, staffing) and for learners (devices, data, home study space). Relative advantage is strongest in low-density areas (less travel). Compatibility tracks with work and family schedules. Complexity appears as platform friction. Trialability shows up in pilots and short modules. Observability spreads via

peers (“my cousin finished an online class”). A diffusion-aligned outcome used in the Results is “First-Time Access,” defined as the first recorded enrollment from a ZIP code with no prior participation in any modality. Under DoI, new-access ZIPs should cluster first around early-adopting colleges and then spread outward—especially where relative advantage is high (e.g., RUCA 7–10).

Telehealth Parallels

The telehealth analogy is deliberately narrow: I borrow it for service diffusion under distance and time constraints, not for claims about health outcomes. When clinics went virtual, the largest marginal reach often appeared in rural and small-town catchments once basic infrastructure (broadband, devices, staff workflows) was in place. Adult ESL shares that trajectory. Programs that moved placement and instruction online could reach ZIPs where weekly travel to campus had been prohibitive. The analogy clarifies two expectations I carry into the analyses: (a) geographic reach should expand first where baseline access was thin, and (b) the curve is mediated by infrastructure and readiness (hotspots where device lending, multilingual onboarding, or instructor training came early; cold spots where none of that existed). I use this analogy to interpret patterns, not to import external data.

Measurement and Interpretation

These frameworks are not wallpaper; they guide how I read the patterns in the data. From andragogy, I treat flexibility as an access condition rather than a convenience. CoI reminds me that growth in online sections signals opportunity but not automatic success. DoI directs attention to where change starts and how it spreads, so I watch RUCA-by-modality patterns across 2020–2024 and note “first-time access” ZIPs—places with a first recorded enrollment after 2020. The telehealth parallel keeps the focus on distance and infrastructure, which often matter most outside urban cores. Throughout, rurality is described using the USDA RUCA ZIP crosswalk, with groups aggregated to Urban (1–3), Large Rural (4–6), and Small/Isolated (7–10) for readability (USDA ERS, 2024a, 2024b).

Review of Related Literature

Adult English as a Second Language (ESL) programs play a crucial role in the integration of immigrant and refugee adults in the United States. Beyond English language instruction, these programs enable learners to pursue further education, find better employment, and integrate into their communities (Barbara Bush Foundation, 2021; COABE, 2022; U.S. Department of Education, 2022; WTCS, 2024). Tens of millions of adults across the United States report speaking English less than 'very well'; in Wisconsin, that number exceeds 142,000 (Heller & Slungaard Mumma, 2024; IES, 2025; ProLiteracy, 2022; WTCS, 2024). Yet despite these numbers, only a fraction of those who could benefit from these programs actually enroll. Recent research indicates that as few as 10% of eligible adults access adult education programs in the U.S. (Barbara Bush Foundation, 2021; COABE, 2022; LINCS, 2022; Pickard, 2022; ProLiteracy, 2022).

Tracking and analyzing longitudinal enrollment data for adult ESL classes is therefore vital, as it can suggest how effectively these programs are reaching the population in need—informing decisions regarding policy, instructional planning, and the allocation of resources. Declining or disproportionate enrollment, for example, can indicate unmet demand or access issues, which is particularly important for vulnerable and disadvantaged groups who may otherwise "slip through the cracks" (Belzer et al., 2022; Heller & Slungaard Mumma, 2024; LINCS, 2022; National Skills Coalition, 2020; WTCS, 2024). National data now suggest that despite an increase of over 40% in the adult ML population from 2000–2021, federally funded ESL participation has declined by 60%, with program reach falling to less than 2% of the potential target population in recent years (Heller & Slungaard Mumma, 2024).

In Wisconsin, the vast majority of state-funded adult ESL instruction is delivered via the Wisconsin Technical College System (Konruff, 2023; ProLiteracy, 2022; WTCS, 2024). WTCS's adult education programs indicate high-performance outcomes relative to national benchmarks; for example, Wisconsin exceeds national averages in adult learner skill gains, employment, and credential attainment

(Heller & Slungaard Mumma, 2024; IES, 2025; Minnesota NRS, 2021; WTCS, 2024). Given the impact of these programs on the state, understanding enrollment trends in WTCS adult ESL classes is particularly significant. If fewer students enroll over time, the broader benefits of adult ESL programming (from workplace readiness to community integration) risk being diminished (Barbara Bush Foundation, 2021; COABE, 2022; ProLiteracy, 2022; WTCS, 2024). Furthermore, these trends can shed light on structural challenges and opportunities. For example, are declines in enrollment driven by demographic shifts, economic conditions, immigration policies, access issues, or program limitations? Are certain regions (urban vs. rural) or learner populations underserved, and how have online and hybrid modalities affected access, especially after the COVID-19 pandemic?

By exploring these questions in both a national and regional context, this literature review establishes why examining adult ESL enrollment trends and the impact of new course modalities, especially in Wisconsin technical colleges, is an important and worthwhile endeavor. The review first examines enrollment trends at the national level (2010–present), then narrows in focus to Wisconsin, where learner demographics and specific issues of access and modality are explored. Finally, gaps in the existing literature are identified to emphasize why the present study is needed and how it contributes new insights.

National Trends

National studies reveal a steady, long-term decline in adult ESL enrollments across the United States over the past two decades (COABE, 2022; Heller & Slungaard Mumma, 2024; Pickard, 2022; ProLiteracy, 2022; U.S. Department of Education, 2022; WTCS, 2024). After peaking in the late 1990s, participation in federally funded adult education programs—including ESL, Adult Basic Education, and Adult Secondary Education—has decreased sharply and consistently (Barbara Bush Foundation, 2021; Heller & Slungaard Mumma, 2024; IES, 2025; NMHED, 2021; U.S. Department of Education, 2022). In 2000, over 2.6 million adults were enrolled in U.S. adult education classes; by 2021, enrollment had

fallen to under 900,000, a 65% decline in overall adult education participation, with ESL participation specifically declining by about 60% (COABE, 2022; Heller & Slungaard Mumma, 2024; IES, 2025; ProLiteracy, 2022). This means that despite the adult ML population growing by over 40% nationally during this period, only about 2% of potential learners are now being served (Heller & Slungaard Mumma, 2024). These declines have significantly outpaced the reduction in the U.S. adult population without a high school diploma, indicating a widening gap between community need and program reach (Barbara Bush Foundation, 2021; Heller & Slungaard Mumma, 2024; National Skills Coalition, 2020; ProLiteracy, 2022; Vanek, 2020).

These downturns predate the COVID-19 pandemic and reflect long-term trends and structural challenges (Heller & Slungaard Mumma, 2024; NMHED, 2021; Pickard, 2022; ProLiteracy, 2022). While the pandemic in 2020–2021 undoubtedly impacted attendance, with many programs temporarily closed or operating remotely, the overall downward trend in adult ESL and ABE enrollment started in the mid-90s and accelerated after 2001 (IES, 2025; LINCS, 2022; Pickard, 2022; U.S. Department of Education, 2022). Data from the National Reporting System and federal reports confirm that since standardized reporting began in 2000–2001, federally funded adult ESL enrollments have shrunk by about half, with only brief and modest upticks (COABE, 2022; Malas, 2024; Minnesota NRS, 2021; Pickard, 2022). By 2019–2020, national adult ESL enrollment stood at roughly 570,000, down from over 1.1 million two decades earlier (Pickard, 2022). The COVID-19 outbreak then drove a further dip; some estimates indicate that adult ESL participation fell by an additional 20% during 2020–2021 alone, yet analysts agree that pandemic-era losses account for only a modest portion of the long-term collapse (Belzer et al., 2022; COABE, 2022; Heller & Slungaard Mumma, 2024).

Researchers point to an interplay of factors that have led to these declines, including years of underfunding, rising per-pupil costs, and shifting policy accountability measures (Barbara Bush Foundation, 2021; COABE, 2022; Heller & Slungaard Mumma, 2024; ProLiteracy, 2022; U.S. Department

of Education, 2022). Federal and state funding for adult education has remained flat or declined in real terms for decades, resulting in less program capacity, fewer class offerings, and increased staff turnover (Barbara Bush Foundation, 2021; Heller & Slungaard Mumma, 2024; WTCS, 2024). For example, Heller and Slungaard Mumma (2024) point out that while per-student costs have risen by 85% since 2000, overall funding has dropped by 15–20% when adjusted for inflation, reducing the system's reach. With dwindling resources, programs have been forced to reduce class offerings and other services, especially in rural or high-need communities (COABE, 2022; Pickard, 2022; WTCS, 2024). Simultaneously, the introduction of stricter performance accountability and data reporting measures (i.e., the National Reporting System in 1998 and Workforce Innovation and Opportunity Act requirements in 2016) has led many programs to prioritize learners who can make faster skill gains, potentially excluding those with the most significant barriers (Heller & Slungaard Mumma, 2024; IES, 2025; LINCS, 2022; Pickard, 2022).

Other factors frequently mentioned by researchers include changing immigration patterns, labor market dynamics, and demographic shifts. During periods of low unemployment, for example, fewer adults seek out education programs, or cannot attend classes while working multiple jobs (COABE, 2022; Heller & Slungaard Mumma, 2024; WTCS, 2024). State and national data suggest that a tight labor market in the late 2010s coincided with a drop in adult education enrollment, as potential students chose work over school (Malas, 2024; Minnesota NRS, 2021; WTCS, 2024). On the other hand, immigration policy changes, such as the expansion of the "public charge" rule under the Trump administration, have been linked to declines among Hispanic, low-income, and students of color in some contexts due to fear or confusion regarding participation in public programs (Eckert, 2021).

A recent study by Eckert (2021) offers a systematic quantitative analysis of how changes to the public charge rule influenced enrollment trends in adult ESL classes in the United States. After analyzing enrollment data from all 116 California community colleges from 2015–2019, Eckert found no statistically significant "chilling effect" on overall adult ESL participation following the federal expansion of the

"public charge" rule. However, the study did reveal significant enrollment declines among Hispanic, low-income, and students of color, populations most likely to experience fear and confusion regarding public benefits as a result of policy changes. This suggests that shifts in immigration policy can indirectly depress participation in state-funded ESL programs for vulnerable groups of learners. These findings emphasize the need for subtle, data-driven research on the intersection of immigration policy and adult education access.

Broader demographic changes also shape program reach. While the number of adults without a high school diploma has decreased (from 18.4% to 10.6% of the adult population since 2000), the adult ML population has surged (now over 23 million), making ESL increasingly central to adult education (Heller & Slungaard Mumma, 2024; Malas, 2024). Despite an ever-growing need, research highlights that the majority of eligible LEP adults still do not enroll in any formal ESL program (Barbara Bush Foundation, 2021; Pickard, 2022). Some of this non-participation likely reflects substitution toward low-cost, self-paced options (e.g., mobile apps, online courses, YouTube channels), which can meet entry-level needs and raise the bar for programs to demonstrate a clear relative advantage for busy adults. This persistent "service gap" shows up in routine signals—waitlists, capped sections, and programs reporting that demand exceeds funded seats—especially in urban and high-immigration states such as California and Texas (Gonzalez, 2007; Malas, 2024; Raufman et al., 2019).

Compounding these issues, the COVID-19 pandemic acted as both an accelerant and a disruptor, forcing a rapid shift to online and hybrid delivery and exposing new inequities related to digital access and skills (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024). National surveys and state-level data indicate that while some learners benefited from expanded remote offerings, many others were left out due to lack of devices, broadband, or digital literacy, and programs struggled to support the most vulnerable students (Barbara Bush Foundation, 2021; LINCS, 2022; ProLiteracy, 2022; WTCS, 2024).

In sum, national enrollment trends since 2010 suggest a persistent and accelerating erosion of adult ESL participation, driven by funding and policy constraints, changing population needs, economic cycles, and more recently, the structural disruption of the COVID-19 pandemic. Despite these challenges, the need for adult ESL remains high and growing, with states and programs now serving a smaller and often more complex learner population, but often unable to meet total demand (Barbara Bush Foundation, 2021; Heller & Slungaard Mumma, 2024; Malas, 2024; ProLiteracy, 2022). This national context sets the stage for examining Wisconsin's trends: to what extent do these broad patterns hold in the Midwest, and what unique local dynamics are at play (Konruff, 2023; ProLiteracy, 2022; WTCS, 2024)?

Wisconsin Trends

Recent program year data emphasize both the scale of need and the achievements of Wisconsin's AEFLA-funded adult education system. As of 2023–24, over 354,000 adults in Wisconsin lacked a high school diploma, and more than 142,000 adults reported speaking English less than 'well', figures that have remained steady in recent years (WTCS, 2024). Nationally, immigrants now comprise nearly half of adults without a high school diploma, with the adult LEP population continuing to rise despite declines in overall enrollment (Heller & Slungaard Mumma, 2024). Wisconsin's AEFLA programs have not only buffered against the most severe national declines, but have also reported outcome measures consistently above national benchmarks, including higher rates of measurable skill gains, credential attainment, and post-exit employment (Heller & Slungaard Mumma, 2024; WTCS, 2024).

