



Reinforcement strategies and influence on self-regulated among adult in lifelong education programme

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Abstract

The study examines how reinforcement strategies affect self-regulated learning among adults entering lifelong education programs. The paper provides a conceptual and philosophical introduction to adult education, the importance of self-directed learning in adult education, and how it facilitates autonomy and lifelong learning. The review of relevant literature examines the existing empirical evidence on the use of reinforcement to improve the self-regulation of adult learners. In addition, a theoretical map is created to demonstrate the relationship that exists between reinforcement and self-regulated learning. There are recommendations for practical reinforcement-believing strategies to improve the self-regulatory abilities of adult learners. Policy implications and recommendations for educators, curriculum developers, and policymakers are presented at the end of the article to bring about effective, sustainable, and learner-centered adult education. The present work fills a gap in the discussion of the process engagement in lifelong learning improvement, focusing on specific vulnerability measures at the motivational and instructional levels.

Keywords: Reinforcement strategies, Self-regulated learning, Adult education, Lifelong learning, Self-directed learning

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1. INTRODUCTION

Adult learning has developed immensely to become an important instrument in lifelong learning, as it enables learners to acquire the skills and attitudes required by individuals and society. Reinforcement efforts and self-regulation have been developed as ideological contributors to adult learning behaviors and outcomes in this changing environment. Reinforcement, outlined in behavioral psychology, is external stimuli that shape and maintain learning, and self-regulation involves internal mechanisms by which learners establish targets, track their progress, and evaluate results. The reinforcement, in combination with self-regulation, is especially relevant in adult education, where learners may exhibit a wide range of backgrounds, motivations, and learning requirements. Bandura's self-regulation theory of reinforcement and Skinner's reinforcement theory provide a theoretical basis for adults' learning and responding to an instructional strategy. The paper presents the conceptual and philosophical framework of adult and lifelong learning, a literature review, and a theoretical framework of the relationship between reinforcement and self-regulated learning. It also discusses issues related to facilitating self-directed learning in the Nigerian context and suggests reinforcement-based approaches that can improve adult learning. The article, therefore, seeks to add value to the debate on sustainable adult education practices that build autonomous, motivated, and lifelong learners by situating these discussions in the African context and proposing practical and policy recommendations.

Philosophical and Conceptual Foundations of Adult Education and Lifelong Learning

The philosophy and conceptual foundations of adult education and lifelong learning are rich and emphasize learners being independent, inclusive, and developed as human beings. Adult learning, in general terms, can be defined as a pattern of organized, long-lasting learning to satisfy the learning needs of adults, including those who are no longer in school at the usual period of schooling and those who have lacked the opportunity to get a formal education. According to Abua (2024), adult education is crucial for imparting functional literacy, vocational skills, and knowledge vital to achieving sustainable development. It also includes formal and informal learning platforms, such as continuing education, outreach, and remedial programs, tailored to the needs of the particular adult learners (Akpala, 2018).

The philosophy of adult education is ground-breaking in the traditions of humanism and constructivism. According to Aloni (2003), humanism embraces the fundamental value of the learner and emphasizes individual growth, self-actualization, and the development of personal potential. In this philosophical underpinning, adult learners are considered autonomous, self-directed, and driven by their inner desires for improvement and meaning-making. The other dominant philosophy in education is constructivism, in which the learning process is rarely a construction of knowledge based on experience, interaction, and reflection (Alam, 2023). Through such a lens, the learning process is not a passive one but rather active, and thus of particular interest to an adult learner who enters the learning experience with much prior knowledge and lived experience (Chand, 2023).

The concept of adult education is further blurred by that of lifelong learning, which is the process of acquiring knowledge and skills throughout a person's life. Lifelong learning must consider that learning does not stop in the classroom or in schools, but occurs in many different situations and at different phases of the life cycle (Benavot et al., 2022). The broader conceptualization is crucial in the fast-paced world, where people must adapt to changing socioeconomic and technological requirements (Afzal et al., 2023). Following this, self-directed learning (SDL) has become a main issue in adult learning. Ahammad (2023) posits that SDL

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empowers adults to take ownership of their learning by setting goals, choosing resources, and evaluating progress independently. This learner-centered model aligns well with the self-regulatory capabilities of adult learners, fostering resilience, motivation, and lifelong curiosity (Morris, 2019).

