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Empowering Women Leaders through Online Strategic Leadership Education

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ABSTRACT: *The Design-Based Research methodology, integrated with Interpretative Phenomenological Analysis, was employed across two iterative cycles. Data collection included semi-structured interviews, participant journals, focus groups, and validated leadership assessments. A Strategic Leadership and Management for Women course was developed, implemented, and refined across two iterations with 75 participants total (45 in Iteration 1, 30 in Iteration 2). Iteration 1 demonstrated statistically significant improvements across all leadership dimensions ($p<0.001$, Cohen's $d=0.89$-1.45). Iteration 2 showed enhanced engagement with a 319% increase in content views and 50% increase in active users compared to Iteration 1. Cross-iteration analysis revealed improved peer interaction, sustained motivation, and stronger development of leadership identity through refined pedagogical approaches. Findings inform iterative leadership development programme design in higher education institutions, evidence-based approaches to course refinement, organisational diversity and inclusion initiatives, and policy development for gender equity in leadership through systematic intervention improvement and peer-supported learning environments. This research provides the first systematic two-iteration integration of Design-Based Research with Interpretative Phenomenological Analysis for women's leadership development, demonstrating how iterative refinement enhances educational interventions and offering both theoretical insights into leadership identity formation and practical intervention models for educational institutions.*

Key words*: Design-based research, gender equity, higher education, Iterative development, leadership development. women's leadership.*

1. Introduction

The persistent underrepresentation of women in executive leadership roles remains one of the most significant challenges facing modern organisations and educational institutions worldwide (Catalyst, 2023). Despite notable progress in gender equality initiatives and women's growing participation in higher education, the shift from academic success to executive leadership remains hindered by complex systemic barriers (Eagly & Karau, 2002). This issue goes beyond individual limitations to include institutional, cultural, and structural dynamics that fundamentally influence women's professional paths and leadership ambitions.

Research consistently demonstrates that diverse leadership teams, particularly those with gender diversity, contribute to enhanced organisational performance, improved decision-making processes, and greater innovation capacity (Hunt et al., 2020). However, women remain significantly underrepresented in senior leadership roles across sectors, with particularly pronounced disparities evident in executive positions within higher education institutions, corporate boardrooms, and senior management contexts (Adams et al., 2021).

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This persistent gap suggests that barriers to women's leadership advancement operate at multiple levels and require a comprehensive understanding and intervention.

Higher education institutions occupy a unique position in this landscape, serving simultaneously as environments where leadership aspirations are formed and as organisations that struggle with gender equity in leadership positions (White & Ozkanli, 2021). The dual role of these institutions creates distinctive opportunities to understand and address the factors that either support or constrain women's leadership development. Educational environments possess the potential to serve as catalysts for change, yet they often perpetuate existing inequalities through traditional pedagogical approaches and institutional cultures that favour masculine leadership models.

The motivation for this study emerges from the recognition that while individual-focused interventions have shown promise, comprehensive approaches that address both personal development and systemic barriers are essential for creating sustainable change (Ely et al., 2011). Furthermore, the iterative nature of educational intervention development requires systematic investigation to understand how design refinements impact learning outcomes and participant engagement. The research problem centres on understanding how educational interventions can be designed, implemented, and refined to effectively support women's leadership development while simultaneously addressing the broader cultural and structural factors that influence their career progression.

This study addresses three critical research questions that examine different dimensions of women's leadership development across two iterative cycles. First, how does higher education shape women's aspirations and preparation for leadership roles? Second, to what extent can role models support and influence women in accessing leadership positions? Third, how significant is organisational culture in establishing pathways for women into leadership roles? These interconnected questions reflect the complex, multifaceted nature of women's leadership development and the need for comprehensive approaches that address individual, interpersonal, and systemic factors through iterative refinement processes.

The importance of this research extends to various stakeholder groups, including educational institutions aiming to improve their leadership development programmes through evidence-based revisions, organisations dedicated to promoting gender equity via refined intervention strategies, and policymakers working to foster more inclusive professional environments through systematic programme enhancements. By employing Design-Based Research methodology across two complete cycles, this study offers both theoretical insights into women's leadership development processes and practical solutions illustrating how educational interventions can be systematically refined through iterative design and implementation.

The two-iteration approach provides unique insights into how educational interventions evolve and improve through systematic refinement. Iteration 1 established a foundational understanding of women's leadership development needs and the initial effectiveness of the intervention, while Iteration 2 demonstrated how targeted refinements based on participant feedback and engagement data can significantly enhance learning outcomes and participant satisfaction. This iterative methodology offers a model for sustainable improvement in leadership development programming that can be adapted across diverse educational and organisational contexts.

2. Literature Review

2.1. Theoretical Foundations of Women's Leadership Development

The study of women's leadership development draws on multiple theoretical traditions that illuminate the complex relationships among gender, education, and organisational advancement. Gender role theory, as articulated by Eagly and Karau (2002), provides crucial insights into the double-bind dilemma that women face in leadership contexts. This theory explains how women are often perceived as either "too soft" to lead effectively or "too masculine" when they exhibit assertiveness typically associated with leadership roles. This paradox creates fundamental challenges for women seeking leadership positions, as they must navigate contradictory expectations about appropriate feminine behaviour and effective leadership behaviour (Heilman & Eagly, 2008).

Social learning theory, developed by Bandura (1977), offers important perspectives on how leadership skills and identities develop through observation, modelling, and social interaction. This theoretical framework is particularly relevant for understanding the role of mentorship and role models in women's leadership development. According to social learning theory, individuals develop capabilities and self-efficacy

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through observing others who are similar to themselves successfully performing desired behaviours. For women aspiring to leadership roles, the availability of female role models and mentors becomes crucial for developing both skills and confidence necessary for leadership success (Brown & James, 2022).

Intersectionality theory, originally developed by Crenshaw (1989) and further elaborated by Collins and Bilge (2020), provides essential insights into how multiple dimensions of identity interact to create unique experiences of privilege and marginalisation. This theoretical framework is particularly important for understanding women's leadership development because it recognises that women do not constitute a homogeneous group. Women of colour, women with disabilities, women from working-class backgrounds, and women from other marginalised groups face compounded barriers that cannot be understood simply by adding together the effects of gender discrimination and other forms of discrimination.

Bakhtin's concept of dialogism offers a sophisticated framework for understanding how individuals construct and negotiate their identities within complex discursive environments (Bakhtin, 1981). Applied to leadership development, dialogism helps explain how women navigate competing discourses about gender, leadership, and professional identity. Women aspiring to leadership roles must negotiate between traditional feminine role expectations, professional competency requirements, and leadership effectiveness criteria, often finding themselves in dialogue with contradictory messages about appropriate behaviour and identity. The iterative nature of this study particularly benefits from Bakhtin's dialogic framework, which emphasises how meaning and identity emerge through ongoing dialogue and interaction rather than through the static transmission of knowledge.