One notable trend, in particular, is the surge in multilingual learners with low-beginner literacy levels. In the academic year 2023–24, 6,399 participants accessed ESL services in Wisconsin, with 40% entering at the lowest Beginning Literacy level, many of whom have limited formal education even in their first language (WTCS, 2024). At the same time, there is a growing cohort of internationally trained professionals among ML participants; about one in four MLs had college credits or credentials at entry,

up from just 8% a decade prior, echoing the broader national shift towards a more heterogeneous ML student population (COABE, 2022; Heller & Slungaard Mumma, 2024; Raufman et al., 2019; WTCS, 2024). This dual trend mirrors demographic shifts observed across the Midwest and nationwide: more skilled immigrants and refugees with interrupted schooling, both requiring highly differentiated instruction (Malas, 2024; ProLiteracy, 2022; WTCS, 2024).

Wisconsin's AEFLA programs have consistently outperformed national averages on federal WIOA indicators. During the academic year 2023–24, Wisconsin reported a measurable skill gain rate of 62.3% (national average: 43.1%), a credential attainment rate of 65.9% (national average: 25.8%), and higher employment and earnings outcomes than national benchmarks (WTCS, 2024). These results place Wisconsin among the national leaders in AEFLA outcomes, even while serving an increasingly diverse and high-need learner population. This is particularly significant given the simultaneous influx of beginning literacy students and internationally trained professionals.

Against this backdrop of strong outcomes amid rising complexity, the introduction and rapid implementation of online and hybrid modalities—accelerated by the COVID-19 pandemic—has been particularly important for expanding access to rural and working-adult populations since 2020. State data suggest that digital enrollments have grown most rapidly in rural districts, directly expanding access for learners facing significant travel or scheduling barriers (Belzer et al., 2022; JSI, 2021; WTCS, 2024). However, access issues remain: limited broadband and digital access and skills continue to be barriers, and geographic disparities remain pronounced (JSI, 2021; WTCS, 2024).

The growth in enrollment, paired with growing complexity of learner needs, has not been matched by an increase in funding. To the contrary, federal AEFLA spending per learner has decreased, especially as increasing numbers of learners enter at the lowest literacy levels, requiring the most instructional resources (Heller & Slungaard Mumma, 2024; WTCS, 2024).

Within the broader context of the Midwest, similar trends are observed in neighboring states. Minnesota and Illinois, for example, have experienced similar—or steeper—declines in adult ESL enrollments throughout the 2010s. Some metro-area programs have grown in response to influxes of refugees, while rural areas often struggle to maintain consistent class offerings (Barbara Bush Foundation, 2021; Belzer et al., 2022; JSI, 2021; Minnesota NRS, 2021). Rural Wisconsin, in particular, faces the challenge of serving small, dispersed populations of English learners who may be separated by long travel distances, with limited resources or public transportation (JSI, 2021; ProLiteracy, 2022; WTCS, 2024).

Taken together, Wisconsin's technical college system—characterized by its decentralized structure, integration of adult ESL classes with workforce training, and a strong rural-urban outreach infrastructure—provides a unique context within the Midwest for understanding both the resilience and ongoing vulnerability of adult ESL programs (COABE, 2022; Konruff, 2023; WTCS, 2024). These patterns emphasize the importance of both system-level adaptability and targeted policy interventions to address geographic and demographic disparities in program access and outcomes.

Demographic Shifts

The demographics of adult ESL learners in technical and community college programs have shifted dramatically over the past decade, reflecting broader trends in immigration, labor markets, and the changing landscape of adult education. National and state studies consistently report an increasingly divided ML learner population: on one end, immigrants with a college degree or prior credits, including internationally trained professionals seeking licensure or employment, now represent a growing proportion of adult ESL enrollees; on the other, increasing numbers of learners with little or no formal schooling, many of whom are refugees or come from countries with disrupted education systems (COABE, 2022; Heller & Slungaard Mumma, 2024; Malas, 2024; Raufman et al., 2019; WTCS, 2024).

In the Wisconsin Technical College System, the proportion of ESL students entering programs with a college degree or postsecondary credentials increased from 8% in 2012 to over 21% by 2022, a trend found in other states and attributed to evolving U.S. immigration policy and workforce needs (ProLiteracy, 2022; WTCS, 2024). At the same time, about 40% of all adult MLs now enter at the lowest proficiency level (i.e., “Beginning ESL Literacy”), with many who are still developing literacy in their first language. Between 2013 and 2022, the proportion of WTCS MLs who already held a college degree at enrollment increased from 8.3% to 21.6% (Konruff, 2023). Over roughly the same period, the share of entrants placing into ‘Beginning ESL Literacy’ rose from about 28% to approximately 40%, based on unpublished WTCS ELL data (B. Konruff, personal communication, March 2023). The simultaneous growth of these two groups, on opposing ends of proficiency, means that today’s adult ESL programs must support both advanced learners with specific professional or academic goals and beginners who require basic literacy instruction (COABE, 2022; JSI, 2021; Malas, 2024; WTCS, 2024).

Age and employment status further complicate this landscape. While adult MLs have always constituted a wide age range, recent research suggests growth at both ends: older adults (50+) returning to ESL classes for community engagement or personal goals, and younger adults (18–24) who are typically recent high school graduates or late-arriving immigrants (Minnesota NRS, 2021; ProLiteracy, 2022; WTCS, 2024). National and state data suggest an increase in the proportion of employed ESL students, often requiring learners to balance full-time work with study, which impacts modality preferences and program retention (Belzer et al., 2022; Heller & Slungaard Mumma, 2024; JSI, 2021; Malas, 2024; WTCS, 2024).

Ethnic and linguistic diversity within adult ESL programs is increasing nationwide and in Wisconsin. The majority of adult ML learners are Hispanic/Latinx, but substantial numbers of Asian, African, Middle Eastern, and Eastern European immigrants and refugees are now present in many programs, especially in the Midwest and rural areas (JSI, 2021; ProLiteracy, 2022; Shiffman, 2019; WTCS,

2024). In Wisconsin, this includes Hmong, Somali, Afghan, Congolese, Venezuelan, and Ukrainian populations, further diversifying classroom needs and requiring more cultural competency and multilingual staff (JSI, 2021; Minnesota NRS, 2021; WTCS, 2024).

Gender patterns, while still skewing female for many daytime programs, are shifting as the availability of online and hybrid modalities allows more flexibility for all genders. Some local and national reports suggest that mothers of young children, in particular, benefited from remote options, while others found it harder to participate without access to childcare at home (Belzer et al., 2022; LINCS, 2022; ProLiteracy, 2022).

These shifts are reflected in course and program design. Many colleges, including those in the WTCS, have developed specialized "English for Professionals" courses or contextualized ESL pathways for specific career fields, while also expanding basic literacy and multi-level instruction to support beginners with limited prior formal education (COABE, 2022; Raufman et al., 2019; WTCS, 2024). The result is a more complex, but also more responsive, adult ESL system.

Both at national and state levels, adult ESL programs now serve a broader and more complex array of learners than at any time in recent history. This reality emphasizes the importance and need for differentiated instruction, flexible course modality options, and targeted support services and outreach—an imperative further heightened by the increased adoption of online and hybrid learning in the post-pandemic era (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024).

Access Issues

Geographic, structural, and social barriers play a significant role in access to adult ESL classes, limiting participation even in areas with robust program offerings. Shiffman (2019) suggested that access to these classes varies dramatically between urban and rural areas, as well as across states and regions (See also, JSI, 2021; Malas, 2024; ProPublica, 2022; WTCS, 2024). Urban (1–3) centers typically offer multiple ESL programs through technical colleges, community organizations, and libraries; however,

urban learners still face hurdles such as long waitlists, transportation issues, conflicting work schedules, and childcare responsibilities that can hinder consistent attendance (Belzer et al., 2022; LINCS, 2022; Malas, 2024; ProLiteracy, 2022; WTCS, 2024). In major cities, for example, popular ESL classes may have lengthy waitlists, especially for higher-level courses or those that provide on-site childcare, making it difficult for learners to access services in a timely manner (COABE, 2022; WTCS, 2024).

Rural and small-town communities face even greater barriers due to limited or nonexistent local program availability. National investigations reveal that large swaths of rural America lack accessible adult education classes, leaving would-be learners in many counties with no nearby ESL instruction or basic literacy programs at all (JSI, 2021; ProPublica, 2022). In Wisconsin, rural technical college districts often span multiple counties with dispersed populations, meaning that even when ESL classes are available, potential students may need to travel 30 miles or more—an insurmountable barrier for many low-income adults, especially those balancing work and family obligations (Belzer et al., 2022; JSI, 2021; WTCS, 2024). The scarcity of public transportation in rural areas compounds these challenges, while small class sizes in rural communities can make it difficult to sustain regular course offerings (JSI, 2021; ProLiteracy, 2022; WTCS, 2024). Some rural learners also face unique social barriers, including feelings of isolation as the only non-native English speaker in their community or reluctance to attend public classes due to fear of stigma (JSI, 2021; Shiffman, 2019; WTCS, 2024).

This phenomenon is part of a broader pattern of “education deserts,” as described by Hillman (2016), which are regions where local postsecondary options are limited or entirely absent. His national analysis emphasizes that proximity to a college—especially a broad-access institution like a technical college or regional university—is a key factor in educational participation, with most U.S. undergraduates attending college within 50 miles of home. In rural commuting zones, where options are often scarce or nonexistent, distance becomes a primary barrier, further compounding the challenges faced by adult learners seeking ESL instruction. The analysis also highlights that many traditional data sources

undercount rural educational access points, overlooking the importance of branch campuses and "additional locations" (such as dual-enrollment programs in K–12 schools or community agencies) that are vital for local access (Hillman, 2016). At the same time, the growing availability of self-directed digital resources (e.g., Duolingo, Khan Academy, YouTube) provides alternative entry points for language learning, though these tools often lack the structured progression, credentials, and supports that formal ESL programs offer.

Structural barriers hindering access to adult ESL instruction extend further than geography. National research consistently identifies work schedules, family responsibilities, transportation, childcare, and cost as major factors preventing adults MLs from enrolling in ESL programs (Center for Applied Linguistics, 2010; Malas, 2024; ProLiteracy, 2022; WTCS, 2024). Even when classes are free, indirect costs and logistical burdens can deter participation, particularly for low-income or shift-working adults (Barbara Bush Foundation, 2021; LINCS, 2022; Malas, 2024). During the COVID-19 pandemic, digital divides emerged as a new and urgent barrier: learners without reliable internet, devices, or adequate digital skills were unable to participate in remote or hybrid courses (Barbara Bush Foundation, 2021; JSI, 2021; Malas, 2024; ProLiteracy, 2022; WTCS, 2024). While some programs, including those in Wisconsin, responded by loaning out Wi-Fi hotspots and laptops or providing digital literacy support, gaps persist, especially in rural and low-income communities (JSI, 2021; WTCS, 2024).

Lastly, the impact of immigration policy and public perception cannot be ignored. For example, Eckert (2021) found that California community colleges saw enrollment declines among Hispanic, immigrant, and low-income students during the period of expanded "public charge" rules. More broadly, analysts and advocates have argued that highly visible enforcement actions can contribute to a chilling effect on participation in public programs among some immigrant communities; this underscores the importance of trust-building outreach alongside program delivery (Eckert, 2021).

To address access barriers, many states have developed creative outreach and delivery models. The use of community-based organization partnerships and mobile learning labs, such as library-based ESL classes or “classroom vans” visiting remote areas, are cited as promising strategies in both national and Wisconsin-specific research (JSI, 2021; ProLiteracy, 2022; Vanek, 2020; WTCS, 2024). In Wisconsin, technical colleges increasingly partner with libraries, workforce centers, and local employers to bring instruction closer to learners, especially in rural or underserved areas (Konruff, 2023; WTCS, 2024). The growth of online and hybrid modalities since 2020, discussed in the following section, has further expanded the toolkit for overcoming geographic barriers, but only when digital access and skills supports are adequately provided (Belzer et al., 2022; JSI, 2021; WTCS, 2024).

In sum, persistent barriers—geographic, structural, and social—continue to limit adult ESL enrollment and access nationwide, especially among rural populations and those with the greatest needs. Addressing these barriers will require continued investment in flexible delivery models, digital inclusion, and culturally responsive outreach, as well as policy reforms that reduce participation risks for immigrant learners (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024).

New Modalities: Impacts and Outcomes

The rapid expansion of online and hybrid learning since 2020 represents one of the most significant transformations in adult ESL education in recent memory. The COVID-19 pandemic served as an accelerant, forcing programs to adopt remote instruction almost overnight and driving the widespread adoption of digital learning platforms, particularly among technical and community colleges (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024). National surveys report that by mid-2020, over 97% of adult education program administrators had transitioned at least some services to distance learning, a dramatic increase from pre-pandemic practices (Belzer et al., 2022; Vanek, 2020).