The andragogical model, popularised by Malcolm Knowles, is another cornerstone of adult education's conceptual foundation. This model distinguishes adult learning (andragogy) from child learning (pedagogy) by highlighting adults' capacity for self-direction, reliance on life experiences, readiness to learn based on real-life needs, and orientation towards problem-solving (Loeng, 2020). Adult learners are often intrinsically motivated and seek education to solve practical problems or achieve personal and professional goals (Du Toit-Brits, 2019). Therefore, the design of adult learning programs must be participatory, flexible, and relevant to their real-life challenges (Abua, 2024).

Importantly, adult education in the Nigerian and broader African context serves as a vehicle for social transformation. It addresses educational inequality and supports national development by reducing poverty, fostering civic engagement, and promoting skill acquisition (Obetta & Egwuekwe, 2018). In Nigeria, adult education encompasses initiatives such as vocational training, agricultural extension, family literacy, and workplace programs that help combat illiteracy, enhance employability, and foster community development (NMEC, 2013; Usman, 2015). However, several challenges, such as inadequate funding, poorly trained facilitators, and a lack of infrastructure, persist and hinder the full realization of its potential (Yahaya, 2013).

The integration of emerging technologies also plays a significant role in advancing lifelong learning. As Stasolla et al. (2025) and Lai (2024) indicate, tools such as artificial intelligence and digital platforms can personalize learning experiences, promote engagement, and support self-regulation. This technological enhancement aligns with current global educational trends, bridging access gaps and fostering inclusive, adaptable learning pathways for adults (Haleem et al., 2022).

In conclusion, adult education and lifelong learning are underpinned by philosophical beliefs in autonomy, human potential, and transformative learning. Conceptually, they are built around the principles of self-directed learning, contextual relevance, and lifelong adaptability. In the Nigerian context, adult education remains a powerful instrument for individual empowerment and national development, despite ongoing implementation challenges. By adopting inclusive policies and leveraging digital tools, adult education can continue to evolve as a key driver of social and economic transformation.

Application of Bandura's Self-Regulation and Skinner's Reinforcement Theories to Adult Learning

The theories of self-regulation articulated by Bandura and of reinforcement by Skinner are helpful in determining how adults can learn, especially in lifelong education settings. According to Bandura, self-regulation is a process by which people direct their thoughts, emotions, and behaviors to achieve personal goals, typically through self-observation, self-judgment, and self-reaction (Lai, 2024). Conversely, behaviorism emphasizes external factors, including stimuli and positive or negative reinforcement, in the formation and reinforcement of behavior (Stasolla et al., 2025). Both theories applied to adult learning provide details on how motivation and behavior management can be used to improve academic results in an environment where learners need to self-task, control their learning behaviors, and maintain interest over prolonged periods.

Bandura's self-directed learning defines his notion of self-regulated learning (SRL), which is congruent with the increasingly focused direction toward self-directed learning in adult learning. Adults are supposed

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to have control over their learning process, encompassing learning goals, monitoring learning outcomes, and modifying approaches when necessary (Tadesse et al., 2022). Park and Kim (2022) note that adult learners who adopt SRL strategies are more persistent, show stronger academic performance, and pay closer attention to cognitive engagement. These capabilities play an essential role in lifelong learning, where formal guidance is less prevalent. Bandura's theory empowers learners by supporting the notions of agency and self-efficacy, which postulate that adults tend to succeed in a learning exercise when they believe they have the ability to do so. Lai (2024) notes that self-regulation is even more important in digital learning settings, where students must manage distractions, manage time, and stay motivated without any control.