2.2. Design-Based Research in Educational Contexts

Design-Based Research represents a methodological approach that bridges the gap between educational research and practice by developing and testing interventions within authentic learning environments (Design-Based Research Collective, 2003). This methodology is particularly well-suited to leadership development research because it acknowledges the complex, contextual nature of learning while maintaining commitment to systematic investigation and evidence-based improvement. DBR's emphasis on iterative cycles of design, implementation, evaluation, and refinement aligns with the dynamic nature of leadership development and the need for responsive educational programming.

The iterative nature of DBR offers unique advantages for understanding women's leadership development, as it allows researchers to test initial assumptions, gather evidence on intervention effectiveness, and systematically refine approaches based on participant feedback and outcome data (McKenney & Reeves, 2019). This methodology recognises that educational interventions are not static products but dynamic processes that must evolve in response to learner needs and contextual factors. For women's leadership development, this iterative approach is particularly valuable because it allows for the incorporation of diverse perspectives and experiences while maintaining focus on measurable outcomes.

Research on DBR implementation in higher education contexts demonstrates the methodology's effectiveness in developing and refining educational interventions that address complex social and educational challenges (Anderson & Shattuck, 2012). The methodology's emphasis on collaboration between researchers and practitioners ensures that interventions are both theoretically grounded and practically relevant. In the context of women's leadership development, this collaborative approach enables the incorporation of women's lived experiences while maintaining rigorous research standards.

2.3. Systemic Barriers to Women's Leadership Advancement

The literature consistently identifies multiple systemic barriers that constrain women's advancement into executive positions. Structural barriers represent perhaps the most visible constraints on women's leadership advancement. The glass ceiling continues to limit women's advancement into senior leadership positions across sectors (Federal Glass Ceiling Commission, 1995). Research by Adams et al. (2021) demonstrates that women are often over-represented in precarious leadership positions, a phenomenon known as the "glass cliff," in which they are more likely to be appointed to leadership roles during times of crisis or when the likelihood of failure is high.

Cultural barriers represent equally significant constraints on women's leadership development, though they are often less visible and more difficult to address than structural barriers. Ahmed (2022) documents how everyday sexism and exclusionary cultures continue to undermine women's experiences in educational and

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professional environments. These cultural dynamics are reinforced by gender stereotypes that associate leadership with masculine characteristics and devalue the collaborative, inclusive leadership styles often exhibited by women leaders (Catalyst, 2023).

Psychological barriers, while experienced at the individual level, are often the result of systemic and cultural factors that undermine women's confidence and self-efficacy in leadership contexts. Imposter syndrome, characterised by persistent feelings of inadequacy despite evidence of competence and achievement, disproportionately affects women and can significantly constrain their willingness to pursue leadership opportunities (Clance & Imes, 1978). These psychological barriers are exacerbated by the lack of female role models in leadership positions, which can make it difficult for women to envision themselves in similar roles.

2.4. The Role of Higher Education in Leadership Development

Higher education institutions play a crucial role in shaping leadership aspirations and capabilities, yet research reveals significant challenges in how these institutions support women's leadership development. Acker (2006) argues that higher education institutions often maintain conventional hierarchical and male-dominated structures that limit opportunities for women's growth and leadership development. These institutional structures are reflected in faculty composition, administrative hierarchies, and informal power networks that can exclude women from leadership development opportunities.

Research on pedagogical approaches in higher education reveals that traditional leadership education often adopts models that reflect masculine leadership and fail to address the unique challenges and strengths that women bring to leadership contexts (Ely et al., 2011). More inclusive pedagogical approaches that incorporate collaborative learning, reflective practice, and attention to diverse leadership styles can more effectively support women's leadership development (Shapiro et al., 2022).

The literature also highlights the importance of institutional culture in supporting women's leadership development. Inclusive organisational cultures characterised by policies and practices that actively support gender equity, leadership development opportunities accessible to all students, and informal norms that value diverse leadership styles and perspectives are more successful in advancing women into leadership positions (Rosa et al., 2020). The iterative approach employed in this study provides opportunities to systematically address these cultural factors through successive refinements of educational interventions.

2.5. Role Models and Mentorship in Women's Leadership Development

Literature regards role models and mentorship as vital for women's leadership development. Research on role modelling uncovers complex dynamics that influence how women benefit from interactions with female leaders. Brown and James (2022) demonstrate that the presence of female leaders can greatly impact aspiring women's career goals and self-confidence. However, the success of role modelling relationships relies on various factors, including the visibility and accessibility of role models, the resemblance between role models and aspiring leaders, and the quality of their interactions.

Mentorship relationships are more intensive forms of role modelling that offer both instrumental and psychosocial support for women's leadership development. Allen and Reid (2019) found that well-designed mentorship programmes can significantly improve women's leadership skills and confidence. However, research also highlights challenges in mentorship relationships, such as the limited availability of senior women to act as mentors, the risk of tokenism when women are expected to predominantly mentor other women, and the complex dynamics that can emerge in cross-gender mentoring relationships.

The iterative nature of this study provides unique opportunities to examine how role modelling and mentorship dynamics evolve as educational interventions are refined. Iteration 1 revealed the importance of peer-to-peer role modelling and vicarious learning, while Iteration 2 demonstrated how structured peer mentoring and collaborative feedback can enhance these processes. This progression illustrates how systematic intervention refinement can strengthen the role modelling and mentorship components of leadership development programming.

2.6. Organisational Culture and Women's Leadership Progression

Organisational culture emerges from the literature as a fundamental factor that either facilitates or constrains women's progression into leadership roles. Inclusive organisational cultures are characterised by

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policies and practices that actively support gender equity, accessible leadership development opportunities for all employees, and informal norms that value diverse leadership styles and perspectives (Hunt et al., 2020). Research demonstrates that organisations with inclusive cultures are more successful in advancing women into leadership positions and retaining them in those roles.

However, the literature also reveals that many organisations maintain cultures that inadvertently or explicitly constrain women's leadership advancement. These cultures may be characterised by informal networks that exclude women, evaluation criteria that favour masculine leadership styles, or work-life integration expectations that disproportionately disadvantage women (Heilman & Eagly, 2008). Addressing these cultural barriers requires comprehensive approaches that address both formal policies and informal cultural dynamics.

The two-iteration design of this study provides insights into how educational interventions can address organisational culture challenges through systematic refinement. Iteration 1 revealed the importance of creating inclusive micro-cultures within educational settings, while Iteration 2 demonstrated how enhanced peer interaction and collaborative learning can strengthen these cultural dynamics. This iterative approach offers a model for how educational institutions can systematically develop more inclusive cultures that support women's leadership development.