Early evidence suggests that online and hybrid modalities have substantially expanded access for certain groups of learners, notably those who previously struggled to attend in-person classes due to

work schedules, transportation, or family obligations (Belzer et al., 2022; JSI, 2021; Malas, 2024; ProLiteracy, 2022; WTCS, 2024). This flexibility has proven especially beneficial for rural learners and working adults, who can now participate without long commutes or significant disruptions to their employment and family routines (JSI, 2021; Malas, 2024; WTCS, 2024).

One notable example of these trends is provided by Fox Valley Technical College, a WTCS institution, as documented in the JSI (2021) report. Before the shift to remote modalities, Fox Valley staff described difficulties in reaching rural learners, especially for those working split shifts or residing in sparsely populated areas where in-person classes were rarely feasible and commuting distances can be long. With the implementation of remote ESL instruction, staff reported being able to serve "more rural ML students and in areas that it could not serve before," directly expanding the college's geographic reach (JSI, 2021, p. 10). While the report does not present enrollment statistics for before and after the transition, it does note that staff attributed a 75% retention rate, credited in part to technology-supported peer mentoring and flexible communication tools. This case highlights the potential for remote and hybrid modalities to overcome the persistent barriers of distance, scheduling, and instructor availability that have historically limited rural participation in adult ESL. At the same time, Fox Valley's experience emphasizes the continued need for robust digital infrastructure and support to ensure equitable access for all learners.

Some programs reported increased enrollment and improved attendance among learners able to join remotely, with instructors noting that online learning reduced typical barriers such as weather, childcare, and transportation (Belzer et al., 2022; ProLiteracy, 2022). The convenience and privacy of remote learning attracted new participants, including adults who may have felt stigmatized or anxious about attending in-person classes (Belzer et al., 2022; LINCS, 2022).

At the same time, the transition also laid bare stark digital divides. Many learners, especially those in rural or low-income communities, lacked the devices, internet access, or digital skills necessary

to engage fully in remote courses (Barbara Bush Foundation, 2021; JSI, 2021; Malas, 2024; ProLiteracy, 2022; WTCS, 2024). National and Wisconsin-specific studies note that learners without reliable broadband or sufficient digital skills were often excluded from online classes, exacerbating existing equity gaps (Belzer et al., 2022; JSI, 2021; ProLiteracy, 2022; WTCS, 2024). To counter this, many programs, including Wisconsin's technical colleges, implemented creative solutions such as lending laptops and Wi-Fi hotspots, incorporating digital skills training into the ESL curriculum, and providing one-on-one tech support to both students and faculty (Belzer et al., 2022; JSI, 2021; ProLiteracy, 2022; WTCS, 2024).

Learning Outcomes and Retention in Online and Hybrid Modalities

Research on online and hybrid learning in postsecondary and adult education has yielded a consistent pattern: learning outcomes are generally comparable to, and sometimes stronger than, those achieved in traditional classrooms, while learner retention presents greater challenges. In a widely cited U.S. Department of Education meta-analysis, Means et al. (2013) found that students in online and blended courses performed modestly better than peers in face-to-face instruction, with blended learning demonstrating the most consistent gains. The authors linked these effects not to modality alone but to specific instructional practices observed in the studies they reviewed—particularly the use of supplemental learning resources and repeated opportunities for engagement with content. However, the authors cautioned that the quality of instructional design mediated these effects, suggesting that modality should not be considered in isolation from pedagogy.

Studies of online higher education similarly indicate that outcomes are shaped by learner self-regulation. Broadbent and Fuller-Tyszkiewicz (2018) reported that time management, motivation, and strategy use were strong predictors of academic success in online university courses. This finding emphasizes that online learning can match or exceed face-to-face outcomes, but only when students receive adequate support to manage the demands of digital instruction.

Evidence from community colleges provides a more complex picture, especially in relation to learner persistence. Xu and Jaggars (2014) analyzed large-scale course data and found that withdrawal and failure rates were significantly higher in online courses compared to face-to-face, particularly for academically underprepared, male, and minority students. Johnson and Mejia (2014) corroborated this finding in the California community college system, noting that online courses generally had lower completion rates. Yet they also found that students who persisted in online courses sometimes accumulated credits more efficiently, suggesting that successful adaptation to online learning can yield longer-term benefits. Together, these studies indicate that while online access can expand educational opportunities, it may simultaneously exacerbate inequities in persistence unless targeted supports are in place.

Direct evidence from adult education programs emphasizes the same balance of opportunity and risk. Murphy et al. (2019) found that online and hybrid models in adult basic education and workforce programs reduced barriers such as transportation, childcare, and work conflicts, thereby supporting continued participation. Nevertheless, sustained retention required deliberate supports, including consistent communication and coaching. Similarly, COABE (2022) and ProLiteracy (2022) reported that while adult ML and ABE learners benefited from the flexibility of digital programs, dropout risks were higher in fully online settings unless programs employed proactive outreach, scaffolding, and peer mentoring strategies. These findings highlight that access alone does not guarantee persistence in adult education contexts.

Broader engagement research supports this conclusion. Kahu et al. (2019) argued that student engagement in online and hybrid settings depends heavily on institutional support, instructor presence, and the cultivation of a sense of belonging. Although their study was situated in higher education, the emphasis on engagement structures has clear implications for adult education, where learners often balance complex life demands with academic goals.

In sum, the literature suggests that online and hybrid modalities can yield learning outcomes equal to or better than traditional classrooms. However, the challenge lies in retention, particularly in fully online programs. Hybrid models appear to mitigate these risks by balancing flexibility with interpersonal connection. For both postsecondary and adult education, the evidence indicates that the success of online and hybrid learning depends less on the modality itself and more on the extent to which institutions design courses with scaffolding, instructor interaction, and support systems that sustain engagement over time.

Learner Preference for In-Person, Online, and Hybrid Modalities

Research on learner preferences for instructional modality suggests consistent patterns across adult and postsecondary contexts: in-person learning remains the most widely favored, online formats are often valued for flexibility, and hybrid models are increasingly regarded as the most balanced option.

In a study involving adult ML learners, Reeve (2022) surveyed community-based students and found that a large majority (76%) preferred traditional classroom instruction, with only 15% favoring hybrid models and a small minority selecting fully online learning. Learners highlighted the value of in-person interaction for practicing communication skills and receiving immediate support, underscoring the centrality of human connection in language learning. Reports in adult ESL and ABE contexts echo this pattern, noting that learners frequently prefer in-person formats for the sense of community and accountability they provide, though many appreciate online options as a useful supplement when life circumstances disrupt attendance (COABE, 2022; LINCS, 2022; ProLiteracy, 2022).

Community college research reveals parallel trends. Xu and Jaggars (2014) observed that underprepared students, as well as those from minority backgrounds, were more likely to prefer face-to-face instruction, citing greater structure and immediate feedback. Johnson and Mejia (2014), in their analysis of California community colleges, found that students commonly chose online courses for

their flexibility, particularly when managing work and family responsibilities, but many still expressed an overall preference for in-person or blended formats.

Evidence from large-scale reviews further supports the appeal of hybrid learning. Means et al. (2013), in a meta-analysis of postsecondary and K–12 studies, reported that blended models not only yielded stronger learning outcomes but were also rated positively by students who appreciated the mix of autonomy and structure. Similarly, Murphy et al. (2019) found that adult learners valued online and hybrid formats for reducing barriers such as transportation and childcare, but they often expressed the greatest satisfaction with models that combined digital flexibility with periodic face-to-face contact.

Finally, broader engagement research suggests that preference is shaped less by modality alone than by the quality of the learning environment. Kahu et al. (2019) argued that learners are most satisfied with whichever modality fosters meaningful engagement, instructor presence, and a sense of belonging. For many students, hybrid learning emerged as the most effective way to balance flexibility with social connection.

Taken together, these studies indicate that in-person instruction remains the dominant preference for adult ML learners, while online formats are most appealing to those facing significant logistical barriers. Hybrid models appear to bridge these competing demands, offering both flexibility and interpersonal support. For adult education in particular, modality preferences reflect the tension between the convenience of online learning and the enduring importance of community and interaction for persistence and success.

The experience of Wisconsin mirrors these national trends. WTCS data suggest rapid growth in online ESL enrollments post-2020, with especially strong uptake among rural populations who previously faced significant travel or scheduling barriers (WTCS, 2024). Yet, equity issues remain: learners in areas with poor broadband or limited digital supports remain underserved, and technical challenges persist for both staff and students (JSI, 2021; Malas, 2024; WTCS, 2024). The consensus among practitioners and

researchers is that a learner-centered, flexible mix of in-person, online, and hybrid modalities will be necessary going forward to maximize access and equity (Belzer et al., 2022; JSI, 2021; WTCS, 2024).

Innovative practices developed during the pandemic, such as asynchronous learning materials, peer mentoring, and targeted digital resource support, have improved engagement and retention, but these advances require sustained investment in digital infrastructure and professional development (Belzer et al., 2022; Malas, 2024; WTCS, 2024). The experience of the past several years indicates that technology, when supported by robust program design and digital inclusion efforts, can significantly expand the reach of adult ESL, especially for rural and working adults. However, without continued attention to digital equity, modality choice may also reinforce existing barriers for the most marginalized learners (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024).

Methods

This study employed a comprehensive mixed-methods research design, integrating detailed quantitative analyses of historical enrollment data (2014–2024) and qualitative insights from interviews with ESL program stakeholders at the Wisconsin Technical College System (WTCS). This approach was chosen to address the persistent research gaps identified above and to provide robust evidence regarding both trends and the lived realities of policy, practice, and modality shifts in adult ESL education (Belzer et al., 2022; JSI, 2021; Malas, 2024; WTCS, 2024).

Quantitative

Quantitative enrollment data were obtained directly from the Institutional Research offices of the six colleges, each providing multi-year enrollment extracts disaggregated by academic year; modality (in-person, online, hybrid); learner demographics (age, gender, ethnicity, education, employment); and learner residence (ZIP code, 5-digit). Because reporting formats varied, variable names were standardized, categorical codes aligned to a common schema, and residence data recoded to RUCA codes (via learner ZIP code) using the USDA ZIP Approximation File. These harmonization steps followed

protocols recommended in recent multi-state research on adult ESL participation (Malas, 2024; Raufman et al., 2019; WTCS, 2024).

Data Cleaning and Preparation

All datasets were inventoried and checked for completeness. Variables were then standardized for comparability across colleges: modality was recoded to three categories (in-person, online, hybrid); learner residence was matched to RUCA codes (via learner ZIP code) and grouped into three tiers (Urban 1–3, Large Rural 4–6, Small/Isolated 7–10); and demographic categories (age, gender, ethnicity, education, employment) were aligned to a common coding scheme. Deduplication was performed to remove overlapping student records, and missing values were flagged and managed according to the procedures described in Table 1. Table 2 lists all variables considered in the analysis, with the harmonized codes applied across the six participating colleges. These steps followed best practices outlined in national adult education research (Belzer et al., 2022; Heller & Slungaard Mumma, 2024; WTCS, 2024).

Table 1

Data Cleaning and Harmonization Steps

Step	Description
Deduplication	Removed duplicate student records based on a unique student identifier and term–year combination.
Recoding	Standardized modality labels across datasets (e.g., “Distance” recoded to “Online”).
Missing data	Applied consistent codes for missing demographic values across colleges.
Audit trail	Documented all changes in logs.

Note. Uniform preprocessing across colleges and years: de-duplication, standardization of identifiers and term–year, and cross-college label harmonization.

Table 2

Variable Harmonization Summary

Raw Variable / Source	Harmonized Variable	Definition / Notes
Face-to-face; On-campus	In-person	Delivery in a classroom or physical site.
Distance; Remote; Virtual; Web; Online	Online	Delivery fully online (synchronous or asynchronous; no required on-site meetings).
Hybrid	Hybrid	Structured combination of in-person and online components.
Any	All modalities (aggregate)	Aggregate across in-person, online, and hybrid.
RUCA_1,2,3	Urban	Collapsed from RUCA codes 1–3.
RUCA_4,5,6	Large rural	Collapsed from RUCA codes 4–6.
RUCA_7,8,9,10	Small/Remote Rural	Collapsed from RUCA codes 7–10; source label “Small/Isolated.”
N_served	ZIPs served	Count of distinct ZIP codes served by the college.
Dist_mi	Median distance (mi)	Median miles from learners’ ZIPs to the nearest campus/site.
age_18_24	Age 18–24	Age group category.
age_25_34	Age 25–34	Age group category.
age_35_44	Age 35–44	Age group category.
age_45_plus	Age 45+	Age group category.
female	Female	Gender category.
male	Male	Gender category.
race_white	White	Race/ethnicity category.
race_black	Black	Race/ethnicity category.
race_hispanic	Hispanic	Race/ethnicity category.
race_asian	Asian	Race/ethnicity category.
race_other	Other race/ethnicity	Residual category aggregating all other responses.
Baseline	Baseline (2014–15)	Pre-period reference.