However, the reinforcement theory taught by Skinner emphasizes the role of feedback and motivation through the introduction of cues and responses into the environment. Repeating desired learning behaviors, such as verbal praise, certificates, and other physical gifts, is an example of positive reinforcement (Stasolla et al., 2025). In adult education, especially within the Nigerian context, reinforcement strategies can help bridge motivational gaps created by socio-economic barriers or past educational failures. Cobos-Sanchiz et al. (2022) highlight the impact of reinforcement on adult learners' confidence, noting that consistent, positive feedback can combat feelings of learned helplessness and elevate expectations of success. This is particularly significant in contexts where adult learners may have internalized negative perceptions of their abilities due to prior educational setbacks.

The integration of both theories becomes especially powerful when learners are guided to self-regulate while receiving consistent reinforcement. For instance, feedback mechanisms that acknowledge effort and strategy use, rather than just outcomes, serve as reinforcers that also support metacognitive development (Adarkwah, 2021; Yang et al., 2021). Such a combined approach aligns with Ahammad's (2023) emphasis on supporting self-directed learning through appropriate scaffolding, enabling adult learners not only to maintain motivation but also to develop autonomy over time. Bandura's emphasis on internal motivation and cognitive control complements Skinner's focus on external motivators, offering a holistic approach to adult education that addresses both internal dispositions and environmental factors.

Furthermore, applying these theories to lifelong learning in African contexts, such as Nigeria, requires sensitivity to systemic constraints and learner diversity. According to Abua (2024), many adult learners in Nigeria face economic and infrastructural challenges that hinder sustained engagement in educational programs. Reinforcement strategies, such as recognition at community gatherings or conditional cash incentives, can serve as external motivators, while training in goal setting and reflective learning can foster self-regulatory skills. In a study by Calonia et al. (2023), time management and intrinsic motivation were found to be essential predictors of achievement, underscoring the relevance of both internal self-regulation and external reinforcement in adult education settings.

In sum, integrating Bandura's and Skinner's theories provides a dual lens for promoting effective learning among adults. Bandura's emphasis on self-regulation equips learners with the tools to manage their learning journeys, while Skinner's reinforcement strategies provide external motivators that sustain engagement and boost learner confidence. Together, they form a comprehensive framework that can inform the design of adult education programs, particularly in Nigeria, where motivation, access, and learner autonomy remain critical challenges.

Conceptual Clarification of Reinforcement and Self-Regulation in Adult Education

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Reinforcement and self-regulation are highly conceptualized ideas in adult learning, especially in lifelong learning. Reinforcement is used in adult learning to reinforce good learning behaviors, whereas self-regulation is the learner's ability to plan, monitor, and assess their learning tasks. These notions do not exist separately; they interrelate dynamically and affect the experiences and outcomes of adult learners. Knowing the relationship between the two is essential to providing teaching programs that enable learners, as adults, to learn through ownership.

Reinforcement is a concept in behavioral psychology that holds that learners' behaviors are shaped by consequences and maintained. The theory of operant conditioning described by B.F. Skinner shows that behaviors rewarded with positive consequences are more likely to be repeated, whereas behaviors accompanied by negative consequences are less likely to be repeated (Stasolla et al., 2025). Reinforcement in adult education may be intrinsic (such as feeling good after accomplishing something or receiving self-satisfaction) or extrinsic (such as grades, certificates, or oral approval). Strategically applied as reinforcements, these helps encourage adult students, whose numbers can include people who have returned after long work, who have studied before but had to work and raise a family (Abua, 2024). Reinforcement has recently become extremely relevant in technologically mediated settings. For example, adaptive learning technologies use algorithms that offer immediate feedback and rewards, promote further progress, and maintain learners' interest (Stasolla et al., 2025).

Self-regulation, by contrast, is embedded in cognitive and social cognitive theories. The self-regulation concept presented by Bandura involves setting goals, self-monitoring, instruction, and reward (Park & Kim, 2022). Essentially, it is the capacity of a learner to take the initiative in his/her own learning process by controlling his/her cognition, motivation, and behavior. This skill is particularly useful in adult learning, where it is assumed that the adult learners are generally independent, accountable, and driven (Tadesse et al., 2022). Adult learners who exhibit high levels of self-regulation are typically better at managing time, setting realistic goals, sustaining motivation, and evaluating their performance. These skills are essential for navigating lifelong learning pathways, where learning often occurs outside traditional classroom settings and relies heavily on personal initiative.

