

Instructional Materials in Non-Formal TVET and Higher Education Extension Programs: A Literature Review

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ABSTRACT

Higher education institutions are heavily mandated to bridge the gap between academic innovation and grassroots development through structured community-based extension programs. In the landscape of technical-vocational livelihood training such as clothing and garment technology the execution of appropriate instructional materials (IMs) plays a critical role in facilitating technical skill transmission and ensuring socio-economic empowerment. However, traditional training resources are frequently plagued by extreme technical density, outdated mechanical sewing structures, and a lack of local relevance, causing heightened anxiety and lower retention among non-formal adult learners. This study implements a rigorous Systematic Literature Review (SLR) conforming to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement parameters to critically evaluate the core pedagogical configurations, structural design challenges, and evaluative methodologies surrounding instructional resources for community-based vocational sectors. By launching an explicit search protocol across databases including Scopus, Google Scholar, ERIC, and PhilJOL for literature published between 2020 and 2026, a curated matrix of peer-reviewed empirical research, national registries, and academic audits was isolated. To systematically code and extract structural insights from this literature base, a novel four-dimensional analytical framework called the C-CAE Model (Context, Competency, Andragogy, and Experience) is proposed and deployed. The thematic synthesis indicates that sustainable technical mastery relies on a comprehensive architecture: rigorous contextual diagnosis of baseline literacy, outcomes-based competency blocks prioritizing pattern drafting logic, andragogical user-interfaces utilizing icon-guided visual paths to reduce cognitive load, and structured experiential learning loops that encourage self-guided reflection and active drafting execution. Ultimately, this systematic review offers curriculum designers a definitive conceptual and systematic roadmap to build expert-validated, adult-centered training manuals.

Keywords— Adult learning, Community extension, Garment technology, Higher education, Instructional materials, Literature review, Non-formal TVET, Pattern drafting.

INTRODUCTION

In the contemporary educational landscape, there is a pressing global imperative to achieve and promote inclusive, equitable, and quality lifelong learning opportunities. As articulated in Sustainable Development Goal (SDG) No. 4, quality education must extend beyond formal academic structures to embrace non-formal environments (United Nations, 2015). Concurrently, SDG No. 8 highlights the necessity of promoting sustained, inclusive economic growth, full and productive employment, and decent work, particularly through entrepreneurship and localized skill acquisition (United Nations, 2015). To bridge the gap between institutional knowledge and community development, Higher Education Institutions (HEIs) are mandated to extend their educational functions beyond traditional classroom instruction through active engagement in community-based extension programs (Terano, 2023).

Within the domain of technical-vocational training, clothing and garment technology extension activities frequently focus on dressmaking and tailoring skills that contribute directly to local livelihood development (Mendoza et al., 2023). The effective use of appropriate instructional materials (IMs) or teaching and learning materials (TLMs) is a viable strategy for meeting these socioeconomic and educational needs. In both formal and non-formal training settings, instructional materials play a definitive role in facilitating the structured

transmission of technical skills and improving overall learner achievement (Haruna, 2022; Pecson & Sarmiento, 2025).

However, a recurring challenge in community-based technical education is the severe limitation or outright absence of simplified, standardized, and validated training materials appropriate for non-formal adult learners (Ramasamy & Pilz, 2019). Traditional instructional resources tend to be overly dense, highly technical, or designed strictly for formal educational contexts (Boahin & Hofman, 2013). This structural mismatch makes them poorly aligned with the literacy levels, educational backgrounds, and unique cognitive needs of community beneficiaries, such as out-of-school youth, homemakers, and aspiring micro-entrepreneurs (Catada & Atillo, 2023; Setiawati & Shofwan, 2023). Consequently, there exists a pressing need to examine, adapt, and continuously evaluate high-quality instructional resources that bridge this instructional gap while maintaining pedagogical integrity.

While tailoring and dressmaking programs are common fixtures in community livelihood initiatives, their curricula frequently rely on outdated or overly technical materials that focus primarily on mechanical sewing replication (Ramirez & Santos, 2025). In contrast, basic pattern drafting procedures serve as the actual structural backbone of garment construction, equipping learners with independent design capabilities, spatial awareness, and technical adaptability (Anankware et al., 2018). Despite current research recognizing the value of developing outcomes-based and visually driven instructional materials across various academic fields (Romarate et al., 2023), there remains a distinct empirical scarcity regarding synthesized literature that maps out the systematic development, pedagogical framing, and validation criteria of specialized technical manuals tailored explicitly for HEI extension frameworks.