Raw Variable / Source	Harmonized Variable	Definition / Notes
Post2020	Post-2020	Analysis period covering 2020–2024.
Blended; Hybrid	Hybrid	Mix of in‑person and online meetings.

Note. Raw labels varied by college; representative examples are shown, and all were recoded to the three study-wide modality categories for comparability.

Geographic Classification and Rurality Coding

Rurality was operationalized using USDA RUCA codes assigned to each learner's ZIP code via the USDA ERS ZIP-RUCA crosswalk (WWAMI framework). I then collapsed the original ten RUCA categories into three analytically tractable groups: Urban (RUCA 1-3), Large Rural (4-6), and Small/Isolated Rural (7-10). I made this decision to balance both construct fidelity with the needs of the analyses. First, aggregating to three levels mitigates sparse cells in multi-year, cross-college crosstabs and chi-square tests, which stabilizes estimates and reduces the risk of unreliable inferences. Second, the categories preserve a substantively meaningful continuum that maps directly onto my research question about whether online and hybrid instructional modalities expand access for rural learners. RUCA codes were assigned once from the USDA ZIP approximation file and carried through all merges; when sample sizes allowed, I spot-checked patterns using the finer four-level and original ten-level RUCA schemes and observed the same directional results. Tables and figures therefore use the three-tier labels for readability, with the full RUCA definitions documented in the Appendix (U.S. Department of Agriculture, Economic Research Service, 2020; WWAMI Rural Health REsearch Center, n.d.).

Table 3

Rural–Urban Classification Scheme (RUCA-based)

RUCA Codes	Learner Group
1–3	Urban
4–6	Large Rural
7–10	Small/Isolated Rural

Note. RUCA = Rural–Urban Commuting Area. The original 10 RUCA codes were collapsed into a 3-tier learner-rurality classification for this study: Urban (RUCA 1–3), Large Rural (RUCA 4–6), and Small/Isolated Rural (RUCA 7–10).

RUCA coding of student ZIP codes to derive rurality classifications (e.g., urban = RUCA 1–3; rural = RUCA 4–10) is a well-established analytical technique for examining geographic access patterns. This method has been used extensively in fields such as telehealth, where patient ZIP codes are linked to RUCA designations to compare telehealth versus in-person service utilization (Lin et al., 2022; Warrier et al., 2024; Zullig et al., 2023). In digital health intervention research, RUCA classifications have similarly been applied to participants' addresses to analyze how program reach and engagement vary with rurality in web-based interventions (Danaher et al., 2007). Furthermore, social service program evaluations—such as those examining Supplemental Nutrition Assistance Program (SNAP) Employment and Training—have utilized RUCA-based analyses to assess participation patterns across rural and urban populations (United States Department of Agriculture, USDA, 2021).

Despite the application of this methodology in other fields, to my knowledge it has not been applied to multi-year enrollment data in adult English as a Second Language (ESL) programs or in technical college settings. In the field of education, rurality is often defined by institutional location or county—rather than by learner ZIP code—potentially masking important differences in access at the individual level (Provasnik et al., 2007). By combining learner-level RUCA classification with detailed modality coding (in-person, online, hybrid) across multiple years, this study adapts and extends a validated analytic approach into a new domain. It enables a more granular examination of pre- and

post-COVID-19 shifts in rural learner engagement with online and hybrid modalities than would be possible when relying on institution-level rurality measures.

Analytic Procedures

I used Pearson's chi-square tests to examine associations between categorical variables - modality (in-person, online, hybrid), rurality (RUCA tiers), and available learner demographic data - because these variables are nominal and my aim was to test patterns of association rather than fit explicit parametric regression models. Each chi-square test was paired with Cramér's V to quantify effect size and applied Monte Carlo or exact adjustments when expected cell counts were sparse; where multiple same-family tests were run, I controlled false discovery and reported effect sizes alongside p-values to avoid over-interpreting trivially small but statistically significant results. Analyses were conducted in Microsoft Excel (Version 16.84) and R (Version 4.5.1) with base functions (i.e., chisq.test); since all contingency tables had dimensions greater than 2x2, no continuity correction was applied, and Monte Carlo simulations were used when expected cell counts were sparse to obtain more reliable p-values. The decision to use chi-square aligns with the present study's cross-tabulation strategy for enrollment by modality, rurality, and demographics across years, which were summarized descriptively and then tested inferentially under the same framework.

As a complement to these categorical tests, I examined geographic reach by calculating learner-to-campus distances and summarizing them by modality for the post-2020 window. For colleges with usable ZIP × modality data (Madison, Milwaukee Area Technical College, and Northcentral), I calculated great-circle miles from each learner ZIP centroid to the nearest campus site offering ESL. Campus coordinates were taken from participating colleges' location lists. For the post-2020 window (AY 2020–21 to 2023–24), I summarized distances by modality using medians and interquartile ranges (IQR) to reduce the influence of outliers. Where distributional comparisons were warranted, I used Mann–Whitney U tests (reporting exact p values) and controlled false discovery for same-family tests.

Because distances are properties of ZIP locations, between-modality differences reflect which ZIPs each modality served during the window rather than changes in the underlying geography.

Qualitative

Participants and Recruitment

Staff connected to Wisconsin Technical College System (WTCS) adult ESL programming were recruited for semi-structured interviews, with participants selected to capture variation in institutional type, geographic location, and professional role - i.e., purposive sampling designed to obtain a variety of relevant perspectives at multiple levels within WTCS (Patton, 2015).

Data Collection

Semi-structured interviews were conducted via Microsoft Teams, following a protocol designed to elicit detailed accounts of enrollment trends, program delivery, access barriers, and institutional or policy responses. The semi-structured interview format allows for a balance between consistency and the flexibility to probe newly arising themes and ask follow-up questions that capture context and nuance (Kvale & Brinkmann, 2015). Interviews lasted 30–45 minutes, were audio-recorded with consent, and subsequently anonymized for analysis.

Interview Analysis

Audio recordings of interviews were transcribed and analyzed manually using Microsoft Word and Excel. I conducted coding and theme development as a single analyst, consistent with reflexive thematic analysis, which emphasizes themes generated from the researcher rather than inter-rater agreement (Braun & Clarke, 2006, 2019). Open coding was performed in Word using highlights and annotations. Codes were then transferred to an Excel matrix organized by transcript, excerpt, code, and emerging theme with columns for notes, decision/rationale, and a link to the source location to allow for systematic comparison. Emergent themes were constructed by clustering codes that were related conceptually; each was then given a concise name, short analytic description, inclusion/exclusion

criteria, and anchor excerpts. Themes were reviewed against the entire dataset for internal coherence and distinction, including checks for negative/disconfirming evidence, followed by iterative refinement (i.e., code merges/splits and boundary tests). Throughout the analysis I documented analytic decisions - including code definitions, merges and splits, and theme revisions - in brief memos to enhance coherence of the evolving account (Miles, Huberman, & Saldaña, 2014). Table 11 presents the final qualitative codebook with code names, definitions, and representative data-based examples.

Ethical Considerations

All study procedures were reviewed and approved by the University of Wisconsin–River Falls Institutional Review Board (IRB; IRB-FY2025-87). Data security, confidentiality, and informed consent protocols were strictly followed. No identifying information is reported in the thesis. Participation was voluntary and could be withdrawn at any time without penalty.

Methodological Limitations

Despite efforts to standardize data collection and analysis, several limitations remain. Variation in institutional data reporting limited comparability of some variables. Only six of sixteen WTCS colleges provided analyzable data, restricting the breadth of the quantitative analysis. In the qualitative phase, absence of member checking and single-coder analysis may limit the depth of interpretive validity, though this is mitigated by the robust audit trail and systematic documentation. The unique disruptions of the COVID-19 pandemic may affect the generalizability of some findings.

Results

RQ1. Enrollment Trends and Demographic Shifts

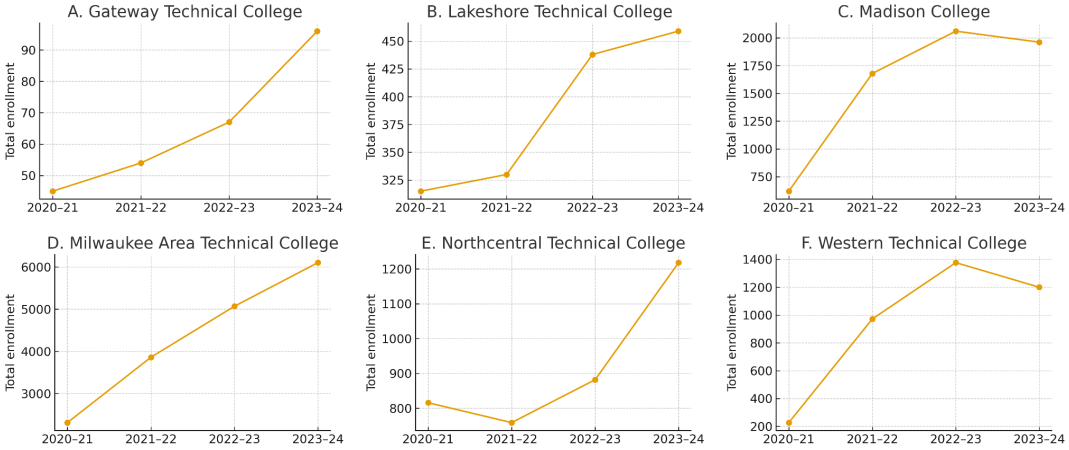
This question asks how ESL enrollment changed over time and what shifted in the learner population. I compiled yearly headcounts from six Wisconsin Technical College System colleges, standardized modality (in-person, online, hybrid), calculated cross-college percentages by year, and summarized demographics each year as 100% stacked shares. Year-over-year composition is shown as

percent shares in Table 2; because these ratios are stable across indicators, I summarize them briefly here without an additional figure.

Enrollment fell during the pandemic and then recovered. Gateway rose from 45 to 96 (2020–21 → 2023–24). Lakeshore rose from 315 to 459. Madison rose from 620 to 1,961. Milwaukee Area Technical College (MATC) rose from 2,311 to 6,104. Northcentral rose from 816 to 1,218. Western rose from 227 to 1,200.

Figure 1

Year × Total Enrollment (per college)



Modality across the six participating colleges shifted back toward in-person. In 2020–21 the combined sample was 33.1% in-person, 66.5% online, and 0.3% hybrid (N = 4,334). By 2023–24 it was 77.6% in-person, 15.6% online, and 6.8% hybrid (N = 11,038). Intermediate years follow the same path (2021–22: 45.9% / 42.6% / 11.5%; and 2022–23: 68.0% / 21.2% / 10.8%).

Figure 2

Modality Shares 2020–2024 (per college)

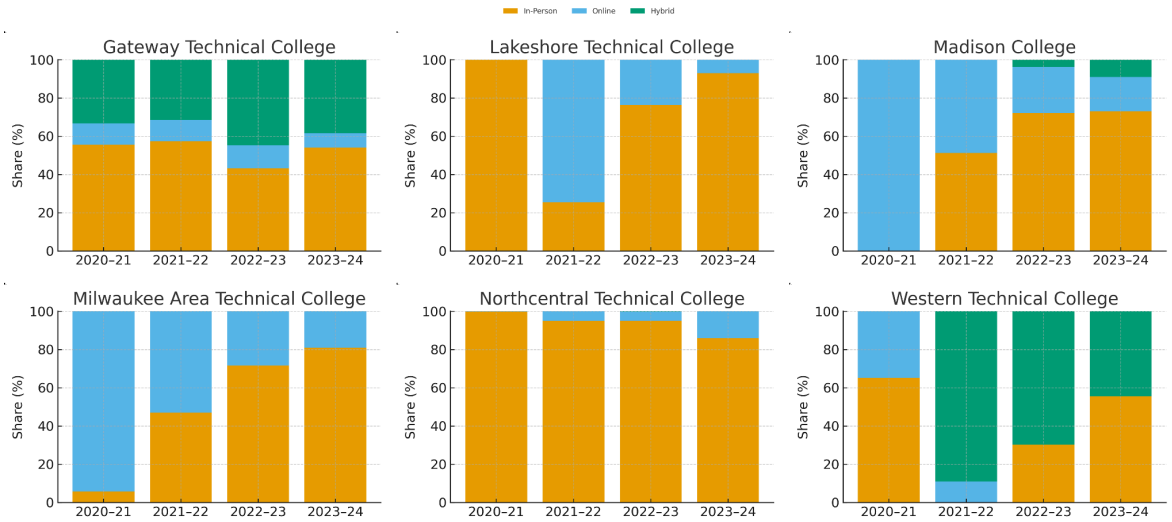


Table 4

Enrollments by Academic Year & Modality for Five WTCS Colleges (Annual Unduplicated Headcount)

Academic Year	In-person (n, %)	Online (n, %)	Hybrid (n, %)	Total N
2020-21	1,529 (30.6%)	2,347 (46.9%)	1,123 (22.5%)	4,999
2021-22	3,831 (50.4%)	2,144 (28.2%)	1,631 (21.4%)	7,606
2022-23	6,003 (64.5%)	1,742 (18.7%)	1,569 (16.8%)	9,314
2023-24	8,679 (73.0%)	1,393 (11.7%)	1,817 (15.3%)	11,889

Note. Counts reflect annual unduplicated headcounts for five WTCS colleges (Northcentral, Madison, Milwaukee, Western, Gateway). Milwaukee modality counts are lower bounds (LB) and this table uses the LB values. Percentages are row percentages and may not sum to 100% due to rounding. Lakeshore Technical College was excluded because joint ZIP × Modality counts were not provided.

