



From Information to Transformation: A Thematic Analysis of the Curriculum Gap in Climate Resilience Education for Rural Adults

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Abstract

Climate change continues to threaten agricultural productivity and the livelihoods of rural communities; however, a persistent gap remains between climate change awareness and the practical adoption of adaptation strategies. This study examined how adult education can bridge this gap by synthesising the existing literature. This study employed qualitative document analysis and an adapted thematic synthesis approach based on Thomas and Harden (2008). A systematic search of Google Scholar, ERIC, and Science Direct identified relevant literature published between 2010 and 2025. Following screening based on predefined inclusion and exclusion criteria, 13 key publications were retained for the thematic synthesis. Four interrelated themes emerged from the analysis: psychological transformation, social learning, curriculum relevance and institutional gaps, and the integration of Indigenous and scientific knowledge. The reviewed literature indicates that climate resilience education is more effective when it promotes critical reflection, participatory learning, context-responsive curricula, and integration of local and scientific knowledge systems. The thematic synthesis further suggests that adult education provides an effective platform for strengthening adaptive capacity,

promoting sustainable agricultural practices, and supporting long-term climate resilience in rural communities. This study contributes an integrated conceptual framework that demonstrates how transformative learning, social learning, curriculum relevance, and knowledge integration can collectively enhance climate resilience education. Policymakers, curriculum developers, adult educators, and extension practitioners should strengthen participatory and context-specific climate education programmes, while future empirical studies should validate the proposed framework in diverse rural settings.

Keywords: Adult education, climate resilience, climate change awareness, transformative learning, social learning, Indigenous knowledge, rural communities.

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Introduction

Climate change continues to disrupt rural livelihoods, particularly in regions where agriculture is the primary income source. Across Sub-Saharan Africa and other parts of the Global South, shifts in rainfall patterns, prolonged droughts, and extreme weather events have made farming increasingly unpredictable (Intergovernmental Panel on Climate Change [IPCC], 2023; Food and Agriculture Organization [FAO], 2023). These changes contribute to declining crop yields, food insecurity, and increased vulnerability among rural households (FAO, 2016; FAO, 2023).

Despite growing access to climate information, many rural farmers struggle to translate their awareness into practical adaptation. Research shows that access to information alone does not automatically lead to behavioural changes (Arbuckle et al., 2013; Ricart et al., 2023). This has resulted in a persistent knowledge–action gap, wherein farmers are aware of climate risks but lack the support needed to apply adaptive strategies effectively.

One key explanation for this gap lies in the design of climate-education programs. Many initiatives are externally developed and insufficiently tailored to local contexts, limiting their relevance and impact (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2022a). Rural learners are adults living in rural communities who engage in learning activities to improve their

livelihoods, skills, and capacity to respond to local socioeconomic and environmental challenges, including climate change. These programs often prioritise information delivery over practical engagement, overlooking the experiences and knowledge systems of rural learners. As Yahaya (2025) notes, this creates a curriculum gap in which educational content fails to address real-life challenges.

This requires a shift toward participatory and learner-centred approaches that integrate local knowledge with scientific insights. Social learning models, which emphasise collaboration and shared problem-solving, have been shown to improve the adoption of sustainable practices (Phuong et al., 2017; Davis et al., 2012). Although existing studies have extensively examined climate change awareness and adaptation strategies, significant gaps remain in our understanding of how rural farmers translate knowledge into sustained adaptive practices. Much of the literature emphasises access to information, yet insufficient attention is given to the learning processes that enable behavioural change, particularly regarding psychological transformation, social learning and participatory engagement. In addition, climate education programmes are often inadequately contextualised, reflecting a persistent curriculum gap that limits their practical relevance for rural adult learners. Furthermore, while the value of integrating Indigenous and scientific knowledge is widely acknowledged, its application within structured educational frameworks remains inconsistent. This study addresses these gaps by providing a thematic analysis of how adult education can bridge the divide between climate awareness and action through transformative, learner-centred and context-sensitive approaches.

