Between Doubt and Data: A Phenomenological Study of Adult Learners' Lived Experiences with Impostor Syndrome in AI-Enhanced Higher Education

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By

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Dedication

First and foremost, I dedicate this achievement to the glory of my Holy Lord and Savior, Jesus Christ, whose grace, strength, and guidance sustained me through every obstacle along this journey. Without my faith and belief in His direction, I would not be here today to reach this milestone. It is through His glory and His grace that I give thanks with all my heart.

I lovingly dedicate this dissertation to those who are not here with me today to celebrate this moment, but who have remained in my heart throughout this journey. To my parents, Earl and Shirley Reichard, whose love, encouragement, and unwavering belief in my potential inspired me to pursue my dreams and strive for my highest goals. Although they are no longer here, the values they instilled in me continue to guide my life and the path that led to this achievement. To my beloved husband, Edward, who was by my side when this journey first began. Although he is not here to see its completion, his love, support, and spirit remained with me throughout every step of this path. His memory continues to inspire and strengthen me. And in loving memory of my son, Christian, who remains forever in my heart. His memory continues to inspire my strength, perseverance, and determination.

Last, but certainly not least, I dedicate this achievement to my three sons, Edward Paul, Christopher Earl, and Joseph John. There are not enough words to thank you for your love, patience, and encouragement throughout this journey. You stood beside me through the late nights, the early mornings, the challenges, and the moments when the road felt most difficult. Your belief in me gave me the strength to keep going when I thought I could not. Today you are here to celebrate this achievement with me, and this accomplishment is shared with each of you.

This milestone is not mine alone, but a testament to the love, faith, and support that carried me here.

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Abstract

Limited research has examined how adult learners experience impostor syndrome within technology-rich higher education environments, particularly as artificial intelligence and digital learning tools become more integrated into academic settings. This qualitative phenomenological study explored how adult learners attending higher education institutions in Northeastern Pennsylvania and the Lehigh Valley region perceive and navigate impostor syndrome while engaging in technology-mediated learning environments.

Guided by the Critical Digital Literacy Framework, the Impostor Phenomenon Framework, and Self-Determination Theory, this study examined the lived experiences of adult learners balancing academic responsibilities alongside employment, caregiving, and other life roles. Semi-structured interviews were conducted with twelve adult learners aged 25 and older enrolled in undergraduate and graduate programs. Data were analyzed using reflexive thematic analysis to identify patterns across participant narratives.

Findings revealed four major themes: role strain and adult learner identity, manifestations of impostor syndrome, technology as a dual influence, and institutional gaps and desired supports. Results suggest that impostor syndrome among adult learners is shaped not only by internal self-doubt but also by institutional expectations, digital learning environments, and competing life responsibilities. These findings highlight the importance of institutional practices that better support adult learners navigating technology-rich higher education environments.

Key words: adult learners, impostor syndrome, digital literacy, artificial intelligence in education, higher education.

CHAPTER ONE

The Problem and Its Setting

Introduction

Adult learners—mature students often balancing postsecondary education with employment and family responsibilities—represent a vital yet distinct division of the higher education landscape (Kasworm, 2020; NCES, 2021). In fall 2022, approximately 2.9 million students aged 25 and older were enrolled in undergraduate programs in the United States, comprising 23% of the nation's 12.8 million undergraduates (BestColleges, 2023). This demographic is expected to grow significantly, with Gen Z adult learners projected to increase from 31% of the adult learner population in 2024 to 60% by 2031 (Meet Your New Graduate and Adult Learner Infographic, 2024).

Despite their growing presence, adult learners face unique challenges compared to traditional undergraduates. Among these challenges is impostor syndrome, a psychological pattern characterized by persistent self-doubt and fear of being exposed as a fraud (Clance & Imes, 1978; Bravata et al., 2020). While initially identified among high-achieving women, impostor syndrome is now recognized as affecting diverse populations, including undergraduate and graduate students across various disciplines (Parkman, 2016; Gómez-Morales, 2021). Adult learners, in particular, may experience heightened susceptibility to impostor syndrome due to the compounded pressures of social expectations and institutional demands (Ramsey & Brown, 2019). These complexities are further amplified as higher education institutions increasingly integrate artificial intelligence (AI) and other emerging tools, making technology a central part of adult learners' academic experiences.

While adult students navigate complex life roles, technological advancements in higher education add new dimensions to their experiences. Over the past decade, institutions have increasingly adopted AI and other emerging technologies to enhance learning and support services (Zawacki-Richter et al., 2019). These tools—such as virtual assistants, automated grading systems, and personalized learning platforms—offer flexibility and convenience, which are especially valuable for adult learners managing busy schedules. However, despite their growing adoption, many colleges and universities still lack formal policies or clear guidelines on the ethical use, implementation, and oversight of AI tools in educational settings. The absence of such policies may leave both students and faculty uncertain about best practices and exacerbate underlying concerns. Moreover, the integration of AI may unintentionally intensify impostor syndrome, particularly among those with limited digital literacy, by exacerbating feelings of inadequacy or self-doubt (Holmes & Tuomi, 2022). Additionally, persistent issues of digital equity, such as unreliable internet access, outdated devices, or insufficient technology training, can further erode confidence and heighten impostor-like anxieties (van Deursen, 2020).

Although research has explored the prevalence of impostor syndrome and its impact on academic performance (Vergauwe et al., 2020), there remains a notable gap in understanding how adult learners perceive and navigate these challenges in the context of evolving technological demands. This gap in understanding extends beyond academic curiosity; it holds significant implications for higher education leaders, faculty, and policymakers. Existing studies have primarily examined impostor syndrome among younger students, leaving a critical gap in research regarding how adult learners experience and cope with these challenges in technology-driven educational settings. Addressing how adult learners perceive and navigate impostor

syndrome in technology-rich contexts is essential for promoting equitable access and creating supportive environments for adult students.

When adult learners face heightened self-doubt or lack the necessary digital resources, their academic and professional growth may be hindered—a situation that could also impact broader workforce development and lifelong learning initiatives. Such challenges may have long-term implications for workforce readiness and place additional strain on adult education programs. This study specifically sought to understand how adult learners describe their experiences with impostor syndrome in technology-rich higher education contexts.

The purpose of this qualitative study was to explore how adult learners in higher education experience impostor syndrome, examining their perceptions, challenges, and coping strategies within technology-rich academic settings. By investigating the relationship between impostor syndrome and varying levels of technological access and usage, this research sought to illustrate the unique perspectives of adult learners and to provide actionable insights for institutions. Ultimately, this study aimed to strengthen pathways to success for this increasingly vital segment of the student population.

Theoretical Approaches

Three theoretical approaches guided this research: Critical Digital Literacy Framework (Freire, 1970; Lankshear & Knobel, 2008), Impostor Phenomenon Framework (Clance & Imes, 1978), and Self-Determination Theory (SDT) (Deci & Ryan, 1985). Each approach offered a unique lens for understanding the relationship between psychological pressures, digital literacy, and institutional support. Together, these frameworks provided a comprehensive foundation for analyzing the multifaceted experiences of adult learners.

The Critical Digital Literacy Framework provided a comprehensive approach to understanding the relationship between digital literacy, equity, and empowerment within technology-driven contexts. At its core, this framework drew on Freire's critical pedagogy (1970), which emphasized education as a means of liberation through fostering critical awareness and encouraging individuals to challenge systemic barriers. Freire's ideas established education as a pathway to social transformation, emphasizing its role in empowering individuals to take meaningful action.

Building on Freire's principles, Lankshear & Knobel (2008) expanded the scope of literacy to include digital contexts, recognizing the increasing importance of technology in shaping opportunities and access. This framework addressed structural inequities in access to digital resources, such as disparities in internet access, availability of digital devices, and sufficient training to develop digital skills. It also underscored the need to empower learners to critically analyze and engage with digital technologies, moving beyond basic usability to include evaluation, creation, and advocacy within digital spaces (Lankshear & Knobel, 2008).

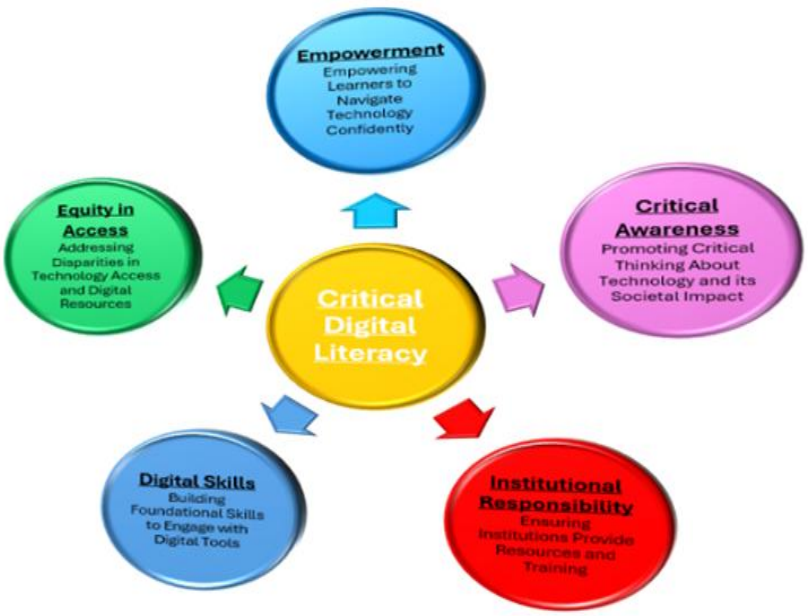

Figure 1: Critical Digital Literacy (developed by the author based on Freire, 1970; Lankshear & Knobel, 2008).

Figure 1 illustrates five interconnected elements central to critical digital literacy: Equity in Access, Empowerment, Critical Awareness, Digital Skills, and Institutional Responsibility. Each element highlights a specific aspect of the framework. For instance, "Equity in Access" addresses systemic disparities in digital resources, while "Empowerment" focuses on building learners' confidence to navigate technology effectively. "Critical Awareness" promotes reflective thinking about the societal impacts of technology, and "Digital Skills" emphasize foundational competencies required for effective engagement. Finally, "Institutional Responsibility" underscores the role of organizations in providing the necessary resources and training to bridge gaps in access and literacy. Together, these components form an integrated strategy for addressing barriers to digital participation and fostering social equity.

This framework also highlights how inequities in digital literacy can impact learners' confidence and exacerbate impostor syndrome. For example, Holmes and Tuomi (2022) noted that individuals with limited digital proficiency often experience heightened anxiety when working with advanced technologies like artificial intelligence. Similarly, van Deursen (2020) observed that digital inequalities, particularly during the COVID-19 pandemic, significantly influenced individuals' access to online resources and their ability to use them effectively. By addressing these disparities, institutions can support the development of critical digital literacy and promote equitable access to opportunities in the digital age.

The impostor phenomenon introduced by Clance and Imes (1978), provides insight into the psychological experiences of high-achieving individuals who perceive themselves as "frauds," despite clear evidence of their accomplishments. This phenomenon is particularly

pronounced in adult learners, who often juggle academic, professional, and personal responsibilities, creating conditions that exacerbate feelings of self-doubt and inadequacy (Kasworm, 2020; NCES, 2021). Common symptoms include perfectionism, fear of failure, and a tendency to attribute success to external factors rather than personal ability (Bravata et al., 2020).

The terms Impostor Phenomenon and Impostor Syndrome are often used interchangeably in academic and popular literature. The term Impostor Phenomenon was originally introduced by Clance and Imes (1978) to describe the psychological pattern of persistent self-doubt and fear of being exposed as a "fraud." Over time, the term Impostor Syndrome has become more widely recognized and is commonly used in both academic and public discourse (Parkman, 2016). For the purpose of this study, the terms are treated as synonymous, and Impostor Syndrome is used predominantly for consistency and accessibility (Parkman, 2016; Bravata et al., 2020).

Figure 2: Impostor Syndrome (developed by the author based on Clance & Imes, 1978).

Figure 2 highlights the interconnected factors that intensify impostor syndrome, particularly in technology-rich educational environments. At the center of the framework is impostor syndrome, characterized by persistent feelings of self-doubt. Surrounding this core are

five contributing factors: challenges with AI tools, digital equity barriers, limited institutional support, impact on confidence, and feelings of self-doubt. For instance, Holmes and Tuomi (2022) note that the introduction of advanced technologies, such as artificial intelligence (AI), often overwhelms learners with limited digital skills, amplifying their impostor-like feelings. Additionally, inequitable access to digital resources, such as unreliable internet or outdated devices, further compounds these challenges, as noted by NCES (2021).

Limited institutional support—such as inadequate training or the absence of guidance—exacerbates these struggles, leaving learners feeling unprepared and isolated. These barriers collectively erode confidence, making learners hesitant to trust their abilities or engage with new technologies. The impact on confidence is cyclical, as diminished self-assurance perpetuates the cycle of self-doubt, leading to further disengagement and heightened anxiety.

The framework, visualized in Figure 2, underscores the complex and interrelated nature of these factors. The dashed connections between elements reflect their reciprocal influences, emphasizing the need for comprehensive, holistic strategies to address both technological and psychological dimensions. For example, institutions can mitigate these challenges by offering targeted training programs, equitable access to digital tools, and consistent support structures to empower learners to overcome impostor syndrome and thrive in technology-enhanced learning environments. By examining the dynamic interplay of these factors, the Impostor Phenomenon Framework provides a critical perspective on how educational institutions can support adult learners in overcoming barriers to confidence and success.

Self-Determination Theory (SDT), developed by Deci and Ryan (1985), proposes that motivation and well-being are driven by the fulfillment of three fundamental psychological needs: autonomy, competence, and relatedness. Autonomy reflects the need for self-direction and

control, enabling individuals to feel that their choices align with their values and goals. Competence represents the need to feel capable and effective in achieving desired outcomes, while relatedness highlights the importance of supportive social connections and relationships (Ryan & Deci, 2000). Together, these components form the foundation for intrinsic motivation, which is essential for meaningful engagement and success in learning environments.

Figure 3: Self Determination Theory (developed by the author based on Deci & Ryan, 1985; Ryan & Deci, 2000).

Figure 3 illustrates how these three components—autonomy, competence, and relatedness—interconnect to drive motivation. When these psychological needs are met, learners are more likely to engage deeply in their tasks, achieve positive learning outcomes, and experience well-being. Conversely, environments that fail to support these needs can result in heightened anxiety, diminished motivation, and reduced performance (Ryan & Deci, 2000). For example, a lack of autonomy in rigid educational settings or insufficient institutional support for skill development may hinder learners' ability to thrive.

Personalized AI learning tools, for instance, can promote flexibility and enhance learning outcomes by addressing autonomy and competence. However, for learners with limited digital skills, such technologies can inadvertently undermine confidence, exacerbating feelings of inadequacy (Shen & Wang, 2024). SDT provides a valuable framework for analyzing how supportive environments—through the provision of accessible resources, inclusive technology, and relationship-building opportunities—can mitigate challenges like impostor syndrome and foster intrinsic motivation.

Conceptual Framework

The conceptual framework of this study brought together three theoretical approaches—Critical Digital Literacy Framework, Impostor Phenomenon Framework, and Self-Determination Theory (SDT)- to examine the experiences of adult learners navigating technology-rich higher education environments. Each approach provided a unique lens for understanding how external and internal variables interacted to influence learners' motivation, confidence, and performance.

The Critical Digital Literacy Framework focused on the external variables of digital literacy and technology access. Disparities in access to reliable internet, up-to-date devices, and adequate training (Holmes & Tuomi, 2022; NCES, 2021) can create equity challenges that impact learners' ability to engage confidently with digital tools. These barriers are particularly relevant for adult learners who may already feel marginalized in academic settings due to socioeconomic factors or limited prior exposure to technology.

The Impostor Phenomenon Framework examined the internal variables of self-doubt, fear of failure, and perceived inadequacy (Clance & Imes, 1978). Adult learners, balancing professional and personal responsibilities alongside academic demands, often experience heightened impostor syndrome (Kasworm, 2020; Bravata et al., 2020). This self-doubt can be

exacerbated by the rapid integration of AI technologies, as learners with limited digital literacy may struggle to adapt, further eroding their confidence (Holmes & Tuomi, 2022).

Finally, Self-Determination Theory (SDT) highlighted the psychological needs of autonomy, competence, and relatedness as intrinsic motivators (Deci & Ryan, 1985; Ryan & Deci, 2000). Autonomy and competence are particularly relevant for understanding how adult learners engaged with personalized AI learning tools. While these tools can enhance flexibility and support self-directed learning, they may also undermine competence for learners who lack digital skills or feel unsupported by institutional resources (Shen & Wang, 2024). Relatedness further emphasized the need for supportive relationships and community connections to reduce feelings of isolation and impostor-like tendencies.

