

Effectiveness of Adult Education Programs in Saudi Arabia for Empowering Learners to Meet Sustainable Development Requirements

Issa bin Khalaf Al-Dosari

e-mail: e.aldosari@psau.edu.sa

Department of Educational Sciences, Education Faculty- Prince Sattam bin Abdulaziz University, Al-Kharj Governorate, Saudi Arabia.

Abstract: This paper aims to assess the roles of adult education programs in Saudi Arabia as tools for enabling the learners to meet the needs of sustainable development. The research used a mixed-methods approach that included a quasi-experimental pretest-posttest design, correlational and regression tests, and a survey of perceived barriers. Results indicated a significant enhancement in cognitive and skill-based competencies of the participants who were involved in the programs, and the learning accrued was not biased based on the gender or the educational level. The results of the statistical analysis indicated that there was a strong and positive correlation between the overall program outcomes and the meeting of the requirement of sustainable development, and that close to 50 percent of the variance in the requirements was accounted for by the program results. Patterns became apparent: cognitive gains were most strongly connected with economic empowerment, the acquisition of skills with social engagement, and the affections with the engagement with the environment. Regardless of these advances, the research found out that there were still enduring organizational, social, and cultural barriers, which moderate the effectiveness and sustainability of program outcomes. The findings provide a suggestion to adopt a holistic four-axis improvement model, which aims at focusing on the flexible governance, curriculum and sustainability, strong community relationship, and sustainable management of the resources to achieve long-term empowerment and increased congruence in the sense of national development.

Keywords: Capability Expansion, Conversion Factors, Implementation Constraints, Socio-Cultural Barriers, Quasi-Experimental Evidence.

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1. Introduction

Sustainable development has risen to become a major policy concern and a national and international priority due to the recent decades of fast economic, social, and technological changes. The question of development is no longer evaluated by the conventional measurements of growth but by how a given society can reconcile the current demands with those of the future by continuously investing in human capital as well as by ensuring that there is an equitable contribution by all. Here, the structural

barriers to the ability of adults with limited access to learning opportunities to participate effectively in the economic, civic, and social life of society are often amplified, which confirms the developmental significance of accessible and high-quality adult learning opportunities. Adult education has thus come out of being a remedial role to be a strategic instrument of building capacity, employability, and social inclusion. The contemporary adult learning will assist the person in enhancing his or her skills, adapting to the new working organization, and enhancing the results in terms of income production, health, family welfare, and civic participation. At the same time, free lifelong learning has become a prerequisite orientation in the modern educational system, especially in this uncertain time that requires continuous upskilling and adaptable academic paths throughout one's life (Grotlüschen et al., 2024). Adult education, in this perspective, is a resilience policy tool, which helps students to be productive and maintain agency in a rapidly changing world.

The sustainable development framework further enhances the need to have adult education on the basis of multidimensional outcomes that go well beyond the sphere of employability. Adult learning, through the targeted programs, is seen to decrease educational inequities and enable community involvement through the development of competencies related to responsible citizenship, entrepreneurship, healthier lifestyles, and environmental stewardship (Vandenabeele et al., 2024). Nonetheless, even with the solid policy backing, there is still uncertainty as to whether there is a genuine empowerment of adult education programs to meet the needs of sustainable development in the economic, social, and environmental sectors. To demonstrate their effect, such programs should go beyond simple literacy levels, meet the demands of the fast-changing technological and social landscape, and provide learning experiences that can create transferable skills and knowledge that would be applicable in the digital environment and the sustainable development of communities (Charatsari et al., 2022).

Adult and continuing education in Saudi Arabia have been receiving growing strategic priority in the country in the human capital and development agenda. The official Saudi structures define continuing education as incorporating formal and non-formal learning programs that are provided to adults to acquire reading, digital, professional, and life skills together with supportive services to increase the participation and foster lifelong learning as per the national developmental objectives. Moreover, development of human capability and cultivation of future skills are considered priorities of the national programs in improving competitiveness and equipping citizens to meet changing labor market demands, so human capability development is identified as one of the key drivers of large-scale development results. However, most empirical studies in Saudi Arabia are usually not systematic, and thus instead of conducting a comprehensive analysis of how adult education programs enhance learners to meet the multidimensional needs of sustainable development, they tend to focus on discrete outcomes, e.g., administrative obstacles, academic performance, or a particular form of illiteracy.

This research paper examines how adult education in the Kingdom of Saudi Arabia empowers the learners to achieve the requirements of sustainable development. The effectiveness is determined as the degree to which the programs yield verifiable outcomes of empowerment, with the notion of empowerment being a multidimensional construct comprising (a) economic (e.g., employability, digital and professional competence, readiness to become an entrepreneur), (b) social (e.g., agency, inclusion, civic engagement, health and family literacies), and (c) environmental (e.g., environmental

awareness and environmentally sustainable practices) empowerment. Through putting adult education outcomes directly in contact with the goals of sustainable development, the current study shall attempt to develop an extensive evidence base that determines which program features have the greatest influence on enabling empowerment, what organizational, financial, and structural constraints limit its impact, and what a current policy improvement should undertake to advance quality assurance, program refinements, and quality assurance in the area of adult learning.

1.1. Problem Statement

Illiteracy remains a significant limitation to the sustainable development process in Saudi Arabia because it hinders the productive involvement of the person in the economic life of the country, his or her meaningful social activity, and the implementation of those practices that would contribute to environmental sustainability (Katiyar, 2021). Even though the country has long-term efforts and institutional investments in adult learning, it has been indicated that most of the programs are challenged in their ability to effectively respond to modern development needs. The transformative nature of adult learning provision is hindered by persistent issues such as inflexible curricula, lack of professional training of adult educators, inadequate alignment with labour-market and sustainability concerns, and unequal digital access (Alojail et al., 2023; Sharabi, 2024).

Further analysis of the available literature indicates that studies carried out on adult education in the Saudi context have had the propensity of covering outcomes in a disjointed way. Most research focuses on the fundamental cognitive achievement, literacy intercession, or solitary computer proficiency, whereas other research is based on administrative or organizational limitations. Relatively little empirical effort has been put, however, into studying adult learning as a compounded empowerment mechanism that can propel the three interdependent pillars of sustainable development: economic empowerment (including employability, productivity, and entrepreneurial preparedness), social (including civic participation, agency, and lifelong learning capabilities), and environmental (including sustainability awareness and responsible practices) empowerment (Chaaben et al., 2024). This division has constrained the theoretical consistency and practical applicability of the previous research.