Year-over-year composition shows only small movement across available indicators. Because percent shares in Table 2 already display the ratios by year, I report these results briefly here without an additional figure.

Demographic composition was largely stable across colleges; Gateway and Lakeshore show the clearest local shifts. Gateway female share fell from 71.0% to 63.0% (−8.0 points); male rose from 29.0%

to 37.0% (+8.0). At Lakeshore, gender stayed 61% female / 39% male. At Gateway, Hispanic eased from 90.2% to 87.3% (−2.9) while White rose from 2.9% to 7.0% (+4.1). At Lakeshore, Hispanic rose from 57.1% to 75.4% (+18.3) while Asian fell from 40.1% to 20.1% (−20.0).

RQ2. Rural Access and Geographic Distribution

This question asks whether modality patterns differ by rural–urban context and whether online and hybrid modalities expanded reach as measured by distance from learner ZIP code to nearest campus location with ESL offerings. Expanded reach analyses were limited by data availability: distance-to-campus was calculated for Madison, MilwaukeeArea Technical College (MATC), and Northcentral. Learner ZIP codes were assigned to Rural–Urban Commuting Area (RUCA) code tiers (RUCA via learner ZIP code) and modality was summarized by tier and by year; chi-square tests with effect sizes were run where the data allowed. For distance, learner-to-campus distance was summarized by modality as medians and interquartile ranges (IQR). The median is the middle distance (half of learners live closer and half live farther). The IQR is the span for the middle 50% of learners; smaller IQRs mean distances are more clustered. A pooled summary of modality shares by RUCA group for AY 2020–21 to 2023–24 is shown in Appendix Table A4.1.

Associations between rurality and modality were generally small and varied across institutions. At Madison, per-year tests were statistically significant in AYs 2021–22, 2022–23, and 2023–24 (small to small–moderate effects); AY 2020–21 was not testable. Gateway was nonsignificant in AY 2020–21 through 2022–23; AY 2023–24 reached significance with a very small effect. Western showed no significant association in the testable years (one year was not testable). For Milwaukee, hybrid is absent; online dominates in AY 2020–21 (≈87–95%), in-person is largest in AY 2022–23 and 2023–24 (≈65–83%), and AY 2021–22 is inconclusive because of suppressed data; enrollment is almost entirely Urban with only trace counts in Large Rural and Small/Isolated ZIPs. At Northcentral, the association is most apparent in AY 2023–24 (small–moderate), and in the pooled results: online and hybrid appear across

RUCA tiers; in AY 2023–24 online has a substantial presence in Small/Isolated ZIPs while in-person remains the dominant modality.

Table 5a

RUCA × Modality — Pooled Headcount (AY 2020–21 to 2023–24) with Δ Row % and Δ Col % (2020–21 → 2023–24)

RUCA (3-tier)	In-Person	Online	Hybrid
Urban	9,495 (Δ Row: +4.5 pp; Δ Col: -1.9 pp)	2,415 (Δ Row: -22.9 pp; Δ Col: -17.3 pp)	5,157 (Δ Row: +18.4 pp; Δ Col: +6.3 pp)
Large Rural	1,298 (Δ Row: +3.1 pp; Δ Col: +1.0 pp)	265 (Δ Row: -11.7 pp; Δ Col: +4.3 pp)	524 (Δ Row: +8.6 pp; Δ Col: -6.1 pp)
Small/Isolated Rural	1,149 (Δ Row: -4.3 pp; Δ Col: +1.0 pp)	181 (Δ Row: +1.8 pp; Δ Col: +13.1 pp)	54 (Δ Row: +2.5 pp; Δ Col: -0.2 pp)

Note. Values represent pooled headcounts across Academic Years (AY) 2020–21 to 2023–24. Each cell lists the pooled headcount (top line) and the change in Row % (within‑RUCA share) and Col % (within‑modality share) from 2020–21 to 2023–24 in parentheses (percentage points, pp). Colleges included are Northcentral, Madison, Western, and Gateway. Milwaukee and Lakeshore are excluded from this table (Milwaukee provided lower‑bound ZIP × modality counts in a separate file and Lakeshore did not provide joint ZIP × modality counts). RUCA categories follow the RUCA 2010 ZIP crosswalk (1–3 = Urban, 4–6 = Large Rural, 7–10 = Small/Isolated Rural). Modalities were normalized as In‑Person, Online (includes Distance and Online‑P), and Hybrid (includes Blended). Percentages are based on headcounts and rounded to one decimal place.

Table 5b

(Milwaukee LB) RUCA × Modality — Pooled Lower-Bound Headcount (AY 2020–21 to 2023–24) with Δ Row % and Δ Col % (pp)

RUCA (3-tier)	In-Person	Online
Urban	11,480 (Δ Row: 73.0 pp; Δ Col: -0.2 pp)	7,754 (Δ Row: -73.0 pp; Δ Col: -0.5 pp)
Large Rural	6 (Δ Row: 60.0 pp; Δ Col: 0.1 pp)	21 (Δ Row: -60.0 pp; Δ Col: 0.0 pp)
Small/Isolated Rural	13 (Δ Row: NA pp; Δ Col: 0.2 pp)	11 (Δ Row: NA pp; Δ Col: 0.5 pp)

Note. Milwaukee ZIPs were crosswalked to RUCA 2010 and collapsed to a 3-tier scheme (1–3 Urban, 4–6 Large Rural, 7–10 Small/Isolated Rural). Cells show pooled lower-bound (LB) headcounts for AY 2020–21 to 2023–24 (top line) and the change in within-RUCA (Row %) and within-modality (Col %) shares from 2020–21 to 2023–24 on the second line (percentage points, pp). Hybrid omitted. Unknown RUCA rows were excluded.

To assess geographic reach, I pooled ZIP-level nearest-campus distances across Madison Area Technical College, Milwaukee Area Technical College, and Northcentral Wisconsin Technical College over the shared data window (AY 2020-21 to 2023-24). Distances are great-circle miles from each learner ZIP centroid (the representative latitude/longitude point for a ZIP Code used to calculate distances) to the nearest campus (latitude/longitude); each ZIP appears once per modality if it had any ESL enrollment in that modality during the window; ZIPs are deduplicated across colleges; and cells report unweighted medians with IQRs (differences across modalities reflect the sets of ZIPs served, not changes in the distances themselves). Lakeshore was excluded due to providing no joint ZIP x Modality counts); Gateway and Western excluded because data was pre-coded to my three-tier RUCA scheme without ZIPs.

The pooled results show a clear tendency for online classes to draw on learners from farther ZIP codes than in-person classes: the median distance for online learners is 21.54 miles (IQR 10.08-74.86; n=123) versus 13.72 miles for in-person learners (IQR 7.73-41.71; n=93). By contrast, hybrid learners exhibit the shortest median distance - 8.68 miles (IQR 3.60-18.75; n=46).

The above pooled findings indicate that in the period since the COVID pandemic in 2020, online offerings tended to reach learners living farther from campuses offering ESL classes than in-person classes, while learners enrolled in hybrid offerings tended to live closest and those enrolled in in-person classes fell in between. See Table 6 for modality specific median (IQR) nearest-campus distances and ZIP counts.

Table 6

Pooled Nearest-Campus Distance by Modality — Madison, Milwaukee, Northcentral (AY 2020–21 to 2023-24).

Modality	n (ZIPs)	Median (miles)	IQR (miles)
In-person	93	13.72	7.73–41.71
Online	123	21.54	10.08–74.86
Hybrid	46	8.68	3.6–18.75

Note. I pool Madison College, Milwaukee Area Technical College, and Northcentral Technical College over the study window shared by the included colleges (AY 2020–21 through 2023–24). Distances are great-circle miles from each ZIP centroid (from uszips.csv) to the nearest campus in each college's registry. For each modality (In Person, Online, Hybrid), I include a ZIP once if it had any ESL enrollment in that modality at any point in the window, and I deduplicate across colleges so a ZIP is not double-counted. Table cells report unweighted medians and IQRs across those ZIPs; n (ZIPs) is the number of distinct ZIP codes included for that modality. Distances are static; differences between modalities reflect differences in the set of ZIPs served, not changes in the distances themselves. Lakeshore excluded due to no joint ZIP × Modality counts for ZIP-level distance computation; Gateway—data were already coded to my three-tier RUCA classification scheme with no ZIP data, so ZIP-level distances could not be formed; Western—data were also already coded to my three-tier RUCA scheme, preventing ZIP-level distance analysis within the study window.

RQ3. Learner Demographics and Modality (Northcentral)

This research question examines whether adult MLs demographics are associated with participation in in-person versus online classes at Northcentral Wisconsin Technical College across AY 2020-21 through 2024-25 (Hybrid excluded per Table 7.) I report chi-square tests and Cramérs V to indicate the presence and magnitude of association; interpretations emphasize effect size.

Age shows a statistically significant but small association with modality, $\chi^2(4)=17.61$, $p<.001$, $V=.06$. There is a tendency for online participation to be higher among middle-aged adult groups (i.e.,

25-34, 35-44) and lower among the youngest (<25) and oldest (55+) learners. Ethnicity is also significantly associated with instructional modality, $\chi^2(8)=32.38$, $p<.001$, $V=.08$, with a tendency for Hispanic/Latino learners to participate online more than expected and for Asian learners to participate online less than expected; White learners show a small online tendency. Education level demonstrates a small association, $\chi^2(4)=26.46$, $p<.001$, $V=.0$): there is a tendency for online participation to be more common among learners whose highest education level upon enrollment was grades 9-11 (i.e. some high school) and less common among those with grades 6-8. Economic disadvantage shows a significant association with a small effect, $\chi^2(2)=12.08$, $p<.001$, $V=.05$, indicating a tendency for non-disadvantaged learners to enroll in online classes more than expected and disadvantaged learners to do so less.

By contrast, employment status is not associated with instructional modality in this dataset, $\chi^2(6)=7.25$, $p=.30$. Gender falls at the threshold of statistical significance, $\chi^2(2)=6.20$, $p=.05$, and does not indicate a practically meaningful tendency by gender.

In sum, the RQ3 results indicate tendencies in who participates in online adult ESL courses at Northcentral: middle-adult learners, learners with previous high school experience (grades 9-11), Hispanic/Latino learners, and those not economically disadvantaged all show a mild tendency toward online participation, while the association between modality and gender appears negligible and not significant with regard to employment status. Across variables, all associations are small ($V \leq .08$), indicating detectable but limited demographic tendencies. Table 7 includes the full cross-tabulations of in-person versus online by age, ethnicity, highest education level at enrollment, employment, gender, and economic disadvantage, including observed and expected counts, chi-square tests, and Cramér's V that show the small but significant tendencies summarized here.

Table 7

Observed and Expected Counts for Modality (In-Person vs. Online) × Demographics — Northcentral (AY 2020–21 to 2024–25)

Panel A. Age Group

	In-Person	Online	Row Total
< 25	1112 (1092.36)	62 (81.64)	1174
25–34	1734 (1746.47)	143 (130.53)	1877
35–44	988 (1004.89)	92 (75.11)	1080
45–54	298 (292.16)	16 (21.84)	314
55+	203 (199.12)	11 (14.88)	214
Column Total	4335	324	4659

Note. $\chi^2(4) = 17.61$, $p < .001$; N = 5,177. Cramér's V = 0.06.

Panel B. Ethnicity

	In-Person	Online	Row Total
American Indian/ Alaska Native	581 (564.44)	31 (47.56)	612
Asian	1799 (1758.23)	91 (131.77)	1890
Black/African American	92 (93.96)	9 (7.04)	101
Hawaiian/Pacific Islander	7 (6.51)	0 (0.49)	7
Hispanic/Latino	2211 (2244.77)	202 (168.23)	2413
Multi-Ethnic	15 (15.81)	2 (1.19)	17
Not Specified	70 (68.84)	4 (5.16)	74
White	156 (161.87)	18 (12.13)	174
Column Total	4350	326	4676

Note. $\chi^2(8) = 32.38$, $p < .001$; N = 4,594. Cramér's V = 0.08.

Panel C. Employment Status

	In-Person	Online	Row Total
Dislocated Worker	3 (2.77)	0 (0.23)	3
Full-Time	1449 (1463.94)	135 (120.06)	1,584
Not in Market	2360 (2338.23)	170 (191.77)	2,530
Part-Time	295 (301.29)	31 (24.71)	326
Refused	8 (8.32)	1 (0.68)	9
Underemployed	5 (4.62)	0 (0.38)	5
Unemployed	684 (684.83)	57 (56.17)	741
Column Total	4,804	394	5,198

Note. $\chi^2(6) = 7.25$, $p = .30$; N = 5,177.