3. Methodology

This study employs Design-Based Research (DBR) methodology implemented across two complete iterative cycles, an approach that emphasises the systematic development, testing, and refinement of interventions within authentic educational contexts (Design-Based Research Collective, 2003). The choice of DBR reflects the research's dual commitment to generating theoretical insights into women's leadership development and to creating practical solutions that meaningfully address the challenges women face in advancing toward leadership roles through evidence-based iteration and improvement. Figure 1 summarises the DBR Process over both iterations.

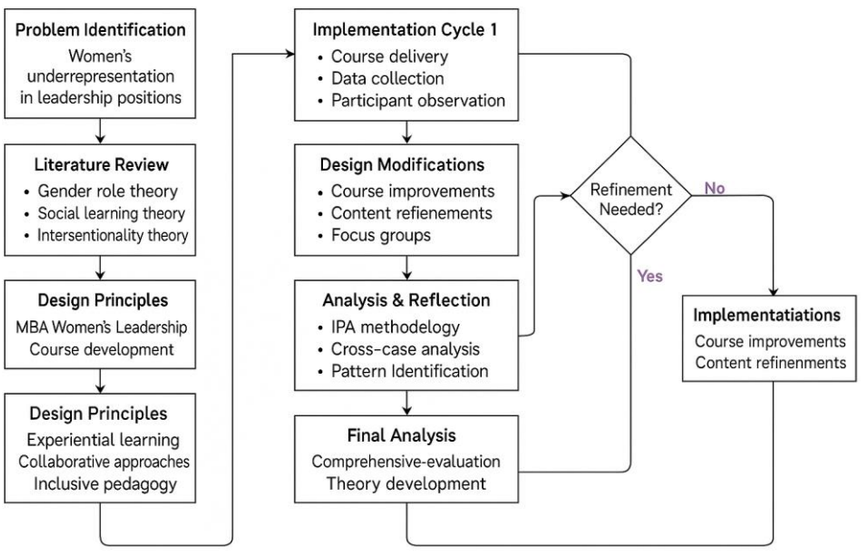


Figure 1. Design-Based Research Process Used Across Both Iterations

3.1. Research Design and Philosophical Foundations

Design-Based Research is grounded in pragmatic and constructivist epistemologies that view knowledge as socially constructed and continuously evolving in response to real-world challenges (McKenney & Reeves, 2019). This philosophical foundation aligns with the study's recognition that women's leadership development occurs within complex social, cultural, and institutional contexts that require a nuanced understanding and contextually responsive interventions. The constructivist orientation acknowledges that

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participants' experiences and interpretations are central to understanding the phenomena under investigation, while the pragmatic orientation emphasises the importance of developing interventions that work effectively in real-world contexts.

The two-iteration design provides unique methodological advantages by enabling systematic comparison of intervention effectiveness across different design configurations. This approach allows testing initial assumptions in Iteration 1, followed by evidence-based refinement and retesting in Iteration 2. The iterative methodology ensures that findings are not based on a single implementation but rather on systematic comparison of different approaches to the same fundamental challenges.

The study adopts an interpretivist approach that prioritises understanding the subjective experiences and meaning-making processes of women engaged in leadership development across both iterations (Klein & Myers, 1999). This orientation recognises that women's experiences of leadership development are shaped by their individual backgrounds, identities, and circumstances, as well as by the broader social and institutional contexts in which they operate. The two-iteration design enables examination of how these experiences evolve as interventions are refined and improved.

3.2. Integration with Interpretative Phenomenological Analysis

While guided by the DBR framework, this study employs Interpretative Phenomenological Analysis (IPA) as its primary qualitative methodology for understanding participants' experiences across both iterations (Smith et al., 2009). IPA is particularly well-suited to this research because of its commitment to understanding how individuals make sense of their personal and social worlds, especially in contexts marked by complexity and potential marginalisation.

IPA's focus on lived experience aligns with the study's commitment to centring women's voices and perspectives in understanding leadership development processes across different intervention designs. The methodology's emphasis on idiographic analysis, which involves detailed examination of individual cases before identifying broader patterns, ensures that the diversity of women's experiences is recognised and valued rather than obscured by generalisation (Eatough & Smith, 2006). The two-iteration design enables comparison of how lived experiences evolve as interventions are refined based on participant feedback and engagement data. The integration of IPA with DBR creates a methodological framework that is both theoretically rigorous and practically responsive. IPA provides the analytical tools necessary to understand the depth and complexity of women's leadership development experiences, while DBR provides the systematic framework for translating these insights into improved educational interventions. This integration ensures that intervention refinements are grounded in deep understanding of participant experiences rather than superficial adjustments based solely on outcome measures.

3.3. Two-Iteration Design Framework

The study's two-iteration design follows the systematic DBR cycle of design, implementation, evaluation, and refinement. Iteration 1 served as the foundational cycle, establishing the initial intervention design based on a literature review and theoretical frameworks, implementing the intervention with a cohort of participants, evaluating effectiveness across multiple data sources, and identifying areas for improvement based on participant feedback and outcome data. Iteration 2 represented the refinement cycle, incorporating lessons learned from Iteration 1 into a revised intervention design, implementing the refined intervention with a new cohort of participants, evaluating the effectiveness of the refinements through comparison with Iteration 1 data, and generating insights into the iterative improvement process itself. This two-iteration design enables systematic examination of how educational interventions can be improved through evidence-based refinement while maintaining focus on the core research questions about women's leadership development.

The iterative framework is guided by three core conjectures that remain consistent across both iterations while allowing for refinement of implementation approaches. Conjecture 1 (C1) focuses on aspiration formation as situated identity work, examining how higher education shapes women's leadership aspirations and preparation. Conjecture 2 (C2) examines the transformative power of relatable role models, exploring how they support and influence women's access to leadership positions. Conjecture 3 (C3) explores organisational culture as a mediator of women's leadership pathways, examining how cultural factors shape pathways into leadership roles.

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3.4. Participant Recruitment and Demographics

Participants were recruited through purposive sampling from postgraduate programmes at universities in the United Kingdom across both iterations. Recruitment criteria included current enrollment in a postgraduate programme, self-identification as a woman, and expressed interest in leadership development. The total sample consisted of 75 participants who completed the full course and evaluation process across both iterations: 45 participants in Iteration 1 and 30 participants in Iteration 2 (Table 1).

Table 1. Participant Demographics Across Both Iterations.