Besides, major constructs that have found their way into the modern adult education discourse are often used without definite concept lines or without a definite connection to the prospects of sustainable development. Consequently, policymakers and curriculum planners do not have strong and evidence-based information on how adult education programs can be strategically enhanced to promote learner empowerment in various ways that meet national development priorities and global sustainability models.

Based on these constraints, there is an evident necessity for an extensive analysis of adult education in Saudi Arabia that goes beyond the descriptive diagnosis and evaluates their efficacy as the tools of learner empowerment in the economic, social, and environmental aspects of sustainable development.

Accordingly, the central research question guiding this study is: To what extent are adult education programs in Saudi Arabia effective in empowering adult learners to achieve the economic, social, and environmental requirements of sustainable development?

1.2. Study Objectives

1. The effectiveness of adult education programs in enabling learners cognitively

and skillfully.

2. The nature of the relationship between the outcomes of adult education programs and the requirements of sustainable development in its economic, social, and environmental dimensions.
3. The challenges facing adult education programs in fulfilling the requirements of sustainable development.
4. The proposed vision for developing adult education programs to enhance their role in empowering learners to achieve the requirements of sustainable development.

1.3. Study Questions

1. To what extent are adult education programs effective in empowering learners cognitively and skillfully?
2. What is the nature of the relationship between the outcomes of adult education programs and the requirements of sustainable development in its economic, social, and environmental dimensions?
3. What are the main challenges facing adult education programs in fulfilling the requirements of sustainable development?
4. What is the proposed vision for developing adult education programs to enhance their role in empowering learners to achieve the requirements of sustainable development?

1.4. Study Significance

This study elicits its relevance from the overlaps of both strong theoretical input and practical usefulness that are very essential towards the development of the field of adult education in the larger context of sustainable development. On the theoretical level, the study addresses a fundamental educational issue by conceptualizing the issue of adult education not only as the process of literacy remediation but as a strategic process of creating human resources, enhancing social cohesion, and evolving adaptive abilities to meet the new global demands. In contrast to most of the existing literature that tends to separate outcomes or operational barriers in a disjointed way, this research contributes to a single conceptual framework that integrates the theories of lifelong learning, sustainable development principles, and the multidimensional concept of learner empowerment. In so doing, it will address a significant void by clarifying how the results of adult education are related to economic productivity, social involvement, and environmental stewardship and will serve to inform future academic discussion and curricular reform in the Arab world and elsewhere.

In terms of application, the study stands out due to its strict assessment of the efficiency of adult education programs in practice based on the data analysis of both cognitive and skill-based changes in the learner population. The paper explores the scope of these educational benefits in relation to increased employability, productive social interaction, and active involvement in the satisfactions of sustainability issues in a systematic way. In addition, it finds out systemic challenges, including the lack of resources, teacher training, insufficient digital access, and pedagogical resistance, as well as outlining viable ways of change based on empirical evidence. The results will be used by policymakers and educational leaders, and they will provide practical suggestions on how to revise curricula, improve teacher training, take advantage of digital learning settings, and establish the collaborative partnership with the local community.

More importantly, the theoretical and practical importance of this work is that

it contains a comprehensive vision of adult learning: both as a factor of personal empowerment and a driver of social change with the goals of Saudi Vision 2030 and the principles of international sustainability systems. By spelling out explicit connections between the results of adult education and the various facets of sustainable development, the research does not only contribute to the intellectual insight but also presents practical solutions that can be applied to various learning institutions. Overall, the study can make a contribution to theory and practice by providing an evidence-based guide to increasing the quality and strategic significance of adult education on the national and regional levels.

1.5. Study Scopes

1.5.1. Topical Boundaries

The study is limited to adult learning programs as a means of empowering students to attain sustainable development needs in terms of economic, social, and environmental aspects. It does not touch on the other types of education, which include general, higher, or pure vocational education.

1.5.2. Temporal Boundaries

The study is limited to the 2025/2026 academic year. Results indicate only the impacts and data recorded at this particular time in the academic year.

1.5.3. Spatial Boundaries

It is restricted to adult education programs in the Kingdom of Saudi Arabia, namely programs provided in official institutions of learning. Programs that fall outside of this institutional or national context are out.

1.5.4. Human Boundaries

The study is aimed at adult learners who attend the known adult education courses in the 2025/2026 academic year. Other segments, like the dropouts, non-enrolled, or educators, are only mentioned in regard to the objectives of the study.

2. Theoretical Framework

2.1. Study Positioning and Knowledge Gap

Adult education in Saudi Arabia is becoming a more frequently viewed development tool, but the assessments usually end with completion rates or test gains (Alfaifi, 2024). These indicators fail to define whether learning leads to actual opportunities that are conducive to sustainable development, which also concerns the modern adult literacy discourse on SDG4 impact pathways (Holst & Tarlau, 2025). Only one interpretive lens is thus needed to bridge program resources to enable constraint empowerment. This approach is taken as the Capability Approach recognizes development as extended liberties and not just inputs (Seckler & Volkert, 2021). Effectiveness is then seen as the expansion of ability with the help of which learners will be able to reach the requirements associated with sustainability.

2.2. Core theory: The Capability Approach

In the Capability Approach, capabilities are defined as real opportunities, and functionings

are defined as actual outputs of the opportunities (Barreno-Alcalde et al., 2024). Education offers resources such as knowledge, skills, credentials, and learning supports, but they need conversion into usable options, which is known as empowerment. Such conversion factors as personal, institutional, and societal decide whether such transformation is possible. The key role is played by agency since empowerment presupposes a meaningful choice and the ability to implement it (Horbachevska et al., 2024). Here, education can be understood as a common good when it contributes to the effective freedoms and does not only distribute services (Gracia-Calandín & Tamarit-López, 2021).

2.3. Empowerment Constructs Derived from the Theory

Empowerment is defined as the capability growth in three areas that are in line with the pillars of sustainable development without eliminating the resource-capability-functioning distinction. Economic empowerment has to do with employability, entrepreneurship preparedness, and financial-digital preparedness, and the functionings can be observed in labor involvement and informed economic judgments. Social empowerment deals with inclusion, civic engagement, and health and family literacy capabilities, and its functionings are evident in participation and enhanced social integration. Environmental empowerment is about being able to practice responsibly and solve sustainability problems, and the visible functions are apparent in decisions that minimize harm and benefit sustainable living (Essa & Harvey, 2022). Skill and cognitive gains are viewed as facilitating resources and not the outcomes of empowerment in themselves.

