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Design and Validation of Supplementary Learning Materials in Clothing Construction Course

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ABSTRACT

This study designed and validated supplementary learning materials for the Clothing Construction course and assessed the skills and learning challenges of fourth-year Bachelor of Technology and Livelihood Education major in Home Economics (BTLED-HE) students at Polangui Community College during Academic Year 2024–2025. A descriptive-developmental research design was employed. Through total enumeration, 78 students from two sections participated, while five clothing-construction experts composed of a TESDA trainer and TLE teachers with National Certificate II and/or Trainers Methodology Certificate I evaluated the developed material. Data were gathered using a researcher-developed questionnaire and an expert validation tool. The instruments underwent review, dry-run administration, and reliability testing through Cronbach's alpha. Weighted mean and a five-point Likert scale were used for analysis. The respondents were highly proficient in drafting and cutting patterns (M = 4.22), preparing and cutting materials (M = 4.44), sewing casual apparel (M = 4.27), and applying finishing touches (M = 4.30), with an overall mean of 4.31. Nevertheless, comparatively lower ratings were recorded for pattern manipulation, simple calculations, alteration of completed garments, and analysis of quality deviations. The principal challenges were lack of practical experience (M = 3.79), insufficient learning resources (M = 3.76), time constraints (M = 3.73), and limited exposure to industry standards (M = 3.71). In response, supplementary materials were developed around the four TESDA-aligned competencies. Expert validation produced an overall mean of 4.94, interpreted as strongly agree, across objectives, content, format and language, presentation, and usefulness. The study concludes that the material is curricularly valid and suitable as a self-directed, competency-based resource for strengthening clothing-construction proficiency. Its adoption, classroom implementation, and subsequent effectiveness evaluation are recommended.

Keywords: *clothing construction, competency-based learning, supplementary learning materials, skills acquisition, curricular validation, BTLED-Home Economics*

INTRODUCTION

Clothing construction is a technical and creative process that involves taking body measurements, drafting and manipulating patterns, preparing and cutting fabrics, operating sewing equipment, assembling garment parts, and applying finishing and quality-control procedures. Because these competencies combine conceptual understanding with precise psychomotor performance, students require repeated practice, clear demonstrations, appropriately sequenced activities, and feedback. Supplementary learning materials can reinforce classroom instruction by providing additional explanations, worksheets, illustrations, self-checks, video-supported tasks, and performance activities that learners may revisit at their own pace.

Within the Bachelor of Technology and Livelihood Education (BTLED) program, Clothing Construction prepares Home Economics majors to teach Technology and Livelihood Education and to perform industry-

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relevant garment-production tasks. The Commission on Higher Education requires BTLED major courses to reflect relevant technical-vocational standards (Commission on Higher Education [CHED], 2017). Dressmaking and Tailoring National Certificate II training regulations provide closely related competencies, including measurements and calculations, machine operation and maintenance, quality standards, pattern drafting and cutting, material preparation, sewing, and finishing (Department of Education [DepEd], 2020; Technical Education and Skills Development Authority [TESDA], n.d.). DepEd likewise encourages partnerships with TESDA and industry and emphasizes adequate trainers, equipment, facilities, and learning resources in Technical-Vocational-Livelihood offerings (DepEd, 2023).

Despite these standards, students may attain general proficiency while continuing to experience difficulty in complex and less frequently practiced procedures. Studies in vocational and garment education have identified inadequate practical exposure, obsolete or insufficient resources, weak alignment with current industry practice, limited instructor feedback, and time restrictions as recurrent barriers to skills acquisition (Higgins, 2020; Javed & Ali, 2022; Jones & McDonald, 2020; Reyes & Javier, 2021). These concerns are consequential for prospective TLE teachers because partial mastery may affect both their own workplace readiness and their future ability to teach technical competencies effectively.

Competency-based materials are particularly relevant in this context because they organize instruction around observable performance standards and enable learners to demonstrate mastery before moving to more advanced tasks. Ventayen (2019) emphasized the value of TESDA-aligned materials in pattern drafting and cutting, while the University of the Philippines Open University (2022) demonstrated how self-paced modules can support measuring, pattern development, alteration, and sewing through contextualized examples and activities. International training resources similarly combine technical principles with hands-on assessment to develop precision, efficiency, and craftsmanship (Fashion Institute of Technology, 2021; Textile and Fashion Industry Training Centre, 2024).

At Polangui Community College, the researcher observed that available Clothing Construction resources did not provide sufficient enhancement activities, practical exercises, and assessments explicitly organized around the relevant TESDA competencies. Although previous studies have examined vocational skills, modular instruction, or learning-material validation, limited research has completed the entire cycle of identifying the skill profile and challenges of BTLED-HE students, developing supplementary materials from those findings, and subjecting the output to curricular validation within the same institutional context.

Accordingly, this study assessed the clothing-construction proficiency of fourth-year BTLED-HE students in drafting and cutting patterns, preparing and cutting materials, sewing casual apparel, and applying finishing touches. It also identified the challenges encountered during skills acquisition, designed supplementary learning materials based on the results, and determined the curricular validity of the developed resource. The findings were intended to support students, TLE instructors, school administrators, and curriculum planners in providing more systematic, industry-aligned, and learner-responsive instruction.

Literature Review

Competency Standards and Clothing Construction Skills

Competency-based vocational education defines learning through measurable knowledge and performance outcomes. In clothing construction, the progression from fundamental to complex procedures requires students to demonstrate competence in measurement, calculation, pattern development, fabric preparation, sewing-machine operation, garment assembly, finishing, and quality evaluation. TESDA-aligned resources therefore provide an occupational framework that links classroom tasks to workplace expectations (DepEd, 2020; TESDA, n.d.; Ventayen, 2019).