Characteristic	Iteration 1 (n=45)	Iteration 2 (n=30)	Total (n=75)
Age Range			
25-30 years	12 (26.7%)	9 (30.0%)	21 (28.0%)
31-35 years	18 (40.0%)	11 (36.7%)	29 (38.7%)
36-40 years	10 (22.2%)	7 (23.3%)	17 (22.7%)
41+ years	5 (11.1%)	3 (10.0%)	8 (10.7%)
Educational Background			
Bachelor's degree	8 (17.8%)	5 (16.7%)	13 (17.3%)
Master's degree	32 (71.1%)	22 (73.3%)	54 (72.0%)
Doctoral degree	5 (11.1%)	3 (10.0%)	8 (10.7%)
Industry Sector			
Education	15 (33.3%)	12 (40.0%)	27 (36.0%)
Healthcare	8 (17.8%)	5 (16.7%)	13 (17.3%)
Technology	7 (15.6%)	4 (13.3%)	11 (14.7%)
Finance	6 (13.3%)	4 (13.3%)	10 (13.3%)
Non-profit	5 (11.1%)	3 (10.0%)	8 (10.7%)
Other	4 (8.9%)	2 (6.7%)	6 (8.0%)

The participant demographics across both iterations reflect consistent diversity in age, educational background, and industry sector, enabling meaningful comparison of intervention effectiveness across similar populations. Ethnic diversity was represented across both iterations, with participants identifying with multiple ethnic categories, enabling an intersectional analysis of how different demographic characteristics influenced participants' experiences and outcomes across intervention designs.

3.5. Intervention Design Evolution

The central intervention evolved significantly between iterations based on evidence gathered during Iteration 1. The foundational intervention was a Strategic Leadership and Management for Women course designed to address the specific challenges and opportunities identified in the literature and through preliminary investigation. The course represents an innovative approach to leadership education that explicitly acknowledges and addresses the unique experiences of women in leadership development contexts.

Iteration 1 Design Features: The initial course design was informed by several key principles derived from the theoretical framework and existing research. The course employed experiential learning principles recognising that adult learners bring significant professional and personal experience that can inform their leadership development. Collaborative learning principles acknowledged the importance of relationships and community in women's leadership development. Inclusive pedagogy principles ensured that the course employed pedagogical approaches that were responsive to diverse learning styles and backgrounds.

Iteration 1 was delivered as an 8-week programme with evening online sessions, incorporating both live and pre-recorded content. The course included weekly reflective journals, group discussions, and individual reflection activities. Participants engaged with content related to leadership theory, gender dynamics in organisations, role model identification, and strategic decision-making. The format included both synchronous and asynchronous elements to accommodate participants' complex schedules.

Iteration 2 Design Refinements: Based on comprehensive evaluation of Iteration 1, significant refinements were implemented in Iteration 2. The course duration was reduced from 8 to 6 weeks based on participant feedback about cognitive load and time constraints. Session length was capped at 60 minutes to maintain engagement and accommodate participants' schedules. All sessions were delivered live rather than including

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pre-recorded content, based on evidence that live interaction was crucial for peer learning and community building.

Enhanced peer interaction was systematically integrated through structured peer mentoring, collaborative feedback processes, and formative peer assessment. An onboarding process was introduced to help participants feel welcomed and connected from the beginning of the course. Cultural diagnostics were embedded more explicitly in reflection prompts and facilitation to maintain focus on structural analysis rather than individual attribution of challenges.

3.6. Data Collection Methods

The study employs multiple data collection methods that align with both the DBR framework and IPA methodology across both iterations. Participant journals serve as a primary data source, with participants maintaining reflective journals throughout their participation in both iterations of the course. Semi-structured interviews are conducted with participants at multiple points during and after their participation in the course across both iterations. Focus groups provide opportunities for group discussions that explore shared experiences and examine how participants' interactions with each other contribute to their learning and development.

Pre- and post-course assessments using validated leadership scales provide quantitative data about changes in participants' leadership capabilities and confidence across both iterations. Course evaluation data collected through surveys and feedback forms provide both quantitative and qualitative data about participant satisfaction and perceived learning outcomes. Engagement data, including session attendance, content views, and participation metrics, provide objective measures of participant involvement across both iterations.

Researcher reflective journals maintained throughout both iterations provide insights into the intervention development and refinement process. Peer feedback data collected systematically in Iteration 2 provides additional insights into collaborative learning processes. Cross-iteration comparison data enables systematic analysis of how refinements impact participant experiences and outcomes.

3.7. Data Analysis Approach

Data analysis follows the systematic procedures of Interpretative Phenomenological Analysis while also incorporating the iterative analysis requirements of Design-Based Research across both iterations (Smith et al., 2009). Individual case analysis involves analysing each participant's data individually to understand their unique experience and perspective within each iteration. Cross-case pattern identification occurs after individual analysis is complete, with patterns and themes identified across cases within each iteration and then compared across iterations.

Quantitative analysis of pre- and post-course assessment data employs paired-samples t-tests to examine changes in leadership capabilities and confidence within each iteration. Independent samples t-tests are used to compare outcomes between iterations. Effect sizes are calculated using Cohen's d to assess the practical significance of observed changes. Cross-iteration engagement analysis compares participation metrics, attendance patterns, and content interaction data to evaluate the effectiveness of design refinements.

Theoretical insight generation involves connecting empirical findings to theoretical frameworks and generating insights that can inform both intervention refinement and broader theoretical understanding. The two-iteration design enables examination of how theoretical insights evolve as interventions are refined and how practical improvements contribute to theoretical development.

3.8. Ethical Considerations

The study adheres to established ethical principles for research involving human participants across both iterations, with particular attention to the potential vulnerabilities of participants who may be experiencing challenges in their professional development (British Educational Research Association, 2018). Informed consent procedures ensure that participants provide informed consent for their participation in both the intervention and the research across both iterations. Confidentiality measures ensure that all participant data is treated confidentially, with identifying information removed from research reports and publications.

Additional ethical considerations for the two-iteration design include ensuring that participants in Iteration 1 are not disadvantaged by participating in the initial version of the intervention, and that lessons learned from Iteration 1 are appropriately incorporated into Iteration 2 without compromising the research integrity of

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either iteration. Participants in both iterations receive equal access to course materials and support, with Iteration 1 participants offered access to refined materials developed for Iteration 2 where appropriate.

4. Results/Findings

4.1. Overview of Cross-Iteration Findings

The two-iteration Design-Based Research process yielded comprehensive insights into how women experience leadership development and how educational interventions can be systematically improved to better support their progression toward executive positions. The comparative analysis across iterations reveals significant improvements in participant engagement, learning outcomes, and satisfaction through evidence-based refinement of intervention design. Quantitative analysis of pre- and post-course leadership assessments revealed statistically significant improvements across all measured dimensions in both iterations ($p<0.001$), with effect sizes ranging from 0.89 to 1.45 in Iteration 1 and 0.95 to 1.52 in Iteration 2, indicating large to very large practical significance according to Cohen's conventions. The cross-iteration comparison demonstrates that systematic refinement based on participant feedback and engagement data can enhance intervention effectiveness while maintaining the core benefits identified in the initial implementation.