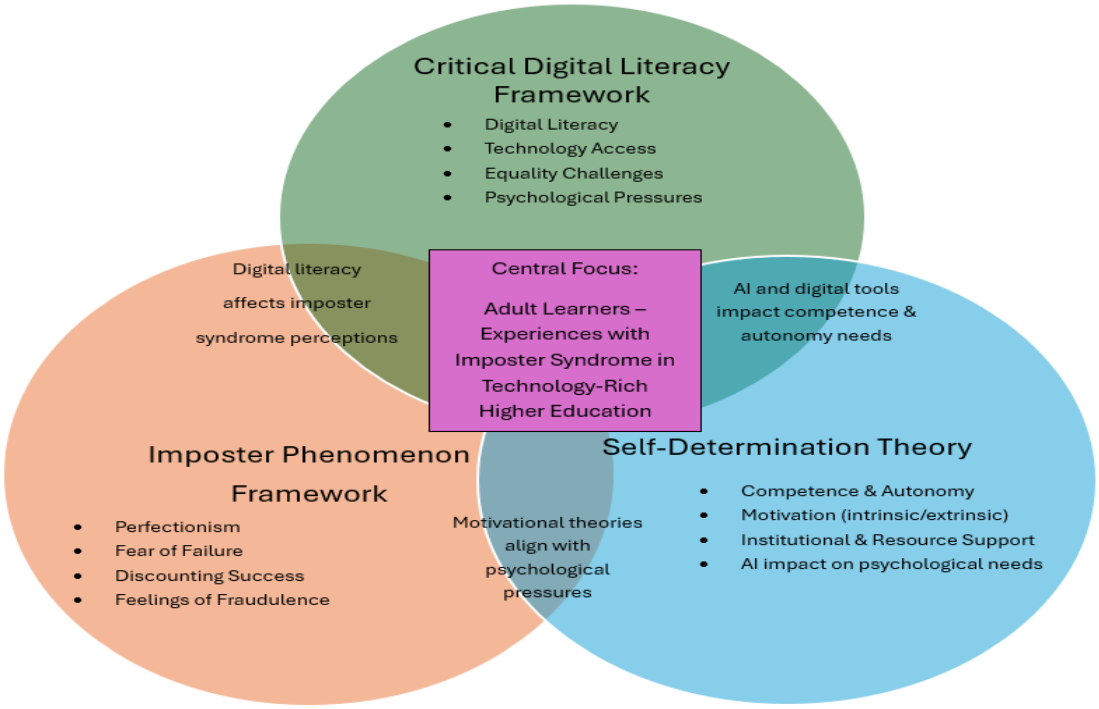

Figure 4: Theoretical Approaches (developed by the author)

Figure 4 visually integrates these theories and framework, illustrating how variables such as digital literacy, impostor syndrome, and psychological needs intersect to impact motivation and learning outcomes. The overlapping sections reflect the interdependence of these variables,

emphasizing the need for holistic solutions. For instance, fostering intrinsic motivation through autonomy-supportive environments, while simultaneously addressing digital equity barriers and providing psychological support, can help mitigate impostor syndrome and empower learners.

This integrated framework highlights the importance of institutional responsibility in addressing both technological and psychological dimensions. By creating equitable access to resources, offering targeted digital skills training, and fostering inclusive, autonomy-supportive environments, institutions can support adult learners in overcoming impostor syndrome and achieving academic success.

Purpose Statement

The purpose of this qualitative study was to employ a phenomenological epistemological approach to explore the lived experiences of adult learners attending higher education institutions in Pennsylvania—including campuses in Northeastern Pennsylvania and the Lehigh Valley region—who experience impostor syndrome. This study examined their perceptions, challenges, and coping strategies. For the purpose of this study, impostor syndrome was conceptually defined as a psychological pattern in which individuals doubt their achievements.

Research Question

How do adult learners attending higher education institutions in Northeastern Pennsylvania and the Lehigh Valley region perceive and navigate their lived experiences with impostor syndrome in technology-rich environments?

Sub-questions

1. How do adult learners describe the impact of impostor syndrome on their academic performance and engagement in higher education?

2. In what ways do adult learners view AI tools as either enhancing or detracting from their learning experience?
3. How do adult learners describe their access to technology (e.g., hardware, software, internet) in higher education?

Additional areas, including coping strategies, confidence using AI, and barriers to equitable digital access, were explored through the semi-structured interview guide (Appendix E). These areas remained central to the study and informed the thematic analysis.

Definitions of Terminology

Adult learners are typically defined as mature students (often aged 25 and older) who engage in postsecondary education while managing multiple life roles, such as employment and family responsibilities (Kasworm, C.,2020). In this study, adult learners were individuals aged 25 years or older, currently enrolled in a two-year community college or four-year accredited higher education institution, who self-identified as having responsibilities (e.g., employment, caregiving) in addition to their academic pursuits.

Experiences are typically defined as the subjective interpretations and meanings individuals derived from their interactions with people, environments and events (Nickerson, 2023). In this study, experiences were participant-reported narratives collected through semi-structured interviews, describing perceptions, emotions, and interpretations related to impostor syndrome, AI tool use, and technology access.

Higher Education typically refers to formalized, post-secondary educational systems and institutions that confer academic degrees and credentials such as associate's, bachelor's, master's, and doctoral levels (Marginson, 2016). In this study, Higher Education was defined as

enrollment in a recognized, accredited institution that offers post-secondary degree programs at the undergraduate or graduate level.

Impostor Syndrome (also known as the impostor phenomenon) is typically defined as a persistent psychological experience characterized by self-doubt, feelings of intellectual fraudulence, and a fear of exposure as inadequate, despite clear evidence of competence and achievements (Bravata et al., 2020). In this study, Impostor Syndrome described the Participant self-descriptions indicating persistent doubt in their academic competence, fear of being "found out" as unqualified, and reluctance to internalize their accomplishments, as identified through conceptual analysis of interview transcripts.

The Lehigh Valley is a major metropolitan region in eastern Pennsylvania, encompassing Lehigh and Northampton Counties and anchored by the cities of Allentown, Bethlehem, and Easton (U.S. Census Bureau, 2020). Spanning approximately 40 miles in length and 20 miles in width, the area is bounded by Blue Mountain to the north, South Mountain to the south, Lebanon Valley to the west, and the Delaware River/New Jersey border to the east (Discover Lehigh Valley, 2025). With a 2020 population of around 861,889, it is the third-largest metro region in Pennsylvania (U.S. Census Bureau, 2020). Historically rooted in steel and heavy manufacturing—most notably Bethlehem Steel—the Lehigh Valley has transitioned into a diversified economy driven by logistics, healthcare, education, and technology (Lehigh Valley Economic Development Corporation [LVEDC], 2024). Communities such as Center Valley and Bethlehem fall within this region, making them highly relevant to this study's educational and geographic context (LVEDC, 2024)

Lived Experiences refer to an individual's firsthand, personal engagement with an event encompassing their emotions, thoughts, perceptions, and interactions within a specific context.

Lived experience was used to emphasize the subjective, and deeply personal nature of how individuals experience and make sense of events in their lives (Van Manen, 1990). In this study, lived experience referred to how adult learners navigate impostor syndrome within technology-rich higher education environments, including their perceived challenges, coping mechanisms, and the role of digital literacy and AI tools in shaping their self-efficacy and academic identity.

Non-traditional students referred to individuals who do not follow the typical pathway of enrolling in higher education immediately after high school. These students often balanced academic responsibilities with employment, caregiving, financial independence, or military service. They also included those pursuing education part-time, returning to school after a gap, or enrolling in online and hybrid learning environments (Kasworm, 2020). For the purposes of this study, non-traditional students were defined as students aged 25 or older who are currently enrolled in higher education while managing additional life responsibilities, such as full-time employment, caregiving duties, or financial independence. In this study, the terms "adult learners" and "non-traditional students" were used interchangeably to describe this population.

Northeastern Pennsylvania (NEPA) is a geographic region of Pennsylvania that includes the Pocono Mountains, the Endless Mountains, and the industrial cities of Scranton, Wilkes-Barre, Pittston, Hazleton, Nanticoke, and Carbondale (DiscoverNEPA, 2025). The region is characterized by a mix of urban and rural communities, a diverse economy, and multiple higher education institutions serving both traditional and adult learners (DiscoverNEPA, 2025). Historically, NEPA has roots in coal mining and manufacturing but has diversified into healthcare, education, and technology sectors (DiscoverNEPA, 2025). In this study, Northeastern Pennsylvania (NEPA) referred specifically to the geographic area encompassing higher education institutions that provide programs for adult learners in counties including Lackawanna,

Luzerne, Monroe, and Northampton. These institutions include but are not limited to community colleges, private liberal arts colleges, and public universities that offer online, hybrid, or in-person educational opportunities for non-traditional students.

Delimitations

This study was delimited to adult learners, individuals aged 25 and older, who were currently enrolled in accredited higher education institutions. The institutional focus was delimited to two higher education institutions located in both NEPA region, providing a targeted yet geographically diverse context. This intentional setting allowed for a thorough exploration of the adult learner population within these locations, generating insights that were contextually relevant and reflective of the unique challenges and resources inherent to such environments.

The study was also methodologically delimited through the use of a qualitative phenomenological epistemological approach, which limited the inquiry to an in-depth exploration of participants' lived experiences (Creswell & Poth, 2018). This methodological delimitation intentionally excluded surveys, focus groups, and quantitative assessments, thereby bounding the study to rich, individualized accounts rather than broad generalization.

Additionally, the study was temporally delimited to participants' experiences of impostor syndrome during a single academic semester. This time frame ensured the research remained focused on the immediate interaction between impostor syndrome and the educational demands of adult learners, rather than attempting to capture longitudinal developments or the interplay of multiple psychological constructs.

Assumptions

This study operated under the fundamental assumption that participants would respond to the interview questions honestly and thoughtfully, offering genuine insights into their

experiences and perceptions of impostor syndrome. This assumption was critical to the research process, as it ensured that the data collected reflected participants' authentic perspectives and formed a trustworthy foundation for exploring their lived experiences within the defined context.

Significance of Study

This study offered a critical pathway for understanding and addressing the changing dynamics of higher education and the distinct challenges faced by adult learners. Adult learners, those aged 25 and above, who manage academic, professional, and personal obligations, constitute an expanding and essential portion of the student demographic in the United States (Kasworm, 2020; NCES, 2021). By 2031, this cohort will constitute 60% of the adult learner population (Meet Your New Graduate and Adult Learner Infographic, 2024). Adult learners, essential for workforce development and lifelong learning, frequently face distinct psychological obstacles, such as impostor syndrome, which can impede their academic and professional advancement (Ramsey & Brown, 2019).

As higher education progressively incorporates artificial intelligence (AI) and digital technology (Zawacki-Richter et al., 2019), the experiences of adult learners grow increasingly complex. Although new technologies provide flexibility and efficiency, they may also intensify impostor syndrome in students with little digital literacy or lack of technology resources (Holmes & Tuomi, 2022). Confronting these multifaceted problems is essential for promoting individual achievement and guaranteeing equity and inclusivity in higher education.

This study addressed a significant gap in the literature by investigating the interaction of impostor syndrome, technology, and digital equity from the perspective of adult learners. While research has explored impostor syndrome in professional and academic settings (Bravata et al., 2020; Parkman, 2016), there is limited scholarship on how adult learners, particularly those in

technology-rich higher education environments experience and navigate these challenges (Ramsey & Brown, 2019). Additionally, studies on digital literacy and AI-enhanced education have primarily focused on younger, traditional students, often overlooking the distinct challenges that adult learners face in adapting to evolving technological demands (Makransky et al., 2023; Holmes & Tuomi, 2022). There is also a lack of integrated theoretical frameworks that simultaneously examine impostor syndrome, digital literacy, and self-determination theory in adult education, leaving a gap in understanding how these factors interact to shape student engagement and success (Zawacki-Richter et al., 2019).

By addressing these gaps, this study provided valuable insights for higher education institutions seeking to create more inclusive, supportive learning environments for adult learners. The findings will guide the formulation of supporting policies, practices, and resources aimed at alleviating impostor-related fears, improving digital literacy, and fostering more equitable access to technology-enhanced instruction.

Furthermore, this study had significant implications for institutional leaders, policymakers, and educators committed to improving student well-being and retention. Understanding and addressing the barriers faced by adult learners can enhance academic persistence, increase digital confidence, and strengthen workforce preparedness, ultimately supporting the development of lifelong learners vital for a dynamic and adaptable society.

CHAPTER 2

Literature Review

Introduction

Since the early 21st century, higher education has undergone significant transformations, driven by rapid developments in digital learning and shifts in student demographics. The

expansion of the internet and the rise of online learning platforms have made education more flexible and accessible, particularly for non-traditional students—students who engage in postsecondary education while managing multiple life roles, such as employment and family responsibilities (Kasworm, 2020). As the emphasis on lifelong learning as a means of career advancement grows, institutions have responded by developing programs designed to help adult learners enhance their skills and credentials while accommodating their diverse needs (Kasworm, 2020).

Despite the increased accessibility of education, many adult learners encounter significant psychological and structural barriers that hinder their academic success. One of the most prevalent challenges is impostor syndrome, a psychological phenomenon characterized by persistent self-doubt and the fear of being exposed as intellectually fraudulent, despite evident achievements (Canning et al., 2020). This experience is particularly pronounced among adult learners, who often perceive themselves as lacking the academic preparedness or technological competency of their younger peers (Makransky et al., 2023). Although impostor syndrome has been widely studied among traditional college students and professionals, fewer studies have examined how it manifests in adult learners returning to higher education, particularly in online or AI-supported learning environments.

Compounding this issue is the rapid advancement of digital learning tools, which many adult learners struggle to navigate effectively, intensifying their feelings of academic inadequacy. Additionally, AI-driven education has further complicated the landscape, with some adult learners feeling overwhelmed by AI-integrated learning environments, while others benefit from AI-supported personalized learning experiences. As a result, impostor syndrome can lead to

increased stress, decreased academic engagement, and an overall sense of isolation in higher education settings.

Beyond impostor syndrome, adult learners frequently struggle with additional psychological barriers, including anxiety, low self-esteem, and a lack of confidence in their academic abilities (Meijers et al., 2023). These psychological challenges often stem from prolonged absences from formal education, prior negative academic experiences, or difficulties adapting to digital learning environments (Zawacki-Richter et al., 2019). Furthermore, the growing reliance on technology in higher education—while offering numerous benefits—can further exacerbate feelings of inadequacy among adult learners with limited digital literacy (Zawacki-Richter et al., 2019). Many adult learners struggle to keep pace with rapidly evolving educational technologies, leading to increased frustration and disengagement from the learning process (van Deursen, 2020). Emerging research suggests that AI tools can either mitigate or exacerbate these challenges depending on their implementation, highlighting the need for more nuanced investigations into AI's role in shaping adult learners' experiences. This intersection between impostor syndrome and digital literacy creates a unique set of challenges, demonstrating the need for a more supportive educational framework that addresses these challenges holistically.

While existing studies quantify the barriers adult learners face, there is limited research exploring their lived experiences, particularly how they navigate impostor syndrome and digital literacy challenges in technology-rich learning environments. Few studies have examined these issues specifically from the perspective of adult learners navigating technology-rich higher education environments. This study seeks to address this gap by focusing on adult learners' narratives and meaning-making processes in digital learning settings, exploring how these

perceptions influence their academic engagement and self-efficacy. Moreover, the study will analyze how adult learners perceive and engage with AI-driven learning tools, investigating whether AI-based support systems enhance or hinder their academic confidence. The research is guided by the following central question: How do adult learners perceive and navigate impostor syndrome in technology-rich higher education settings?

This discussion is organized into several key sections. The first section conceptualizes adult learners, exploring their demographic trends, characteristics, and evolving roles in higher education. The following section examines impostor syndrome, focusing on its prevalence, contributing factors, and implications for nontraditional students. Next, the review shifts to digital literacy, analyzing the role of technology in adult education and how digital competency gaps contribute to academic struggles. A subsection will explore the impact of AI-driven educational technologies on adult learners, examining how AI influences both digital literacy development and impostor syndrome experiences. The final sections explore the intersection of impostor syndrome and digital literacy, emphasizing how these factors collectively impact student success. The review concludes by identifying the best practices and institutional strategies that can help mitigate these challenges, offering recommendations for creating a more inclusive and supportive educational environment.

By synthesizing the existing body of knowledge, this study contributes to the ongoing discourse on adult learners in higher education, aiming to inform policy development, instructional design, and institutional practices that promote student success. Through a qualitative approach, this research seeks to amplify the voices of adult learners, capturing their unique experiences with impostor syndrome and digital literacy challenges often overlooked in quantitative studies. Furthermore, this research will provide critical insights into the implications

of AI-based learning tools for adult learners, ensuring that digital education strategies are designed to empower rather than alienate nontraditional students.

Conceptualizing Adult Learners in Higher Education

Historical Background of Adult Learning

The concept of adult education has evolved significantly over time, reflecting societal changes and the growing recognition of lifelong learning. Historically, formal education was primarily reserved for the young, with adults gaining knowledge through apprenticeships, religious instruction, or community-based learning (Knowles, 1980). However, the Industrial Revolution marked a pivotal shift, as the demand for a more educated workforce prompted the establishment of formal adult education programs in the United States and Europe (Merriam & Bierema, 2013). During this period, German educator Alexander Kapp introduced the term "andragogy" to describe the principles of adult learning, distinguishing it from pedagogy, which focuses on child learning (Henschke, 2011). This distinction was later expanded by Malcolm Knowles, who emphasized self-direction, intrinsic motivation, and the role of lived experiences as key elements of adult learning (Knowles, Holton, & Swanson, 2015).