To optimize training delivery and address the distinct needs of non-formal participants, a comprehensive analysis of existing educational models and adult learning frameworks is necessary. Although individual studies have explored elements of the Context, Input, Process, Product (CIPP) Evaluation Model (Stufflebeam & Zhang, 2017), Competency-Based Education and Training (CBET) (Hauuanga, 2023), Andragogical Theory (Knowles, 1980), and Experiential Learning (Kolb, 1984), there is a critical lack of a unified literature review that synthesizes how these frameworks intersect to guide technical material design for underserved community contexts.

To address this empirical and practical gap, the present study offers a systematic literature review examining the core pedagogical underpinnings, design challenges, and evaluative methodologies surrounding instructional materials for community-based vocational programs. By synthesizing diverse foreign and local literatures, this review aims to provide a clear, thematic conceptual roadmap for educators, curriculum designers, and extension practitioners striving to cultivate sustainable community empowerment, local enterprise development, and economic self-reliance.

METHODOLOGY

This study utilizes a structured Systematic Literature Review (SLR) design. The research architecture and operational workflow strictly conform to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement parameters. By employing an explicit, multi-stage search, screening, and selection strategy, this review ensures a replicable analytical workflow that patterns the rigorous structural parameters established in contemporary educational review literature (Pecson & Sarmiento, 2025). Rather than presenting an unstructured descriptive summary, the systematic protocol filters the broader literature base to comprehensively isolate, evaluate, and map contemporary empirical insights regarding the development and application of instructional materials within non-formal technical-vocational and higher education community extension contexts.

Information Sources and Search Strategy

A comprehensive electronic search protocol was executed across major internationally and domestically indexed academic databases to harvest relevant empirical data. The investigated networks included Scopus, Google Scholar, the Education Resources Information Center (ERIC), and the Philippine Journals Online (PhilJOL)

portal. To secure an exhaustive collection of primary research, the search strings were constructed using combinations of Boolean operators, wildcards, and specialized keywords targeting titles, abstracts, and index terms.

Specifically, the first exact search structure deployed across the database interfaces paired general institutional outreach with material development by querying the intersection of "higher education extension" or "university community engagement" and "instructional materials" or "modules" or "training manuals". To target localized technical trades, the second search query combined non-traditional training pipelines with explicit apparel parameters, tracing the relationship between "non-formal TVET" or "livelihood training" or "alternative learning" and "garment technology" or "apparel design" or "pattern drafting manual". Finally, to isolate mature educational dynamics and behavioral performance outcomes, the third operational search block evaluated the intersection of "adult learning" or "andragogy" and "skill acquisition" or "technical competency".

LITERATURE SELECTION: INCLUSION AND EXCLUSION CRITERIA

To filter the retrieved documents with high precision and eliminate arbitrary selection bias, an explicit matrix of eligibility boundaries was established prior to the data collection phase. To be included in the final qualitative synthesis pool, documents had to meet four strict parameter thresholds:

- 1. Temporal and Language Parameters:** Studies must be published in the English language within peer-reviewed journals, national development report registries, or authorized institutional repositories between 2020 and 2026 to capture post-pandemic instructional shifts and modernized community qualification standards.
- 2. Contextual Parameter:** Materials must directly focus on non-formal TVET frameworks, adult education tracks, alternative technical learning pathways, or university-led higher education community extension programs.
- 3. Core Operational Parameter:** Research must explicitly address the design, structural evaluation, field validation, or deployment of technical-vocational curricula or tangible instructional media (e.g., modular text packages, localized kits, illustrated guides).
- 4. Target Demographic Parameter:** The empirical sample must focus heavily on adult learners, non-traditional students, marginalized community blocks, or grassroots livelihood trainees rather than traditional primary or formal secondary schooling tracks.

Conversely, papers were systematically excluded if they focused exclusively on highly automated, capital-intensive industrial manufacturing configurations or purely theoretical fashion history. These exclusion boundaries ensured that the final curated literature base remained highly applicable to localized grassroots community empowerment and manual skill transfer.

Screening, Selection, and PRISMA Flow Protocol

The systematic screening process was operationalized across four sequential phases in strict compliance with the PRISMA framework: identification, screening, eligibility assessment, and inclusion.

During the Identification Phase, all citations generated by the electronic search strings were exported into reference management software, where automated algorithms and manual cross-checks located and eliminated duplicate records.

During the Screening Phase, the titles and abstracts of the remaining unique records were independently audited against the inclusion and exclusion criteria by the researchers. Irrelevant papers, opinion pieces, editorial notes, and unverified abstracts were culled at this stage.

During the Eligibility Phase, the full-text manuscripts of all remaining potentially eligible studies were retrieved and subjected to deep diagnostic analysis. Any discrepancies regarding study eligibility between the primary reviewers were resolved through collaborative consensus or arbitration by an external academic panel.

As graphically mapped out in the PRISMA flow architecture, the quantitative reduction of records was carefully documented from the initial bulk identification down to the final selection of peer-reviewed articles, institutional policy papers, and empirical studies that met the absolute qualitative thresholds of this review.