Panel D. Economic Disadvantage

	In-Person	Online	Row Total
No	2579 (2610.87)	246 (214.13)	2,825
Refused	15 (13.86)	0 (1.14)	15
Yes	2210 (2179.27)	148 (178.73)	2,358
Column Total	4,804	394	5,198

Note. $\chi^2(2) = 12.08$, $p < .001$; N = 5,177. Cramér's V = 0.05.

Panel E. Education Level

	In-Person	Online	Row Total
No School / No Equivalency	3575 (3560.02)	277 (291.98)	3,852
Grades 6–8	420 (402.95)	16 (33.05)	436
Grades 9–11	429 (445.47)	53 (36.53)	482
Above 12th (Postsecondary)	15 (15.71)	2 (1.29)	17
Not Specified	365 (379.85)	46 (31.15)	411
Column Total	4,804	394	5,198

Note. $\chi^2(4) = 26.46$, $p < .001$; N = 5,177. Cramér's V = 0.07.

Panel F. Gender

	In-Person	Online	Row Total
Female	2940 (2962.07)	265 (242.93)	3,205
Male	1777 (1754.13)	121 (143.87)	1,898
Not Specified	87 (87.80)	8 (7.20)	95
Column Total	4,804	394	5,198

Note. $\chi^2(2) = 6.20$, $p = .05$; N = 5,177.

Notes. Cells display Observed (Expected) counts; χ^2 tests on 2×k tables; Monte Carlo used when ≥20% of expected cells were <5, otherwise asymptotic. Values are formatted to two decimals in cells; Cramér's V is reported only for significant associations ($p < .05$). Analytic window is AY 2020/2021–2024/2025; 'Distance' normalized to Online; Hybrid excluded due to sparse and intermittent counts.

Table 8

Chi-Square Tests Summary: Modality × Demographics, Northcentral (AY 2020–21 to 2024–25)

Variable	χ^2	df	p	Cramér's V	N
Ethnicity	32.38	8	p < .001	0.08	4,594
Employment Status	7.25	6	p = .30		5,177
Economic Disadvantage	12.08	2	p < .001	0.05	5,177
Age Group	17.61	4	p < .001	0.06	5,177
Education Level	26.46	4	p < .001	0.07	5,177
Gender	6.20	2	p = .05		5,177

Note. Two-category modality (In-Person vs. Online). Cramér's V omitted when not significant at $\alpha = .05$.

RQ4. Staff Perspectives on Access and Modality

I synthesize staff perspectives on access and modality across rural-urban contexts. Three staff interviews (30-45 minutes) were conducted, transcribed, and coded for emerging themes linked to enrollment and modality. Interview participants converged on a set of barriers to adult ESL classes - access to devices and broadband, work-family constraints (especially childcare), and uneven digital skills - while also describing a resilient technical college system that adapted to post-pandemic realities through device and hotspot lending, flexible scheduling and modality mixes, and strong community partnerships. The discussion below connects these themes to the examples in Table 10 and extends them with detail from the interviews. Table 9 summarizes the three interview participants, including participant ID, current role, years in current role, short notes on their experience, and key context themes.

Table 9

Qualitative Interview Participants

Participant ID	Role / Position	Affiliation	Key Context	Years in Current Role	Experience Notes
P01	Admin/ System Staff	WTCS	Planning, policy, enrollment trends; mentioned transitions to online delivery	~1.5	≈15 years WTCS; ≈1.5 years current admin role
P02	Admin/ System Staff	WTCS	Barriers such as broadband, childcare; convenience of online for refugee women	4	≈4 years current admin role (ELL)
P03	ELL Instructor	[WTCS college]	Program delivery; rural vs urban dynamics; covers [counties in SE Wisconsin]	≈18	3 yrs adjunct + FT since 2007 ⇒ ≈21 total; ≈18 years in current role

Note. Participants are de-identified as P01–P03 in accordance with IRB procedures. All values reflect self-reported information from the interview transcripts.

A consistent throughline across interviews was that internet access and reliability remain constraints for many learners, particularly those living in rural areas. As one participant put it, “Broadband is still an issue in large swaths of rural Wisconsin” (P02, para. 176). Access to adequate devices is intertwined with this constraint: many learners “don’t have laptops or tablets,” so “they do it on their phone,” a workaround that is often fragile for synchronous instruction and multi-platform tasks (P02, paras. 209-215). Several colleges have mitigated these barriers through laptop lending, mobile hotspots, and on-call tech support - supports that, when present, make online participation in adult ESL courses viable rather than aspirational.

Table 10

Qualitative Codebook (code names, definitions, and representative examples)

Code	Definition	Representative Example (pxx:line)
broadband_gap	Internet access/reliability problems limit participation	P02:176 — "Broadband is still an issue in large swaths of rural Wisconsin."
childcare_conflict	Childcare responsibilities or policies limit attendance	P03:252 — "The college's policy is no kids in the classroom."
device_access	Device availability/lending logistics affect access	P02:334 — "Laptops that they can loan… depends on the resources of the different tech colleges."
digital_skills_ support	Need for digital literacy/computer skills	P02:293 — "The lack of digital literacy—anything that's online really doesn't work for them."
partnerships_ system_level	System/community partnerships shape offerings	P02:419 — "The Wisconsin tech system. It was Department of Workforce Development. It was Wisconsin and literacy and it was Department of Children and Family."
modality_fit_ levels	Online/hybrid fit varies by learner level	P01:170 — "For Levels 1–2, we're cautious about putting them in exclusively online instruction."
schedule_ flexibility	Flexible times/sections mitigate conflicts	P03:216–217 — "I teach the same thing morning and evening… they can come in the evening."
work_schedule_ variability	Rotating/irregular shifts reduce ability to attend	P03:244–245 — "Some have a very variable work schedule—two days on and three days off."

Note. Representative examples are participant quotations (≤35 words) cited as P01–P03:line. Examples are illustrative rather than exhaustive and reflect the final consolidated codebook used in the reflexive thematic analysis.

Even when connectivity and hardware are in place, digital literacy surfaced as a compounding barrier, especially for learners at beginning proficiency levels. Staff emphasized that entry-level students - often with limited prior schooling - struggled to navigate online learning platforms, manage logins, and troubleshoot audio/video in real time. As one participant noted, "ELLs Level 1 and 2 also need to build

their digital literacy," constraining the appropriateness of fully online formats for newcomers (P01, para. 67). Taken together, these accounts frame online and hybrid delivery as opportunities only when devices, broadband, and basic digital practices are deliberately scaffolded in advance - what I coded as modality fit by level. Key code merges/splits and theme decisions are summarized in Table 11.

Table 11

Qualitative Coding Decisions

Decision	Initial Code(s)	Final Code	Rationale	Line	Theme
Merge	lower_level_ online_ challenge + online_level_ reference	modality_fit_ levels	Levels 1–2 online challenges combined under modality fit.	P01: 170	Theme A — Modality fit varies by level/design
Retain	digital_skills_ support	digital_skills_ support	Digital literacy limits online participation. "The lack of digital literacy—anything that's online really doesn't [work] for them." (P02:293)	P02: 293	Theme A — Modality fit varies by level/design
Merge	device_lending + equipment_as_ last_mile	Device access	Device logistics noted. "Laptops that they can loan… depends on the resources of the different tech colleges." (P02:334)	P02: 334	Theme B — Logistics & last-mile access
Retain	broadband_gap	broadband_gap	Connectivity remains a barrier. "Broadband is still an issue in large swaths of rural Wisconsin." (P02:176)	P02: 176	Theme B — Logistics & last-mile access

Decision	Initial Code(s)	Final Code	Rationale	Line	Theme
Retain	transportation_ barrier	transportation_ barrier	Commute burdens independent of device/connectivity issues.	P01: 198	Theme B — Logistics & last-mile access
Rename	schedule_ flex_ morn_eve	schedule_flexibility	Flexible sections mitigate conflicts. “I teach the same thing morning and evening… they can come in the evening.” (P03:216–217)	P03: 216	Theme C — Flexibility vs. constraints
Merge	childcare_policy _online + childcare_ mentions	childcare_conflict	Childcare policy/needs constrain attendance. “The college’s policy is no kids in the classroom.” (P03:252)	P03: 252	Theme C — Flexibility vs. constraints
Rename	health_vision_ needs (early tag)	work_schedule_ variability	Recoded to work_schedule_variability; rotating-shift evidence (P03:244–245).	P03: 49	Theme C — Flexibility vs. constraints
Retain	economic_ constraints	economic_ constraints	Direct financial barrier cited. “Poverty… housing… telephone… reliable internet—those bills affect whether people can keep studying.” (P03:256)	P03: 256	Theme C — Flexibility vs. constraints
Merge	travel_continuity + remote_ attendance	hybrid_ affordances	Travel/relocation continuity documented. “A student completed the whole semester from Ecuador.” (P03:222)	P03: 222	Theme C — Flexibility vs. constraints

Decision	Initial Code(s)	Final Code	Rationale	Line	Theme
Retain	employer_ partnerships	coordinated_ services	Cross-unit coordination. “More interchange between our two sides… to refer students one way or the other.” (P03:316)	P03: 316	Theme D — Coordinated services
Retain	standards_ alignment	standards_ alignment	Statutory/standards anchor. “It’s statutorily required that we offer English as a second language instruction.” (P01:345)	P01: 345	Theme D — Coordinated services

Note. Entries document code definitions, recodes/merges/splits, and final theme assignments, with supporting evidence cited as P01–P03:line (first matching instance where available). Short participant quotations are illustrative and lightly edited for readability—brackets for clarifications and ellipses […] for minor omissions—without altering meaning. No verbatim transcript blocks are reproduced. All content is fully de-identified per IRB procedures, with unique titles/locations bracketed as needed.

Scheduling realities layered additional friction onto access. Inconsistent and multiple work shifts made consistent attendance difficult, with one interview participant describing learners on “two days on and three days off,” a rhythm that undermined regular in-person participation (P03, para. 50). Furthermore, childcare demands reduced the effective bandwidth of at-home learning; for some parents in synchronous online classes, caregiving needs meant they "couldn't even focus” as interruptions repeatedly pulled them away from instruction (P03, paras. 61-62). These narratives reinforce that modality alone does not neutralize employment and childcare constraints; rather, those constraints reappear in different ways unless course structures anticipate them.

In response, staff described a differentiated modality strategy that aligns delivery with learner readiness. Synchronous online sections tended to work best for intermediate and advanced groups, while beginning literacy students benefited from on-site instruction or supported hybrid designs with

intensive front-end onboarding and real-time tech troubleshooting (P03). The practical implication is straightforward: pair online/hybrid with explicit tech onboarding for all learners and reserve fully online course formats for groups with sufficient language and digital fluency, while anchoring Levels 1-2 in supported, in-person environments.

Flexibility in scheduling emerged as one lever colleges can control. Where colleges were able to offer the same class multiple times across the day, learners could route around shift changes and caregiving demands. One instructor described offering the "same course morning and evening…[so] they can come in the evening" when daytime attendance was not possible (P03, paras. 216-217). In short, modular learning units and accessible re-entry points complemented this approach, demonstrating an ethos of "meet students where they are" through active outreach, consistent communication, and opportunities to rejoin classes without penalty (P03, paras. 71-74). In practice, this flexibility stabilized attendance more effectively than modality changes alone.

Beyond individual classrooms, staff pointed to local community partnerships and system-level infrastructure as the multipliers that make access gains sustainable. At the state level, coordination among the technical colleges and agencies - "The Wisconsin tech system… Department of Workforce Development… Wisconsin Literacy… and [the] Department of Children and Family" - enabled device lending and workforce-aligned ESL initiatives at scale (P02, paras. 419-429). Locally, mobile and off-site delivery (i.e., a "mobile lab… like a bus") and employer partnerships brought placement and instruction closer to learners and created more predictable attendance windows (P01, para. 83; P02, paras. 287-297). These efforts were not merely peripheral; they were the mechanism by which online/hybrid options became real for rural residents and shift workers who would otherwise drop classes at intake or within the first few weeks.

Finally, staff differentiated the rural-urban landscape less by a simple binary and more by "distance versus density" problems. In multi-county rural districts, challenges centered on reach - small,

dispersed learner groups, long travel distances, and unreliable broadband - where synchronous online sections, mobile learning labs, and device/hotspot lending programs produced the biggest marginal gains (P02, para. 114; P01, para. 83). In more urbanized colleges, the emphasis shifted to throughput - scheduling options, fast tech support, and streamlining intake and assistance at scale. Across both settings, the same enabling conditions recurred: reliable broadband, the necessary technology, and a human being to help a learner get set up the first time (P02, paras. 208-212; P01, para. 67).