2.3.1. Capability-based Model and Variable Logic

Adult Education Program inputs are placed at the first level in the model, which consists of the following resources: curriculum relevance, adult-appropriate pedagogy, assessment quality, and learning support. The expected effect of these inputs is the raising of learning resources, which is operationalized as cognitive and skill gains in the pre-post component. The capabilities can be expanded by learning resources only in case of conversion factors, i.e., the institutional flexibility, the access to technology, and the community opportunities. Capabilities are manifested as functionings in the application of opportunities of work, participation, and sustainability practices by learners as measured by survey indicators and contextual evidence. The capability of adult educators is considered to be one of the conversion factors since pedagogical expertise and currency in the domain determine usable competence (Chen & Murphy, 2023).

2.3.2. Methodological Alignment and Inference

Mixed-methods design is consistent with the capability approach since the expansion of capability can be observed partly by functioning and partly by opportunity, agency, and constraints. The quasi-experimental strand estimates the change in learning resources, the correlational strand tests the relationship with the sustainability-related indicators, and the descriptive strand explains conversion barriers. It is also a measurement of opportunity-linked indicators and implemented practices instead of satisfaction alone, which reinforces capability-consistent inference. The use of triangulation is needed due to the fact that hidden constraints may conceal limited capabilities even with the better scores. Conversely, an accelerated technological change may also boost the enhancement of capabilities when there is the presence of digital access and supports that enhance sustainability-related learning effects (Akpinar et al., 2025).

2.3.3. Diagram-ready Model and Integrative Synthesis

The Capability Approach is appropriate to the study, as it describes the concept of empowerment as actual freedom, and it can be interpreted in economic, social, and environmental aspects without any theoretical misinterpreting. One of the major weaknesses is an indirect measurement that is addressed by the explicit modelling of converting factors and multiple-source evidence. The framework is represented diagrammatically and in the form of a left-to-right sequence: Program Inputs - Learning Resources - Capabilities (economic, social, environmental) - Functionings - Sustainability-related requirements, where conversion factors moderate each of the pathways. The Saudi situation considers the factors of locality, access to programs, and constraints of sociocultural factors as conversion factors that can determine heterogeneous outcomes. In general, the effectiveness of the program is explained by the increased opportunities and implemented functioning that are in line with sustainability requirements and in accordance with the single theory underpinning it (Broek et al., 2024).

3. Literature Review

In this section, the previous studies will be presented through a critical literature review approach, in which the literature is analyzed, thematically categorized, and critically evaluated. Key methodological trends, theoretical foundations, points of agreement and contradiction, and research gaps are identified to provide a comprehensive and insightful basis for the current study.

Newer research that has been conducted to relate adult learning to sustainable development in the Saudi situation tends to theorize the concept of empowerment as a multidimensional process but still defines the concept of empowerment by various proxies that define what should be considered successful programs. In Riyadh, motivational facets have been used to understand enrollment and participation patterns in adult high schools that predetermine age- and gender-based differences, which suggest that the design of programs should not view participation as a disempowering precondition but rather as a process of empowerment. Simultaneous research on Saudi governmental higher education institutions places lifelong-learning orientation as a cultural product connected to institutional practices, and it is important because adult education programs tend to be based on similar policy and quality-assurance designs that organize outreach and continuous education (Faraj, 2023). Using an overtly labor-market frame, it has been demonstrated that education, training, and e-learning can reinforce social empowerment and sustainable employment generation in Saudi Arabia, and that government policy and orientations of the national culture might mediate these associations and make linear arguments about impact challenging (Singh et al., 2022). The presence of ESD-focused curricular interventions in Saudi Arabia in the context of the higher-education setting also suggests that competence-based pedagogies have the potential to instill literacy and agency that are related to sustainability, but the degree to which these outcomes can be transferred to populations of adult learners directly needs to be tested (Oraif, 2024).

Taken together, the studies examined indicate that the concept of the effectiveness of adult education is more and more a systemic property that can arise due to the manner in which the programs are institutionalized within the local governments,

professional learning communities, and the opportunity structures but not due to the instruction within the classroom. A meso-level synthesis claims that effective local adult learning systems require a conducive socio-spatial context, with coordination, accessibility, and institutional interactions being prerequisites for adults to participate in scale-based learning. On the macro-policy level, adult learning and education have been placed as part of SDG agenda development, but the same study also cautions that SDG alignment may be little more than rhetoric without financing, recognition, and equity mechanisms incorporated into implementation regimes (Charatsari et al., 2022). Another aspect that is considered to mediate between adult education and sustainability is professional learning, in which continuing professional development is defined as a significant part of lifelong learning mediating the updating and mobilization of skills across occupational transitions (Friedman, 2023). Combined, these arguments push the assessment of short-term learning results out towards long-run capacity building and institutional responsiveness, which becomes particularly salient when reforms in the country demand adult learning to make demonstrably sustainable development results.

Another trend recurs as those studies shift to the view of empirical constraints; barriers are not always noise in the context but often represent the causal pathways that lead to the weakening of program effects on empowerment outcomes. Adult community learning center evidence highlights the impact of resource scarcity, staffing constraints, and governance bottlenecks in undermining the quality and sustainability of the program, which implies that resource-moderate challenges can result in a systemic underperformance despite the well-intended curricula. The consideration of indigenous knowledge in adult education as a tool of relevance and community ownership is also mentioned as a sustainability concern but also has methodological implications regarding the process of validating, assessing, and protecting such knowledge when part of a formal program (Moges et al., 2024). Compared to strictly diagnostic descriptions of constraints, planning-oriented studies of integrated functional adult education demonstrate that both design and sequencing decisions, which are reflected through mixed methods, can expose where implementation drift is likely to arise and which planning practices are most apt to maintain learner engagement and progress of learning (Assefa et al., 2024). These studies align methodologically on the usefulness of qualitative and mixed-method designs as the means to understand the dynamics of the institution; however, they are divided by the degree to which they indirectly transform the operational weakness into the economic, social, and environmental aspects of sustainable development.