Self-regulation in adult learners is often facilitated by a learner-centered and supportive environment. For instance, feedback plays a crucial role in reinforcing self-regulatory behavior by helping learners identify their strengths and areas for improvement (Adarkwah, 2021). Regular, constructive feedback boosts learners' confidence and motivation, thereby increasing their commitment to learning. Furthermore, digital learning tools have expanded the possibilities for self-regulation by allowing learners to track their own progress, set learning goals, and access personalized learning resources (Lai, 2024). These technological interventions often employ reinforcement mechanisms, such as gamification, badges, and performance analytics, to sustain motivation and guide learning behaviors.

The synergy between reinforcement and self-regulation becomes particularly significant when viewed through the lens of adult education theory. Adult learners are typically self-directed, meaning they take the initiative to identify their learning needs, set goals, and evaluate outcomes independently (Ahammad, 2023). However, this autonomy must be supported with appropriate reinforcement strategies to maintain engagement and persistence. Without positive reinforcement, learners may experience learned helplessness or disengagement, particularly if they perceive challenges as insurmountable (Cobos-Sanchiz et al., 2022). Hence, reinforcement acts as a catalyst, strengthening self-regulated learning behaviors by affirming learners' efforts and encouraging continued participation.

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In the context of adult education in Nigeria and other African nations, the interplay between reinforcement and self-regulation is especially crucial given limited institutional support, infrastructural challenges, and socio-economic pressures (Akpala, 2018). Despite these barriers, many adult learners demonstrate high resilience and motivation when empowered by supportive learning environments. Programs that incorporate reinforcement strategies such as recognition, community support, and timely feedback are more likely to foster self-regulation and, consequently, enhance learning outcomes and program retention (Benavot et al., 2022).

Reinforcement and self-regulation are interdependent elements that significantly influence adult learning. While reinforcement encourages sustained engagement through positive stimulus, self-regulation equips learners to independently manage their learning. Together, they provide a robust framework for fostering lifelong learning, particularly when embedded in well-structured adult education programs that recognize the unique characteristics and challenges of adult learners. Understanding this relationship is vital for educators, policymakers, and instructional designers seeking to create meaningful and effective learning experiences for adults.

Concept of Self-Directed Learning in Adult Education Programs

Self-Directed Learning (SDL) has been a core concept in the field of adult education, underscoring the importance of the learner (the active learner) in determining their learning needs, goals, choice of learning strategies, and assessment of outcomes. Because adult learners usually enter the learning process with a background of knowledge, experience, and intrinsic motivation, SDL positions them as actors in the learning process, with responsibility for their learning progress (Ahammad, 2023). It is a learner-centered approach that deviates from past, teacher-led teaching styles and rather nurtures independence and reflection. Loeng (2020) points out that SDL aligns with the concept of lifelong learning, making it especially appropriate for adult learners who are constantly upgrading or participating in community-based education programs.

SDL cannot be overestimated in adult learning. In the modern world, which is rapidly changing and requires an ongoing upgrade of knowledge and skills, SDL provides learners with the adaptability to meet changing requirements (Morris, 2019). Many adult learners play multiple roles as individuals responsible at work, in the family, and in society; therefore, self-regulation and time management are key to successful learning. Tadesse et al. (2022) reported that self-regulated teaching plans, such as goal setting, self-monitoring, and strategic help-seeking, were critical predictors of expected learning outcomes among college students. The same strategies are also important in adult education settings, where learners are not only motivated but also prepared to manage their learning independently. SDL also facilitates the acquisition of competencies that are essential for sustainable development, i.e., critical thinking, problem-solving, and adaptability (Abua, 2024).

Adult education is characterized by several features of self-directed learning. To begin with, motivation is an important element. SDL is based on intrinsic motivation, in which one learns to satisfy oneself rather than in view of external rewards (Ryan & Deci, 2020). According to Bernacki et al. (2021), an autonomous learning environment that introduces the notion of personalization is likely to promote motivation and learning results. Secondly, self-regulation is integral. Self-directed learners are expected to plan their learning, set goals, monitor progress, and adjust strategies as needed. Park and Kim (2022) demonstrated that students who exhibit higher self-regulation also tend to show increased engagement and academic performance, a trend likely applicable to adult learners in non-formal settings.