To address this gap, this study is guided by the following research questions:

1. How does psychological transformation influence rural farmers' ability to move from climate awareness to adaptive action?
2. In what ways does social learning contribute to the adoption of climate-resilient agricultural practices among rural communities?
3. How do existing climate education programmes reflect a curriculum gap in addressing the practical needs of rural adult learners?
4. How can the integration of indigenous and scientific knowledge enhance the effectiveness of climate resilience education?

Transformative Learning Theory (Mezirow, 2000) suggests that adult learning involves a shift in deeply held assumptions through critical reflections. In rural contexts, climate change disrupts traditional farming knowledge, creating a “disorienting dilemma” that challenges existing beliefs. This process can lead to new ways of thinking and acting, making the theory useful for understanding how farmers move from awareness to adaptation to climate change.

Andragogy, originally developed and popularised by Malcolm Knowles, emphasises that adult learners are self-directed, bring rich life experiences to learning, are ready to learn when education addresses real-life needs, and are problem-centred in their orientation to learning (Knowles et al., 2015). However, many climate education programs fail to align with these principles, often presenting abstract or theoretical content that does not address immediate needs (Rogers, 2014).

Together, these theories highlight that effective climate adaptation depends on learning approaches that are reflective, practical, and responsive to adult learners’ experiences.

Climate change is a disruptive force that affects agricultural systems and livelihoods, particularly in communities that depend heavily on rain-fed farming (IPCC, 2023). In response, adult education serves as a critical mechanism for translating climate-related knowledge into practical and context-relevant actions through lifelong learning, capacity building and community engagement (UNESCO, 2022b). Within this framework, learning is viewed as a continuous and cyclical process in which knowledge acquisition informs action, and lived experiences continuously reshape understanding (Merriam & Baumgartner, 2020). Through this process, rural farmers can adopt sustainable agricultural practices that enhance their capacity to adapt to environmental changes and reduce their vulnerability (UNESCO, 2022b). However, this learning–action cycle is often weakened by a curriculum gap, where educational programs fail to reflect local realities and practical needs (Yahaya, 2025).

The framework also recognises the importance of social learning and the integration of Indigenous and scientific knowledge in strengthening climate resilience. Collaborative learning processes enable communities to share experiences and co-develop solutions, whereas indigenous knowledge provides locally grounded strategies that complement scientific insights. Together, these

elements highlight that effective climate resilience education depends on participatory, context-sensitive, and responsive approaches to rural learners' lived experiences.

To provide a theoretical representation of how adult education can bridge the gap between climate change awareness and practical adaptation among rural communities, a conceptual framework was developed by integrating the principles of Transformative Learning Theory, Andragogy, and Social Learning Theory with evidence synthesised from the reviewed literature. The proposed framework is illustrated in Figure 1.

Figure 1:

Conceptual Framework: Bridging the Gap Between Climate Awareness and Adaptation Among Rural Adults