The conceptual syntheses of these results suggest that the role of adult education as a contributor of sustainable development can better be understood through the mediated pathways where input of the program contributes to empowerment through motivational engagement, learning opportunities, and enabling environments, with policy and culture as the moderators of the strength of its impact. The determinants related to participation, including motivation and demographic trends, seem to influence beneficiaries and conditions of participation, which means that equity-sensitive recruitment and retention approaches are structurally linked to the effectiveness assertions. When national policies are aligned with digital and blended modalities, they can potentially increase the effect of empowerment and employability, but the evidence indicates that technology is not a universal equalizer unless institutional resources make it accessible and meaningful to use. At the systems level, the arguments

support that adult learning at scale can be facilitated by local learning systems and SDG-linked policy promises but warn that SDG discourse should be understood not as a replacement to governance, financial, and reward systems (Jekabsone & Guddele, 2023). The lack of Saudi-specific assessments incorporating empirically determined cognitive and skill empowerment, direct mapping on the dimensions of sustainable development, and investigation of the problem of implementation as an explanatory variable instead of a descriptive background, therefore, becomes the research gap in the current study.

Overall, the literature associates adult education with sustainability via capacity-building and facilitation of participation. It also indicates that the governance and recognition framework predetermine whether learning will be empowerment. Nevertheless, Saudi-oriented integrative appraisals are relatively limited and methodologically unequal. This is the gap in the current research whereby an empowerment-sustainability analytic model is used. It is structured to produce practical evidence regarding how to improve the program.

Although the reviewed literature sources all support the theoretical connection between adult education, development of capabilities, and sustainability, as well as identify the conclusive impact of governance and recognition systems, an obvious gap in integrative and methodologically solid research in the Saudi context is visible. This current paper fills these gaps by assuming an empowerment-sustainability analytic framework, which links directly quantifiable learning outcomes with sustainable development goals and systematically examines the implementation barriers as variables of explanation instead of descriptive context. By doing this, the study will be action-oriented and evidence-based to enhance the improvement of the program, thus contributing to the body of knowledge and policy-implementing practice.

4. Methodology and Procedures

4.1. Research Design and Methodological Rationale

An integrated methodology was utilized to achieve the study goals and research questions using complementary pieces of evidence. The design combined the elements of quasi-experimental, correlational, and descriptive-analytical ones to investigate the effect, associations, and contextual limitations in adult education programs. The quasi-experimental section was of a one-group pre-test/post-test design that was used to approximate change that could be attributed to the participation in the program in realistic field conditions. The correlational aspect involved a test of the relationship between the education outcomes of adults and the economic, social, and environmental aspects of sustainable development by applying the Pearson correlation and regression. The diagnostic element was the descriptive-analytical component, which was made to diagnose barriers and to inform the production of a development-oriented framework to reinforce the transformative role of adult education.

4.2. Quasi-Experimental Component

The program of adult education was tested in terms of its ability to empower learners cognitively and skillfully with the help of the quasi-experimental design, where only one group of the respondents was considered, and their results were measured twice. Before participation, the participants were evaluated to determine

baseline performance and evaluated again at the end of the program to determine post-intervention performance. This design allowed determining the direction and the extent of change and was feasible within an applied educational context. The outcome of this element was the quantifiable enhancement of the cognitive and real-life skill application of the learners. Nonparametric techniques that are suitable in comparing paired measures were used in analyzing statistical significance of pre-post differences.

4.3. Correlational Component

Correlational analysis was done on the three aspects of sustainability in order to explore how the outcome of adult education relates to the needs of sustainable development. The correlation coefficient was used to establish the strength and direction of relationships between outcome domains and sustainability indicators by Pearson. This was then estimated by using simple regression analysis that was applied to predict the contribution of the predictive outcomes of adult education towards sustainable development requirements. This element offered the analytical linkage between the learning outcomes and the development-related competencies on a larger scale. The correlational evidence was explained according to the integrated views of empowerment in the study in the economic, social, and environmental fields.

4.4. Descriptive-Analytical Component

The descriptive-analytical approach was employed in order to determine the challenges restricting the ability of adult education programs to satisfy the requirements of sustainable development. This aspect aided a further explanation of institutional, resource-based, curricular, and sociocultural limitations based on program performance. The proposed developmental framework based on the Saudi context was also developed based on the analysis. Focus was laid on identifying obstacles in a systematic way and not as problems at hand. The resulting framework was formulated to be actionable and in line with priorities of improving programs.

4.5. Study Population

The target population consisted of those people who are participating in adult education programs in the Kingdom of Saudi Arabia in the Al Kharj Governorate. The population of learners included all the enrollees in the literacy and adult learning centers within intermediate and secondary schools, which amounted to 450 learners. Besides learners, there were 87 teachers, 35 school principals, and 23 administrators who were employed under the same learning environment. This type of population allowed considering the instructional, administrative, and leadership views as well as learner outcomes. The definition of the population was multidimensional, as the study was interested in effectiveness, relationships, and barriers.

4.6. Study Sample and Sampling Strategy

Sampling was consistent with the aim of the study and was divided into three separate groups that represented the main analytic strands. To determine the effectiveness using the quasi-experimental method, a purposive sample consisting of about 100 learners was chosen through adult education centers, considering regular attendance and consistent participation as support for valid pre-post measurement. In the case of correlational and barrier studies, a thorough field survey was done among the stakeholders of the program, through which a sample population of 145 participants

was obtained, including principals, administrators, and teachers. To create the proposed framework, a purposive sample of 15 adult education and sustainable development specialists was identified among Saudi university specialists, educational research centers, and ministries of education-related institutions. This stratified sampling plan meant that every research goal was aligned to a suitable group of respondents and data bank. The outcome sample structure enhanced methodological consistency in measurement, association testing, and framework creation.

4.7. Study Instruments

Three quantitative measures were used: a pre-test/post-test and two questionnaires, which were associated with certain goals and the multidimensional design of the study. The development of the instruments was based on the purposes of adult education programs in Saudi Arabia, the curricula approved by the Ministry, and the results of the Seventh International Conference on Adult Education. Relevant literature and previous studies were also used as the basis of tool construction to have content relevance and conceptual coverage (e.g., Țurcanu, 2023). Professional scrutiny was used in a systematic manner to enhance the content validity, comprehensibility, and fit with the specific dimensions. Estimates of reliability were determined by pilot testing before implementation.