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Another characteristic is the use of diverse learning strategies and resources. In a digital era, adult learners increasingly rely on technology to support their learning, accessing open educational resources, online forums, and digital tools for collaboration and reflection (Lai, 2024). This technological shift has not only expanded access to education but also enhanced learner autonomy. As highlighted by Stasolla et al. (2025), advancements in artificial intelligence and deep learning are beginning to provide personalized support that reinforces learners' efforts toward self-regulation. Additionally, the social aspect of SDL cannot be ignored. While self-directed learning emphasizes independence, learners often engage with peers and facilitators for feedback, encouragement, and accountability (Dahal & Bhat, 2024).

In essence, SDL in adult education promotes a transformative shift in how learning is approached. It fosters critical engagement, resilience, and lifelong learning capabilities. Programs that encourage SDL are more likely to produce empowered learners who can navigate complex, dynamic environments and contribute meaningfully to their personal and societal development (Benavot et al., 2022; Cobos-Sanchiz et al., 2022). Therefore, embedding SDL into adult education curricula is a strategic imperative for both educators and policymakers.

Review of Empirical Studies on Reinforcement Strategies and Self-Regulation in Adult Learning

Self-regulation, which is primarily about learners independently planning, checking, and evaluating their learning, can be greatly augmented by incorporating sound reinforcement actions into learning activities. A scoping review conducted by Stasolla et al. (2025) demonstrated that the use of reinforcement methods, especially with the help of digital and AI-powered technology solutions, significantly affects academic outcomes by fostering self-directed activity and intrinsic motivation among college students. In the same way, Lai (2024) concluded that adaptive learning technologies, together with their reinforcement feedback mechanisms, could facilitate the metacognitive growth in learners and foster the prospects of long-term retention in the setting of adult education.

In the African context, Tadesse et al. (2022) investigated factors affecting perceived learning gains in an Ethiopian university and concluded that reinforcement strategies, as practices of self-regulated learning, positively impacted students' academic achievement and confidence. Park and Kim (2022) also observed, in their study of the flipped classroom, that structured feedback and reinforcement significantly increased self-regulation, motivating students to take ownership of their learning. These results align with a study by Cobos-Sanchiz et al. (2022), which explores the effects of the Pygmalion effect in adult learning and emphasizes the role of positive reinforcement, including teacher expectations and feedback, which could help overcome learned helplessness and affirm learners' self-control.

Ahammad (2023) also made more detailed comments on the role of reinforcement in stimulating self-regulated learning, demonstrating that adult students are positively affected by motivational strategies such as immediate feedback and concrete rewards, which lead to greater persistence. Adarkwah (2021) supported this model by compiling a literature review demonstrating how constructive feedback should be used as a reinforcement mechanism that enables learners to self-regulate and increase academic performance. In addition, Du Toit-Brits (2019) emphasized that high expectations and learner responsibility, reinforced by an educator, can lead to a significant increase in students' self-directedness and learning autonomy.

Digital inclusion has also emerged as a critical enabler of reinforcement strategies. Afzal et al. (2023) observed that access to digital tools enables the deployment of reinforcement-based learning platforms,

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improving learner engagement and self-monitoring. Alam (2023) argued for integrating constructivist and connectivist approaches in adult education, where reinforcement occurs through peer interaction and feedback loops, fostering deeper self-regulatory learning. These digital environments make it easier to provide real-time reinforcement, which supports learners' ability to adjust strategies and goals effectively.

The link between reinforcement and motivation was also underscored by Ryan and Deci (2020), who affirmed that extrinsic motivators such as praise and achievement recognition can transition into intrinsic motivators over time, thereby reinforcing sustainable self-regulated behaviors in adult learners. Complementing this, Bernacki et al. (2021) reported that personalized reinforcement tailored to individual learner profiles was more effective in building self-regulation capacities than standardized feedback mechanisms. Lastly, Dahal and Bhat (2024) highlighted the challenges of implementing self-directed learning, noting that reinforcement strategies, such as consistent guidance and positive affirmation, can help overcome these barriers. Their review supports the need for educators to embed both social and instructional reinforcement in adult learning environments to cultivate autonomous and resilient learners.