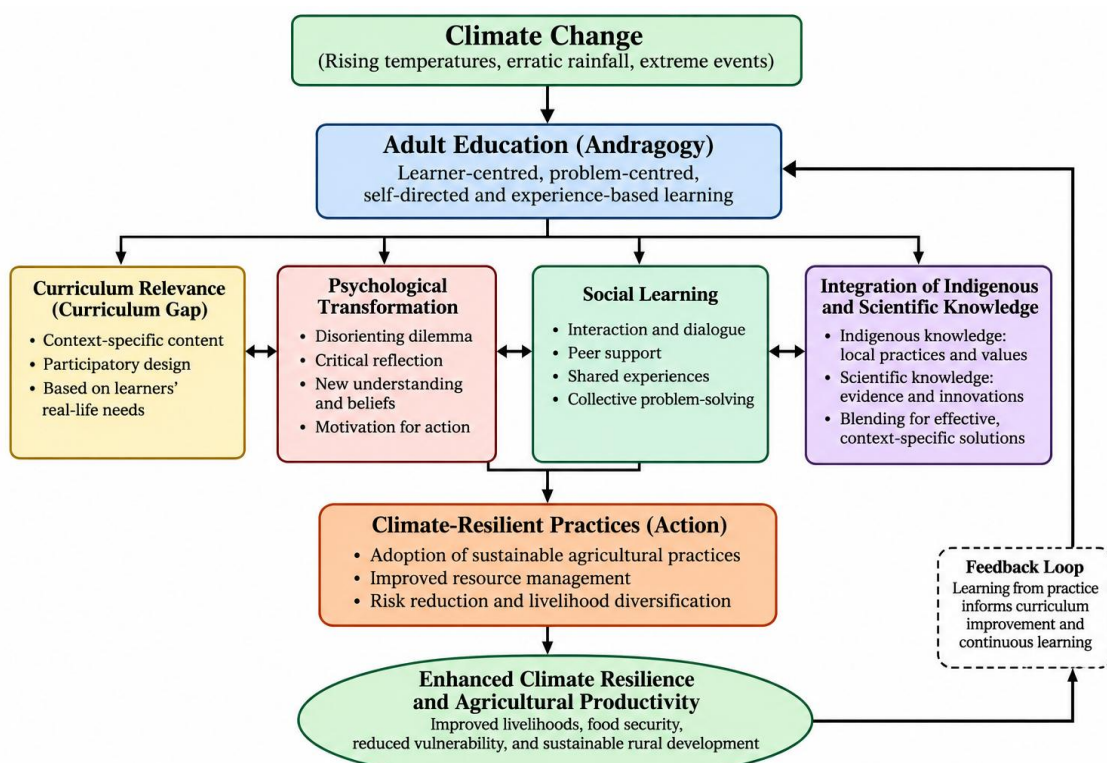


Figure 1. Conceptual framework: Bridging the gap between climate awareness and adaptation among rural adults.

Note. Adapted from Mezirow (2000), Knowles, Holton, and Swanson (2015), and UNESCO (2022a, 2022b).

Figure 1 illustrates how adult education bridges the gap between climate change awareness and practical adaptation in rural communities. The framework shows that psychological transformation stimulates critical reflection and behavioural change, while social learning promotes collaboration and knowledge sharing among learners. Curriculum relevance ensures that learning responds to the needs and realities of rural adults, and the integration of Indigenous and scientific knowledge supports the development of locally appropriate climate-adaptation strategies. Together, these components promote climate-resilient agricultural practices and improve adaptive capacity. The feedback loop indicates that the experiences gained from practice continuously inform curriculum improvement and future learning, making climate resilience education an ongoing and adaptive process.

Methodology

This study employed qualitative document analysis and adapted thematic synthesis to examine how adult education can bridge the gap between climate awareness and practical adaptation among rural adults. Qualitative document analysis was considered appropriate because it enables the systematic examination, interpretation, and synthesis of existing scholarly and institutional literature relevant to the study (Bowen, 2009). The thematic synthesis approach was adapted from Thomas and Harden (2008) to suit the analysis of conceptual, theoretical, and empirical documents, rather than primary qualitative datasets.

A literature search was conducted between January and March 2026 using Google Scholar, ERIC, and Science Direct. The search focused primarily on publications produced between 2010 and 2025 to capture contemporary scholarship on climate resilience, adult education, transformative learning, social learning, curriculum relevance and Indigenous knowledge. Earlier foundational works, including those of Mezirow (2000), Knowles et al. (2015), Bowen (2009), and Thomas and Harden (2008), were retained because they provided the theoretical and methodological foundations for the study.

The search terms included "climate adaptation", "climate resilience", "adult education", "transformative learning", "social learning", "curriculum relevance", "Indigenous knowledge", and "rural farmers". These keywords were searched

individually and in various combinations to maximise the retrieval of relevant literature.