In the United States, the late 19th and early 20th centuries saw the emergence of institutions dedicated to adult education. For example, the Chautauqua Institution, founded in 1874, pioneered non-traditional, vacation-based adult learning programs, offering courses in history, literature, and public affairs (Trollinger, 2013). Around the same time, universities such as Harvard and Cornell developed extension programs to provide higher education opportunities beyond traditional college-aged students (Graff, 2018). These initiatives laid the foundation for continuing education movements that expanded throughout the 20th century, demonstrating the

increasing acknowledgment of adult education as a critical component of workforce development and personal advancement.

The expansion of community colleges during the postwar era marked a transformative shift in adult education, offering accessible, affordable, and flexible learning opportunities tailored to working adults and lifelong learners. These institutions provided accessible, affordable, and flexible learning opportunities for working adults and those seeking career advancement. According to Cohen, Brawer, and Kisker (2014), community colleges have played a crucial role in increasing higher education access for non-traditional students, particularly those balancing education with employment and family obligations. The flexible scheduling, online course options, and open admissions policies of community colleges have made them a central avenue for adult learners striving to upskill and remain competitive in evolving job markets.

The mid-20th century marked a turning point in adult education policy, as federal legislation sought to increase access to higher learning. The Economic Opportunity Act of 1964 provided federal funding for Adult Basic Education (ABE), reinforcing the role of education in poverty reduction and economic mobility (U.S. Department of Education, 2019). This was followed by the Higher Education Act of 1965, which introduced financial aid options specifically designed for adult and nontraditional students (Kasworm, 2020). Further legislative advancements, such as the Workforce Innovation and Opportunity Act (WIOA) of 2014, have reinforced the role of adult education in workforce development, emphasizing skill-building programs in high-demand industries (U.S. Department of Labor, 2020). These policies signified a growing recognition that adult learners play a crucial role in the workforce and require flexible educational pathways to succeed.

In recent decades, technological advancements, including online learning platforms and AI-driven educational tools, have further reshaped adult learning. Programs such as MOOCs (Massive Open Online Courses) and competency-based education have expanded access, allowing adults to learn at their own pace while balancing work and personal responsibilities (Fischer, Hilton, Robinson, & Wiley, 2021). Additionally, AI-driven tutoring systems, adaptive learning technologies, and digital credentialing programs have enabled personalized and skills-focused education (Xie, Heddy, & Greene, 2021). These innovations have been particularly beneficial for adult learners who experience impostor syndrome in technology-rich environments, as they provide flexible, low-stakes opportunities to build digital literacy and confidence (Clance & Imes, 1978; Parkman, 2016).

The evolving landscape of adult education also underscores the increasing diversity within the adult learner population. Many students are first-generation college students, military veterans, career changers, or individuals returning after long educational gaps (Kasworm, 2018). These learners often face psychological and emotional challenges, including self-doubt, learning anxiety, and concerns about belonging in academic spaces (Brookfield, 2013). Understanding these cognitive and emotional dimensions is critical for addressing barriers to persistence and success, particularly as institutions expand digital and remote learning opportunities.

More recent policy initiatives continue to emphasize the need for greater access and support for adult learners. For example, the expansion of Pell Grants for short-term credential programs and employer-sponsored tuition assistance have improved opportunities for career advancement among non-traditional students (U.S. Department of Education, 2022). Additionally, policies encouraging AI literacy and digital skills training reflect the growing

recognition that technological fluency is essential for both academic and professional success (Bates, 2020).

As the landscape of higher education continues to evolve, understanding the intersection of digital access, psychological barriers, and policy frameworks is essential to supporting adult learners. The integration of AI-driven learning tools and flexible educational models highlights the importance of addressing impostor syndrome and digital literacy within this population. These considerations are particularly relevant as institutions strive to develop equitable learning environments that foster confidence, motivation, and academic success for adult students.

Adult Learners and Demographic Trends

Today, adult learners—often referred to as non-traditional students—are defined as individuals aged 25 and older who pursue post-secondary education while balancing multiple life roles, such as employment, family responsibilities, and financial commitments (National Center for Education Statistics [NCES], 2023). Unlike traditional students, who typically enroll in higher education immediately after high school, adult learners often delay or interrupt their academic journeys due to external obligations. They may attend college part-time, work full-time, or have caregiving responsibilities, necessitating greater flexibility in learning formats (Kasworm, 2020).

The adult learner population constitutes a substantial portion of higher education students. As of Fall 2023, overall postsecondary enrollment increased by approximately 476,522 students, marking a 2.5% rise compared to Fall 2022 (National Center for Education Statistics [NCES], 2025). This increase is particularly notable given the previous decade's declining college enrollment rates, which were exacerbated by the COVID-19 pandemic and shifting workforce demands (National Student Clearinghouse, 2023). This growth was primarily driven

by older students, with first-year students aged 25 and older increasing by 6.5%, while those aged 21 to 24 saw a 6% rise. In contrast, there was no growth among traditional-age first-year students (20 years old or younger) (Higher Ed Dive, 2024). Many of these learners are employed while pursuing their degrees, with a significant proportion working full-time (Best Colleges, 2023). Additionally, a considerable number of adult learners have dependent children, further adding to their responsibilities outside of academia (Best Colleges, 2023).

Another key demographic trend is the increasing representation of women in adult education. According to the National Center for Education Statistics (NCES, 2023), women make up nearly 60% of all non-traditional students, often returning to higher education to advance their careers, gain financial stability, or reenter the workforce after caregiving responsibilities. Women adult learners are also more likely than their male counterparts to enroll in online or hybrid programs due to the flexibility these formats provide for balancing academic, professional, and family obligations (Johnson, 2021).

In addition to gender representation, recent research highlights the growing racial and socioeconomic diversity within the adult learner population. A 2022 report by BestColleges found that Black students comprised 18.5% of adult learners, with more than one-third (39%) of all Black degree seekers being adult learners. Similarly, Latinx students accounted for 18.5% of adult learners, making up 30% of all Hispanic students in higher education. Asian students represented 11.7% of adult learners, with 37% of all Asian degree seekers falling into this category (BestColleges, 2022).

This growing diversity has significant implications for institutional support, as nontraditional students often require tailored resources to address unique challenges. The American Council on Education (ACE, 2024) reports that, despite the increasing enrollment of

racially diverse adult learners, disparities in educational attainment and completion rates persist, particularly among students from lower-income backgrounds (Inside Higher Ed, 2024). Additionally, first-generation adult students often encounter barriers such as financial insecurity, limited institutional support, and inadequate access to technology, further widening educational gaps (Insight Into Diversity, 2024). As a result, higher education institutions must implement targeted financial aid programs, flexible learning pathways, and digital literacy support to ensure the academic success of nontraditional students.

In addition to financial and logistical challenges, adult learners often encounter psychological and social barriers. Research on the impostor phenomenon indicates that many adult learners struggle with feelings of self-doubt and academic insecurity, particularly those returning to education after a long absence (Parkman, 2016). These challenges are further compounded by digital literacy gaps, which can hinder engagement in online and technology-enhanced learning environments (Bates, 2020). Institutions are responding to these concerns by integrating digital literacy training, peer mentoring, and personalized advising to support adult learners in overcoming these obstacles (Kahu & Nelson, 2018).

Furthermore, adult learners increasingly enroll in competency-based education (CBE) programs, which allow students to progress at their own pace by demonstrating mastery of subject matter rather than following a fixed academic calendar (Voorhees & Milam, 2020). CBE programs have been particularly beneficial for working professionals and military veterans, as they provide credit for prior learning and allow students to accelerate their education without redundancy in coursework (American Council on Education, 2022). The rising adoption of micro-credentials and stackable certificates further reflects the shift toward more modular and

skills-focused learning approaches, enabling adult learners to earn workforce-relevant credentials without committing to a full degree program (Fain, 2021).

As demographic shifts continue to shape higher education, institutions must adapt to the evolving needs of adult learners by expanding access to flexible learning models, enhancing financial aid structures, and addressing the psychological and digital barriers that non-traditional students face. Understanding these trends is crucial for designing policies and programs that foster the success of this growing and diverse population.

Impostor Syndrome

Theoretical Background

Impostor Syndrome (also referred to as the Impostor Phenomenon) was first identified by Clance and Imes (1978) as a psychological experience in which individuals persistently doubt their achievements and fear being exposed as intellectual frauds. Despite external evidence of competence, those affected by impostor syndrome struggle to internalize their successes and attribute their success to luck, external factors, or deception rather than their own ability. Impostor syndrome is commonly associated with high-achieving individuals and has been observed across various professional and academic domains (Bravata et al., 2020).

The phenomenon is characterized by several cognitive and emotional traits, including self-doubt, perfectionism, fear of failure, and an inability to accept praise (Bravata et al., 2020; Hutchins, 2015). These traits contribute to an ongoing cycle in which individuals work excessively to prove their worth, experience short-term relief from success, but ultimately revert to feelings of fraudulence upon encountering new challenges (Clance, 1985). While impostor syndrome was initially studied in high-achieving women, contemporary research demonstrates

that it affects individuals of all genders and backgrounds, particularly those in high-pressure environments such as higher education (Parkman, 2016).

Recent studies suggest that impostor syndrome is particularly prevalent among non-traditional students, including adult learners, first-generation college students, and individuals from underrepresented backgrounds (Ramsey & Brown, 2019; Vergauwe et al., 2020). These students often face additional pressures related to work-life balance, financial constraints, and adapting to unfamiliar digital learning environments, all of which can amplify feelings of self-doubt and perceived inadequacy (Craddock et al., 2011).

In the context of adult learners, Knowles' (1980) Andragogy framework provides insight into how impostor syndrome disrupts self-directed learning (Brookfield, 2017). Knowles emphasized that adult learners thrive in autonomous, self-guided educational environments, yet those experiencing impostor syndrome may struggle with self-confidence and second-guess their ability to manage their own learning effectively (Brookfield, 2017). Instead of feeling empowered, they may seek excessive reassurance from instructors or peers, reinforcing dependency rather than autonomy.

Similarly, Mezirow's (1991) Transformative Learning Theory suggests that adult learners undergo a significant shift in perspective when engaging with new knowledge and experiences. However, impostor syndrome can act as a psychological barrier that prevents adult learners from fully embracing academic identity changes. For example, when confronted with new digital tools, advanced academic writing expectations, or younger peers who appear more adept with technology, adult learners may perceive themselves as outsiders and struggle to engage in the learning process (Mezirow, 1991; Kegan, 2009). This reluctance to embrace transformative learning can lead to avoidance behaviors, such as reluctance to engage in group work, reluctance

to use AI-powered educational tools, or hesitation to pursue academic leadership roles (Hutchins & Rainbolt, 2017).

A study by Hutchins and Rainbolt (2017) further supports this, finding that adult learners experiencing impostor syndrome often fail to integrate new learning experiences into their professional identities, creating a disconnect between acquired knowledge and self-perception. This resistance to transformation can impact long-term career advancement, as adult learners may hesitate to apply new skills in professional settings due to persistent self-doubt. Additionally, research by Casanova et al. (2021) highlights that digital learning environments, while flexible, can exacerbate impostor syndrome by reducing direct social interactions and increasing the reliance on self-guided learning, further intensifying self-doubt among adult learners.

In the context of higher education, impostor syndrome can manifest in various ways, including reluctance to participate in class discussions, avoidance of seeking help from faculty, and heightened anxiety surrounding academic performance. Studies suggest that impostor syndrome is linked to lower self-efficacy, increased stress, and reduced academic persistence (Vergauwe et al., 2020). For adult learners, these effects can be particularly pronounced in online learning contexts, where asynchronous communication and the lack of immediate feedback may contribute to feelings of isolation and academic insecurity (Stone & Springer, 2019). These effects are particularly pronounced among populations who perceive themselves as outsiders in academia, including first-generation college students, racial and ethnic minorities, and adult learners (Ramsey & Brown, 2019).

Given the increasing reliance on AI-enhanced learning tools and digital platforms, it is crucial to explore how impostor syndrome intersects with digital literacy challenges. Studies

indicate that adult learners who struggle with digital fluency often experience heightened anxiety and feelings of fraudulence, particularly when engaging with AI-powered tutoring systems or online learning platforms that assume a baseline level of technological proficiency (Ng, 2022). Addressing these barriers through targeted interventions, such as digital literacy workshops, peer mentoring, and structured faculty support, may help mitigate the negative effects of impostor syndrome in adult learning contexts (Jisc, 2021).

Impostor Syndrome Among Adult Learners

Adult learners often experience impostor syndrome differently from traditional students due to their unique educational trajectories and life circumstances. While traditional students typically transition into higher education directly from secondary school, adult learners frequently return to education after significant time away, leading to heightened feelings of self-doubt and uncertainty (Parkman, 2016). Unlike younger students, who may have more recent academic experience and exposure to digital learning, adult learners often struggle with adapting to new educational technologies, digital literacy expectations, and academic rigor, further exacerbating impostor feelings (Meijers et al., 2023).

One of the primary contributors to impostor syndrome among adult learners is the perception of being academically unprepared compared to their younger peers. Many adult students worry that they lack the foundational knowledge or technical skills necessary to succeed in higher education, leading to feelings of intellectual inadequacy (Makransky et al., 2023). This perception is particularly strong among first-generation adult learners, who may not have access to the same familial or social networks that provide academic guidance and support (Ramsey & Brown, 2019). Research also suggests that racial and ethnic minority adult learners may

experience a compounding effect of impostor syndrome due to systemic inequities in educational access and cultural stereotypes about academic competence (Cokley et al., 2017).

This perception is particularly prevalent in technology-rich learning environments, where digital literacy is assumed rather than explicitly taught. Studies indicate that adult learners who lack confidence in their technological abilities are more likely to experience impostor syndrome, particularly when engaging in online learning or AI-driven educational platforms (Fraenza, 2016). For example, many higher education institutions now rely on AI-enhanced learning management systems, automated grading, and adaptive learning tools, which can create additional stress for adult learners who feel unfamiliar with these technologies (Ng, 2022). Without structured support, these students may disengage from digital learning environments due to fear of failure or comparison with more tech-savvy peers (Stone & Springer, 2019).

A longitudinal study by Bernard et al. (2022) found that adult learners who received structured digital literacy training showed a 28% reduction in self-reported impostor syndrome symptoms over a two-year period. This highlights the importance of designing targeted interventions, such as scaffolded technology instruction, digital mentoring programs, and AI-enhanced study aids, to build confidence among adult learners (Jisc, 2021). Institutions that implement structured digital onboarding programs and workshops see higher rates of persistence and engagement among nontraditional students (Casanova et al., 2021).

Additionally, many adult learners return to higher education due to career transitions and upskilling needs, but they often feel like impostors in both academic and professional settings. Research indicates that workplace impostor syndrome—feeling unqualified despite career experience—can carry over into higher education, particularly in technology-driven fields that demand continuous learning (Bravata et al., 2020). A study by Hutchins and Rainbolt (2017)

found that adult learners in STEM and healthcare fields reported higher levels of impostor syndrome than those in humanities or social sciences, suggesting that career-switchers in highly technical disciplines may experience heightened self-doubt when learning new industry standards. Adult learners who perceive themselves as lagging behind younger colleagues in digital fluency may struggle with impostor feelings in both domains (Makransky et al., 2023).

Additionally, adult learners frequently compare themselves to traditional students, reinforcing their impostor feelings. They may feel out of place in classroom settings, believing that they are slower to grasp new concepts or less adaptable to digital tools than younger students (Parkman, 2016). This self-perception can lead to self-sabotaging behaviors, such as avoiding class participation, procrastinating on assignments, or hesitating to seek academic support (Hutchins, 2015). Impostor-related stress may also manifest physically, with research linking higher rates of anxiety, fatigue, and sleep disturbances to academic self-doubt among adult learners (Peteet et al., 2015). These symptoms, combined with work and family obligations, may increase dropout risks for nontraditional students who struggle to see themselves as belonging in higher education (Johnson & Ozaki, 2021).

The combination of these factors places adult learners at a higher risk of experiencing impostor-related stress and disengagement from their studies. To counteract these effects, universities are increasingly implementing mentorship programs, peer-support networks, and faculty training to recognize and address impostor syndrome among nontraditional students (Bates, 2020). Expanding institutional awareness of these challenges and fostering inclusive learning environments can help reduce self-doubt and enhance adult learners' persistence and success.

Impostor Syndrome and Academic Performance

A study by Parkman (2016) highlights that individuals experiencing impostor tendencies often exhibit high levels of perfectionism and workaholic behaviors, which can lead to burnout and decreased job satisfaction. This is particularly relevant for adult learners who may already be balancing multiple responsibilities. Additionally, research by Hutchins (2015) indicates that mature students in their first year of university often experience feelings of fraudulence and a lack of confidence in their abilities. This transition period involves significant identity changes and the challenge of gaining a sense of belonging within the academic community. Furthermore, a review by Bravata et al. (2020) found that impostor syndrome is widespread in post-secondary populations and may be disproportionately experienced by groups already marginalized within academia, such as women and racialized students. These feelings of being an impostor can lead to psychological distress and impact academic performance.