In sum, interview participants identified four primary challenges - unreliable and slow broadband, uneven device access, limited digital literacy among beginning-level learners, work and childcare constraints that persist across instructional modalities, and misalignment between fully online formats and entry-level proficiency needs. Alongside these challenges, staff also highlighted opportunities that have improved access since 2020: system-coordinated device lending with basic tech onboarding, flexible scheduling with duplicated course sections at different times of the day and re-entry points, differentiated modality mixes (supported hybrid/on-site at Levels 1-2; more online at higher levels), and multi-level partnerships (agencies, employers, libraries/mobile learning labs) that extend reach and stabilize participation. Put differently, online and hybrid modalities can expand access when paired with scaffolds for devices, internet connectivity, and digital skills - and when programs schedule classes with working families in mind; absent those supports, the same barriers to access that have depressed enrollment simply migrate online.

Discussion

Enrollment Trends and Demographic Shifts

Across the six participating WTCS colleges, enrollment fell in AY 2020–2021 during COVID-19 disruptions—which closed campuses and pushed instruction online (COABE, 2022; JSI, 2021; WTCS, 2024). As COVID-restrictions eased, enrollment rebounded to pre-pandemic levels. Modality followed a similar path. Online enrollments surged during AY 2020–2021 when in-person options were restricted, then declined as in-person classes resumed. By 2023–2024, most adult ESL enrollment was in-person, with online and hybrid in smaller, steady supporting roles. This arc matches national data describing a sharp pandemic drop followed by uneven recoveries shaped by local course capacities and policy supports (Barbara Bush Foundation, 2021; COABE, 2022; WTCS, 2024). Staff accounts in this study—and guidance in the literature—describe online and hybrid as especially useful for adults balancing work and family demands when simple supports are in place (Garrison, 2011; Vanek, 2020).

The demographics of adult ESL learners at participating colleges remained largely stable through the pandemic-dip and subsequent recovery. Small shifts in gender and ethnicity appeared at some colleges, but there was no broad change across the combined sample. The relative stability of learner demographics across the study window aligns with national trends and prior research showing that adult ESL often serves a familiar subset of the eligible population (ProLiteracy, 2022; Shiffman, 2019). Overall, enrollment recovered from the pandemic-dip and the demographic makeup of adult ESL learners remains stable - mirroring national trends. Online and hybrid instructional modalities now play a steady supporting role; in-person remains the dominant instructional modality for adult ESL classes offered at participating Wisconsin Technical Colleges.

Rural Access and Geographic Distribution

Across the six participating colleges, rural–urban differences in online enrollment were small. Some years show a relationship between where learners live and which instructional modality they chose, but the pattern is not strong or consistent. This fits the literature: travel distance, local section availability, broadband quality, and device access all shape participation, so digital delivery helps only when those basics are in place (JSI, 2021; WTCS, 2024).

Where distance data were available, patterns differed by level of aggregation. At the college level for Milwaukee Area Technical College (MATC) and Northcentral, online learners did not consistently live farther from the nearest campus than in-person learners; in these medians, they lived roughly a mile closer. By contrast, when distances were pooled across Madison College, MATC, and Northcentral (AY 2020–21 to 2023–24), online sections drew from farther ZIP codes than in-person, while hybrid drew from the closest ZIPs (Table 6). This suggests that the pooled pattern reflects cross-college composition of ZIPs as much as within-college differences (JSI, 2021; Vanek, 2020).

Learner Demographics and Modality (Northcentral)

The demographic analysis was limited to Northcentral, the only college that provided row-level records with consistent fields. Within that dataset, demographic differences by modality were modest. Employment status showed no association with modality, while age, education, ethnicity, and economic disadvantage each showed small but statistically significant associations. These modest effects align with prior research emphasizing that participation decisions are shaped by schedule flexibility, local section availability, broadband quality, and device access rather than by broad demographic divides (Belzer et al., 2022; Vanek, 2020; WTCS, 2024).

The andragogical framework helps contextualize these patterns by emphasizing that adult learners engage when instruction fits immediate life demands (Knowles, 1984; Knowles et al., 2015). Online instruction can reduce barriers linked to shift work, transportation, and caregiving, offering a

practical option even though employment status itself was not associated with modality in this dataset. Age differences were small, echoing reports that younger and middle-aged adults often adopt new delivery modes sooner, while some older learners prefer in-person formats (ProLiteracy, 2022; WTCS, 2024).

Small but significant associations by ethnicity and education suggest limited demographic tendencies rather than strong predictors of modality. This parallels national accounts where observed differences are often shaped less by cultural preference than by structural factors—notably broadband access, childcare, and immigration policy (Eckert, 2021; JSI, 2021; ProLiteracy, 2022).

Taken together, these results point to online instruction working best as a complement to in-person options. Even with only small demographic effects—and no association for employment status—online sections can help sustain participation when schedule constraints, transportation, or caregiving would otherwise disrupt attendance. Program design should therefore emphasize flexible modality mixes and targeted supports (devices, broadband, onboarding) rather than expecting demographic groups to sort predictably by modality.

Staff Perspectives on Access and Modality

Staff highlighted a set of prerequisites for participation in online ESL courses: an adequate device, affordable data, and stable internet. Because many learners join by phone, online classes function best when instructions are concise, typing is limited, links are dependable, and the weekly rhythm is predictable. These design choices are consistent with adult online learning guidance and with evidence that instructor presence, peer interaction, and scaffolded, step-by-step tasks support learning (Garrison, 2011; Vanek, 2020). Staff also observed that online and hybrid options accommodate adults balancing shift work and caregiving, whereas beginners often benefit from in-person classes to build early literacy and gain confidence with the tools. Consistent with the interviews, pairing online/hybrid

delivery with front-end onboarding and ready tech support made participation workable; without those supports, the same access barriers simply migrated online.

Prior studies similarly find that blended formats sustain engagement when structure and supports are explicit (Means et al., 2013; Murphy et al., 2019). Taken together, these points help explain the observed pattern: in-person carries most of the instructional load, while online and hybrid reduce routine disruptions that might otherwise lead to withdrawal from courses, but function best for learners who are familiar with technology and not at beginning-literacy levels. In practice, programs that duplicated sections across times of day and offered clear re-entry points stabilized attendance more effectively than modality changes alone, with the largest gains where distance and broadband constraints were greatest (rural “distance” contexts) and throughput solutions (scheduling, fast tech help, streamlined intake) were most salient in more urban settings.

Implications

The results of the present study point to a practical planning approach: keep in-person as the core instructional modality, use online and hybrid formats to solve specific access problems, and focus effort where the data show real use. First, maintain strong in-person capacity, especially at entry levels. Beginners and learners with limited digital access benefit from the classroom to get started, learn routines, and build early literacy. This remained true across the six colleges. Second, keep a modest, predictable number of online and hybrid course offerings. The goal is reliability, not breadth. Offer them on a regular schedule so adults with changing work hours know when they can enroll again. Third, target outreach in areas showing sustained enrollment in online or hybrid classes.The practical value of the rural-access findings is a clearer map of which ZIP codes use online or hybrid. Aim advertising, community messaging, and technology support at those ZIPs.

Taken together, these steps keep the in-person classroom at the center while using online and hybrid where they clearly help—supporting adults who work full time, and extending and sustaining reach in specific rural ZIP codes identified by the data.

Limitations and Future Research

These findings come from six colleges, not the entire 16-college system, so they show part of the picture. In addition, colleges shared data with varying levels of detail and data suppression. Distance to campus was estimated from approximated ZIP-code latitude/longitude center-points, which is a practical shortcut but not as exact as a street address. Conclusions from staff interviews should be interpreted cautiously due to the small sample size; they are meant to add context to the data.

Future research should examine whether online and hybrid courses support sustained participation and retention, as well as positive learning outcomes—both in rural and urban contexts. This includes tracking learner retention and learning outcomes by modality to see if online and hybrid options help learners stay enrolled when life interrupts in-person attendance (Means et al., 2013; Murphy et al., 2019). It also involves testing small pilot programs in rural areas and tracking enrollments in those programs over multiple years to determine whether participation from Small/Isolated ZIP codes reflects sustained access gains rather than isolated enrollments (JSI, 2021; WTCS, 2024).

Conclusion

This study examined enrollment trends in adult ESL programs across six Wisconsin Technical Colleges during 2014–2024 (with data availability varying by college), with particular focus on the post-2020 expansion of online and hybrid modalities following the COVID-19 pandemic. Using a mixed-methods design that combined quantitative enrollment data with qualitative insights from program staff, the study addressed four central questions: how overall enrollment and demographics shifted, whether online and hybrid courses expanded access for rural learners, how modality choices

intersected with demographics, and what challenges and opportunities staff identified in supporting participation.

The results show participating colleges largely returned to pre-pandemic enrollment levels, though patterns varied by college. Online participation peaked in 2020–21, but by 2023–24 in-person instruction again accounted for more than three-quarters of enrollments, with online and hybrid stabilizing as supplementary formats. Demographics across the six colleges remained mostly stable, with only modest local shifts in gender and ethnicity. Compared to 2017–2019 baselines, enrollments fell sharply in 2020–21 and then recovered: Northcentral climbed from 816 in 2020–21 to 1,218 in 2023–24, surpassing its pre-pandemic level of about 1,050; Madison and Milwaukee both dropped steeply but rose to exceed their earlier counts; Lakeshore dipped to 315 before returning close to its 465 baseline; Gateway grew from a smaller base, rising from 45 in 2020–21 to 96 in 2023–24; and Western rebounded from 227 to 1,200, well above its pre-pandemic total of about 700.

Modality shares across the six colleges also shifted substantially during the pandemic before stabilizing closer to baseline patterns. In 2018–19, about 80–85% of enrollments were in-person, with the remainder online. In 2020–21 this balance flipped to 66.5% online and 33.1% in-person, with hybrid virtually absent. By 2023–24, the mix returned near pre-pandemic proportions at 77.6% in-person, 15.6% online, and 6.8% hybrid, with intermediate years showing a gradual step back toward in-person delivery.

Evidence of rural–urban differences in online and hybrid participation is present but modest and varies by college. At Madison, per-year tests reached statistical significance though effects were small. Gateway and Western showed little rural variation, while Northcentral saw more online enrollments from Small/Isolated ZIP codes in later years. For distance, college-level medians at Milwaukee Area Technical College (MATC) and Northcentral showed only minor gaps—with online learners living slightly

closer to campus than in-person learners—whereas the pooled analysis across Madison, MATC, and Northcentral indicated the opposite pattern (online farther than in-person and hybrid closest).

Qualitative findings help explain these quantitative patterns. Staff emphasized that online and hybrid classes provide valuable flexibility for learners balancing work, childcare, or transportation barriers, but also stressed that beginning-level students and those with limited digital skills still need in-person instruction. Technology emerged as both an enabler and a barrier: access to devices, reliable broadband, and basic digital onboarding often determined whether students could participate online. Staff also highlighted the importance of community partnerships and employer alignment in sustaining enrollment. Taken together, these perspectives underscore that while online and hybrid classes extend opportunities—especially when paired with upfront tech supports and flexible scheduling—in-person instruction remains essential, particularly for entry-level learners.

The implications of these findings are clear for both institutions and policymakers. For WTCS administrators, in-person instruction should remain the backbone of adult ESL programming, while online and hybrid formats should be strategically targeted to areas where they consistently expand access, especially Small/Isolated ZIP codes. Sustaining such access requires more than course offerings alone. Investments in device lending programs, broadband infrastructure, and digital literacy supports are critical if rural learners are to benefit fully. At the policy level, aligning ESL expansion with workforce development initiatives, child care supports, and community partnerships can directly address the logistical barriers—such as variable work schedules and family responsibilities—that staff consistently identified.

These findings should be read with the study's constraints in mind, including the limited number of participating colleges, differences in institutional reporting, and the small qualitative sample. Even with these boundaries, the combination of quantitative data analysis and staff perspectives increases confidence in the study's conclusions.

Future research should build on this foundation in two ways. First, longitudinal studies that track retention and completion by modality would clarify whether online and hybrid formats support continued attendance when life gets in the way of attending in-person classes. Second, comparative studies of online and hybrid program design and costs could help identify models that are both instructionally effective and financially sustainable in both rural and urban contexts. Broader analyses that link enrollment data with broadband availability, community partnerships, and employment outcomes would further illuminate how modality influences equitable access and learner success. The number of adult ESL students reporting Social Security numbers upon enrollment has been decreasing, complicating the ability to track transitions to credit-bearing postsecondary programs and employment outcomes.

In closing, this thesis shows that while the pandemic brought an unprecedented shift toward online learning, the long-term trajectory of adult ESL in Wisconsin Technical Colleges is one of returning to in-person instruction, supplemented by targeted digital options. The lesson is not that online replaces in-person, but that intentional integration of hybrid and online formats—backed by adequate supports and partnerships—can extend reach and support retention for learners navigating complex lives. For policymakers, administrators, and educators alike, these findings highlight both the resilience of adult ESL programs and the opportunities that remain to advance equitable access in a state where language learning is integral to workforce readiness, civic participation, and community vitality.