The Analytical Framework: The C-CAE Model

To systematically process, categorize, and synthesize the selected literature, this study proposes and applies the **C-CAE Model** (Context, Competency, Andragogy, and Experience). Patterned after the operational approach of the PRIME model utilized by Pecson and Sarmiento (2025), the C-CAE matrix serves as a multi-dimensional thematic lens to extract meaningful structural insights from the literature base:

- C – Context Diagnoses:** Reviewing literature that examines how instructional materials identify, adapt to, and address the baseline socio-economic deficits, localized literacy levels, and technical anxieties of community blocks.
- C – Competency Orientation:** Evaluating studies that detail the structuring of complex workflows into observable, measurable occupational outputs rather than traditional, rote theoretical recall.
- A – Andragogical Adaptation:** Analyzing documentation regarding the minimization of cognitive load and technical density by introducing simplified verbal paths, intuitive layout strategies, and highly visual instruction suitable for self-directed adult learners.
- E – Experiential Cycles:** Investigating empirical research on embedding reflective, hands-on, and iterative practice loops into instructional text to secure long-term skill retention and technical independence.

By filtering the gathered literature through these four systematic filters, the review moves away from an unstructured descriptive summary, instead building a cohesive, academically rigorous narrative regarding the definitive characteristics of effective community training resources.

RESULTS AND DISCUSSION

Study Selection and Characteristics

Following the execution of the PRISMA systematic filtration protocol, a final pool of 25 primary empirical studies, peer-reviewed journals, national development registries, and institutional academic audits published between 2020 and 2026 were isolated for definitive thematic synthesis. The selected literature represents a global and localized cross-section of non-formal technical vocational education and training (TVET) and higher education institution (HEI) community extension initiatives. To ensure an organized transition to thematic analysis, the included studies were mapped across the structural domains of the C-CAE Model (Context, Competency, Andragogy, and Experience), as summarized in Table 2.

Table 2. Methodological Matrix of Included Literature Categorized by C-CAE Core Vectors

| C-CAE Domain | Structural Pedagogy Focus | Key Sample Citations (2020–2026) |
|-----------------------------------|--|---|
| Context Diagnoses (C) | Responsive curriculum frameworks, localized infrastructure deficits, and Training Needs Assessments (TNA). | Alakpa (2022); Catada & Atillo (2023); DEPDev (2024); Lero (2020); Ramirez & Santos (2025); Terano (2023) |
| Competency Orientation (C) | Outcomes-Based Education (OBE), performance-gate | Catherine et al. (2025); Hauuanga (2023); Lee et al. (2023) |

| | | |
|------------------------------------|---|---|
| | metrics, pattern drafting logic vs. mechanical replication. | |
| Andragogical Adaptation (A) | Cognitive load mitigation, icon-guided layout strategies, removal of academic jargon, mathematical anxiety reduction. | Elbedewy et al. (2024); Lim et al. (2023); Mendoza et al. (2023); Phyo (2025); Setiawati & Shofwan (2023) |
| Experiential Cycles (E) | Kolb’s learning loops, iterative psychomotor practice, measurement-to-fabric correction logs. | Cabral (2023); Garcia & Reyes (2023); Lightsey (2025); Prosper (2025); Santos (2024); Valle-Noronha et al. (2023) |

THEMATIC SYNTHESIS

Theme 1: Structural Realities and Institutional Mandates in Extension TVET (C – Context)

The literature reveals that the success of community-focused vocational education is directly dependent on its responsiveness to environmental realities. Studies categorized under the Context filter emphasize that Technical and Vocational Education and Training (TVET) deployed through university extension programs cannot rely on top-down, supply-driven curriculum frameworks (Alakpa, 2022). Higher Education Institutions (HEIs) often execute short-term training activities without establishing standardized instructional infrastructure, which frequently results in a lack of project sustainability (Lero, 2020; Terano, 2023).

Furthermore, local policy reports document a persistent structural mismatch: traditional, school-based vocational guides are frequently utilized in rural communities despite being overly academic, language-dense, and highly theoretical (DEPDev, 2024; Ramirez & Santos, 2025). When instructional materials ignore the baseline literacy levels, localized economic constraints, and scheduling realities of non-formal community blocks specifically out-of-school youth, homemakers, and micro-entrepreneurs retention rates decline sharply (Catada & Atillo, 2023). Thus, the literature establishes that rigorous contextual diagnosis, such as a Training Needs Assessment (TNA), must serve as the mandatory foundation for any vocational material development to align strictly with the socioeconomic equity targets of SDGs 4 and 8 (Ramamamy & Pilz, 2019; United Nations, 2015).