Documents were included if they (i) addressed climate change adaptation or resilience within adult education or lifelong learning contexts, (ii) examined rural communities, agricultural extension, or community-based learning, (iii) discussed transformative learning, social learning, curriculum relevance, or Indigenous knowledge systems, and (iv) were published in peer-reviewed journals, scholarly books, or reports produced by recognised international organisations. Documents were excluded if they were unrelated to adult education, focused exclusively on technical climate science without educational implications, lacked sufficient conceptual or methodological relevance, or were duplicate records.

The initial search identified 28 studies. After removing five duplicate records, 23 documents remained for title and abstract screening. Following the application of the inclusion and exclusion criteria, 22 publications were selected for the full-text review. Of these, 13 key publications were retained for the final thematic synthesis because they provided the most relevant conceptual, theoretical, and empirical evidence to address the study's research questions. Only documents published in English were included.

Data were analysed using an adapted thematic synthesis based on Thomas and Harden (2008). The selected documents were read repeatedly to become familiar with their content. Relevant text segments were coded according to recurring concepts and patterns. Similar codes were grouped into descriptive categories, which were subsequently refined into four analytical themes: psychological transformation, social learning, curriculum relevance and institutional gaps, and integration of Indigenous and scientific knowledge. The analysis represents a synthesis of the evidence from the reviewed literature rather than original empirical findings.

To enhance the trustworthiness of the analysis, all three authors participated in the review. The first author conducted the literature search, document coding and preliminary theme development. The second and third authors independently reviewed the coding framework, assessed the consistency of the emerging themes, and discussed areas of disagreement until a consensus was reached. The final themes were validated through an iterative comparison of the selected studies,

thereby enhancing the credibility and dependability of the thematic synthesis (Bowen, 2009).

Results and Discussion

Theme 1: Psychological Transformation and Climate Adaptation

The thematic synthesis of the reviewed literature indicates that psychological transformation is fundamental in translating climate awareness into adaptive action among rural farmers. Across the reviewed studies, climate change creates a disorienting dilemma that challenges existing farming beliefs and practices, prompting learners to engage in critical reflection and reassess their traditional assumptions (Mezirow, 2000; Taylor & Cranton, 2012). However, the literature also shows that adaptation is frequently constrained by psychological and institutional barriers rather than by a lack of climate information alone (Moser & Ekstrom, 2010; Kates et al., 2012). Therefore, the synthesis suggests that climate resilience education should deliberately incorporate reflective learning processes that support behavioural change rather than focusing solely on information dissemination. These findings address Research Question 1 by demonstrating that psychological transformation provides a foundation for moving from climate awareness to practical adaptation.

Theme 2: Social Learning as a Driver of Collective Climate Resilience

The reviewed literature consistently indicates that social learning strengthens climate resilience by enabling rural farmers to exchange experiences, experiment with new practices, and collectively develop locally appropriate adaptation strategies. Participatory learning approaches, such as farmer field schools, encourage dialogue, peer learning, and collaborative problem-solving, thereby improving knowledge application and innovation (Davis et al., 2012; Phuong et al., 2017; FAO, 2016). However, the synthesis also reveals that many climate education programmes have not institutionalised participatory learning as a core educational strategy. Consequently, the reviewed literature suggests that strengthening community-based learning structures enhances adaptive capacity and sustains climate-resilient agricultural practices. This theme answers Research Question 2 by highlighting social learning as an essential mechanism for translating individual awareness into collective action.

Theme 3: Curriculum Relevance and Institutional Gaps in Climate Education

The thematic synthesis indicates that a persistent curriculum gap continues to limit the effectiveness of climate-resilience education for rural adults. Much of the reviewed literature describes existing programs as theoretical, externally designed, and insufficiently responsive to local realities, thereby reducing their practical relevance to learners (Knowles et al., 2015; Rogers, 2014; Reed et al., 2018). UNESCO (2022a) similarly emphasises the importance of learner-centred and context-sensitive educational programmes that reflect local environmental challenges and livelihood needs. Collectively, the reviewed literature suggests that climate education should be redesigned based on adult learning principles, local experiences, and practical problem-solving. This theme addresses Research Question 3 by demonstrating that improving curriculum relevance is essential for narrowing the knowledge–action gap.