Collectively, these studies affirm that reinforcement strategies, whether technological, pedagogical, or social, play a pivotal role in promoting self-regulation in adult learning, with implications for policy and curriculum development in lifelong education programs.

Challenges to Promoting Self-Regulated Learning through Reinforcement in Adult Education Programs

Encouraging self-regulated learning (SRL) through reinforcement in adult education programs raises several issues specific to the Nigerian context. Although the theory's inference about the efficacy of reinforcement in promoting autonomous learning behavior is sound, its practical application often encounters systematic and individualized limitations to success. Positive feedback, incentives, or an adaptive reinforcement system work best in situations where learners have reasonable resources, support systems, and favorable learning conditions (Stasolla et al., 2025). However, these conditions are often absent in Nigeria, which limits the possibility of reinforcement triggering effective self-regulation.

Among the conditions that are particularly important is poor access to digital infrastructure and educational technologies. Lack of internet connectivity, irregular electricity, and inadequate access to learning devices are common among adult learners in rural or underdeveloped areas, and all of them limit the propagation and response to reinforcement cues in technology-aided learning (Afzal et al., 2023). The digital divide remains an obstacle for adult learners who cannot access the strategies used in adult learning environments via digital tools and learning platforms enabled by AI, which customizes feedback to reinforce behaviors (Stasolla et al., 2025). Consequently, this stalls the progress of such reinforcement methods for student development and prevents them from developing self-regulation abilities.

The situation is more difficult due to socio-economic constraints. Most adult learners have numerous obligations, such as employment and family responsibilities, that deprive them of time and energy to undertake self-directed learning tasks (Abua, 2024). They may also be limited by a lack of funds to acquire the learning materials they require or to attend programs that apply advanced reinforcement strategies. Besides, a lack of responsiveness to reinforcement may be exacerbated by psychological difficulties, e.g., a lack of motivation or learned helplessness. Cobos-Sanchiz et al. (2022) also affirm that a state of powerlessness can develop in which reinforcement, regardless of how well designed, fails to inspire changes in the intended self-regulating behavior due to negatively held self-concepts.

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There is also an additional barrier to the successful promotion of self-regulated learning because of cultural and institutional factors. Adult learners, especially women in certain communities in Nigeria, might find themselves unable to take the initiative to engage in autonomous learning due to societal expectations that limit them (Adarkwah, 2021). Also, the design of most adult education programs is largely teacher-centered and inflexible, which does not align with the learner-centered instruction that self-regulated learning demands (Alam, 2023). Unless there is a change in pedagogical arrangements toward more constructivist and collaborative forms of learning and teaching, a reinforcement strategy can seem irrelevant or inefficient to a student accustomed to passive study methods.

Finally, learners' readiness is also important. Most adult learners in the programs come in with low literacy levels or have had very little exposure to formal education and thus would find it hard to comprehend and respond to reinforcement appropriately. To adjust reinforcement for adult learners in a world where AI is steadily penetrating technology, it is necessary to meet the standards of digital and cognitive literacy, which not every adult learner may possess (Lai, 2024). In addition, the lack of facilitator induction during reinforcement implementation, which encourages self-regulation, diminishes the strategy's effectiveness. Teachers may use too little or inappropriate reinforcement, which does not create an enabling environment for self-regulation to produce positive results (Tadesse et al., 2022).

Overall, despite the possibility that self-regulated learning can be promoted by reinforcement in adults, a network of obstacles, such as technological inequity, socio-economic constraints, cultural predispositions, system-wide hardness, and individual-related difficulties, needs to be overcome to bring reinforcement and its potential to fruition. Reinforcement could remain an underutilized tool in adult learning without comprehensive reforms and inclusive plans.