4.7.1. Pre-Test and Post-Test (Cognitive and Skill Empowerment)

The pre-test/post-test tool was intended to evaluate the first objective through the measurement of the cognitive and skill-based empowerment outcomes of the learners. It consisted of two areas: a cognitive area that gauged basic abilities, including reading, writing, and socio-economic sensibility, and a skill area that evaluated how learning is applied in real-life and work situations. Every domain contained 15 multiple-choice questions, generating a final test of 30 questions. Five academic experts in the field of adult education, curricula, and teaching methods were involved in the validation of content validity. Reliability was tested by pilot administration to 25 adult learners with the response coefficients of Cronbach of 0.784 (pre-test) and 0.701 (post-test), which is deemed as being acceptable internal consistency of applied educational measurement.

4.7.2. Questionnaire on Outcomes and Sustainable Development Requirements

4.7.2.1. The Second Instrument

The second tool was used to determine the relationship of the results of adult education programs and the needs of sustainable development in the economic, social, and environmental aspects. In order to formulate the questionnaire, the research used previous literature that covers the connection between adult learning and sustainable development (Newton & Ellis, 2025). The final version based on this review had 30 items that are distributed in six dimensions that operationalize the intersections of program outcomes and the pillars of sustainability. Each item was rated on a five-point Likert scale from Strongly Agree to Strongly Disagree, and this is the reason that this scale allows uniform comparison across dimensions. The instrument was revised by eight adult education, sustainable development, and educational measurement experts who wanted to enhance content alignment and clarity prior to field use. Subsequently, a pilot study that involved 30 individuals revealed that the Cronbach alpha coefficients of the described sub-dimensions are 0.631 and 0.634, which is satisfactory as far as the exploratory and field-based assessment is concerned.

4.7.3. Questionnaire on Challenges and Obstacles

The third tool evaluated obstacles that restricted the effectiveness of adult education programs in meeting the sustainable development demands. It was created in the context of a narrow analysis of pertinent sources on the limitations facing the implementation of adult education (Mavropoulos et al., 2021). There were 20 questions in the final questionnaire, which were grouped into four domains, namely, administrative and organizational, financial and resource-related, academic and content-related, and social and cultural issues. The answers were gathered on a five-point Likert scale to allow the same method of scoring in domains. The content validity was determined by the review of six experts in educational administration and adult education. The pilot test yielded an alpha of 0.663, which is acceptable in diagnosing limitations of the program in the field.

4.8. Statistical Analysis Procedures

The analysis of data was performed with SPSS26 according to each objective and data structure. Means and standard deviations were calculated in order to profile the respondent perceptions and the instrument domains using descriptive statistics. The Wilcoxon signed-rank test has been used to determine the relevance of pre-post differences in the performance of the learners, and the estimation of the effect size to determine the magnitude of the effect on a practical scale. Pearson correlation coefficients were computed to test the relations of the outcome domains of adult education and the dimensions of sustainable development. The results of simple regression analysis were used to predict the influence of the outcomes of the adult education programs on the needs of sustainable development. All these processes contributed to strong analysis of performance, connections, and patterns of constraints in the research environment.

5. Results

In order to be accurate, the Wilcoxon Signed-Rank Test was employed to determine the success of adult education programs in empowering the learners both cognitively and practically. The findings are represented in the table 1 below.

Table 1: Wilcoxon Signed-Rank Test Results for the Effectiveness of adult Education Programs (N=100).

Dimension	M (Pretest)	M (Posttest)	Z	r	p (2-tailed)
Cognitive	19.35	22.80	-8.452	0.845	<.001
Psychomotor	5.85	10.03	-8.750	0.875	<.001
Overall	25.20	32.38	-8.717	0.871	<.001

The outcome of the Wilcoxon signed-rank test on the pretest-posttest comparison (N=100) is provided in Table 1. In all of the dimensions, posttest means were greater than the respective pretest means, which implies that there were improvements after the program was undertaken. The negative Z values indicate the direction of change of the Wilcoxon procedure and not the decrease in performances, and the pattern that we have seen testifies to the fact that the scores rose following the intervention. All the two-tailed p-values were less than .001, and this indicates statistically significant differences between the pretest and posttest scores in the cognitive, psychomotor, and overall scores. The outcome estimates of effect were large ($r = .845-.875$), which

demonstrates a strong practical significance of the program to the cognitive and psychomotor activity of learners and their overall performance effects.

5.1. Effect of Gender (Male/Female) on the Effectiveness of Adult Education Programs in Empowering Learners Cognitively and Psychometrically

A Mann-Whitney U test was conducted to determine whether there was a difference in the effectiveness of the adult education programs between the male and female genders. This was a procedure of comparing males and females in the cognitive, psychomotor, and overall scores at the pretest and posttest levels. It was employed to identify statistically significant differences in performance between groups in terms of the dimensions in the study. The table below presents the findings.

Table 2: Results of the Effect of Gender (48 Males, 52 Females).

Dimension	U	Z	r	Sig. (2-tailed)
Cognitive (Pre-test)	1207.00	-0.284	0.028	0.776
Cognitive (Post-test)	1142.50	-0.736	0.074	0.461
Skill-based (Pre-test)	1232.50	-0.108	0.011	0.914
Skill-based (Post-test)	985.00	-1.841	0.184	0.066
Total (Pre-test)	1191.00	-0.396	0.040	0.692
Total (Post-test)	1207.00	-0.284	0.028	0.776

The findings in Table 2 reveal that there are no statistically significant gender differences in pretest or posttest performance in the cognitive, skill-based, and total scores. The reported p-values were all between .066 and .914, which is more than the traditional $\alpha = .05$ value, which means that any differences between males and females, in turn, were not found to be statistically significant. Moreover, the estimates of effect sizes were always modest ($r = .011 - .184$), which indicates that there is no significant effect of gender on the cognitive and skill-based outcomes.

These findings combined together suggested that there was no gender difference in how the adult education programs enhanced the cognitive and skill-based competencies of the learners. The programs yielded widely similar results in terms of the gains that were produced by males and females, and this indicates a regular trend of effectiveness among the groups of sex.

5.2. The Effect of Educational Level (Intermediate/Secondary) on the Effectiveness of Adult Education Programs in Enhancing Learners' Cognitive and Skill-Based Competencies

To determine whether program outcomes differed by educational level (intermediate vs. secondary), the Mann-Whitney U test was conducted. This analysis compared participants from the two educational-level groups on the cognitive, skill-based, and total scores at both the pretest and posttest stages. The test was used to assess whether any between-group differences in performance were statistically significant across the study dimensions. The results are presented below.