Theme 4: Integration of Indigenous and Scientific Knowledge

The reviewed literature further indicates that integrating Indigenous and scientific knowledge enhances the effectiveness of climate resilience education by combining local experience with scientific evidence to produce context-specific adaptation strategies. Indigenous knowledge contributes valuable environmental observations and practical adaptation practices, whereas scientific knowledge provides complementary evidence and technological innovation (IPBES, 2022; UNESCO, 2022a; Ijatuyi et al., 2025). However, the synthesis also revealed that institutional frameworks frequently privilege scientific knowledge while underutilising Indigenous perspectives. The reviewed literature suggests that effective climate resilience education should intentionally create opportunities to integrate both knowledge systems through participatory learning processes. This theme answers Research Question 4 by demonstrating that knowledge integration improves the relevance, acceptability, and sustainability of climate adaptation initiatives.

Conclusion and Recommendations

This study synthesised the reviewed literature to examine how adult education can bridge the gap between climate change awareness and practical adaptation in rural communities. Using qualitative document analysis and an adapted thematic synthesis, the review identified four interrelated themes underpinning effective

climate resilience education: psychological transformation, social learning, curriculum relevance and institutional gaps, and the integration of Indigenous and scientific knowledge.

The reviewed literature indicates that climate resilience education is most effective when it extends beyond raising awareness to foster critical reflection, behavioural change, collaborative learning, and the practical application of context-specific adaptation strategies. The synthesis further suggests that adult education programmes should be learner-centred, participatory, and responsive to rural communities' realities. Addressing curriculum gaps and integrating Indigenous knowledge with scientific evidence can enhance the relevance, acceptability, and sustainability of climate adaptation initiatives in the region.

This study contributes to the growing body of knowledge on climate resilience education by presenting an integrated conceptual framework that links transformative learning, social learning, curriculum relevance, and knowledge integration as complementary pathways for strengthening adaptive capacity among rural adults. The framework provides a useful guide for educators, curriculum developers, policymakers, extension practitioners, and development agencies seeking to design inclusive and effective climate education programs.

Overall, the thematic synthesis suggests that repositioning adult education as a strategic component of climate resilience efforts can strengthen individual and community adaptive capacity, promote sustainable agricultural practices and support long-term rural development. Future research may build on this review by conducting empirical studies that examine how these interconnected educational approaches influence climate adaptation outcomes in diverse community contexts.

Based on the evidence synthesised from the reviewed literature, the following recommendations are proposed:

1. Promoting transformative learning in climate education programs: Adult education providers should incorporate reflective and participatory learning approaches that encourage rural adults to critically examine existing farming practices and adopt sustainable climate adaptation strategies.
2. Strengthening Social Learning and Community Participation: Governments, extension agencies, non-governmental organisations, and community-based organisations should support collaborative learning platforms, such as farmer field

schools and peer-learning networks, to facilitate knowledge sharing, innovation, and collective climate action.

3. Enhancing Curriculum Relevance for Rural Learners: Curriculum developers and adult education practitioners should design climate education programmes that are learner-centred, context-specific, and responsive to the environmental, socio-economic, and livelihood realities of rural communities.

4. Integrating Indigenous and Scientific Knowledge Systems: Policymakers, researchers, and educators should promote educational approaches that combine Indigenous knowledge with scientific evidence to develop locally relevant, culturally appropriate, and sustainable climate adaptation strategies.

5. Strengthening the Capacity of Adult Educators and Extension Personnel: Regular professional development programs should be organised to equip adult educators and agricultural extension personnel with the knowledge and pedagogical skills required to facilitate effective climate resilience education.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest, financial or otherwise, that could have influenced the design, conduct, interpretation, or reporting of this study.

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