Reinforcement-Based Strategies for Enhancing Self-Regulation in Adult Learners

Reinforcement strategies are core components in promoting self-regulated learning (SRL) among adult learners in lifelong education programs. Self-regulation is one of the characteristics of adult learning that facilitates the efficiency of the learning process, autonomy, and perseverance, and can be understood as the ability of learners to determine in advance, observe, and judge the learning process (Tadesse et al., 2022). Adult students are inclined to bring diverse experiences and inner drive to the training process, and the system of rewards might play a significant role in strengthening their ability to embrace their personal educational goals. Positive, constructive reinforcement interventions can be implemented to motivate extended stays and help grown-ups surmount challenges to independent learning.

Positive reinforcement is among the most effective strategies for motivating adult learners to develop self-regulation. This technique involves providing verbal praise, rewards, and appreciation to encourage preferred learning behaviors. Individualized feedback, as the authors stress (Lai, 2024), can be particularly useful when it aligns with learners' objectives and, in addition to supporting self-regulatory behavior, enhances their metacognition, an essential component of self-regulation. Similarly, teacher feedback, as stated by Yang et al. (2021), is perceived by students as an inspirational factor with immense responsibility for students' overall outcomes. In adult learning, or, to be more precise, in non-conventional settings (that is, evening courses or courses via the internet), reinforcement can be timely and more contextually focused, helping to encourage learners to move forward and to learn about learning on their own. If-regulated learning is setting goals and making reinforcement gradual. Another thing that adult learners like working on is breaking long-term learning goals into small milestones they strive to attain and are rewarded for. Park

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and Kim (2022) found that higher self-regulation and impressive academic outcomes in a flipped learning environment led to greater continued improvement among learners, driven by routine, structured feedback on educational accomplishments. Reinforcement at each level of learning helps the learner develop a sense of competency and continue associating with the content of the learning. This positive reinforcement incrementally helps learners acquire total independence, and in the process, learners ultimately internalize behaviors and strategies that lead to positive learning.

Another recent strategy is technology-enabled reinforcement, which is increasingly popular as digital tools are applied to learning. As artificial intelligence and adaptive learning technologies continue to advance, adults can receive timely feedback, track their performance more effectively, and receive customized cues that strengthen their self-directed learning patterns. Stasolla et al. (2025) note that deep learning and reinforcement learning algorithms have been used to assess and improve the academic performance of university students. These technologies offer scalable, responsive models for reinforcing effective learning strategies, particularly in adult learning environments where learners juggle multiple roles and responsibilities.

An important aspect of reinforcement is that it tends to influence both intrinsic and extrinsic motivation. Ryan and Deci (2020) state that reinforcement is critical in helping learners shift from extrinsic to intrinsic motivation (learning as something one is interested in and derives satisfaction from) when they rely on extrinsic motivation (learning for external rewards). Given that most adult learners are self-motivated to some extent, though lacking confidence or direction, reinforcement strategies that recognize progress, validate effort, and highlight personal relevance may ignite intrinsic motivation. For example, through formative feedback and recognition of learner agency, educators can foster a learning environment that sustains engagement and supports long-term self-regulatory skills (Adarkwah, 2021).

In contexts such as Nigeria, where adult education faces challenges like poor infrastructure and limited teacher support (Abua, 2024; Akpala, 2018), reinforcement-based strategies are even more important. Educators can adopt culturally relevant reinforcement methods, such as community recognition or peer encouragement, to foster accountability and engagement. Cobos-Sanchiz et al. (2022) highlights the importance of social reinforcement, including the Pygmalion effect, in which higher expectations lead to improved performance, and warn against learned helplessness that may arise from repeated academic failure without constructive feedback. Thus, positive reinforcement must be consistent, meaningful, and tailored to the socio-cultural realities of adult learners to be effective.

Peer reinforcement is another valuable strategy for enhancing self-regulation in adult education. Peer feedback, collaborative learning tasks, and mentorship offer adult learners' opportunities to observe, model, and internalize self-regulated learning behaviors. Lai (2024) notes that learners exposed to generative AI platforms and collaborative tools often develop greater self-awareness and discipline when peer interaction is encouraged. Moreover, peer reinforcement fosters a sense of community and shared responsibility, which is especially relevant in adult education, where learners often value relational support over authoritative instruction.