As Shown at table (3) The findings show that the pretest and posttest performance of the intermediate and secondary educational attained participants across the cognitive, skill-based, and total scores had no statistically significant differences at $p < 0.05$. The given p-values were reported to range between .078 and .888, which validates the fact that the differences between the groups were not statistically significant. Nevertheless, the posttest cognitive score was close to the standard significance level

($p = .078$), which indicates the existence of a slight tendency towards participants at the secondary level and might be explored in more significant and more extensive samples. The estimates of the effect size remained small in all dimensions, which suggested that educational level had a weak practical impact on program outcomes.

Table 3: Results of the Effect of Educational Level (44 Intermediate, 56 Secondary).

Dimension	U	Z	r	Sig. (2-tailed)
Cognitive (Pre-test)	1033.00	-1.388	0.139	0.165
Cognitive (Post-test)	981.50	-1.760	0.176	0.078
Skill-based (Pre-test)	1212.00	-0.141	0.014	0.888
Skill-based (Post-test)	1183.50	-0.342	0.034	0.733
Total (Pre-test)	1075.00	-1.096	0.110	0.273
Total (Post-test)	1033.00	-1.388	0.139	0.165

5.3. The Nature of the Relationship Between the Outcomes of Adult Education Programs and the Requirements of Sustainable Development

Table 4: Pearson Correlation Coefficients Between the Axes and the Domains of Sustainable Development.

Axis/Domain	Economic	Social	Environmental	Overall Axis
Cognitive Outcomes (Pearson r)	0.770	-0.008	0.024	
Sig. (2-tailed)	0.000	0.928	0.776	
Skill-Based Outcomes (Pearson r)	-0.153	0.669	0.059	
Sig. (2-tailed)	0.066	0.000	0.482	
Affective Outcomes (Pearson r)	0.050	0.070	0.692	
Sig. (2-tailed)	0.549	0.401	0.000	
Overall, Axis (Pearson r)				0.703
Sig. (2-tailed)				0.000

The Pearson correlation findings in Table 4 indicate that the correlation between domains of the adult education outcome and the dimensions of sustainable development are either positive or negative in strength. Some pairs of outcome dimensions showed a high statistically significant positive relationship. The economic dimension had a strong correlation with cognitive outcomes ($r = .770, p < .01$), the social dimension with skill-based outcomes ($r = .669, p < .01$), and the environmental dimension with affective outcomes ($r = .692, p < .01$). The rest of the pairings, however, did not provide significant or even weak positive correlations, indicating that the outcomes of programs cannot be uniformly transferred to other outcomes of sustainable development and that program impact might vary according to the outcome type.

At the aggregate level, the overall program outcomes axis was found to have a strong and positive correlation with the overall sustainable development requirements axis ($r = .703, p = 0.01$). This means that the adult education results are correlated at higher levels, where the results of sustainable development dimensions are strong among adult learners.

Table 5: Simple Regression Results (ANOVA).

Predictor (X)	Outcome (Y)	B (Slope)	Std. Error	Beta	t	Sig.	95% CI (Lower–Upper)
Adult Education Program Outcomes	Sustainable Development Requirements	0.881	0.074	0.703	11.832	0.000	0.734 – 1.029
Constant		0.340	0.297	–	1.144	0.254	-0.247 – 0.927

The simple regression findings as given in Table 5 explain the degree to which the outcomes of adult education programs (predictor) are helpful in meeting the sustainable development needs (outcome). The model produced a value of R^2 of .494, and this means that the program outcomes explained about 49.4 percent of the variation in the requirement of sustainable development, which is a large percentage of explained variance in a single predictor model.

The regression coefficient shows that the effect is positive and statistically significant. Slope is not standardized ($B = 0.881$, $SE = 0.074$), which indicates that adult education program outcomes increase by one unit; the increase in the requirement of sustainable development is expected to be 0.881 units. The strength of the positive association between these two variables was proven by the standardized coefficient ($b = .703$), and the effect was statistically significant ($t = 11.832$, $p < .001$). The B (0.734 to 1.029) confidence interval does not have a zero, which also confirms the strength of the positive relationship.

5.4. Challenges Facing Adult Education Programs in Achieving Sustainable Development Requirements

Table 6: Means and Standard Deviations for the Challenge Domains.

Domain	Mean	Standard Deviation
Organizational and Administrative Challenges	3.01	1.4219
Financial and Resource Challenges	2.95	1.4172
Academic and Content Challenges	2.97	1.4275
Social and Cultural Challenges	3.09	1.4457
Overall Instrument	3.01	1.4280

As Shown at table (6) The responses of the participants revealed that the issues limiting the adult education programs from fulfilling the sustainable development requirements were of moderate intensity, on the whole. The overall mean score of the instrument amounted to 3.01 ($SD = 1.43$), which indicates that the barriers are perceived as significant but not so serious as to completely prevent the implementation of the program.

All the types of challenges were also within the moderate range across subdomains. The social and cultural challenges were the highest rated ($M = 3.09$, $SD = 1.45$), and then organizational and administrative challenges ($M = 3.01$, $SD = 1.42$). Academic and content-related issues were rated similarly as moderate ($M = 2.97$, $SD = 1.43$), whereas financial and resource issues were rated last, though moderate ($M = 2.95$, $SD = 1.42$). This trend indicates that socio-cultural barriers can be taken as the most salient barriers, and the administrative, curricular, and resource-related barriers have a similar, although a little less significant, impact.

5.5. Proposed Framework for Enhancing Adult Education Programs to Support Sustainable Development Requirements

Based on the results of the study, i.e., the high level of success of the adult education program in enhancing cognitive and skills-based performances of the learner, irrespective of gender and level of education; the high level of correlation between program results and sustainable dimensions of development; and the existence of moderately severe constraints in organizations, academics, socio-culture, and the resource sphere, the need to implement a holistic and all-encompassing development framework is well-

grounded. This framework will not only address the existing constraints but will also rebrand adult education as a future-focused strategic catalyst of national development that is in line with the Saudi Vision 2030. The proposed model is structured on two main axes that are four aspects that are interdependent and that together reinforce governance, quality of instruction, community engagement, and financial sustainability.