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Appendix

Table A.1

Collapsed RUCA Scheme: Mapping 10 Codes to Three Rurality Groups.

RUCA Code	Official Primary Description
Urban (RUCA 1–3)	
1	Metropolitan area core: primary flow within an Urbanized Area (UA)
2	Metropolitan high commuting: ≥30% to a UA
3	Metropolitan low commuting: 10%–<30% to a UA
Large Rural (RUCA 4–6)	
4	Micropolitan core: within a large Urban Cluster (UC; 10k–49,999)
5	Micropolitan high commuting: ≥30% to a large UC
6	Micropolitan low commuting: 10%–<30% to a large UC
Small/Isolated Rural (RUCA 7–10)	
7	Small town core: within a small UC (2,500–9,999)
8	Small town high commuting: ≥30% to a small UC
9	Small town low commuting: 10%–<30% to a small UC
10	Rural areas: flow outside a UA or UC

Note. RUCA = Rural–Urban Commuting Area; UA = Urbanized Area; UC = Urban Cluster. Study classification: Urban (RUCA 1–3), Large Rural (RUCA 4–6), Small/Isolated Rural (RUCA 7–10).

Table A.5a

RUCA × Modality (Pooled excl. Milwaukee & Lakeshore) — Column Percentages (AY 2020–21 to 2023–24)

RUCA (3-tier)	In-Person	Online	Hybrid	Total
Urban	76.6	70.4	90.3	81.4
Large Rural	9.1	7.9	8.8	8.9
Small/Isolated Rural	14.3	21.7	0.9	9.7

Note. Column percentages sum to 100 within modality; totals column shows each RUCA tier's share of overall N.

Table A.5b

RUCA × Modality (Milwaukee) — Column Percentages (AY 2020–21 to 2023–24)

RUCA (3-tier)	In-Person	Online	Total
Urban	99.8	99.6	99.7
Large Rural	0.1	0.3	0.1
Small/Isolated Rural	0.1	0.1	0.1

Note. Column percentages sum to 100 within modality; totals column shows each RUCA tier's share of overall N.

Table A.2a

Unmapped Served ZIP Codes, ZIP-ZCTA, Milwaukee Area Technical College (Wisconsin only)

ZIP Code (Unmapped)
53055
53123
53124
53134
53135
53173
53175
53201
53229
53232
53234
53237
53245
53286
53291
53326
53514
53707

18 total unmapped Wisconsin ZIPs

Table A.2b

Unmapped Served ZIP Codes, ZIP-ZCTA, Northcentral Technical College (Wisconsin only)

ZIP Code (Unmapped)
54404

1 total unmapped Wisconsin ZIPs

Note. Display restricted to Wisconsin ZIP ranges (53000–54999). "Unmapped" typically reflects non-geographic USPS ZIPs (e.g., PO Box–only or unique/large-volume customer) that have no corresponding ZCTA because ZCTAs are derived from residential addresses. These ZIPs remain counted as served for coverage; distance metrics use ZIP centroids when available. Metrics that require a ZCTA—such as RUCA shares—exclude these ZIPs from percentage denominators.

Table A.7

Panel A*. Modality × Age Group — Column Percentages*

Category	In-person	Online	Total
< 25	25.7	19.1	25.2
25–34	40.0	44.1	40.3
35–44	22.8	28.4	23.2
45–54	6.9	4.9	6.7
55+	4.7	3.4	4.6

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Panel B. *Modality × Ethnicity — Column Percentages*

Category	In-person	Online	Total
American Indian/ Alaska Native	11.8	8.7	11.6
Asian	36.5	25.5	35.7
Black/African American	1.9	2.5	1.9
Hawaiian/Pacific Islander	0.1	0.0	0.1
Hispanic/Latino	44.8	56.6	45.6
Multi-Ethnic	0.3	0.6	0.3
Not Specified	1.4	1.1	1.4
White	3.2	5.0	3.3

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Panel C. *Modality × Employment Status — Column Percentages*

Category	In-person	Online	Total
Dislocated Worker	0.1	0.0	0.1
Full-Time	30.2	34.3	30.5
Not in Market	49.1	43.1	48.7
Part-Time	6.1	7.9	6.3
Refused	0.2	0.3	0.2
Underemployed	0.1	0.0	0.1
Unemployed	14.2	14.5	14.3

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Panel D*. Modality × Economic Disadvantage — Column Percentages*

Category	In-person	Online	Total
No	53.7	62.4	54.3
Refused	0.3	0.0	0.3
Yes	46.0	37.6	45.4

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Panel E*. Modality × Education Level — Column Percentages*

Category	In-person	Online	Total
No School / No Equivalency	74.4	70.3	74.1
Grades 6–8	8.7	4.1	8.4
Grades 9–11	8.9	13.5	9.3
Above 12th (Postsecondary)	0.3	0.5	0.3
Not Specified	7.6	11.7	7.9

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Panel F. *Modality × Gender — Column Percentages*

Category	In-person	Online	Total
Female	61.2	67.3	61.7
Male	37.0	30.7	36.5
Not Specified	1.8	2.0	1.8

Note. Column percentages sum to 100 within modality; totals column shows each category's share of overall N.

Table A.3

Missing Data Summary, Northcentral Technical College (2017–2025 filtered to AY 2020-21 to 2024-25).

Variable	Missing, n	Missing, %	Action in Analysis
Academic Year	0	0.00%	Excluded from tests
Distance Label (Modality)	0	0.00%	Excluded from tests
Address ZIP (used for RUCA)	14	0.30%	Excluded from spatial analyses
EthnicGroup Label (Ethnicity)	0	0.00%	Recoded as Not Specified
Age Group	17	0.36%	Recoded as Not Specified
WorkStatus Label (Employment Status)	0	0.00%	Recoded as Not Specified
Economic Disadvantage Label	0	0.00%	Recoded as Not Specified
ELL Course Indicator	0	0.00%	Filter variable (= ELL Course only)
N	4,676		

Note. Percentages are rounded to two decimals. Missing values represent system-missing (NaN) entries after filters for ELL and academic year (AY) range (2020/21–2024/25).

Table A.4

Excel Coding Matrix (by transcript, excerpt ID, code, and emergent theme)

Transcript	Excerpt ID	Code	Emergent Theme
P02	P02:176	broadband_gap	Theme B — Logistics & last-mile access
P03	P03:252	childcare_conflict	Theme C — Flexibility vs. constraints
P02	P02:334	device_access	Theme B — Logistics & last-mile access
P02	P02:199	digital_skills_support	Theme A — Modality fit varies by level/design
P01	P01:170	modality_fit_levels	Theme A — Modality fit varies by level/design
P03	P03:216–217	schedule_flexibility	Theme C — Flexibility vs. constraints
P03	P03:244–245	work_schedule_variability	Theme C — Flexibility vs. constraints
P03	P03:316	coordinated_services	Theme D — Coordinated services
P03	P03:222	hybrid_affordances	Theme C — Flexibility vs. constraints
P03	P03:256	economic_constraints	Theme C — Flexibility vs. constraints

Note. This coding matrix lists transcript source (P01–P03) and excerpt identifiers (Pxx:line) mapped to final codes and emergent themes; no verbatim quotations are shown. Each excerpt ID appears once under its best-fit code. All items are fully de-identified in accordance with IRB requirements.

Table A.5a

Gateway Technical College – ESL Headcount by Modality and RUCA (3-Tier), AY 2020–21 to 2023–24

RUCA (3-Tier)	20–21 Hybrid	20–21 In-Person	20–21 Online	21–22 Hybrid	21–22 In-Person	21–22 Online	22–23 Hybrid	22–23 In-Person	22–23 Online	23–24 Hybrid	23–24 In-Person	23–24 Online
Large Rural	41	129	0	128	151	5	139	109	20	214	277	26
Small/ Isolated Rural	4	7	0	3	6	0	18	14	0	29	40	2
Unknown	11	24	3	18	26	3	50	39	5	97	113	2
Urban	201	516	21	521	578	48	827	497	108	1252	1511	73

Note. Academic years abbreviated as YY–YY (e.g., 20–21 = 2020–21). RUCA categories follow the study's 3-tier scheme: Urban (1–3), Large Rural (4–6), Small/Isolated Rural (7–10). Gateway provided RUCA labels; 'Unknown' reflects records the college flagged as uncategorizable. Values aggregate Academic Year × Modality × RUCA3 for AY 2020–21 through 2023–24.

Table A.5b

Lakeshore Technical College – ESL Headcount by Modality and Year, AY 2020–21 to 2023–24

Modality	2020–21	2021–22	2022–23	2023–24
In-Person	315	85	341	432
Online	0	246	104	32

Note. Lakeshore provided modality counts by internal delivery codes rather than learner ZIPs; therefore, RUCA-based rurality breakdowns are not available for this table. Delivery codes were mapped to standard modalities as follows: 00 = In-Person; 24 = Online; 98 = Online (Emergency Remote). Online totals combine 24 and 98. Values are annual headcounts for AY 2020–21 through 2023–24.

Table A.5c

Madison College – ESL Headcount by Modality and RUCA (3-Tier), AY 2020–21 to 2023–24

RUCA (3-Tier)	2020–21 – Online	2021–22 – In-Person	2021–22 – Online	2022–23 – Hybrid	2022–23 – In-Person	2022–23 – Online	2023–24 – Hybrid	2023–24 – In-Person	2023–24 – Online
Large Rural	44	120	73	16	169	57	30	162	35
Small/ Isolated Rural	21	28	25	5	76	17	27	56	17
Unknown	43	58	48	5	114	22	9	72	16
Urban	512	654	673	51	1124	404	111	1142	284

Note. RUCA derived from learner ZIPs using the USDA 2010 ZIP Approximation and collapsed to the study's 3-tier scheme (Urban = 1–3; Large Rural = 4–6; Small/Isolated Rural = 7–10). Modality standardized to In-Person, Online, Hybrid. Values aggregate Academic Year × Modality × RUCA3 for AY 2020–21 through 2023–24.

Table A.5d

Milwaukee Area Technical College – ESL Headcount (Lower‑Bound) by Modality and RUCA (3‑Tier), AY 2020–21 to 2023–24

RUCA (3‑Tier)	2020–21 – In‑Person	2020–21 – Online	2021–22 – In‑Person	2021–22 – Online	2022–23 – In‑Person	2022–23 – Online	2023–24 – In‑Person	2023–24 – Online
Large Rural	0	0	0	0	0	0	0	0
Small/ Isolated Rural	0	0	0	0	0	0	0	0
Unknown	0	10	0	5	0	0	0	6
Urban	132	2169	1815	2040	3631	1439	4938	1160

Note. Values are lower‑bound headcounts by Academic Year × Modality × RUCA3 for AY 2020–21 through 2023–24. Suppressed ZIP‑level counts ('*') were treated as zero for conservative totals. RUCA derived from learner ZIPs using the USDA 2010 ZIP Approximation and collapsed to Urban (1–3), Large Rural (4–6), Small/Isolated Rural (7–10); 'Unknown' indicates ZIPs not matched in the crosswalk. Modality labels: In‑Person, Online.

Table A.5e

Northcentral Technical College – ESL Unduplicated Headcount by Modality and RUCA (3-Tier), AY 2020–21 to 2023–24

RUCA (3-Tier)	2020–21 – In-Person	2020–21 – Online	2021–22 – In-Person	2021–22 – Online	2022–23 – Hybrid	2022–23 – In-Person	2022–23 – Online	2023–24 – In-Person	2023–24 – Online
Large Rural	6	0	8	1	0	13	0	14	3
Small/ Isolated Rural	34	0	69	7	0	110	12	72	47
Unknown	2	0	2	0	0	2	0	1	0
Urban	114	1	72	18	1	113	18	173	47

Note. Values are unduplicated learners (unique RandomID) by Academic Year × Modality × RUCA3 for AY 2020–21 through 2023–24. RUCA derived from learner ZIPs (USDA 2010 ZIP Approximation) and collapsed to the study's 3-tier scheme: Urban (1–3), Large Rural (4–6), Small/Isolated Rural (7–10). Modality mapping: Distance → Online; Hybrid retained. 'Unknown' indicates ZIPs not matched in the crosswalk.

Table A.5f

Western Technical College – ESL Headcount by Modality and RUCA (3-Tier), AY 2020–21 to 2023–24

RUCA (3-Tier)	2020–21 – In-Person	2020–21 – Online	2021–22 – Hybrid	2021–22 – Online	2022–23 – Hybrid	2022–23 – In-Person	2023–24 – Hybrid	2023–24 – In-Person
Large Rural	1	1	0	0	1	0	1	8
Small/ Isolated Rural	0	0	0	0	2	0	1	1
Urban	147	78	866	106	957	417	533	656

Note. RUCA categories standardized to the study's 3-tier scheme (Urban = 1–3; Large Rural = 4–6; Small/Isolated Rural = 7–10). Modality standardized to In-Person, Online, Hybrid. Values aggregate Academic Year × Modality × RUCA3 for AY 2020–21 through 2023–24.