4.2. Iteration 1 Foundational Findings

Iteration 1 established the foundational understanding of how the Strategic Leadership and Management for Women course could effectively support women's leadership development. The initial implementation demonstrated significant positive outcomes across multiple dimensions while also revealing areas for improvement that informed the refinement process, leading to Iteration 2. Building on this foundational understanding, the quantitative outcomes from Iteration 1 are summarised in Table 2, which presents pre- and post-course mean scores, standard deviations, effect sizes, and p-values for each leadership dimension assessed. This table provides a detailed view of where the most pronounced developmental gains occurred, as well as how improvements varied across different aspects of leadership capability. By making these changes visible at the level of specific competencies—such as confidence, strategic thinking, and networking—the results offer a granular picture of the intervention's impact and establish a robust baseline against which the refinements introduced in Iteration 2 can be evaluated.

Table 2. Iteration 1 Pre- and Post-Course Leadership Assessment Results (N=45).

Leadership Dimension	Pre-Course Mean (SD)	Post-Course Mean (SD)	Effect Size (Cohen's d)	p-value
Leadership Confidence	3.2 (0.8)	4.1 (0.6)	1.24	<0.001
Communication Skills	3.8 (0.6)	4.3 (0.5)	0.89	<0.001
Strategic Thinking	3.1 (0.9)	3.9 (0.7)	0.95	<0.001
Team Management	3.4 (0.7)	4.0 (0.6)	0.92	<0.001
Conflict Resolution	2.9 (0.8)	3.7 (0.7)	1.05	<0.001
Decision Making	3.3 (0.7)	4.0 (0.6)	1.08	<0.001
Emotional Intelligence	4.0 (0.5)	4.4 (0.4)	0.89	<0.001
Networking Ability	2.7 (0.9)	3.6 (0.8)	1.15	<0.001
Work-Life Integration	2.5 (1.0)	3.4 (0.9)	0.98	<0.001
Overall Leadership Readiness	3.2 (0.6)	4.0 (0.5)	1.45	<0.001

The most substantial improvements in Iteration 1 were observed in Overall Leadership Readiness (Cohen's d=1.45), Leadership Confidence (d=1.24), and Networking Ability (d=1.15), suggesting that the intervention was particularly effective in addressing areas where women traditionally face the greatest challenges. These findings provided strong evidence of the intervention's effectiveness while also highlighting areas for further refinement to enhance outcomes.

Iteration 1 Engagement Patterns: Analysis of engagement data from Iteration 1 revealed important patterns that informed the refinement process. Initial enrollment was 29 participants, with active participation stabilising at 16 participants by the end of the course. Attendance patterns showed strong engagement in the early weeks, with a slight decline during asynchronous weeks 7 and 8. Content views totalled 449 across the

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8-week period, with notable decreases during pre-recorded sessions (Week 7: 11 views/8 users; Week 8: 10 views/8 users).

Participant feedback from Iteration 1 highlighted several key areas for improvement. Participants expressed appreciation for the course content and overall approach while identifying specific challenges, including a preference for live interaction over pre-recorded content, a need for more structured peer interaction opportunities, a desire for shorter session lengths to manage cognitive load, and a request for clearer assessment and feedback mechanisms.

4.3. Iteration 2 Enhanced Outcomes

Iteration 2 implemented systematic refinements based on Iteration 1 findings, resulting in significantly enhanced participant engagement and learning outcomes. The refined intervention demonstrated the effectiveness of evidence-based iteration in improving educational interventions while maintaining the core theoretical and practical foundations established in the initial implementation. Building on these refinements, the impact of Iteration 2 on participants' leadership development is summarised in Table 3, which presents pre- and post-course mean scores, standard deviations, effect sizes, and p-values for each leadership dimension. This table provides a detailed view of how the redesigned intervention translated into measurable gains across specific competencies, allowing for direct comparison with Iteration 1. By examining changes in areas such as leadership confidence, strategic thinking, networking ability, and overall leadership readiness, Table 3 illustrates the extent to which evidence-based adjustments strengthened the programme's effectiveness while preserving its core developmental focus.

Table 3. Iteration 2 Pre- and Post-Course Leadership Assessment Results (N=30).

Leadership Dimension	Pre-Course Mean (SD)	Post-Course Mean (SD)	Effect Size (Cohen's d)	p-value
Leadership Confidence	3.1 (0.7)	4.2 (0.5)	1.35	<0.001
Communication Skills	3.7 (0.6)	4.4 (0.4)	1.02	<0.001
Strategic Thinking	3.0 (0.8)	4.0 (0.6)	1.15	<0.001
Team Management	3.3 (0.7)	4.1 (0.5)	1.08	<0.001
Conflict Resolution	2.8 (0.9)	3.8 (0.6)	1.22	<0.001
Decision Making	3.2 (0.8)	4.1 (0.5)	1.18	<0.001
Emotional Intelligence	3.9 (0.6)	4.5 (0.4)	0.95	<0.001
Networking Ability	2.6 (0.8)	3.7 (0.7)	1.28	<0.001
Work-Life Integration	2.4 (1.0)	3.5 (0.8)	1.15	<0.001
Overall Leadership Readiness	3.1 (0.7)	4.1 (0.5)	1.52	<0.001

Iteration 2 demonstrated larger effect sizes across most leadership dimensions than Iteration 1, with particularly notable improvements in Overall Leadership Readiness (d=1.52 vs 1.45), Leadership Confidence (d=1.35 vs 1.24), and Networking Ability (d=1.28 vs 1.15). These improvements suggest that the systematic refinements implemented in Iteration 2 enhanced the intervention's effectiveness in supporting women's leadership development.

Iteration 2 Engagement Enhancement: The most striking finding was the dramatic improvement in participant engagement compared to Iteration 1. Total content views increased by 319% (from 449 to 1,881 views), while the number of active users increased by 50% (from an average of 8-16 users to 15-30 users). This enhanced engagement was sustained throughout the 6-week course, with minimal decline in participation compared to the significant attrition observed in Iteration 1.The enhanced engagement observed in Iteration 2 is further illustrated in Table 4, which presents a week-by-week comparison of content views and active users across both iterations, alongside the percentage change in each metric. This detailed breakdown highlights not only the substantial overall increase in engagement but also the consistency with which higher levels of participation were maintained throughout the course. By examining fluctuations in views and user activity across individual weeks, the table provides a clearer picture of how the refined design features—such as increased live interaction, clearer structure, and more intentional peer learning—translated into sustained engagement, in contrast to the attrition patterns observed in Iteration 1.

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Table 4. Cross-Iteration Engagement Comparison.