Axis 1: Organizational and Administrative Development (Reducing Procedural Rigidity)

- 1. Adopt a flexible management model.** The management of the programs is to change the centralized routines of bureaucracy to decentralized and adaptive administration that is more consistent with the realities of adult learners. Key actions include:
 - **Streamline registration and admission.** Develop a unified digital platform that enables self-registration, flexible scheduling, and learner follow-up, while integrating mechanisms for recognizing prior informal learning where appropriate.
 - **Delegate operational authority.** Increase the autonomy of adult education center leaders in decision-making processes to address the needs of learners effectively, utilize their local resources, and act swiftly on the risk of attendance and retention.
 - **Institutionalize data-driven performance management.** Implement a unified surveillance system with the use of which participation, progression, learning outcomes, and program-level measures are monitored, which will allow making evidence-based decisions and continuously improve the program.

Axis 2: Academic and Content Development (Aligning Learning Outcomes with Sustainable Development)

- 2. Redesign curricula using an integrated sustainability model.** Reform in curriculum must go beyond knowledge, skills, and values as objectives to be achieved and integrate them within applied contexts associated with the priorities of sustainable development. This includes:
 - **Connect cognitive learning to economic empowerment.** Combine the ideas of entrepreneurship, simple financial literacy, and labor-market preparedness in the teaching of literacy and numeracy (e.g., how to read the information related to employment, how to manage household budgets, and how to comprehend simple contractual terms).
 - **Connect skill development to environmental responsibility.** Direct skill-based projects (e.g., handicrafts, home production, agriculture-related activities) toward circular economy principles, recycling practices, and sustainability-oriented behaviors.
- 3. Diversify teaching and assessment approaches.** Substitute rote and lecture-based teaching with active and adult-focused strategies that place value on project-based learning, problem solving, and realistic performance tasks. Education should include practical exercises that mimic the economic, social, and environmental problems in the contexts of the lives of learners.

Axis 3: Community and Cultural Development (Strengthening Participation and Social Legitimacy)

- 4. Implement awareness and cultural change initiatives.** Create the systematic

media and community campaigns, provided on the basis of credible national channels and local role models, to minimize stigma, reposition education among adults, and normalize the practice of lifelong learning as something socially desirable.

5. **Strengthen community partnerships.** Build structured collaborations with key stakeholders to enhance recruitment, relevance, and post-program pathways, including:
 - Partners in the private sector as the means of offering training placements, mentoring, and employment opportunities;
 - Civil society bodies to facilitate outreach, recruiting learners, and community-based support;
 - Local and religious institutions to support positive morals in relation to learning and enhance motivation and perseverance.

Axis 4: Financial Development and Sustainability Assurance (Ensuring Resource Stability and Efficiency)

6. **Diversify funding sources.** Less reliance on government grants; mobilize alternative sources of revenue by mobilizing alternative sources of funds, such as private-sector collaborations by way of corporate social responsibility initiatives, and investigate the creation of a separately managed endowment fund to support the development of adult education.
7. **Optimize resource utilization.** Enhance operational effectiveness through the exploitation of the available infrastructure, multiplication of the strategic utilization of digital resources, creation of periodic spending examinations, and preference of interventions that have provable societal and economic payoff.

This four-axis model is supposed to be a coherent system, not a collection of individual reforms. Its applicability requires a concerted action, which enhances institutional flexibility, relevancy of curriculum, engagement of a learner, and sustainability of funds simultaneously in a manner that empowers adult education programs to produce long-term empowerment effects in line with the priorities of sustainable development both domestically and internationally.

6. Discussion

The findings give consistent information that Saudi adult education programs yielded significant learning outcomes, and post-test scores were higher than the pre-test scores in both cognitive and skill-based areas and both significant Wilcoxon effects. Understood substantively, these gains are indicative that the programs were not merely facilitative of short-term achievement; they added to what can be termed as the basic abilities that can be mobilized in the workplace, family, and within the community environment, which is the pragmatic yardstick at which the adult learning will count in development. This meaning is consistent with broader evidence that adult learning (particularly when it is coupled with post-literacy consolidation and socioeconomic integration) may produce quantifiable enhancement when conducted under quasi-experimental settings (Boukbech & Liouaeddine, 2024). Meanwhile, the scale of the gains must be interpreted in the context of design limitations: a one-group pre-post design cannot dismiss the impact of history, maturation, or testing, meaning that findings support the presence of a significant program-related change, but not cause-and-effect relationships.

The fact that there are no statistically significant differences according to gender and educational level is consequential, too. The fact that program benefits were widely shared and not concentrated on specific subgroups makes the equity argument in support of adult education as an instrument of national development very strong. Policy-wise, even-handed learning fruits bear a particularly beneficial aspect when considering adult education since the elements that influence these activities are usually structural obstacles and not academic potential and the high-quality delivery of these services needs to offset inequitable access to opportunity. The global monitoring work consistently emphasizes that the adult learning systems are likely to overlook people in need the most and that the inclusive design and outreach remain constant implementation concerns (van der Klink, 2023). The recent trend of widely similar returns on subgroups is, in that respect, encouraging and shows that the delivery of the programs, at least in the examined context, is not strategically discriminating against a group.

The correlational findings provide a valuable additional dimension since they demonstrate the fact that various outcome domains have different relationships with sustainable development dimensions. The close relationship between cognitive achievements and the economic aspect is inexplicably based on the facilitating role of literacy and numeracy in achieving employability, financial decision-making at the home, and handling of the institutional demands. But the weak or non-significant relations in other pairings suggest that not every learning outcome is transformed into sustainability-related practices in the same manner as easily. This conversion problem is quite established in systems of adult learning: no matter how much knowledge or discrete skills are improved, it will not necessarily translate into a better livelihood or sustained engagement unless the opportunity structure surrounding it encourages uptake. In other words, competency can be provided through adult education, but it is labor-market signalling, neighborhood routes, and opportunities that will enable the completion of what has been learned, which converts the competency into empowerment.

One such pedagogical trend is the almost significant negative correlation of skill-based results with the economic aspect. Instead of this being a statistical noise, it can be considered a plausible sign of a skills-opportunity mismatch: learners can end up with skills that are socially valuable or personally important, but they are not sufficiently identified, compensated, or linked to income-generating opportunities. This finding is in line with larger occupational mobility studies that point to the fact that the pace of change of occupations elevates the worth of adequately aligned, future-facing skills, whereas misaligned training carries low economic payoff despite the high rates of participation and completion. When the content of adult education programs is characterized by traditional or low-demand skills or where advice mechanisms and placement mechanisms are not sufficiently developed, the economic payoff of the skills may be very low despite effective instructional processes. The results of the regression support the feasibility of the consequences of the adult education in terms of the sustainable development needs, and the outcomes of the program describe a significant share of the variance. However, the size of this association must be viewed with a methodological reservation, as cross-sectional relationships may be overstated due to common-method bias and unrestricted contextual variables. The greater contribution of program outcomes can also be because the sustainable development measures in adult learning settings are often proximal—containing awareness, attitudes, and reported practices—and not distal outcomes like stable employment or change in environmental behaviors that can be quantified. International experience indicates that

adult learning systems generally do not have a system to monitor longer-term outcomes, and it is thus necessary to supplement the use of perceptions with indicators of follow-up and triangulation where possible (Jäggle et al., 2024).