The relationship between impostor syndrome and academic performance is complex, as feelings of self-doubt can both hinder and, unexpectedly, motivate students. Some adult learners may overcompensate for their impostor feelings by engaging in perfectionistic behaviors, such as spending excessive time on coursework or striving for unrealistically high academic standards (Vergauwe et al., 2020). While this behavior may lead to short-term academic success, it often results in burnout, increased anxiety, and diminished well-being (Canning et al., 2020).

A significant challenge for adult learners is the tendency to compare themselves to their younger, tech-savvy peers, leading to avoidance behaviors that hinder academic engagement. A study by Johnson and Ozaki (2021) found that adult learners experiencing impostor syndrome were 35% more likely to delay submitting assignments, seeking fewer academic resources, and disengage from collaborative learning experiences due to fear of appearing inadequate. These

behaviors are particularly common in STEM and online learning environments, where digital literacy is often assumed rather than explicitly taught (Ng, 2022).

On the other hand, impostor syndrome can negatively impact engagement and persistence in higher education. Studies show that students experiencing impostor syndrome are more likely to doubt their intellectual abilities, avoid challenging coursework, and experience heightened stress during assessments (Bravata et al., 2020). This self-doubt can lead to academic avoidance behaviors, such as skipping classes, delaying assignments, or withdrawing from programs altogether (Hutchins, 2015). Adult learners who already face significant external responsibilities, such as work and family commitments, may find it particularly challenging to cope with impostor-related stress, increasing their risk of attrition (Ramsey & Brown, 2019).

The financial pressures of higher education further exacerbate impostor syndrome among adult learners. Many non-traditional students return to education while managing full-time employment or caregiving responsibilities, making academic underperformance feel like a significant financial and personal risk (Casanova et al., 2021). Research by Peteet et al. (2015) suggests that the stress of balancing academic, financial, and familial obligations can heighten impostor-related anxiety, leading students to question whether their educational pursuits are worth the emotional toll.

Recent research by Clance et al. (2023) suggests that structured faculty interventions, including targeted feedback and reassurance strategies, can significantly reduce impostor syndrome-related dropout rates. In their study, students who received proactive instructor feedback reported a 40% increase in academic persistence, highlighting the importance of institutional support in mitigating self-doubt. Faculty members who use strengths-based

feedback, emphasizing students' progress rather than deficits, have been shown to improve adult learners' academic confidence (Kahu & Nelson, 2018).

Additionally, institutions are exploring AI-driven adaptive learning tools to support students experiencing impostor syndrome. While personalized feedback and self-paced learning modules can enhance student confidence, these tools may also contribute to heightened anxiety if learners feel they are under constant surveillance or comparison with algorithm-based performance benchmarks (Fraenza, 2016). A study by Makransky et al. (2023) found that AI-based tutoring systems were most effective in reducing impostor syndrome when paired with human interaction, such as faculty coaching or peer mentoring. This suggests that while digital tools can aid in building student confidence, they must be complemented with personalized faculty engagement to ensure positive outcomes.

Faculty and institutional support play a crucial role in mitigating the effects of impostor syndrome among adult learners. Research suggests that mentorship programs, academic advising, and faculty awareness initiatives can help create a more supportive learning environment (Parkman, 2016). Providing adult learners with structured opportunities to develop digital literacy skills, receive constructive feedback, and engage in peer support networks can foster greater academic confidence and resilience (Makransky et al., 2023). For example, institutions that implement first-year experience (FYE) tailored to adult learners, including workshops on digital skills, academic writing, and time management, report higher retention rates and lower self-reported impostor syndrome scores (Stone & Springer, 2019).

Impostor syndrome presents a significant barrier to academic success for adult learners, particularly in technology-rich learning environments. By recognizing the unique challenges faced by nontraditional students, institutions can implement targeted strategies to support their

academic engagement and persistence. Addressing impostor syndrome through faculty training, mentorship programs, and digital literacy initiatives will be essential in fostering an inclusive and empowering higher education experience for adult learners. As AI-driven education becomes more prevalent, further research is needed to understand how technology can be leveraged to reduce impostor syndrome without unintentionally exacerbating student anxiety or disengagement.

Digital Literacy and Higher Education

Conceptualizing Digital Literacy

Digital literacy is a foundational skill in higher education, enabling students to navigate, analyze, and critically engage with digital tools and platforms. Lankshear and Knobel (2008) define digital literacy as the ability to use and evaluate digital technologies effectively, encompassing technical skills, critical thinking, and adaptability. For adult learners, digital literacy is particularly crucial, as many return to higher education after extended periods in the workforce, where technological advancements may have outpaced their previous training. Moreover, digital literacy is not only about technical competence but also about the ability to critically assess digital information, interact effectively in digital environments, and adapt to evolving technological landscapes (Brookfield, 2017).

The integration of digital literacy into higher education has transformed learning environments, making education more accessible through online learning platforms, adaptive technologies, and artificial intelligence (AI)-driven tools. However, adult learners often face unique challenges in acquiring and applying digital literacy skills, which can contribute to feelings of inadequacy and impostor syndrome. Many adult learners perceive themselves as less competent in navigating digital tools compared to their younger counterparts, reinforcing self-

doubt and limiting engagement with technology-driven learning environments (Holmes & Tuomi, 2022). A study by Ng (2022) found that adult learners in technology-heavy courses were 43% more likely to avoid using AI-based learning tools due to fear of being exposed as "digitally incompetent," further reinforcing avoidance behaviors. This gap is particularly evident in courses that assume prior knowledge of digital tools, leaving adult learners feeling unprepared and excluded from fully engaging in academic discourse.

Digital Literacy Barriers for Adult Learners

Despite the benefits of digital technology in education, adult learners frequently encounter barriers that hinder their engagement with digital tools. One primary challenge is the digital divide, where disparities in access to technology and internet connectivity disproportionately affect older, low-income, and rural learners. Many nontraditional students may not have consistent access to personal computers, high-speed internet, or necessary software tools, leading to frustration and disengagement from digital learning environments (Holmes & Tuomi, 2022). These disparities create an uneven playing field in higher education, reinforcing systemic inequalities and limiting educational access for marginalized adult learners (Seale et al., 2021). Additionally, many institutions fail to provide adequate digital literacy training tailored to adult learners, further exacerbating the issue (Brookfield, 2017).

Another significant barrier is the lack of confidence in digital skills, even among those with access to technology. Research suggests that adult learners tend to underestimate their digital competencies, contributing to heightened impostor syndrome in technology-driven courses (Fraenza, 2016). This phenomenon leads to a self-fulfilling cycle where students avoid

digital tools due to fear of failure, which in turn limits opportunities to improve their technological proficiency and exacerbates self-doubt. This reluctance often results in reduced academic participation, as students hesitate to engage with digital platforms and online discussions, fearing exposure of their perceived incompetence (Makransky et al., 2023). For instance, a study by Casanova et al. (2021) revealed that adult learners in online courses who perceived themselves as technologically incompetent were twice as likely to withdraw from coursework compared to their more confident peers.

Furthermore, the learning curve associated with AI-driven platforms and online education exacerbates impostor syndrome among adult learners. While younger students may have grown up with digital technology embedded in their education, many adult learners must develop digital literacy skills alongside their academic coursework, creating an additional cognitive burden (Makransky et al., 2023). AI-driven features such as real-time performance analytics, automated grading, and digital peer assessments—while designed to personalize learning—can intensify stress among adult learners who already question their academic competence (McCoy & Byrne, 2023).When faced with AI-generated feedback, automated grading, and adaptive learning technologies, adult learners may feel that their skills and knowledge are constantly under scrutiny, intensifying feelings of intellectual fraudulence.

AI's Role in Adult Learning and Impostor Syndrome

Given that digital literacy challenges exacerbate impostor syndrome, AI has emerged as both a potential solution and a complicating factor in mitigating these psychological barriers. Adult learners often experience unique challenges that make AI-driven learning both an opportunity and a source of stress. Unlike learners with continuous academic trajectories, adult learners frequently re-enter education after extended gaps, often without exposure to the latest

digital tools or AI-based learning environments. This lack of familiarity can lead to heightened self-doubt, as these learners must simultaneously adjust to new technologies while managing professional and personal responsibilities. Furthermore, the demand for self-paced, flexible learning—while necessary for many adult learners juggling multiple commitments—can contribute to feelings of isolation when AI tools replace human interaction. Without structured faculty guidance and peer connections, AI-based learning may reinforce existing anxieties rather than alleviate them.

AI-driven learning tools, such as automated tutors, adaptive assessments, and chatbots, offer personalized feedback and tailored learning experiences that can benefit students with varying levels of digital proficiency (Zawacki-Richter et al., 2019). These tools allow for flexible learning pathways, enabling students to progress at their own pace and receive targeted support without the pressures of traditional classroom settings. However, AI's effectiveness in reducing impostor syndrome is contingent on its integration with human-centered support systems. While AI can enhance personalized learning, its effectiveness depends on how well it is integrated into instructional design and whether students feel empowered rather than judged by automated systems (Holmes & Tuomi, 2022).

However, AI can also exacerbate impostor syndrome, particularly for adult learners who already struggle with digital literacy. Automated feedback mechanisms, while intended to be constructive, may reinforce negative self-perceptions if students interpret frequent corrections or algorithm-driven assessments as indicators of incompetence. For example, research by McCoy & Byrne (2023) found that students exposed to AI-generated assessments without human guidance reported a 47% increase in anxiety levels, particularly among adult learners who already questioned their academic abilities. A study by Casanova et al. (2021) found that without direct

faculty engagement, AI-driven grading systems increased dropout rates among non-traditional students due to perceptions of impersonal and overly critical evaluation.

Moreover, AI-driven learning environments may lack the human element necessary to counteract feelings of impostor syndrome. Unlike traditional instructors who can provide reassurance and encouragement, AI systems primarily focus on task efficiency and performance evaluation. This lack of personalized interaction can leave adult learners feeling isolated and unsupported, particularly when they struggle with understanding AI-generated feedback or troubleshooting technical issues (Makransky et al., 2023). In a case study from Arizona State University (ASU), students who used AI-powered peer collaboration tools reported higher engagement levels, but the effectiveness of these tools was significantly enhanced when faculty provided additional guidance and real-time feedback (Smith et al., 2023).

AI-based interventions must therefore be carefully designed to balance the benefits of automation with the need for human connection. Research by Luckin & Holmes (2021) emphasizes that AI should be used as a supplemental tool rather than a primary mode of instruction, ensuring that adult learners receive the mentorship and support needed to navigate their academic journey confidently. Institutions that integrate AI alongside faculty mentoring programs, structured digital literacy training, and peer support networks have demonstrated higher retention rates and reduced impostor syndrome symptoms among adult learners (Parkman, 2016).

By recognizing both the advantages and risks associated with AI-driven learning, institutions can implement targeted strategies to maximize its benefits while addressing its limitations. For example, Harvard University's AI-driven adaptive learning platforms have demonstrated success in improving engagement, though research indicates mixed results in

reducing impostor syndrome without direct instructor intervention (Gierdowski & Galanek, 2023). Addressing these challenges proactively will be essential in fostering an inclusive, AI-enhanced learning environment that empowers adult learners rather than alienating them.

Ethical Concerns of AI in Higher Education

While AI has the potential to enhance learning experiences, it also presents ethical concerns, particularly for adult learners who already struggle with digital literacy and impostor syndrome. The unintended consequences of AI-driven learning environments—such as algorithmic bias, data privacy risks, and overreliance on automation—can disproportionately affect nontraditional students, increasing self-doubt and disengagement from academic settings. If not implemented carefully, AI may exacerbate impostor syndrome by reinforcing students' fears of inadequacy rather than alleviating them.

Algorithmic Bias and Its Impact on Adult Learners

Algorithmic bias in AI-powered education tools can significantly impact adult learners who are less digitally fluent or who come from underrepresented backgrounds. AI-driven assessment systems, for example, often assume a baseline level of digital competency, meaning that students who struggle with digital tools may receive lower scores—not because of a lack of knowledge, but due to their unfamiliarity with the system itself (Holmes & Tuomi, 2022). This misalignment can reinforce impostor syndrome, as adult learners may attribute their struggles to personal failings rather than systemic design flaws (Ng, 2022).

A notable example is Turnitin’s AI-based plagiarism detection system, which has disproportionately flagged nontraditional students' work as plagiarized due to differences in writing patterns and digital literacy levels (Zawacki-Richter et al., 2019). Such errors undermine students’ confidence in their academic abilities and may discourage adult learners from fully

engaging with writing assignments. Similarly, AI-powered tutoring systems that provide automated feedback without contextual understanding can lead students to believe they are not performing at the expected level, compounding self-doubt and academic anxiety (McCoy & Byrne, 2023).

A 2020 study by Buolamwini and Gebru (2020) further highlighted bias in facial recognition and AI-powered proctoring tools, which disproportionately flagged students of color for suspected cheating due to biases embedded in the algorithms. Similar issues have been detected in automated grading systems, which have been found to assign lower scores to students from nontraditional backgrounds due to deviations from mainstream academic writing conventions (McCoy & Byrne, 2023). If AI tools are designed based on data from traditionally tech-savvy students, they may not adequately address the unique learning needs of adult learners, inadvertently reinforcing existing disparities (Holmes & Tuomi, 2022).

Without interventions to mitigate these biases, AI-driven learning platforms may continue to privilege students with stronger digital backgrounds, making it more difficult for adult learners to succeed.

Data Privacy and Its Psychological Implications

Beyond algorithmic bias, data privacy concerns can also heighten impostor syndrome among adult learners. AI-driven educational platforms often collect detailed student performance data, tracking progress, time spent on tasks, and engagement levels. While this data can be useful for personalized learning, many adult learners are unaware of how their data is being used. A lack of transparency in AI decision-making can create a sense of helplessness and reinforce feelings of academic insecurity (Luckin & Holmes, 2021).

For example, when students receive automated feedback suggesting they are struggling, but without an explanation of how that assessment was reached, it can erode trust in AI-driven systems and increase anxiety (Ng, 2022). In this way, digital literacy gaps intersect with impostor syndrome, as students who do not fully understand AI's role in their education may feel as though they are being unfairly assessed or monitored (Brookfield, 2017).

A notable case is Pearson Education's 2019 data breach, which exposed the records of thousands of students using AI-driven learning tools, raising concerns about how securely student data is stored and managed (Perez, 2019). Without clear transparency measures, adult learners may hesitate to fully engage with AI-enhanced platforms, fearing potential misuse of their personal and academic data (Ng, 2022).

For instance, some AI-driven platforms, such as Coursera, collect extensive learner data, including quiz performance, time spent on activities, and engagement patterns. However, the lack of clarity about how this data influences personalized recommendations has raised concerns about student autonomy in learning decisions (McCoy & Byrne, 2023). If students do not understand the algorithms shaping their educational experiences, they may develop learned helplessness, further reinforcing feelings of impostor syndrome and digital inadequacy (Luckin & Holmes, 2021).

The Risk of Overreliance on AI and the Erosion of Self-Efficacy

While AI can provide flexibility and personalized learning, an overreliance on automated systems may weaken critical thinking and digital self-efficacy. Adult learners who already struggle with impostor syndrome may begin to defer too heavily to AI-generated recommendations rather than developing confidence in their own abilities (West et al., 2022).

Research shows that students who rely primarily on AI-based feedback—rather than faculty guidance and peer collaboration—experience greater anxiety and self-doubt regarding their own learning progress (Fraenza, 2016). Without direct human interaction and support, AI-driven learning tools can make adult learners feel isolated rather than empowered, intensifying feelings of intellectual fraudulence (Makransky et al., 2023).

To mitigate these risks, institutions must ensure that AI-driven learning environments support rather than hinder adult learners' confidence and academic engagement. Ethical AI use in education should include clearer transparency measures, faculty oversight, and structured digital literacy support to prevent AI-related bias, misunderstanding, and self-doubt from discouraging students.

By prioritizing human-centered AI integration, higher education institutions can reduce the negative psychological impact of AI and ensure that digital learning tools foster self-efficacy rather than impostor syndrome. This requires a balanced approach—leveraging AI's capabilities while maintaining direct faculty engagement, peer mentorship, and student agency in AI-assisted learning environments.

Implications for Policy and Practice

The integration of AI in higher education presents both opportunities and challenges for adult learners, particularly in relation to digital literacy, impostor syndrome, and ethical considerations. While AI-driven tools offer personalized learning support, increased accessibility, and adaptive assessments, they also risk intensifying self-doubt, reinforcing digital literacy gaps, and contributing to student disengagement if not implemented properly.

To ensure that AI supports rather than alienates adult learners, institutions must develop comprehensive policies that address digital literacy training, AI transparency, and student support

mechanisms. Faculty and administrators should prioritize AI literacy programs to help students navigate AI-driven learning environments with confidence. Additionally, institutions must implement mentorship initiatives and faculty-led AI integration strategies that mitigate the psychological effects of AI-related impostor syndrome.