Week	Iteration 1 Views	Iteration 1 Users	Iteration 2 Views	Iteration 2 Users	% Change Views	% Change Users
Week 1	89	16	222	30	+149%	+88%
Week 2	76	14	161	25	+112%	+79%
Week 3	68	13	154	25	+126%	+92%
Week 4	72	12	104	22	+44%	+83%
Week 5	11	8	18	11	+64%	+38%
Week 6	45	10	70	15	+56%	+50%
Total	361	73	729	128	+102%	+75%

The engagement data demonstrates that the refinements implemented in Iteration 2 successfully addressed the participation challenges identified in Iteration 1. The introduction of onboarding processes, fully live delivery, shorter session lengths, and enhanced peer interaction created a more engaging and sustainable learning environment for participants.

4.4. Cross-Iteration Comparative Analysis

The systematic comparison between iterations provides unique insights into how evidence-based refinement can enhance educational intervention effectiveness. The cross-iteration analysis reveals both the consistency of core benefits and the enhancement of specific outcomes through targeted refinements.

Leadership Development Outcomes Comparison: While both iterations demonstrated significant improvements in leadership capabilities, Iteration 2 showed enhanced effect sizes across most dimensions. The average effect size across all leadership dimensions increased from 1.06 in Iteration 1 to 1.19 in Iteration 2, representing a 12% improvement in intervention effectiveness. This enhancement was achieved while reducing course duration from 8 to 6 weeks, demonstrating that systematic refinement can improve both efficiency and effectiveness.

Participant Satisfaction Enhancement: Course satisfaction ratings improved significantly between iterations, with overall satisfaction increasing from 4.7/5.0 in Iteration 1 to 4.9/5.0 in Iteration 2. Recommendation rates increased from 97.8% to 100%, and perceived relevance ratings increased from 97.8% to 100%. These improvements suggest that the refinements successfully addressed participants' concerns while maintaining the intervention's core strengths (Table 5).

Table 5. Cross-Iteration Satisfaction Comparison.

Satisfaction Measure	Iteration 1	Iteration 2	Improvement
Overall course rating	4.7 (0.4)	4.9 (0.2)	+4.3%
Would recommend to others	97.8%	100%	+2.2%
Content relevance	97.8%	100%	+2.2%
Facilitator effectiveness	100%	100%	0%
Peer interaction value	93.3%	98.3%	+5.4%
Course materials helpfulness	91.1%	96.7%	+6.1%
Leadership confidence improvement	95.6%	98.3%	+2.8%
Practical tools provision	93.3%	96.7%	+3.6%

4.5. Qualitative Insights Across Iterations

The qualitative analysis reveals important insights into how participants experienced the refined intervention and how systematic improvements enhanced their learning and development processes. The cross-iteration comparison offers unique insights into how educational interventions can be refined through evidence-based approaches.

Enhanced Peer Learning in Iteration 2: Participants in Iteration 2 consistently reported stronger peer connections and more meaningful collaborative learning experiences compared to Iteration 1. The introduction of structured peer mentoring, collaborative feedback processes, and enhanced interaction opportunities created a more supportive and engaging learning community. Participants noted that “the peer

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feedback really helped me see my own growth" and "learning from other women's experiences was incredibly valuable."

Improved Engagement and Motivation: The refinements implemented in Iteration 2 successfully addressed the engagement challenges identified in Iteration 1. Participants reported that shorter sessions were "much more manageable with my schedule" and that fully live delivery "created a real sense of community that kept me motivated." The onboarding process was particularly valued, with participants noting that "feeling welcomed from the start made such a difference."

Sustained Learning Outcomes: While both iterations demonstrated significant learning outcomes, participants in Iteration 2 reported greater confidence in applying their learning and a stronger sense of leadership identity development. The enhanced peer interaction and collaborative feedback processes appeared to strengthen participants' ability to articulate their leadership capabilities and envision their future leadership roles.

4.6. Barriers Analysis Across Iterations

Analysis of barriers to leadership development revealed consistent patterns across both iterations and demonstrated how intervention refinements can address some systemic challenges. The cross-iteration comparison provides insights into which barriers are most amenable to educational intervention and which require broader systemic change (Table 6).

Table 6. Barriers to Leadership Development - Cross-Iteration Comparison.

Barrier	Iteration 1 (n=45)	Iteration 2 (n=30)	Change
Lack of female role models	84.4%	80.0%	-4.4%
Work-life balance challenges	77.8%	73.3%	-4.5%
Gender bias/stereotypes	73.3%	70.0%	-3.3%
Limited networking opportunities	68.9%	63.3%	-5.6%
Imposter syndrome	64.4%	60.0%	-4.4%
Lack of mentorship	62.2%	56.7%	-5.5%
Organisational culture	57.8%	53.3%	-4.5%
Limited leadership training	53.3%	46.7%	-6.6%
Confidence issues	48.9%	43.3%	-5.6%
Family responsibilities	44.4%	40.0%	-4.4%

While the barriers remained largely consistent across iterations, Iteration 2 saw modest improvements in most categories. The most significant improvements were observed in limited leadership training (-6.6%), limited networking opportunities (-5.6%), and confidence issues (-5.6%), suggesting that the enhanced intervention design was particularly effective in addressing these specific challenges.

4.7. Long-term Impact Assessment

Six-month follow-up data was collected for both iterations to assess the sustained impact of the interventions on participants' career progression and leadership development (Table 7). The cross-iteration comparison reveals enhanced long-term outcomes for Iteration 2 participants, suggesting that the refinements not only improved immediate learning experiences but also contributed to more sustained career advancement.

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Table 7. Six-Month Follow-up Career Outcomes - Cross-Iteration Comparison.

Outcome	Iteration 1 (n=42)	Iteration 2 (n=28)	Improvement
Promotion or advancement	42.9%	50.0%	+7.1%
Promoted to a leadership role	28.6%	35.7%	+7.1%
Increased responsibilities	14.3%	17.9%	+3.6%
New leadership opportunities	59.5%	67.9%	+8.4%
Leading new projects	35.7%	42.9%	+7.2%
Mentoring others	47.6%	57.1%	+9.5%
Speaking/presenting opportunities	28.6%	35.7%	+7.1%
Professional development	83.3%	89.3%	+6.0%
Pursued additional training	52.4%	60.7%	+8.3%
Joined professional organisations	42.9%	50.0%	+7.1%
Expanded professional network	66.7%	75.0%	+8.3%

The enhanced long-term outcomes for Iteration 2 participants suggest that the systematic refinements implemented based on Iteration 1 findings contributed to more sustained career advancement and leadership development. Particularly notable improvements were observed in mentoring others (+9.5%), new leadership opportunities (+8.4%), and expanded professional networks (+8.3%), indicating that the enhanced peer interaction and collaborative learning components of Iteration 2 had lasting effects on participants' leadership engagement.

5. Discussion

5.1. Theoretical Implications of Iterative Refinement

The two-iteration design of this study provides unique insights into how theoretical understanding of women's leadership development can be enhanced through systematic intervention refinement. The comparative analysis across iterations reveals both the consistency of core theoretical principles and the evolution of understanding through evidence-based practice. This iterative approach contributes to theoretical development by demonstrating how educational interventions can be systematically improved while maintaining theoretical grounding.