Theoretically consistent with the performance profile is the moderate level of challenges in the administrative, financial, academic, and sociocultural spheres: programs can be instructionally powerful and at the same time experience constraints that restrict the translation into empowerment on the scale. The barriers are sociocultural things, such as stigma, competing commitments, and unequal community support, which may depress participation and persistence, and administrative inflexibility and resource scarcity, which may constrain program adaptability and diminish responsiveness to the needs of adult learners. Notably, these limits can also be combined with the skills/opportunity mismatch: in cases where adult education lacks a local opportunity ecosystem (employers, community partners, accepted credentials, or supported pathways), sustainability-related impact becomes more difficult to maintain. There are also other design implications for learners in later stages of life regarding motivation, identity, and the goal of social participation, which are considered core determinants of sustained engagement and well-being outcomes (Amen, 2024).

The combined results allow making a balanced conclusion: the programs seem to be very effective in enhancing the measured learning outcomes, and the latter are meaningfully related to the requirements of sustainable development, but the learning-to-empowerment pathway is not uniform in the situation of sustainability dimensions and is limited by contextual issues. The policy implication is not just to increase adult education but to upgrade its logic of development: to put more emphasis on labor-market centralization, to enhance the sustained transitions between learning and livelihood, to institutionalize sustainability as practiced, and to revise the administrative practice in order to secure the continuity of adult learners. When adult education gets established as a strategic development driver, this designing must be geared to the demands of economic change and societal inclusion, such that learning gains can turn into functional sustainability and not transient accomplishments (English, 2022).

7. Conclusion

The study concludes that adult education in Saudi Arabia yields high and quantifiable returns in cognitive and skill-based competencies of learners, as the post-test performances are always high and have significant practical implications as compared to pre-test performances. These returns do not vary significantly by gender and education level, which shows that the benefits of the program do not accumulate in a particular subgroup. Meanwhile, the research indicates that the results of adult education are strongly and positively associated with the requirements of sustainable development at the aggregate level, which proves that the higher the program outcomes, the higher the sustainability-related requirements among adult learners.

The results are directly related to the research objectives, as they prove the efficiency of cognitive and skill empowerment, define the correlation between the program results and the economic, social, and environmental aspects of sustainable development, and define the key issues that influence the implementation process. The findings demonstrate different patterns of linkage: cognitive outcomes have the strongest association with the economic dimension, skill-based outcomes have the strongest

association with the social dimension, and affective outcomes have the strongest association with the environmental dimension. This trend implies that empowerment is a multidimensional process where various areas of learning are aligned to various sustainability needs and not transferable to different pillars in a uniform manner.

The research contributes to the body of work by combining three evidence streams—an assessment of learning change, sustainability mapping, and systematic diagnosis of implementation limitations—into a single coherent evaluative rationale. Rather than taking barriers as contextual background information, the study makes them explanatory conditions that go hand in hand with high learning gains and determines the way in which gains relate to the requirements of sustainable development. The suggested framework also intensifies the contribution by transforming the empirical findings into an action-focused, system-based optimization route that aims at addressing procedure malleability, curriculum sustainability, community acceptability, and resource sustainability, hence facilitating quality assurance and evidence-based program optimization in accordance with the development priorities of the Vision.

7.1. Recommendations

Adopt an integrated system of evidence-based monitoring and evaluation of adult education centers through digitalizing the learner registration, attendance, progression, and outcome dashboards to facilitate quick operations decision-making, minimize rigidity in procedures, and enhance responsibility in the provision of empowerment and sustainability-based outcomes. Reengineer curricula on a unified model of sustainability by integrating economic literacy, employability, and entrepreneurship preparedness into literacy/numeracy activities and achieving an environmental responsibility applied project through realistic performance assessments and problem-based learning. Build adult education educator proficiency as a pivotal conversion variable through the creation of ongoing professional growth aimed at adult-responsive pedagogy, assessment proficiency, and digital delivery skill assisted by coaching cycles and infrequent classroom observation correlated to enhancement plans. Develop formalized community partnerships to improve recruitment and legitimacy and post-program transition through signing contracts with employers, civil society, and local institutions to make placements and provide mentoring, outreach, and long-term support to learners to minimize sociocultural barriers. Diversify and stabilize funding by mobilizing the contribution of social responsibility by the private sector and endowment-type fund and optimizing the resource utilization by conducting periodic expenditure reviews, strategic utilization of the existing infrastructure, and scaling interventions with provable returns.

7.2. Study Limitations

Limitations of the study concentrate on three key limitations that define the interpretation of the findings. First, the one-group pretest-posttest design is supportive of a strong improvement associated with the programs but constrained on causal attribution due to the lack of control on such threats as testing effects and maturation. Second, the study is limited to the 2025/2026 academic year and a particular Saudi institutional context, which limits the applicability of the study outcomes to other areas, delivery models, or years. Third, the outcomes that are associated with sustainability are primarily described using patterns of correlation and regression as compared to long-term follow-up of implemented functionings and restrict the inference about the sustained economic, social, and environmental impact beyond the program period under study.

7.3. Study Implications and Future Directions

Study Implications and Future Directions points out that adult education programs are a development-based empowerment process where learning gains are linked in a systematic way to economic, social, and environmental needs and conversion barriers are considered explanatory conditions instead of background context. The results recommend the methods of better instructional design sustainability-built curricula, adult-relevant assessment, and enhanced educator competency, as well as governance reforms to increase flexibility and management based on data. The agenda is extended in future research whereby controlled or comparative designs are tested, a wider range of sampling is achieved across regions and beyond program types, and longitudinal indicators are included that determine whether the learning resources translate into longer-term functions in work practices, participation practices, and sustainability practices.

7.4. Financial Competing Interests

The author declares there is no competing interests or other interests that might be perceived to influence the interpretation of the article.

7.5. Non-financial competing interests

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