These policy interventions are essential to ensuring that AI enhances, rather than undermines, adult learners' academic confidence and self-efficacy. This study seeks to examine how adult learners perceive and navigate impostor syndrome in technology-rich higher education environments, identifying the institutional strategies that best support student persistence and success.

By analyzing the role of AI in shaping student self-confidence, digital literacy development, and academic engagement, this research aims to provide insights into how institutions can design AI-enhanced learning models that empower rather than discourage adult learners.

AI, Self-Determination Theory, and the Role of Relatedness

Relatedness, or the need for social connection, is critical in overcoming impostor syndrome, yet AI-based learning often lacks the interpersonal engagement necessary to foster belonging (Fraenza, 2016). Traditional face-to-face interactions with faculty and peers play a crucial role in helping learners validate their experiences, receive encouragement, and develop self-assurance (Ramsey & Brown, 2019). The absence of these interactions in AI-driven learning environments can leave adult learners feeling isolated and unsupported.

A study conducted at Arizona State University (ASU) explored how AI-enhanced discussion forums could help address this gap by facilitating structured peer interactions. The study found that AI-powered engagement tools, such as real-time discussion prompts and

automated feedback on student participation, helped increase students' sense of connection in online learning environments (Smith et al., 2023). However, researchers also noted that these AI tools were most effective when paired with active faculty involvement to provide human-centered support.

Integrating Perspectives on AI and Adult Learning

Self-Determination Theory provides a valuable framework for exploring how AI-based education influences motivation, persistence, and confidence among adult learners. This theory highlights strategies that institutions can implement to create AI-enhanced learning experiences that support autonomy, competence, and relatedness—ultimately reducing impostor syndrome and fostering academic success. A case study from the University of Michigan examined the impact of AI-driven mentorship tools in online graduate programs, where an AI system analyzed student interactions and recommended personalized mentorship pairings based on shared academic interests. The results showed a 28% increase in student retention and a significant decrease in reported feelings of academic self-doubt (Gierdowski & Galanek, 2023). This finding underscores the potential for AI to facilitate meaningful peer and faculty connections when designed with a focus on fostering relatedness.

The Critical Digital Literacy Framework emphasizes systemic barriers and the role of digital literacy in equitable learning. The Impostor Phenomenon Framework explains the psychological mechanisms of self-doubt and how they manifest in digital learning environments. Finally, Self-Determination Theory highlights the key motivational factors that influence learners’ confidence and persistence in AI-based education. Together, these theoretical frameworks provide a comprehensive lens through which to analyze the experiences of adult learners in AI-driven education.

By synthesizing these perspectives, this study provides deeper insights into how AI impacts adult learners' experiences with digital literacy and impostor syndrome. Understanding these interactions can inform institutional policies and teaching practices that promote inclusive, supportive, and confidence-building digital education. As AI continues to shape the future of higher education, ensuring that it is implemented in a way that fosters belonging, reduces inequities, and empowers adult learners will be essential for creating more equitable and effective learning environments.

Institutional Interventions and Best Practices

As higher education institutions integrate artificial intelligence (AI) and digital learning technologies, it is crucial to develop strategies that support adult learners in overcoming digital literacy gaps and impostor syndrome. Research suggests that targeted institutional interventions, such as faculty mentoring, structured digital literacy programs, and AI-assisted learning support, can improve student confidence and academic performance (Parkman, 2016; Makransky et al., 2023). This section examines institutional strategies and best practices that address the challenges faced by adult learners in AI-driven education environments.

Institutional Strategies to Support Adult Learners

To ensure the success of adult learners in digital learning environments, institutions must implement comprehensive, multi-layered support systems. Research highlights several key strategies that have been effective in mitigating impostor syndrome and bridging digital literacy gaps.

One of the most impactful strategies is faculty mentoring and academic advising programs, which provide adult learners with structured guidance, fostering confidence in their digital skills and academic abilities. Studies show that strong faculty-student relationships

contribute to a greater sense of belonging and academic self-efficacy, reducing impostor syndrome among nontraditional students (Ramsey & Brown, 2019). Similarly, peer support networks connect adult learners with experienced students who have successfully navigated digital learning environments. Research suggests that participation in online student communities increases persistence, reduces feelings of isolation, and enhances engagement in coursework (Fraenza, 2016).

Coaching and confidence-building workshops have also been effective in helping adult learners recognize and counteract impostor syndrome. These interventions encourage students to reframe self-doubt and develop resilience in digital education settings. A case study at Southern New Hampshire University (SNHU) examined how structured faculty mentoring and student-led peer coaching programs improved digital fluency and self-efficacy among adult learners. The study found that students who participated in structured mentoring programs demonstrated a 32% increase in self-reported confidence using AI-based learning tools, and 78% of participants reported feeling a greater sense of belonging in their online courses (Williams et al., 2023). These findings highlight the importance of integrating mentorship and community-based learning into AI-enhanced education models.

To further bridge digital literacy gaps, institutions have introduced AI training workshops—structured programs designed to improve student confidence and competence in navigating digital tools (Holmes & Tuomi, 2022). These programs provide hands-on training in adaptive learning platforms, AI-driven assessments, and digital collaboration tools, ensuring that adult learners gain practical skills in a supportive environment. A study conducted at Georgia Tech found that their AI literacy workshop, which combined hands-on training with guided

faculty interactions, resulted in a 45% increase in adult learners' confidence in using AI-powered assessment tools and reduced self-reported technology-related anxiety (Chen & Li, 2022).

Faculty Training and Digital Pedagogy

Another critical intervention is faculty training on AI-assisted learning and digital pedagogy. Research suggests that faculty members who receive specialized training on AI-driven education tools are better equipped to support students in technology-rich classrooms, reducing impostor syndrome related to digital fluency (Zawacki-Richter et al., 2019). When faculty actively integrate AI tools into instruction, demystify AI-enhanced learning, and provide structured feedback on digital competencies, adult learners report higher levels of academic engagement and self-confidence.

Institutions that embed scaffolded digital literacy training within coursework, rather than treating it as an isolated skill, have also seen significant improvements in student learning outcomes (Brookfield, 2017). Embedding digital literacy into curriculum design allows students to develop technological competence progressively while reinforcing subject-matter learning. This approach ensures that AI tools enhance, rather than intimidate, the learning experience—reducing digital avoidance behaviors and increasing student persistence.

Programs Addressing Impostor Syndrome

Several higher education initiatives have successfully tackled impostor syndrome by providing targeted support for adult learners. Structured mentorship programs have been shown to significantly reduce impostor syndrome among adult learners (Ramsey & Brown, 2019). These programs pair students with faculty or peer mentors who provide academic and emotional support, helping learners navigate challenges associated with digital education. Research

indicates that mentorship improves retention rates and enhances student motivation by fostering a sense of competence and belonging (Parkman, 2016).

A case study at the University of Illinois explored the effects of an AI-driven mentorship matching system that connected adult learners with experienced faculty based on shared academic interests. Findings showed that students in the mentorship program had 29% higher retention rates and reported lower levels of impostor syndrome compared to students who did not participate (Smith & Zhang, 2023).

AI-powered learning support is another effective intervention. Some institutions have introduced AI-powered tutors and adaptive learning platforms that provide personalized feedback and guidance, reducing students' fear of failure and reinforcing self-efficacy (Makransky et al., 2023). AI-driven tools that adjust difficulty levels based on learner progress have been found to help students gradually build confidence in their abilities, reducing the effects of impostor syndrome (Holmes & Tuomi, 2022).

Faculty-led initiatives for inclusive technology use also play a crucial role in supporting adult learners. Research highlights the importance of faculty engagement in normalizing digital challenges and encouraging a growth mindset among students (Canning et al., 2020). Faculty who openly discuss their own learning experiences with technology can reduce student anxiety and improve academic resilience. Institutions that provide faculty with resources and training on AI's impact on student learning have seen improvements in student confidence and engagement with digital tools (Zawacki-Richter et al., 2019).

Addressing impostor syndrome and digital literacy barriers requires a multi-faceted institutional approach that combines mentorship, structured AI training, faculty engagement, and targeted student support programs. Research suggests that institutions that implement these

strategies see improved academic persistence, reduced dropout rates, and increased student confidence in digital learning environments (Parkman, 2016; Makransky et al., 2023). A longitudinal study at the University of Arizona found that students who participated in a combination of faculty mentorship, peer coaching, and AI-driven academic advising were 24% more likely to complete their degree programs compared to those who relied solely on traditional advising models (Hernandez & Patel, 2023).As AI becomes more prevalent in education, equipping adult learners with the necessary skills and psychological support will be crucial in ensuring equitable access to technology-driven learning opportunities.

Summary of Key Findings from Literature

The existing body of research underscores the significance of digital literacy, impostor syndrome, and artificial intelligence (AI) in shaping the academic experiences of adult learners. Studies indicate that adult learners face distinct challenges when engaging in technology-enhanced education, often due to disparities in digital literacy, self-doubt, and psychological barriers such as impostor syndrome (Holmes & Tuomi, 2022; Makransky et al., 2023). Research also highlights that the rapid integration of AI into higher education has had mixed effects, with some studies emphasizing the benefits of personalized learning while others caution against the exacerbation of self-doubt due to automated feedback mechanisms (Zawacki-Richter et al., 2019; Holmes & Tuomi, 2022).

Impostor syndrome, originally conceptualized by Clance and Imes (1978), has been widely studied in professional and academic settings, particularly among high-achieving individuals. However, literature on its impact within AI-driven learning environments remains underdeveloped. Existing studies suggest that adult learners, particularly those returning to higher education after significant time away, experience impostor syndrome differently than

traditional students, often attributing their academic struggles to perceived deficiencies in digital literacy rather than academic ability alone (Ramsey & Brown, 2019; Brookfield, 2017). Furthermore, the literature suggests that adult learners are at a heightened risk of digital exclusion, as many institutions assume a baseline level of technological proficiency that may not exist among nontraditional students (Brookfield, 2017). This misalignment contributes to the persistence of impostor syndrome and inhibits academic engagement.

Theoretical frameworks, including the Critical Digital Literacy Framework (Freire, 1970; Lankshear & Knobel, 2008), Impostor Phenomenon Framework (Clance & Imes, 1978), and Self-Determination Theory (SDT) (Deci & Ryan, 1985), provide valuable insights into the experiences of adult learners in digital education settings. While literature supports the application of these frameworks in analyzing student motivation, self-efficacy, and engagement, gaps remain in understanding how AI-driven learning environments influence these theoretical constructs.

Identified Gaps in Literature

Despite the breadth of research on digital literacy and impostor syndrome, several critical gaps persist. First, limited research specifically examines the relationship between AI-enhanced education and impostor syndrome among adult learners. While studies have explored the role of AI in adaptive learning, few have assessed its psychological impact on students who already experience self-doubt regarding their academic abilities (Zawacki-Richter et al., 2019).

Second, the intersection of impostor syndrome, digital literacy, and self-determination theory remains underexplored. Existing research tends to examine these factors independently rather than holistically, leaving gaps in understanding how they interact to shape adult learners' experiences in AI-driven environments (Parkman, 2016). There is a need for studies that

integrate these theoretical perspectives to develop a more comprehensive framework for addressing the challenges adult learners face in technology-rich educational settings.

Additionally, most existing studies focus on traditional student populations, leaving a gap in research on the specific needs of adult learners. Much of the literature assumes that students enter higher education with a strong foundation in digital literacy, failing to consider the diverse backgrounds and experiences of non-traditional students. As AI and digital tools continue to play a central role in education, it is essential to investigate how institutions can design more inclusive learning experiences that mitigate impostor syndrome and support adult learners' academic success (Canning et al., 2020; Holmes & Tuomi, 2022).

How This Study Addresses These Gaps

This study sought to fill these gaps by exploring adult learners' perceptions of impostor syndrome in technology-rich higher education environments. By focusing on the lived experiences of non-traditional students, this research provided a deeper understanding of how AI-based learning tools influenced feelings of self-doubt, motivation, and digital self-efficacy.

Furthermore, this study integrated the Critical Digital Literacy Framework, Impostor Phenomenon Framework, and Self-Determination Theory to examine how AI-driven education affects adult learners' psychological and academic outcomes. By applying a multidimensional theoretical approach, this research contributed to the literature by identifying practical strategies for mitigating impostor syndrome and improving digital literacy support within higher education.

The findings of this study have important implications for institutional policies, faculty training, and AI-based learning design. By highlighting the barriers that adult learners face in digital education, this research informs the development of support programs that foster digital competence, enhance self-efficacy, and reduce impostor syndrome. Institutions must recognize

the diverse backgrounds of adult learners and implement strategies that ensure AI and digital learning tools serve as enablers rather than obstacles to academic success.

CHAPTER 3

Methodology

Research Design

This qualitative study utilized a phenomenological approach to examine the lived experiences of adult learners aged 25 and older who were enrolled in higher education institutions and faced impostor syndrome. This approach was particularly suited to exploring participants' perceptions, emotions, and interpretations related to impostor syndrome, digital literacy, and access to technology within the context of technology-rich learning environments. The variables in this study included adult learners' levels of access to technology (e.g., hardware, software, and internet connectivity), their digital literacy skills, the availability of institutional support for technology use, and the integration of artificial intelligence (AI) tools in their learning environments. Additional variables included adult learners' experiences of impostor syndrome, their academic performance, their engagement in higher education, their confidence in using technology and AI tools, and their perceptions of their ability to succeed in academic and professional settings.

Bias of Researcher

The researcher **is** an adult learner who has personally experienced the complexities of balancing higher education with employment and family responsibilities. Returning to academia as a non-traditional student has involved both empowering opportunities and significant challenges, requiring the researcher to navigate shifting priorities, evolving technology, and

moments of self-doubt. These experiences have shaped a deep interest in understanding how impostor syndrome affects adult learners and how technology either supports or complicates their academic journeys.

In addition to these personal experiences, the researcher has worked in academic advising, student support, and administrative roles, directly engaging with adult learners facing similar struggles. Many students have expressed feelings of inadequacy, concern about being "too old" to keep up, and frustration with rapidly changing digital tools that often appear designed for younger generations. These professional experiences, combined with the researcher's personal background, informed this study, which sought to explore how impostor syndrome, digital literacy, and access to technology shape the experiences of adult learners in higher education institutions across Northeastern Pennsylvania.

While this insider perspective provides valuable insight and relatability, it also presents potential biases. The researcher acknowledged the risk of confirmation bias, in which personal experiences and preexisting beliefs may unconsciously influence the interpretation of participants' narratives. To mitigate this risk and ensure academic rigor and objectivity, several safeguards were implemented. A structured interview guide (see Appendix D) was utilized to ensure consistency across all interviews and to prevent unintentional leading questions. Additionally, the researcher engaged in reflexive journaling throughout the study to critically examine assumptions and potential biases.

To further enhance credibility and trustworthiness, member checking was incorporated to allow participants to review and clarify their responses and ensure accurate representation of their experiences. Peer debriefing with the dissertation committee and academic colleagues was used to provide external perspectives, helping to refine interpretations and minimize subjectivity.

Through these measures, the researcher aimed to ensure that the study remained grounded in the authentic voices of adult learners and contributed meaningful insights to the field of higher education research.

Sample

Student participants included undergraduate and graduate adult learners enrolled at two higher education institutions located in Northeastern Pennsylvania and the Lehigh Valley region. One institution was a public community college that serves a diverse student body, including many nontraditional learners pursuing associate degrees while balancing work and family responsibilities. The second institution was a private Catholic university that offers undergraduate and graduate programs with a focus on liberal arts and professional studies, providing insight into the experiences of graduate-level adult learners.

Participants were drawn from diverse gender identities and categorized based on educational level, including: (1) undergraduate students who identified as female, (2) undergraduate students who identified as male, (3) graduate students who identified as female, and (4) graduate students who identified as male. A non-random, purposive sampling method was used to recruit 12 participants who met the inclusion criteria. Data collection continued until construct saturation was achieved—defined as the point at which no new themes or insights emerged from participant interviews—ensuring a broad representation of adult learners, including those with nonbinary or gender-diverse identities. Additionally, snowball sampling was used to expand the participant pool by recruiting additional eligible participants through referrals. This approach ensured a broad range of perspectives on the lived experiences of impostor syndrome among adult learners navigating technology-rich higher education environments.

Inclusion Criteria

The inclusion criteria for this study specified that participants were adult learners aged 25 years or older who self-identified as balancing multiple life roles—such as employment and family responsibilities—alongside their academic pursuits. Participants were actively enrolled in one of the two selected accredited higher education institutions located in Northeastern Pennsylvania or the Lehigh Valley region and were engaged in their educational programs during a single academic semester. Furthermore, participants had consistent access to essential technological tools, such as reliable internet and a suitable device, and possessed basic digital literacy skills. Participants demonstrated the cognitive and linguistic ability to fully understand and were engaged with the semi-structured interview questions. Finally, participants expressed a willingness to participate in the interviews, providing rich, detailed narratives about their experiences.

Exclusion Criteria

The exclusion criteria for this study included individuals who were not fluent in English, as the research required participants to articulate detailed narratives during semi-structured interviews conducted in English. Additionally, individuals who lacked consistent access to essential technological resources—such as reliable internet service, a computer, or other necessary devices, were excluded, as their experiences fell outside the study's focus on technology-rich learning environments.