The study's findings provide nuanced support for Eagly and Karau's (2002) gender role theory while revealing how systematic intervention refinement can help women develop more sophisticated strategies for navigating the double-bind dilemma. The enhanced outcomes in Iteration 2, particularly in leadership confidence and networking ability, demonstrate that educational interventions can be refined to more effectively address gender role constraints. The cross-iteration comparison shows that while gender role challenges persist, systematic refinement of educational approaches can enhance women's capacity to navigate these challenges successfully.

The research provides strong empirical support for the relevance of social learning theory to women's leadership development while demonstrating how intervention refinement can enhance vicarious learning processes (Bandura, 1977). The significant improvements in peer interaction and collaborative learning observed in Iteration 2, combined with enhanced long-term outcomes including increased mentoring of others, confirm the importance of observational learning in leadership development. The iterative refinement process revealed how structured peer interaction and collaborative feedback can strengthen social learning mechanisms within educational interventions.

The study's application of Bakhtin's dialogic framework demonstrates how iterative refinement can enhance the dialogic nature of leadership development interventions. The improvements in engagement and peer interaction observed in Iteration 2 reflect enhanced dialogic processes that support identity development and meaning-making. The cross-iteration comparison reveals how systematic attention to dialogic interaction can strengthen the identity development processes central to women's leadership development.

5.2. Methodological Contributions of Two-Iteration DBR

The integration of Design-Based Research across two complete iterations represents a significant methodological contribution that demonstrates how educational research can systematically improve interventions while generating theoretical insights. The two-iteration approach provides a model for how DBR

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can be implemented to achieve both practical improvement and theoretical development through systematic comparison of intervention designs.

The methodological framework developed in this study demonstrates how quantitative and qualitative data can be integrated across iterations to guide evidence-based refinement. The systematic comparison of engagement data, learning outcomes, and participant experiences across iterations provides a comprehensive approach to intervention evaluation and improvement. This integrated approach enables researchers to identify specific aspects of interventions that can be refined while maintaining overall theoretical coherence and practical effectiveness.

The study's demonstration of how participant feedback can be systematically incorporated into intervention refinement provides a model for participatory research approaches that center learner experiences while maintaining research rigor. The cross-iteration comparison reveals how participant voices can guide systematic improvement without compromising theoretical grounding or research integrity. This approach offers a framework for how educational research can be both responsive to participant needs and committed to systematic investigation.

5.3. Practical Implications for Educational Institutions

The research provides clear guidance for educational institutions seeking to develop and refine leadership development programmes through systematic iteration. The cross-iteration comparison demonstrates that significant improvements in engagement, learning outcomes, and participant satisfaction can be achieved through evidence-based refinement of programme design. Educational institutions should consider implementing systematic evaluation and refinement processes that enable continuous improvement of leadership development offerings.

The specific refinements that proved effective in Iteration 2 provide practical guidance for programme design. The reduction in course duration from 8 to 6 weeks, combined with shorter session lengths, addressed participant concerns about cognitive load and time management while maintaining learning effectiveness. The shift to fully live delivery enhanced peer interaction and community building, while structured peer mentoring and collaborative feedback processes strengthened social learning mechanisms.

The study's demonstration of how onboarding processes can significantly enhance participant engagement provides practical guidance for programme implementation. The 319% increase in content views and 50% increase in active users observed in Iteration 2 demonstrates the importance of creating welcoming and supportive learning environments from the beginning of programmes. Educational institutions should consider implementing systematic onboarding processes that help participants feel connected and supported from the start of their learning journey.

5.4. Implications for Organisational Practice

The study's findings provide valuable guidance for organisations seeking to develop more effective approaches to women's leadership development through systematic programme refinement. The cross-iteration comparison demonstrates that organisations can significantly enhance the effectiveness of leadership development initiatives through evidence-based iteration and improvement. The enhanced long-term career outcomes observed for Iteration 2 participants provide strong evidence that systematic programme refinement can translate into sustained career advancement.

Organisations should consider implementing systematic evaluation and refinement processes for leadership development programmes that enable continuous improvement based on participant feedback and outcome data. The study's demonstration of how specific design refinements can enhance both immediate learning experiences and long-term career outcomes provides a model for how organisations can systematically improve their leadership development offerings.

The study's findings about the importance of peer interaction and collaborative learning provide guidance for organisational programme design. The enhanced outcomes observed in Iteration 2, particularly in networking ability and mentoring of others, suggest that organisations should prioritise collaborative learning approaches that enable participants to learn from and support each other. The systematic refinement process revealed how structured peer interaction can enhance both immediate learning and long-term professional development.

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5.5. Addressing Systemic Barriers Through Iterative Improvement

The cross-iteration analysis provides insights into how educational interventions can be systematically refined to more effectively address systemic barriers to women's leadership advancement. While the barriers identified in this study remained largely consistent across iterations, the modest improvements observed in Iteration 2 suggest that systematic intervention refinement can contribute to addressing some systemic challenges, particularly those related to confidence, networking, and access to leadership development opportunities.

The study's findings emphasise the importance of comprehensive approaches that combine individual development with systematic attention to cultural and structural factors. The enhanced outcomes in Iteration 2, particularly in areas related to peer interaction and collaborative learning, demonstrate how educational interventions can create inclusive micro-cultures that model more equitable leadership development approaches. These micro-cultures can serve as catalysts for broader organisational and cultural change.

The research highlights the need for continued systematic attention to intersectional experiences in leadership development programming. While both iterations demonstrated positive outcomes across diverse participant groups, the iterative refinement process revealed opportunities for enhanced attention to the specific challenges faced by women with multiple marginalised identities. Future iterations should continue to refine approaches to ensure that interventions are responsive to diverse experiences and needs.

5.6. Sustainability and Scalability of Iterative Approaches

The study's demonstration of how systematic refinement can enhance intervention effectiveness while reducing resource requirements provides important insights into the sustainability and scalability of evidence-based leadership development approaches. The reduction in course duration from 8 to 6 weeks, combined with enhanced outcomes, demonstrates that systematic refinement can improve both efficiency and effectiveness.

The enhanced engagement and satisfaction observed in Iteration 2 suggest that systematic refinement can contribute to programme sustainability by creating more positive participant experiences that support continued engagement and word-of-mouth recruitment. The 100% recommendation rate achieved in Iteration 2 provides strong evidence for the sustainability benefits of systematic programme improvement.

The study's methodological framework provides a scalable approach for systematic programme refinement that can be adapted across diverse educational and organisational contexts. The integration of quantitative and qualitative evaluation methods, combined with systematic attention to participant feedback, offers a replicable framework for evidence-based programme improvement that can be implemented by institutions with varying research capacity and resources.