Theme 2: Transitioning from Theory to Product-Driven Competency Blocks (C – Competency)

A major consensus in contemporary apparel and vocational education research is that technical skill acquisition must completely bypass passive theoretical assessments in favor of reproducible occupational outputs. Under the Competency dimension of the model, literature demonstrates that Competency-Based Education and Training (CBET) frameworks are uniquely suited for informal, community-driven training settings because they replace time-bound learning tracks with performance-based milestones (Boahin & Hofman, 2013; Hauanga, 2023).

In the specific field of clothing technology, the literature highlights a critical distinction between mechanical sewing replication and foundational pattern drafting. While basic sewing modules simply train individuals to copy pre-cut shapes, pattern drafting equips learners with high-level design independence, geometric logic, and localized customization capabilities (Anankware et al., 2018). Studies show that instructional manuals structured around explicit competency blocks—featuring highly clear step-by-step performance checklists and output metrics—increase independent technical mastery and boost graduate employability rates by up to 40% (Catherine et al., 2025; Lee et al., 2023). By decomposing intricate drafting calculations into objective, measurable performance gates, instructional materials give non-formal learners a visible pathway to independent livelihood creation.

Theme 3: Mitigating Learning Anxiety through Andragogical Layouts (A – Andragogy)

Because extension program beneficiaries are typically adult learners operating outside formal scholastic systems, the literature underscores that the interface, language, and graphic layout of training resources require specialized

adaptation. Research filtered through the Andragogy parameter reveals that adult learners experience severe cognitive load and heightened anxiety when faced with dense, text-heavy training modules (Setiawati & Shofwan, 2023). This anxiety is particularly pronounced in pattern drafting, which naturally requires mathematical divisions, fractional scaling, and precise anthropometric translations (Mendoza et al., 2023).

To counteract this learning friction, Knowles' (1980) andragogical principles dictate that instructional media must completely abandon abstract academic jargon. Empirical data from international workshop settings indicate that replacing text-dense paragraphs with highly simplified verbal directions, intuitive icon-based navigation, and localized illustrations dramatically enhances comprehension, minimizes programmatic dropouts, and accommodates non-traditional learning styles (Elbedewy et al., 2024; Molema, 2022). Furthermore, local studies confirm that anchoring drafting formulas to regional body types and culturally familiar aesthetics significantly enhances user acceptability, transforming an intimidating technical manual into an approachable, self-paced livelihood tool (Lim et al., 2023; Phyo, 2025).

Theme 4: The Iterative Learning Cycle and Technical Retention (E – Experience)

The final thematic dimension extracted from the literature base emphasizes that deep, sustainable technical competence is forged through a continuous loop of physical execution and self-critique. Applying Kolb's (1984) Experiential Learning lens to vocational disciplines, researchers argue that skill transfer remains temporary unless the learner moves sequentially through concrete experience, reflective observation, abstract conceptualization, and active experimentation (Lightsey, 2025). In apparel drafting contexts, empirical studies validate the immense power of this cycle. For instance, non-formal training programs that structured their lessons around an iterative cycle of physical measurement-taking, draft creation, immediate fitting analysis, and pattern correction reported a remarkable 87% independent mastery rate among adult learners within just a few sessions (Valle-Noronha et al., 2023). The literature confirms that effective manuals must not read like passive textbooks; instead, they must function as active operational logs that guide the user to physically manipulate tools, immediately identify structural fitting errors, conceptualize the underlying geometry, and confidently adjust their patterns (Garcia & Reyes, 2023; Prosper, 2025). This structured, hands-on reflection builds the technical self-reliance necessary for long-term entrepreneurial sustainability (Cabral, 2023; Santos, 2024).

CONCLUSIONS

This systematic literature review underscores that the pedagogical quality, structural configuration, and contextual alignment of instructional materials are primary drivers of success in community-based technical education. By filtering international and local research through the customized **C-CAE Model (Context, Competency, Andragogy, and Experience)**, this study demonstrates that traditional, dense, and school-based training resources consistently fail non-formal adult learners because they ignore localized literacy realities, trigger mathematical learning anxiety, and focus on passive theoretical delivery.

To achieve the transformative social changes envisioned under SDGs 4 and 8, higher education extension frameworks must prioritize the development of specialized, expert-validated instructional manuals. Effective training tools must combine the explicit performance-based milestones of CBET with the user-friendly, visually driven, and non-intimidating layouts demanded by Andragogical Theory. Furthermore, by structuring instructional units around Kolb's iterative experiential cycle and anchoring geometric formulas to localized physiques, educators can demystify complex technical tasks like basic pattern drafting. Ultimately, this review provides a definitive conceptual framework for extension practitioners, proving that the systematic development of localized, simplified, and validated instructional resources is a vital strategy for bridging the educational divide and fostering permanent socio-economic self-reliance within underserved communities.

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