Participants with significant cognitive impairments that inhibited their ability to fully engage in semi-structured interviews or provide comprehensive narratives were also excluded to ensure the integrity of the data collected. Finally, individuals who initially consented to

participate but later withdrew or did not complete the interview process were excluded, as incomplete data could compromise the study's findings.

Recruitment

The population for this study was selected through voluntary participation using targeted email invitations sent to undergraduate and graduate adult learners enrolled at two higher education institutions in Northeastern Pennsylvania and the Lehigh Valley region. A single-stage sampling design was employed to recruit participants. The researcher sent an email (see Appendix A) containing a description of the study's purpose, inclusion criteria, and instructions for expressing interest. A follow-up email was sent to non-respondents to encourage participation and reiterate key study details (see Appendix B). The email was sent a minimum of three times over a two-week data collection window to maximize response rates. Interested participants were asked to respond to the email to schedule a screening interview, during which their eligibility was confirmed based on the study's inclusion criteria.

Once eligibility was confirmed, participants completed a demographic questionnaire (see Appendix C) to gather background information, including age, gender, race/ethnicity, current academic enrollment status, employment, caregiving responsibilities, and level of access to technological resources. This questionnaire ensured participants met the inclusion criteria, such as being adult learners aged 25 and older who balanced multiple life roles alongside their education. Additionally, race/ethnicity data was collected to ensure that the sample reflected the diversity of the adult learner population and allowed for a nuanced analysis of how impostor syndrome and digital literacy challenges may differ across racial and ethnic groups. Furthermore, the demographic data provided contextual information to support the analysis of participants' experiences and ensured that a diverse range of perspectives was adequately represented.

Participants received an informed consent form (see Appendix D) outlining the study details and their rights, which was reviewed and signed before participation.

Instruments

The primary instrument used in this study was the semi-structured interview guide (see Appendix E). This guide was designed to explore the lived experiences of adult learners in higher education, focusing on their perceptions, challenges, and coping strategies related to impostor syndrome and the integration of technology into their academic environments. The guide consisted of open-ended questions aimed at encouraging participants to share detailed, personal narratives about their academic experiences, including questions such as, “How, if at all, do feelings of self-doubt or impostor syndrome affect your academic performance or engagement with your studies?” and “What challenges, if any, have you faced in accessing or using technology for your academic work?” Follow-up prompts were included as needed to clarify or expand upon participants' responses.

This instrument facilitated a comprehensive understanding of adult learners’ experiences with impostor syndrome and technology, providing rich qualitative data for analysis.

Interviews

The interview protocol was comprised of approximately 12 questions designed to explore participants’ experiences with impostor syndrome and technology in higher education (see Appendix E). These questions were derived from and aligned with the sub-questions identified in Chapter One, ensuring a direct connection between the research objectives and the data collection process.

The use of semi-structured interviews in this study provided several distinct advantages. First, interviews enabled the collection of rich, detailed data, allowing participants to describe

their lived experiences with impostor syndrome and technology in their own words. This method was particularly valuable for exploring complex and sensitive topics, such as impostor syndrome, as it allowed for a nuanced understanding of participants' perceptions, challenges, and coping strategies. Additionally, the semi-structured format offered flexibility, enabling the researcher to adapt questions based on participants' responses and probe deeper into unexpected themes. The personal connection established through interviews also encouraged participants to share openly, fostering a deeper understanding of their experiences.

However, interviews also had limitations that had to be considered. They were time-intensive, requiring significant effort to schedule, conduct, transcribe, and analyze. This resulted in a smaller sample size, which limited the generalizability of the findings to the broader population of adult learners. There was also potential for researcher bias, as the phrasing of questions or nonverbal cues during the interview could inadvertently influence participants' responses. Furthermore, because interviews relied on participants' willingness to share personal experiences, particularly on sensitive topics like impostor syndrome, there was a risk that some participants may have withheld or modified their answers. Lastly, the qualitative nature of interview data presented challenges for analysis, as identifying patterns and themes in rich, narrative data required considerable time and attention to detail.

Demographic Questionnaire

The following demographic information was collected via the demographic questionnaire (see Appendix C): age, gender, field of study, current enrollment status (undergraduate or graduate), employment status, caregiving responsibilities, and access to technology. This data provided important context for interpreting participants' responses during the interviews. By understanding participants' life circumstances and technological backgrounds, the study ensured

that the interviews reflected the diverse experiences of adult learners navigating impostor syndrome and technology-rich higher education environments. The demographic information allowed for a more comprehensive analysis of how factors such as employment, caregiving responsibilities, and digital literacy intersected with participants' experiences.

Procedures

Marywood University's Exempt Review Committee (ERC) was asked for permission to conduct the study. A formal application, including the study's purpose, methodology, and ethical considerations, was submitted to ensure compliance with institutional research standards. Once approval was granted, the research process began with the recruitment of participants through email invitations to students enrolled at two higher education institutions located in Northeastern Pennsylvania and the Lehigh Valley region. The email (see Appendix A) provided an overview of the study, outlined the inclusion criteria, and explained what participation entailed. A follow-up email was also sent to non-respondents to encourage participation and reiterate key study details (see Appendix B). The email was sent a minimum of three times over a two-week data collection window to maximize response rates.

Interviews were conducted via Zoom or phone, depending on the participant's preference. This flexibility ensured accessibility for participants with varying schedules and technology constraints. During the interview, open-ended questions from the semi-structured interview guide (see Appendix E) were used to explore participants' experiences with impostor syndrome and their use of technology in higher education. The interviews were audio-recorded with participants' consent to ensure accuracy and allow for detailed analysis.

After the interview, participants were thanked for their time and were provided with a $5.00 Amazon gift card as a token of appreciation. All collected data was stored securely in a

password-protected file, and identifying information was anonymized to ensure confidentiality. Demographic data from the questionnaires was analyzed descriptively to contextualize participants' responses, while interview data was transcribed verbatim by the researcher and was analyzed thematically to identify patterns and themes related to impostor syndrome and technology use in higher education.

Analysis of Data

The data analysis process began with transcribing the interviews to ensure accuracy and consistency in capturing participants' responses. The researcher personally transcribed all interviews to maintain control over data integrity and ensure that nuances in language and meaning were preserved (Braun & Clarke, 2006). During this initial stage, a horizontalization process was applied, where all participant statements were treated with equal weight before identifying key themes (Moustakas, 1994). This method ensured that no single response was given undue emphasis prematurely, allowing for an unbiased examination of participants' experiences with impostor syndrome in technology-rich higher education settings (Clance & Imes, 1978; Parkman, 2016). Significant statements were then highlighted and grouped to gain deeper insights into recurring patterns and variations in participants' perspectives.

Following transcription, thematic analysis was conducted to systematically code and categorize the data into meaningful patterns (Braun & Clarke, 2006). The coding process followed three key stages:

- **Open coding**, in which transcripts were examined line by line to identify recurring concepts and patterns emerging from participants' narratives (Corbin & Strauss, 2015).

- **Axial coding**, where relationships between these concepts were explored, allowing for a deeper understanding of how different themes interconnected within the context of digital learning and impostor syndrome (Corbin & Strauss, 2015).
- **Selective coding**, which refined and integrated the most significant themes into a cohesive framework aligned with the study's theoretical foundations—Critical Digital Literacy, Impostor Phenomenon, and Self-Determination Theory (Deci & Ryan, 1985).

To facilitate the organization and retrieval of coded data, qualitative data analysis software was used (Miles et al., 2019). These tools streamlined the pattern recognition process, ensuring that themes were systematically compared across different participant groups. Construct saturation was used to determine when data collection was complete.

Rigor and Trustworthiness

To enhance credibility and trustworthiness, multiple validation strategies were employed (Lincoln & Guba, 1985):

- Reflexive journaling was used as part of field notes to document the researcher's biases and preconceptions, ensuring transparency throughout the interpretation process (Berger, 2015).
- Member checking allowed participants to review and confirm preliminary findings, ensuring that their experiences were accurately represented (Birt et al., 2016).
- Peer debriefing with committee members provided external perspectives, helping to strengthen the objectivity of the thematic analysis (Nowell et al., 2017).
- Triangulation was employed to validate key themes by comparing data across multiple sources, such as participant reflections, field notes, and supporting literature (Patton, 2015).

- Construct saturation guided the conclusion of data collection.
- Thick descriptions were incorporated to contextualize findings (Geertz, 1973).

Ethical Considerations

Ethical compliance was integral to this research, ensuring adherence to Institutional Review Board guidelines. All participants were fully informed of the study's purpose, procedures, and potential risks through a detailed informed consent process (Creswell & Creswell, 2018). Participation was voluntary, and individuals had the right to withdraw at any time without penalty.

To protect participant confidentiality, aliases were assigned, identifying information was removed, and data was securely stored. Potential risks were minimized, and power imbalances were acknowledged to ensure a non-coercive environment (Tracy, 2010).

Additionally, the study minimized potential risks by providing resources and support referrals for participants who may experience emotional discomfort when discussing impostor syndrome (Tracy, 2010). Any power imbalances between the researcher and participants were acknowledged, ensuring a neutral, non-coercive environment during interviews.

Ethical guidelines were followed in data presentation, including acknowledging counterarguments, discussing alternative interpretations, and ensuring that findings were represented without bias (Tracy, 2010). The researcher engaged in critical reflexivity, recognizing personal biases and took steps to ensure that the analysis remained objective.

Through this systematic and ethically sound approach, this study aimed to generate a comprehensive understanding of how adult learners navigated impostor syndrome in digital learning environments. By incorporating multiple validation methods and upholding ethical integrity, the research contributed to both academic discussions and practical strategies that

supported adult learners in overcoming impostor syndrome and strengthening digital literacy confidence in higher education settings.

Summary

This qualitative study utilized a phenomenological research design to explore the lived experiences of adult learners navigating impostor syndrome in technology-rich higher education environments. The study was guided by three theoretical frameworks: the Critical Digital Literacy Framework, the Impostor Phenomenon Framework, and Self-Determination Theory. Data was collected through purposive sampling using semi-structured interviews with adult learners enrolled at two institutions located in Northeastern Pennsylvania and the Lehigh Valley region. Thematic analysis was applied to identify emerging patterns through a systematic process of close transcript review, manual coding, and analytic reflection. Data was systematically organized through repeated comparison of participant responses to support theme development and interpretation. Construct saturation guided the conclusion of data collection, ensuring that no new themes or insights emerged. Measures to ensure rigor and trustworthiness included reflexive journaling, member checking, triangulation, and peer debriefing, which collectively enhanced the credibility and validity of the study's findings.

Chapter 4

Results

Introduction

This chapter presents the findings from 12 semi-structured interviews with adult learners enrolled in higher education. Findings are organized into four major themes: (1) Role Strain and Adult Learner Identity, (2) Manifestations of Impostor Syndrome, (3) Technology as a Dual

Influence: Supportive Tool and Psychological Barrier, and (4) Institutional Gaps and Desired Supports.

This chapter emphasizes participants' meaning-making processes rather than frequency or prevalence of responses. Themes reflect shared patterns across narratives while preserving individual variation in how adult learners experience impostor syndrome, role strain, and digital engagement. To preserve the authenticity of participants' lived experiences, all participant quotations are presented verbatim, including natural speech patterns and grammatical constructions. Consistent with a phenomenological orientation, findings are presented using participants' own words to highlight lived experience and illuminate how psychological, technological, and institutional factors intersect in adult learners' academic lives.

A reflexive thematic analysis was used to analyze participants' semi-structured interview narratives (Braun & Clarke, 2019). Reflexive thematic analysis is a qualitative approach that focuses on identifying patterns of meaning across a dataset rather than counting responses or measuring frequency. This method emphasizes the researcher's active and reflective role in interpreting participants' accounts, recognizing that themes are developed through sustained engagement with the data rather than discovered as fixed or objective entities. Reflexive thematic analysis was selected because it aligns with the study's phenomenological orientation and allows for an in-depth exploration of how adult learners make sense of their academic experiences within technology-rich and institutionally structured environments.

Together, these findings offer insight into how motivation, identity, and engagement are shaped within technology-rich higher education environments. Rather than emphasizing visual frequency comparisons, demographic characteristics are summarized descriptively to contextualize participant experiences without implying quantitative generalizability.

Participant Demographics

The study consisted of 12 participants ranging in age from 33 to 52 years , with a mean age of 43.5 years (SD = 6.72), reflecting a sample composed primarily of mid-career adult learners navigating higher education alongside established personal and professional responsibilities. This age distribution situates participants within life stages often associated with sustained employment, caregiving obligations, and well-developed professional identities, providing important context for their academic experiences.

The sample reflected diversity across gender identities, employment contexts, and caregiving responsibilities. Female participants represented a larger proportion of the sample than male participants, with 7 female participants (58.3%) compared to 4 male participants (33.3%) and 1 Non-Binary participant (8.3%). This distribution aligns with broader patterns observed among adult learners in higher education and is particularly salient given the intersection of gender, caregiving, and academic role strain described throughout participant narratives.

Most participants were actively engaged in the workforce. Specifically, 66.6% of participants reported being employed. An additional 4 participants (33.3%) identified as unemployed or in military transition at the time of the study. These employment contexts shaped participants' experiences of time scarcity, cognitive fatigue, and the ongoing negotiation between academic expectations and occupational demands.

Caregiving responsibilities further contributed to the complexity of participants' lived experiences. Because caregiving status was reported as a multiple-response item, several participants indicated more than one caregiving role. Specifically, 3 participants (25.0%) reported providing care for children, 2 participants (16.7%) reported caregiving for elderly

family members, while 7 participants (58.3%) indicated that they were not caregivers. These overlapping responsibilities illustrate the cumulative nature of participants' non-academic demands and establish an important foundation for the role strain and identity tensions explored in the findings that follow.

Themes

Figure 6 describes the four themes and nine subthemes with descriptions of each. It provides a consolidated overview identified through reflective thematic analysis. A discussion of each theme follows.

Theme	Subtheme	Description
Role Strain and Adult Learner Identity	Competing Role Demands	Participants described balancing coursework alongside employment, caregiving, and household responsibilities, resulting in cognitive fatigue, time scarcity, and emotional strain.
	Identity Tension as a Returning Student	Participants described tension between their adult identities and perceived academic norms, particularly in digitally mediated learning environments where expectations were often implicit.

Manifestations of Impostor Syndrome	Internalized Self-Doubt and Fear of Incompetence	Participants described persistent self-doubt and fear of exposure that shaped confidence, engagement, and perceptions of academic legitimacy.
	Heightened Sensitivity to Feedback	Participants described strong emotional reactions to feedback, including withdrawal, avoidance, and reduced willingness to seek support.
Technology as a Dual Influence	Technology as Academic Support	Technology supported organization, comprehension, and academic persistence amid competing responsibilities.
	Technology as Psychological Stressor	Technical disruptions and perceived expectations contributed to stress, frustration, and heightened self-doubt.
Institutional Gaps and Desired Supports	Limited Technology Orientation and Guidance	Participants reported insufficient guidance related to digital platforms and technology expectations.
	Lack of Emotional Validation and Normalization	Participants described a lack of institutional acknowledgment of impostor feelings, stress, and role strain.
	Need for Structural Flexibility and Accommodation	Participants emphasized the importance of flexible policies, clear

		communication, and adult-learner-centered supports.

Figure 6: Themes and Subthemes with Descriptions

Theme 1: Role Strain and Adult Learner Identity

Participants described academic engagement as unfolding within complex and overlapping role systems that included employment, caregiving, and household responsibilities. Rather than experiencing these roles as separate from their academic identities, participants consistently portrayed role strain as a persistent and defining feature of their learning experiences. Academic participation was frequently described as occurring in fragmented moments carved out between competing obligations, shaping how learners perceived their capacity to persist, their emotional availability for learning, and their sense of legitimacy as students. These layered responsibilities influenced not only time management but also cognitive endurance and psychological presence.

> I have to make time to complete my work. I have had to work on quizzes during lunch and even in the car waiting to pick my kids up from school. (Participant 9)

Subtheme 1.1: Competing Role Demands

Within this context, participants reported frequent and rapid role switching that depleted the cognitive and emotional resources necessary for sustained academic engagement. Many described moving continuously between professional, caregiving, and academic roles, often within the same day or even the same hour. This constant shifting limited participants' ability to fully disengage from one role before assuming another, resulting in persistent mental exhaustion.

> I work full-time in healthcare and care for my elderly mother. By the time I sit down to do schoolwork, my brain is already exhausted. (Participant 4)

I go from employee, to parent, to student, sometimes all in the same hour. (Participant 7)

It's not that the work is too hard. It's that there's never enough time or energy left.(Participant 9)

Collectively, the impact of competing role demands extended beyond scheduling challenges. Participants described how persistent fatigue and divided attention contributed to deeper tensions related to identity and belonging. As they navigated academic spaces designed primarily for traditional students, role strain intensified feelings of disconnection and self-doubt, particularly in digitally mediated environments where expectations and norms were often implicit rather than explicitly communicated.