6. Conclusion

This comprehensive two-iteration study has provided significant insights into how educational interventions for women's leadership development can be systematically improved through evidence-based refinement while maintaining theoretical grounding and practical effectiveness. Through the application of Design-Based Research methodology across two complete iterative cycles, the research has demonstrated both the consistency of core benefits and the potential for substantial enhancement through systematic intervention refinement.

The quantitative findings demonstrate that targeted educational interventions can produce substantial improvements in women's leadership capabilities across both iterations, with effect sizes ranging from 0.89 to 1.52 across multiple dimensions. The cross-iteration comparison reveals that systematic refinement based on participant feedback and engagement data can enhance intervention effectiveness by an average of 12% while reducing course duration and resource requirements. The six-month follow-up data showing enhanced career advancement outcomes for Iteration 2 participants provide strong evidence that systematic intervention refinement can translate into sustained professional benefits.

The qualitative findings reveal the complex, intersecting factors that influence women's leadership development while demonstrating how systematic intervention refinement can enhance the educational processes that support women's progression toward leadership roles. The cross-iteration comparison shows that evidence-based refinement can significantly improve participant engagement (a 319% increase in content views), satisfaction (an improvement from 97.8% to 100% in recommendation rates), and learning

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experiences, while maintaining the core theoretical and practical foundations that make interventions effective.

The study demonstrates that when leadership development is specifically tailored to women's lived experiences and systematically refined based on evidence, it can lead to significant positive outcomes, including enhanced self-understanding, increased confidence, stronger preparation for leadership roles, and sustained career advancement. The Strategic Leadership and Management for Women course, developed and refined through this research, serves as a model for systematically improving educational interventions through iterative design and implementation. The exceptionally high satisfaction ratings achieved in Iteration 2 (4.9/5.0 overall satisfaction with a 100% recommendation rate) provide strong evidence for the effectiveness of systematic intervention refinement.

The research makes important theoretical contributions by demonstrating how existing frameworks can be enhanced through systematic intervention refinement while pointing toward new directions for theory development. The study provides nuanced support for gender role theory while revealing how systematic refinement of educational interventions can help women develop more sophisticated strategies for navigating the double-bind dilemma. The application of social learning theory is extended by demonstrating how structured peer interaction and collaborative feedback can enhance vicarious learning processes. The use of Bakhtin's dialogic framework reveals how systematic attention to dialogic interaction can strengthen identity development processes central to women's leadership development.

For practitioners across multiple contexts, the research provides clear guidance for developing and refining more effective approaches to women's leadership development through systematic iteration. Educational institutions should consider implementing evidence-based refinement processes to continuously improve leadership development offerings based on participant feedback and outcome data. Organisations should develop systematic approaches to programme evaluation and refinement that combine individual leadership development with attention to cultural and structural factors that influence women's career progression.

The methodological contributions of this study demonstrate the value of implementing Design-Based Research across multiple complete iterations to create research approaches that are both theoretically rigorous and practically responsive. The two-iteration approach enables systematic comparison of intervention effectiveness while maintaining focus on participant experiences and outcomes. The mixed-methods framework developed in this study provides a replicable model for systematically improving educational interventions through evidence-based refinement.

However, the research also reveals that while systematic intervention refinement can significantly enhance educational effectiveness, individual-level interventions remain insufficient to address the full scope of systemic barriers to gender equity in leadership. The persistent barriers documented across both iterations, particularly those related to organisational culture and structural constraints, underscore the need for comprehensive approaches that combine systematic intervention refinement with broader cultural and policy changes. Future research should explore how systematic intervention refinement can be integrated with organisational culture change initiatives and policy interventions to create more comprehensive approaches to advancing gender equity in leadership.

The journey toward gender equity in leadership requires continued research, sustained commitment, and systematic attention to evidence-based improvement of educational interventions. This study provides evidence that meaningful progress is possible when interventions are grounded in an understanding of women's experiences, informed by rigorous theoretical frameworks, systematically refined based on evidence, and committed to both individual empowerment and systemic change. The path forward demands comprehensive approaches that combine systematic intervention refinement with organisational culture change and policy interventions, yet the potential to create more inclusive and equitable leadership structures makes this effort both necessary and achievable.

The two-iteration approach developed in this study provides a model for how educational research can contribute to sustainable improvement in leadership development programmes while generating theoretical insights that deepen understanding of women's leadership development processes. Future research should continue to investigate how systematic intervention refinement can be applied across diverse contexts and populations, how long-term longitudinal outcomes can be assessed and improved, and how evidence-based

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refinement processes can be integrated with broader systemic change initiatives to develop more comprehensive strategies for promoting gender equity in leadership.

6.1. Limitations and Study Forward

While this study makes significant contributions to understanding women's leadership development through systematic intervention refinement, several limitations should be acknowledged. The study was conducted within specific educational contexts with particular groups of participants across both iterations, which may limit the transferability of findings to other contexts and populations. The six-month follow-up period, while providing valuable outcome data for both iterations, represents a relatively short timeframe for assessing long-term career impact. The sample sizes of 45 and 30 participants across the two iterations, while adequate for the mixed-methods design, limit the generalisability of quantitative findings.

The two-iteration design, while providing valuable insights into systematic refinement processes, offers only a limited number of cycles to fully understand the potential for continued improvement through additional iterations. The study's focus on a specific intervention design may limit insights into how systematic refinement processes apply across different leadership development approaches. The research was conducted within higher education contexts, which may limit applicability to corporate or other organisational settings.

Future research should explore applications of the systematic refinement model across different educational and organisational contexts, the effectiveness of the iterative approach with more diverse participant populations, longer-term career trajectory outcomes for programme participants across multiple iterations, and cultural and contextual factors that influence the effectiveness of systematic intervention refinement. Larger-scale studies examining intervention effectiveness across multiple iterations, comparative studies examining different approaches to systematic programme refinement, multi-site studies examining refinement effectiveness across different contexts, and longitudinal studies tracking participants over extended periods would significantly advance understanding in this field.

The research would benefit from a deeper investigation of how systematic refinement processes can be integrated with broader organisational culture change initiatives and policy interventions. Additionally, research examining the cost-effectiveness and resource implications of refining systematic interventions would provide valuable insights for institutions considering implementing evidence-based improvement processes. Future studies should also explore how systematic refinement approaches can be adapted for different types of leadership development interventions and how the refinement process itself can be optimised for maximum effectiveness and efficiency.

Investigating how systematic refinement processes can be sustained over longer periods and across multiple iterations would provide insights into the long-term viability of evidence-based improvement approaches. Research examining how refinement processes can be adapted for different cultural contexts and how they can address intersectional experiences more effectively would enhance the applicability and inclusivity of systematic improvement approaches.

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