The important components of self-regulated learning, namely self-monitoring and reflection, can also be reinforced through structured prompts and assessment measures. For example, checklists, self-evaluation forms, and learning journals, along with positive reinforcement techniques, can help learners evaluate their progress. Elderson-Van Duin et al. (2023) show that interventions that include both self-assessment and

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reflection improve learners' capacity to track their development and adapt their strategies in response. Reinforcement is not just the teacher's responsibility; it also comes from self-affirmation, including appreciation for effort and achievement. In addition, reinforcement approaches should be inclusive and accommodate adult learners' ability to access technology and their educational level. The digital gap can impede the application of advanced reinforcement technologies, leading to digital inequities (Afzal et al., 2023). Teachers will therefore need to use blended methods that offer low-tech or no-tech alternatives to reinforcement, such as printed progress graphs or face-to-face feedback meetings, so that no learner is left unable to experience reinforcement due to a lack of online access.

Finally, reinforcement solutions are not self-sufficient actions but must be integrated into a comprehensive pedagogical process that sustains autonomy, competence, and relatedness. This requires flexibility in curriculum design, self-paced learning, and a learner-centered approach that collectively considers the distinct experiences and needs of adult learners. Brookfield (1984) posits that adult learning works best in a context where reinforcement is not only behavioristic but also dialogical, enabling learners to respond critically to feedback and pursue their study objectives.

To sum up, reinforcement-based approaches offer practical, flexible systems for improving self-regulation among adult learners in lifelong education programs. Using a combination of verbal and goal-based reinforcement, technology-aided feedback, peer acknowledgment, and culturally applicable practices, educators can create conditions that foster long-term self-directed learning. Such strategies must align with learners' contexts, motivations, and challenges to be effective. As lifelong learning continues to gain importance amid rapid social and technological change, reinforcement strategies will remain central to empowering adults to take control of their educational journeys.

Policy Implications, Recommendations, and the Way Forward for Sustainable Adult Education Practices in Nigeria

The practice of sustainable adult education in Nigeria needs a policy framework to address current structural, institutional, and pedagogical issues. Policies are usually not focused on adult learning as a strategic tool of national development, leading to inadequate funding, limited awareness in society, and insufficient support from institutions. To sustainably develop adult education, policies must be inclusive, equity-based, and sensitive to the varying needs of adult learners, especially in rural and marginalized societies. It needs to restructure the national education agenda, which has placed adult learning on the lifelong learning track rather than as a supplementary or remedial option. Moreover, the implied action should be towards decentralizing adult education governance, establishing local education authorities, and ensuring that community-based learning centers are adequately equipped as knowledge and empowerment centers.

Government agencies and stakeholders should consider implementing an integrated adult education program (a combination of literacy with vocational, digital, and civic education) to make a significant difference. To achieve this aim, it is important to invest in the professional development of adult educators, as successful implementation requires specialized training, ongoing capacity building, and competitive compensation. The adult education curriculum should also be flexible, competency-based, and culturally relevant, considering the lived experiences and immediate needs of adult learners. Cooperation among ministries of education, labor, health, and agriculture, as well as non-governmental organizations and private-sector actors, will improve the implementation and sustainability of programs. It is also necessary to

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strengthen the monitoring and evaluation system to track progress, identify gaps, and ensure that adult learning efforts are nationally grounded and responsive to international standards for lifelong learning.

Moving forward, Nigeria must adopt a more proactive and inclusive approach to adult education by creating an enabling environment for lifelong learning. Awareness campaigns should be launched to reshape public perceptions of adult education and highlight its value in fostering personal development, social inclusion, and national productivity. Digital inclusion strategies must be integrated into adult education planning to bridge the digital divide and prepare learners for the demands of a modern economy. Furthermore, policy innovations such as community-driven education models, mobile learning units, and performance-based funding can improve efficiency and expand access. With sustained political will, committed partnerships, and a learner-centered vision, Nigeria can build a resilient adult education system that empowers individuals, strengthens communities, and contributes meaningfully to the country's sustainable development goals.

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