Subtheme 1.2: Identity Tension as a Returning Student

Participants also expressed ongoing tension between their adult identities and perceived academic norms, particularly within digital classrooms. Several described feeling out of place in learning environments populated largely by younger peers, where technological fluency and rapid participation were often assumed.

I felt like a fraud trying to speak up in discussions with younger classmates. *(*Participant 7*)*

Everyone else seemed more comfortable online, and I questioned whether I belonged. *(*Participant 12*)*

These reflections suggest that identity tension extended beyond concerns about academic ability to encompass broader questions of legitimacy and belonging within higher education spaces. Participants frequently described internal comparisons with younger peers, questioning whether their age, life stage, or familiarity with digital platforms aligned with perceived

academic expectations. In online environments where social cues were limited, these uncertainties were amplified, contributing to increased self-monitoring and reluctance to participate. Together, these experiences illustrate how role strain and identity tension operated in tandem, shaping adult learners' academic engagement and laying the groundwork for impostor experiences explored in the following theme.

Theme 2: Manifestations of Impostor Syndrome

Participants' narratives revealed impostor syndrome as a pervasive psychological experience that shaped academic engagement, confidence, and help-seeking behaviors. Rather than appearing as a singular or episodic concern, impostor feelings emerged as an ongoing internal process characterized by self-doubt, fear of exposure, and heightened sensitivity to evaluation. These experiences frequently intensified within digital learning environments, where limited interpersonal cues and perceived expectations amplified uncertainty about academic competence and belonging.

> The more online tools we used the harder it was to keep up and I started to feel helpless and fearful. (Participant 8)

Subtheme 2.1: Internalized Self-Doubt and Fear of Incompetence

Participants described impostor feelings as deeply internalized and persistent, influencing how they approached coursework and academic tasks. Several reported delaying or avoiding assignments due to fears that they would not understand expectations or would confirm perceived inadequacy.

> I was scared to even start assignments because I thought I wouldn't understand them. *(*Participant 2)

> Everyone else seemed to get it instantly. I thought something was wrong with me. *(*Participant 5*)*

Subtheme 2.2: Heightened Sensitivity to Feedback

Participants also described heightened emotional sensitivity to academic feedback, even when feedback was constructive or supportive. These reactions often resulted in withdrawal, reduced participation, or hesitation to seek clarification or assistance.

> Even helpful criticism makes me shut down. *(*Participant 11*)*

Collectively, these experiences illustrate how impostor syndrome functioned as an ongoing psychological process rather than an isolated response to academic difficulty. Participants' narratives suggest that impostor feelings shaped not only confidence and task engagement but also patterns of avoidance, self-monitoring, and help-seeking, laying important groundwork for the examination of technology-related stressors and institutional influences explored in subsequent themes.

Theme 3: Technology as a Dual Influence

Participants consistently described technology as a dual influence within their academic experiences, functioning simultaneously as an essential academic support and a significant psychological stressor. Digital tools and platforms were central to participants' ability to manage coursework, access materials, and sustain academic engagement amid competing life responsibilities.

> Some features like the calendar changed my daily routine for the better. I could not only manage coursework but also add in everyday tasks as well. (Participant 5)

Subtheme 3.1: Technology as Academic Support

Participants frequently described using technology as a means of managing workload, enhancing comprehension, and reducing feelings of overwhelm. Digital tools were often positioned as compensatory supports that enabled continued academic engagement when time and cognitive resources were limited.

> AI helps me summarize readings and outline papers when I'm overwhelmed. *(*Participant 5)

> I have used AI to help write multiple papers. I have used it for editing as well as for formatting and citing. I have also found while it is extremely helpful, it can also be very inaccurate *(*Participant 11*)*

Subtheme 3.2: Technology as Psychological Stressor

Despite these benefits, participants also described technology as a source of psychological strain. Technical disruptions and system inconsistencies often triggered anxiety, frustration, and heightened self-doubt.

> When my laptop freezes, I already feel behind. And it feels like an uphill climb just to get back on track and caught up. (Participant 6)

> When the platform glitches, I feel like I did something wrong. It really stresses me out and ruins my whole class experience. (Participant 9)

Collectively, these accounts illustrate how technology simultaneously enabled academic persistence while amplifying psychological strain. While digital tools supported task completion and time management, technical difficulties and system failures often triggered self-blame and heightened impostor feelings. For adult learners already managing role strain, these

technological challenges compounded existing stress and reinforced uncertainty about academic competence.

Theme 4: Institutional Gaps and Desired Supports

Participants identified institutional gaps that shaped their academic experiences and influenced their ability to engage confidently and effectively in higher education. These gaps were most commonly described in relation to technology orientation, emotional validation, and structural accommodations, highlighting areas where institutional practices were perceived as misaligned with adult learners' lived realities.

> One teacher expected us to take notes on our smart phones, but I struggle to see the phone screen well enough. It was also a major struggle to type the notes I needed to study. (Participant 10)

Subtheme 4.1: Limited Technology Orientation and Guidance

Participants frequently described entering academic programs with limited guidance regarding digital platforms, technology expectations, and available supports. In the absence of structured orientation or clear communication, participants reported uncertainty about how to navigate systems, interpret expectations, or seek assistance. This lack of guidance often compounded existing stress and contributed to heightened self-doubt, particularly for learners already managing competing roles and impostor feelings.

> I feel if the school were to give more training on using the school sites, I would be much better off navigating schoolwork. (*Participant 4*)
>
> I feel a technology course would not only better prepare me for school, but also set me up better for the workforce. *(Participant 8)*

Subtheme 4.2: Lack of Emotional Validation and Normalization

In addition to technological gaps, participants described a lack of emotional validation and normalization of adult learners' experiences. Several expressed a desire for institutions to explicitly acknowledge the challenges associated with balancing academic, professional, and caregiving responsibilities, as well as the prevalence of self-doubt and anxiety in technology-rich learning environments. The absence of such acknowledgment contributed to feelings of isolation and reinforced perceptions that their struggles were individual rather than systemic.

> I wish the school would have a club or support group specifically for parents attending school. Not only would it help bring fellow students with the same experience but could also help give us a chance to figure out the technology together. (Participant 12)

Subtheme 4.3: Need for Structural Flexibility and Accommodation

Participants also emphasized the need for greater structural flexibility and accommodation. Suggestions included clearer communication of expectations, flexible deadlines, access to loaner technology, and the development of academic supports intentionally designed for adult learners. Collectively, these desired supports reflect participants' perceptions that institutional responsiveness plays a critical role in shaping motivation, confidence, and persistence, setting the stage for the implications and recommendations discussed in the following chapter.

> Using the computers in the computer lab really helped. It was faster and all the links and sites were saved directly on to it. I was able to work much faster. (Participant 7)

Summary

This chapter examined adult learners' lived experiences within technology-rich higher education environments, revealing a complex and interconnected set of challenges shaped by role strain, impostor syndrome, and engagement with digital and AI-mediated systems. Rather than emerging as isolated concerns, participants' academic difficulties were embedded within overlapping personal, professional, and institutional contexts that influenced motivation, confidence, and persistence.

Findings demonstrated that competing life roles functioned as a persistent backdrop to academic engagement, shaping learners' perceptions of legitimacy, emotional availability, and cognitive endurance. Impostor feelings emerged as an ongoing internal process characterized by self-doubt, fear of exposure, and heightened sensitivity to feedback, often intensified within digital learning environments. Technology was experienced as a dual influence, simultaneously supporting academic persistence while amplifying psychological strain through technical disruptions, perceived expectations, and self-blame. Participants further identified institutional gaps related to technology orientation, emotional validation, and structural flexibility, highlighting a misalignment between adult learners' lived realities and institutional practices.

Collectively, these findings underscore that adult learners' academic experiences are shaped less by individual deficits than by institutional structures, technological design, and unmet psychological and contextual needs. By centering participants' voices and meaning-making processes, this chapter provides a comprehensive account of how adult learners navigate higher education environments and establishes a foundation for the implications and recommendations explored in the following chapter.

Chapter 5

Discussion

Introduction

This qualitative phenomenological study examined how adult learners in higher education experience impostor syndrome while navigating technology-rich and AI-mediated learning environments. Guided by Critical Digital Literacy Framework, the Impostor Phenomenon Framework, and Self-Determination Theory, the study explored how adult learners made meaning of self-doubt, technological engagement, and academic motivation while balancing competing life roles. Drawing on semi-structured interviews with adult learners enrolled in higher education institutions in Northeastern Pennsylvania and the Lehigh Valley region, the study sought to center participants' lived experiences rather than measure prevalence or predict outcomes

The central question guiding this study asked: *How do adult learners attending higher education institutions in Northeastern Pennsylvania and the Lehigh Valley region perceive and navigate their lived experiences with impostor syndrome in technology-rich environments?* Supporting sub-questions examined how adult learners described the impact of impostor syndrome on academic engagement, how they perceived AI and digital tools as either supportive or stressful, and how access to technology and institutional supports shaped their experiences.

Findings from Chapter 4 revealed four interconnected themes: role strain and adult learner identity; manifestations of impostor syndrome; technology as a dual influence; and institutional gaps and desired supports. Together, these themes illustrate that adult learners' experiences of impostor syndrome are not isolated psychological phenomena, but are embedded within broader institutional, technological, and life-contextual conditions. This chapter situates these findings within the existing literature and theoretical frameworks, discusses their implications for higher education policy and practice, acknowledges study limitations, identifies

directions for future research, and concludes by summarizing the study's contributions to understanding adult learners' experiences in technology-rich higher education environments.

DISCUSSION

The findings of this study suggest that adult learners' experiences of impostor syndrome within technology-rich and AI-mediated higher education environments are not best understood as isolated psychological responses or individual confidence deficits. Rather, participants' stories indicate that impostor feelings develop through ongoing interaction with institutional expectations, digital systems, and competing life roles. Across participants' accounts, self-doubt was shaped less by academic ability and more by how adult learners interpreted their place within environments that often-assumed traditional student identities and uninterrupted access to time, technology, and cognitive resources.

This interpretation is consistent with prior research suggesting that impostor syndrome among adult learners is shaped by institutional and environmental factors, not just individual confidence. Ramsey and Brown (2019) similarly argue that impostor feelings are often reinforced by institutional norms that privilege traditional student pathways and uninterrupted academic engagement.

Academic engagement consistently occurred alongside employment, caregiving, and household responsibilities that were ongoing rather than temporary. These conditions influenced how expectations related to participation, responsiveness, and technology use were experienced. When institutional structures failed to account for these realities, participants often internalized difficulty as personal inadequacy. In this way, impostor feelings functioned as responses to misalignment rather than reflections of motivation or competence.

These findings align with Kasworm's (2020) characterization of adult learners' academic lives as embedded within sustained role obligations rather than disrupted challenges. Prior literature similarly notes that when institutions fail to acknowledge these structural realities, adult learners are more likely to interpret strain as individual failure rather than systemic limitation (Brookfield, 2017).

Role Strain and Adult Learner Identity

Findings related to role strain highlight how adult learners experienced higher education as one responsibility among many rather than as a singular or primary focus. Participants described academic work occurring in fragmented intervals, often after fulfilling professional and caregiving obligations. Over time, this pattern contributed not only to cognitive fatigue, but also to ongoing questioning of academic legitimacy.

This finding is consistent with existing research on adult learning, which identifies role strain as a defining condition of adult learners' academic engagement rather than a deviation from normative participation (Kasworm, 2020; Craddock et al., 2011).

Rather than viewing role strain as an expected feature of adult learning, participants frequently interpreted exhaustion and divided attention as evidence that they were not meeting academic norms. When expectations felt difficult to sustain, learners questioned their own commitment or capability rather than the feasibility of institutional assumptions. This suggests that role strain influenced identity formation and self-assessment in ways that extended beyond time management alone.

Similar patterns have been documented in prior studies, which indicate that adult learners often internalize structural pressures as personal inadequacy when institutional expectations

remain implicit or modeled after traditional student experiences (Ramsey & Brown, 2019; Brookfield, 2017).

Identity tension further intensified these experiences. Participants described feeling out of place in learning environments that appeared to advantage younger students or assume high levels of technological confidence. In digitally mediated classrooms, where expectations were often implied and opportunities for informal clarification limited, these tensions were heightened. Together, role strain and identity tension shaped how adult learners approached participation, engagement, and help-seeking, contributing to the development of impostor feelings.

These findings align with literature on adult learner identity and belonging, which suggests that online and technology-rich environments can amplify feelings of marginalization when norms are unspoken and opportunities for normalization are limited (Parkman, 2016; Stone & Springer, 2019). This study extends prior work by demonstrating how identity tension interacts with role strain to intensify impostor feelings within AI-mediated learning contexts.

Manifestations of Impostor Syndrome

Impostor syndrome emerged across participant narratives as a persistent and internalized experience rather than a reaction to isolated academic challenges. Participants described ongoing self-doubt, fear of exposure, and heightened sensitivity to feedback, even when academic performance was strong. These feelings influenced how learners engaged with coursework and academic relationships, often resulting in hesitation, avoidance, or withdrawal.

This finding is consistent with impostor phenomenon literature, which characterizes impostor syndrome as a chronic cognitive and emotional pattern rather than a situational response to difficulty (Clance & Imes, 1978; Bravata et al., 2020).

Participants frequently interpreted confusion, uncertainty, or feedback as confirmation that they did not belong. Rather than viewing these experiences as part of the learning process, they were often experienced as indicators of personal inadequacy. Heightened sensitivity to feedback further limited help-seeking behaviors, as participants feared that asking questions or requesting clarification would expose perceived incompetence.

Prior research similarly indicates that adult learners experiencing impostor syndrome are more likely to avoid help-seeking and interpret feedback as evaluative judgment rather than developmental guidance (Parkman, 2016; Hutchins, 2015).

These findings suggest that impostor syndrome shaped not only emotional experiences, but also academic behavior. In technology-rich environments, where communication was often asynchronous and social cues limited, opportunities for reassurance and normalization were reduced. As a result, participants engaged in increased self-monitoring and internal comparison, reinforcing impostor narratives.

This pattern aligns with studies of online and digital learning environments, which suggest that reduced immediacy and social presence can intensify self-doubt and internal comparison, particularly among nontraditional students (Stone & Springer, 2019; Fraenza, 2016).

Technology as a Dual Influence

Technology played a central and complex role in participants' academic experiences. Digital and AI-based tools supported organization, comprehension, and persistence, particularly for learners managing competing responsibilities and limited time. Participants described using technology strategically to maintain engagement and complete coursework when cognitive and emotional resources were strained.

Consistent with prior research, these findings suggest that technology can function as an adaptive support for adult learners by increasing flexibility and efficiency within constrained life contexts (Zawacki-Richter et al., 2019; Holmes & Tuomi, 2022).

At the same time, technology functioned as a significant source of stress. Technical disruptions, unclear platform expectations, and system inconsistencies frequently triggered frustration, anxiety, and self-blame. Participants often interpreted technological difficulties as personal failures rather than system-level challenges. For learners already experiencing role strain and self-doubt, these moments intensified impostor feelings and emotional distress.

This finding mirrors existing literature on digital literacy and adult learning, which indicates that technology-related challenges are frequently internalized as competence deficits when adequate orientation and institutional support are lacking (van Deursen, 2020; Holmes & Tuomi, 2022).

The dual influence of technology highlights how digital tools simultaneously enabled academic persistence while reinforcing psychological strain. Without precise guidance, validation, or acknowledgment of learning curves, technology became both a support mechanism and a site where impostor feelings were reinforced.

This study extends prior research by illustrating how technology's supportive and stressful functions coexist, rather than operate as separate or opposing forces, within adult learners' lived experiences.

Institutional Gaps and Meaning-Making

Participants' accounts revealed institutional gaps that shaped how academic challenges were interpreted and internalized. Limited technology orientation, unclear communication, and lack of emotional validation left participants to make sense of difficulties independently. In the

absence of institutional acknowledgment, many participants concluded that struggles reflected individual inadequacy rather than systemic design.

Similar concerns have been raised in the literature, which emphasizes that unclear institutional communication and limited onboarding disproportionately affect adult learners navigating complex digital environments (Brookfield, 2017; Jisc, 2021).

Importantly, participants were not requesting reduced expectations. Instead, they emphasized the need for clarity, flexibility, and recognition of adult learner realities. These desired supports reflect a need for alignment rather than accommodation. When institutions failed to acknowledge role strain, impostor feelings, and the emotional demands of technology-rich learning environments, adult learners were more likely to disengage quietly rather than seek support.

This finding aligns with adult learning scholarship that highlights the importance of institutional alignment with learners' lived realities rather than reliance on individual resilience or self-advocacy (Kasworm, 2020; Kahu & Nelson, 2018).

Collectively, these findings suggest that impostor syndrome among adult learners functions as an indicator of broader misalignment between learners and higher education environments. Rather than reflecting individual deficits, impostor feelings emerged in response to institutional structures, technological expectations, and limited acknowledgment of adult learners' lived realities.

In this way, the study contributes to existing literature by reframing impostor syndrome as a contextual and relational phenomenon, extending prior research that has primarily conceptualized it as an individual psychological experience (Bravata et al., 2020; Parkman, 2016).

Implications

What this study ultimately suggests is that impostor syndrome for adult learners is not just an internal confidence issue, it is deeply shaped by how higher education is designed and communicated. The participants in this study were not struggling because they lacked ability or motivation; they were navigating systems that often-assumed unlimited time, seamless technology use, and a traditional student identity that did not reflect their lived realities. When institutions fail to acknowledge competing roles, unclear expectations, and the emotional weight of feedback and technology, adult learners are left to interpret these gaps as personal shortcomings. In that sense, impostor feelings are not accidental, they are produced at the intersection of institutional structures, digital environments, and adult learners' already complex lives.

For administrators, advisors, and faculty, this means shifting the question from "How do we fix the learner?" to "What are our systems communicating about who belongs here?" The findings imply a need for clearer guidance, more intentional validation, and flexibility that is built into structures rather than offered only as exceptions. Advising and instructional practices that normalize struggle, explain expectations explicitly, and frame technology as support, not surveillance, can reduce the self-doubt that leads adult learners to withdraw or disengage. More broadly, institutions that recognize role strain, identity tension, and emotional labor as normal parts of adult learning can create environments where persistence is supported rather than silently tested. Addressing impostor syndrome, then, is less about resilience training and more about designing higher education in ways that affirm adult learners' legitimacy from the start.

Recommendations for Practice

Based on the findings of this study, higher education institutions should take a closer look at how their policies, communication, and support structures affect adult learners who are already balancing multiple roles. One of the clearest takeaways is the need to recognize role strain as a normal part of adult learning rather than as an individual problem. Advising models, course policies, and participation expectations should reflect the reality that many adult learners are engaging in coursework after full workdays, caregiving responsibilities, and other ongoing demands. When institutions design systems as if students have unlimited time and energy, adult learners are more likely to internalize stress and self-doubt as personal failure.

Institutions should also work toward greater clarity and transparency, especially in technology-rich environments. Clear expectations around participation, deadlines, feedback, and technology use can reduce the uncertainty that often fuels impostor feelings. Faculty and advisors can support this by framing feedback as part of a learning process rather than as a judgment of ability. Emphasizing revision, growth, and skill development may help adult learners interpret feedback as guidance instead of confirmation that they do not belong. In addition, institutions should offer structured, adult-learner-focused technology orientation that explains platforms, AI tools, and where to get help. When guidance is clear and support is visible, technical challenges are less likely to become sources of shame or self-blame.

Finally, higher education leaders should be more intentional about normalizing the emotional side of adult learning. Self-doubt, stress, and uncertainty are common experiences for adult learners, yet they are rarely acknowledged openly. Naming these experiences through advising conversations, orientation materials, and institutional messaging can reduce isolation and increase a sense of belonging. At the structural level, flexibility should be built into policies rather than offered only as accommodations. Predictable communication, reasonable deadlines,

and adult-learner-informed design signal that institutions value persistence without requiring learners to constantly justify their needs. Together, these practices can help create learning environments where adult learners feel supported, capable, and legitimate.

Limitations

This study is subject to several limitations that should be considered when interpreting the findings. First, as a qualitative phenomenological study, the findings are not intended to be generalized to all adult learners or higher education contexts. The sample consisted of 12 adult learners enrolled at two institutions in Northeastern Pennsylvania and the Lehigh Valley region. While this sample provided rich, in-depth insight into participants' lived experiences, it represents a specific population situated within particular institutional and regional contexts. The findings therefore emphasize depth of understanding rather than range or representativeness.

Second, participant self-selection may have influenced the findings. Individuals who volunteered for the study may have been more reflective, more aware of impostor feelings, or more willing to articulate experiences of self-doubt and technological stress. Adult learners experiencing more severe disengagement or those less comfortable discussing impostor syndromes may not have participated, potentially limiting the range of perspectives captured.

Third, the study relied on self-reported data collected through semi-structured interviews. Participants' accounts reflect their perceptions, interpretations, and emotional responses to academic and technological experiences rather than direct observation of institutional practices or digital environments. As such, the findings represent subjective meaning-making rather than objective assessments of instructional design, technology systems, or institutional intent.

Fourth, the researcher's position as an adult learner with professional experience in higher education introduces the potential for interpretive bias. While this insider perspective

enhanced rapport and contextual understanding, it also required careful reflexivity. To address this limitation, reflexive journaling, peer debriefing, and member checking were employed to support analytic rigor and transparency.

Additionally, the study focused exclusively on student perspectives and did not include input from faculty, advisors, or institutional leaders. As a result, conclusions regarding institutional gaps and support reflect participants' lived experiences rather than institutional policy analysis or administrative perspectives. Future research incorporating multiple stakeholder viewpoints may provide a more comprehensive understanding of these dynamics.

Finally, the study captured participants' experiences within a single academic semester. While impostor syndrome emerged as an ongoing process rather than an episodic experience, the design does not allow for examination of changes over time, adaptation to digital environments, or long-term impacts of institutional supports. Longitudinal research would be needed to explore how adult learners' confidence, digital engagement, and impostor experiences evolve across academic trajectories.

Recommendations for Future Research

The limitations of this study suggest several clear directions for future research. Each recommendation below directly corresponds to an identified limitation and reflects opportunities to extend and deepen understanding of adult learners' experiences with impostor syndrome in technology-rich higher education environments.

First, given the qualitative design and limited sample size of this study, future research should examine adult learners' experiences with impostor syndrome across larger and more diverse populations. Quantitative or mixed-methods studies could assess the prevalence and intensity of impostor syndrome among adult learners in technology-rich environments and

explore relationships between impostor feelings, digital literacy, institutional support, and academic persistence. Such approaches would complement the depth of this phenomenological study by offering broader insight into patterns and trends.

Second, because participants self-selected into the study, future research should explore the experiences of adult learners who may be less inclined to participate in reflective or interview-based research. Studies using anonymous surveys or embedded course-based data collection may capture perspectives of learners who experience disengagement, withdrawal, or heightened distress but are less likely to volunteer for qualitative interviews. Including these voices may provide a more comprehensive understanding of how impostor syndrome affects adult learner persistence.

Third, given the reliance on self-reported data, future research should incorporate additional data sources to triangulate adult learners' experiences. Observational studies of online classrooms, analyses of learning management systems, or document reviews of institutional technology policies could provide contextual insight into how digital environments and institutional practices shape learner perceptions. Such approaches may help distinguish between individual interpretation and systemic design factors contributing to impostor experiences.

Fourth, because this study focused exclusively on adult learners' perspectives, future research should include faculty, advisors, instructional designers, and administrators as participants. Multi-perspective qualitative studies or institutional case studies could examine how institutional intentions, instructional practices, and support structures align—or fail to align—with adult learners' lived experiences. Including these stakeholder perspectives may help identify structural contributors to impostor syndrome and inform more responsive institutional practices.

Fifth, due to the single-semester timeframe of this study, longitudinal research is recommended to examine how adult learners' impostor experiences evolve over time. Future studies could track learners across multiple semesters or key academic transitions to explore whether increased familiarity with technology, institutional norms, and AI tools leads to reduced self-doubt or whether impostor syndrome persists throughout academic trajectories. Longitudinal designs may also illuminate how institutional interventions influence confidence and engagement over time.

Finally, because participants demonstrated varied levels of engagement with artificial intelligence tools, future research should examine AI use as a distinct area of inquiry. Studies could explore how different forms of AI engagement—such as writing support, organization, or tutoring—affect adult learners' perceptions of competence, autonomy, and academic legitimacy. Intervention-based research evaluating structured AI orientation, ethical guidance, or faculty-mediated AI use may provide evidence-based strategies for supporting adult learners in technology-rich environments.

Conclusion

The findings of this study suggest that adult learners' experiences of impostor syndrome in technology-rich higher education environments are shaped less by individual deficiencies and more by the interaction of institutional expectations, digital systems, and competing life roles. Participants consistently described navigating academic work within contexts of role strain, implicit technological norms, and limited acknowledgment of adult learner realities. These experiences indicate that higher education environments often assume a level of digital confidence, time flexibility, and academic continuity that does not align with adult learners' lived circumstances. As a result, impostor feelings were reinforced not simply by academic challenge,

but by structural conditions that left participants feeling out of place, hesitant to seek support, and uncertain about their legitimacy as students. These findings suggest the importance of attending to how institutional design, communication, and learning environments implicitly position adult learners within academic spaces.

At a broader level, these findings contribute to a reframing of how impostor syndrome among adult learners is understood within higher education. Rather than viewing impostor feelings solely as internal psychological experiences, this study highlights their relational and contextual nature, emerging at the intersection of identity, technology, and institutional practice. Participants' narratives illustrate that confidence, motivation, and engagement are closely tied to whether academic environments acknowledge adult learners' realities and provide clarity, validation, and flexibility. This reframing underscores that supporting adult learners requires attention not only to individual resilience, but also to the systems and structures that shape how competence and belonging are communicated. By centering adult learners' lived experiences, these implications emphasize the need to consider impostor syndrome as a meaningful indicator of misalignment between learners and their educational environments, rather than as an individual shortcoming.

Appendix A: Recruitment Email and Flyer

Subject Line: Invitation to Participate in a Research Study on Adult Learners and Impostor Syndrome

Dear Students,

My name is Christine Confer, and I am a PhD student at Marywood University. I am conducting a research study for my dissertation that explores the lived experiences of adult learners in higher education, with a focus on perceptions of impostor syndrome in technology-rich environments.

You are invited to participate if you meet the following criteria:

- You are 25 years of age or older.
- You are currently enrolled as an undergraduate or graduate student.
- You balance responsibilities such as work, caregiving, or other life roles alongside your education.

The research will take place virtually or by phone, depending on your preference. Participation will involve:

- Completing a brief demographic questionnaire (sent via email)
- Taking part in a 60-minute interview conducted virtually or by phone

Benefits:
Your participation will contribute to research addressing the unique challenges adult learners face in higher education.

Risks:
The risks are minimal and similar to those you encounter in everyday life. You may skip any question or withdraw from the study at any time without penalty. Some participants may feel mild discomfort when discussing personal experiences related to impostor syndrome.

Compensation:
As a thank you, participants who complete the interview will receive a ***$5.00 Amazon gift card***.

Confidentiality:
Your information will be kept confidential. No identifying details will appear in any reports or publications. Data will be stored on a password-protected device and destroyed after three years.

This study has been approved by Marywood University's Exempt Review Committee.

If you are interested in participating or have any questions, please contact me at **caconfer@m.marywood.edu**.

Sincerely,
Christine Confer
PhD Student
Marywood University

Appendix B: FOLLOW UP REMINDER EMAIL:

Subject Line: Friendly Reminder: Research Study on Adult Learners – $10 Gift Card for Participation

Dear Students,

My name is Christine Confer, and I am a PhD student at Marywood University. I'm following up to remind you about the opportunity to participate in my research study on the experiences of adult learners in higher education, particularly related to impostor syndrome in technology-rich environments.

If you have not yet participated and meet the following criteria, I would be grateful for your input:

- You are 25 years of age or older
- You are currently enrolled as an undergraduate or graduate student
- You balance responsibilities such as work, caregiving, or other life roles alongside your education

The research will be conducted virtually or by phone, based on your preference, and takes approximately 30 minutes, including a short demographic questionnaire.

Benefits:

This study may contribute to a better understanding of how to support adult learners in higher education.

Compensation:
Participants who complete the interview will receive a $5.00 Amazon gift card.

Your participation is voluntary, and all information will remain confidential. This study has been approved by Marywood University's Exempt Review Committee.

If you are interested or have questions, please email me at caconfer@m.marywood.edu.

Thank you for considering this opportunity!

Sincerely,
Christine Confer
PhD Student
Marywood University

Appendix C: Demographic Questionnaire for Research Participants

Thank you for your participation in this study. Your responses will remain confidential and will only be used for research purposes. Please answer the following questions:

Section 1: Personal Background

1. Age:_____
2. Gender:
    - o Male
    - o Female
    - o Non-binary
    - o Prefer not to say
    - o Other (please specify): _____
3. Ethnicity (optional):
    - o African American/Black
    - o Asian
    - o Hispanic/Latino
    - o Native American/Indigenous
    - o White/Caucasian
    - o Other (please specify): _____

4. Current Enrollment Status:
    - o Undergraduate student
    - o Graduate student

5. Employment Status: (**Check all that apply)**
    - o Full-time
    - o Part-time
    - o Per diem (paid on a daily basis, working as needed without a fixed schedule)
    - o Not currently employed

6. Caregiver Status (**Check all that apply**):
    - o I am not a caregiver
    - o I provide care for children
    - o I provide care for an elderly family member
    - o I provide care for a person with a disability or chronic illness
    - o Other (please specify): _____

Appendix D: Informed Consent

Title: Between Doubt and Data: A Phenomenological Study of Adult Learners' Lived Experiences with Impostor Syndrome in AI-Enhanced Higher Education

Principal Investigator (PI): Christine Confer

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Research Advisor: Dr. Alan Levine

Research Advisor Contact Information: levine@maryu.marywood.edu

Invitation for a Research Study

You are invited to participate in a research study about the lived experiences of adult learners who experience impostor syndrome while engaging with technology in higher education. You were chosen because you are an adult learner enrolled in higher education who may have encountered challenges related to impostor syndrome or the use of digital tools. Please read this form and feel free to ask any questions you may have before agreeing to participate.

Purpose – About the Study

The purpose of this study is to explore your perceptions, challenges, and coping strategies related to impostor syndrome and digital technology use in academic environments. The findings will

support a better understanding of how to assist adult learners through policies and practices that address these experiences.

Procedures – What You Will Do

If you choose to participate, you will:

- Complete a brief demographic questionnaire sent via email. It will collect information such as your age, gender, enrollment status, employment, caregiving responsibilities, and access to technology.
- Participate in a 60-minute semi-structured interview conducted at your convenience. The interview may be held virtually by phone, or in person based on your preference.
- Be audio-recorded during the interview using a digital recorder for transcription purposes. Only the researcher will transcribe the recording. No identifying information will be included in the transcript.

Risks and Benefits

The risks associated with this study are no greater than those experienced in everyday life. You may feel mild discomfort when discussing personal experiences related to impostor syndrome. You may skip any question or stop participating at any time without penalty.
While there are no direct benefits to you, your input will help inform ways to improve support systems for adult learners in higher education and may benefit future students navigating similar challenges.

Payment or Other Rewards

You will receive a $5.00 Amazon gift card as a token of appreciation for your participation.

Confidentiality

The records of this study will be kept private. Information used in any written or presented report will not make it possible to identify you. Only the researcher will have access to research records, which will be securely stored on a password-protected device. Audio recordings will be destroyed after transcription. All data will be retained for three years and then permanently deleted in accordance with Marywood University's policy.

No web-based action is perfectly secure. However, reasonable efforts will be made to protect your transmission from third-party access.

Taking Part is Voluntary

Participation in this study is completely voluntary. Your decision whether or not to participate will not affect your relationship with the researcher or with Marywood University. You may withdraw at any time without penalty. If you choose to withdraw, any information collected from you will be deleted and not included in the study.

Contacts and Questions

If you have questions at any time about this study, contact the principal investigator, Christine Confer, at caconfer@m.marywood.edu. You may also contact the research advisor listed at the top of this form.

For questions about your rights as a research participant, please contact the Marywood University Exempt Review Committee (ERC) at (570) 961-4782 or irbhelp@marywood.edu.

You may keep a copy of this form for your records.

Statement of Consent

By proceeding:
- You understand what the study involves.
- You have asked questions and received satisfactory answers.
- You voluntarily agree to participate in this study.

Appendix E: Semi-Structured Interview Guide

Section A: Background and Context

1. To start, can you tell me a little about yourself? For example, are you working full-time, taking care of family, or balancing other responsibilities alongside your studies?
    a. (Follow-up if needed: How do these responsibilities impact your time and energy for school?)

2. What led you to pursue higher education at this stage in your life?
3. How would you describe your overall experience as an adult learner so far?
    a. (Follow-up if needed: What challenges or successes stand out to you?)

Section B: Impostor Syndrome and Academic Performance

4. Can you describe a time in your academic journey when you felt uncertain about your abilities or accomplishments?
    a. (Follow-up if needed: How did you navigate that situation?)

5. How, if at all, do feelings of self-doubt or impostor syndrome affect your academic performance or engagement with your studies?

6. What strategies or approaches have you found helpful in managing feelings of self-doubt or impostor syndrome?
    a. (Follow-up if needed: Are there any resources or support systems you've used?)

Section C: Technology and AI Tools

7. In your experience, how has technology (e.g., AI tools, online platforms, or digital resources) influenced your learning?

8. What challenges, if any, have you faced in accessing or using technology for your academic work?

    a. (Follow-up if needed: How do these challenges affect your confidence or ability to succeed?)

9. How confident do you feel in using technology or AI tools for your coursework?
    a. (Follow-up if needed: What factors contribute to or hinder your confidence?)

10. Do you feel that technology enhances or detracts from your academic success?
    a. (Follow-up if needed: Can you share specific examples?)

Section D: Institutional Support and Final Reflections

11. What, if anything, could higher education institutions do to better support adult learners like you in managing impostor syndrome and adapting to technology?

12. Finally, is there anything else you would like to add about your experiences with impostor syndrome?

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