The BTLED curriculum further situates these technical competencies within teacher preparation. CHED (2017) requires Home Economics major courses to develop both disciplinary knowledge and pedagogical capacity, while DepEd (2023) underscores the importance of industry-responsive TVL offerings. Alinea et al. (2024) observed that learners may exhibit sound work habits and communication skills while remaining less

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prepared in technical and technology-related competencies, indicating that employability preparation requires sustained practice and updated learning resources.

Garment-construction training benefits from the integration of technical accuracy and aesthetic judgment. The Fashion Institute of Technology (2021) emphasizes precision, fitting, efficiency, and craftsmanship through combined theory and practical exercises. Similarly, the Textile and Fashion Industry Training Centre (2024) organizes pattern drafting and sewing around body measurement, block development, design modification, and performance-based assessment. These approaches support the use of clearly sequenced, competency-referenced materials in Clothing Construction.

Experiential, Self-Regulated, and Mastery-Based Learning

The theoretical foundation of the study combined experiential, self-regulated, and mastery-based learning. Experiential learning views knowledge as developing through concrete experience, reflection, conceptualization, and active experimentation. Applied to clothing construction, students learn by measuring, drafting, cutting, sewing, examining completed outputs, and adjusting procedures on the basis of observed results. Saragih et al. (2025) reported that experiential learning strengthens active participation and critical thinking, which are essential in performance-oriented courses.

Self-regulated learning explains how students plan, monitor, and evaluate their own progress. Layco (2020) described the forethought, performance, and self-reflection phases as mechanisms through which learners set goals, apply strategies, observe their performance, and correct weaknesses. Supplementary materials can support these processes through step-by-step instructions, progress checks, reflection questions, video demonstrations, and self-assessment tasks, thereby extending skills practice beyond scheduled class meetings.

Mastery learning requires learners to attain an acceptable level of competence before proceeding to more advanced tasks. McGaghie et al. (2023) emphasized deliberate practice, feedback, and repeated performance as central to mastery. In clothing construction, foundational skills such as machine handling, basic stitching, measurements, and block-pattern drafting should be consolidated before learners undertake pattern manipulation, alteration, and complex finishing. Together, these theories informed the study's Adaptive Mastery Skills Enhancement perspective, which promotes hands-on experience, self-paced progress, competency-based sequencing, personalized feedback, and technology-supported learning.

Challenges in Vocational Skill Acquisition

Vocational learners commonly encounter structural and instructional barriers that limit the transfer of theoretical knowledge into practice. Higgins (2020) identified restricted access to qualified instructors, crowded environments, and limited exposure to authentic settings as constraints on technical learning. Jones and McDonald (2020) similarly emphasized insufficient hands-on opportunities, inadequate instructor expertise, and weak alignment between training content and current industry practice.

Research focused on garment and textile programs further indicates that students struggle when instruction overemphasizes theory, provides limited practice, or uses outdated resources. Javed and Ali (2022) found that technical learners had difficulty converting conceptual knowledge into practical performance, while Kusi and Mensah (2022) reported problems in pattern interpretation, dart manipulation, independent work, and confidence when feedback and visual support were inadequate. Reyes and Javier (2021) associated limited sewing equipment, materials, technology integration, and personalized guidance with reduced opportunities for accurate pattern making, cutting, and sewing.

Time and feedback also influence proficiency. Sumsion and Goodwin (2020) noted that inadequate hands-on activities, limited expert feedback, and weak industry alignment prevent learners from reaching desired levels of technical competence. Lee and Kim (2023) showed that blended and self-paced arrangements can mitigate limited instructional time by allowing students to revisit procedures and monitor progress. These findings justify supplementary materials that provide structured practice, accessible explanations, and repeated opportunities for application.

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Supplementary Learning Materials for Clothing Construction

Supplementary learning materials complement rather than replace the formal curriculum. Anderson (2020) recommended interactive elements, visual aids, step-by-step procedures, real-life tasks, and industry alignment in vocational resources. Gagné and Briggs (2019) likewise stressed the importance of clearly specified outcomes, systematic sequencing, guided practice, feedback, and formative and summative assessment. Such elements are especially important in clothing construction, where procedural accuracy depends on the learner's ability to observe and reproduce a sequence of operations.

Contextualized and flexible resources can increase learner access and independence. The University of the Philippines Open University (2022) developed self-paced content on measurement, basic patterns, alteration, illustrations, examples, and activities, while Ventayen (2019) organized pattern drafting and cutting around TESDA Dressmaking NC II competencies. Digital and blended supports may further enhance engagement by allowing students to replay demonstrations and receive immediate guidance (Lee & Kim, 2023).

Assessment must remain closely connected to authentic performance. Yusop et al. (2022) found that competency-based assessment in technical and vocational education frequently uses demonstrations and performance tasks to determine whether learning outcomes have been achieved. For Clothing Construction, worksheets and knowledge checks are useful only when paired with practical tasks that require students to draft, cut, assemble, alter, finish, and evaluate garments according to established standards.

Development and Curricular Validation of Learning Materials

Instructional-material development should begin with evidence of learner needs and continue through expert review and revision. Roberts and Martin (2022) described a cycle involving needs analysis, initial design, pilot implementation, feedback collection, revision, and revalidation. Co et al. (2021) likewise demonstrated the value of expert validation in determining whether supplementary materials are aligned, understandable, organized, and useful for learners.

Curricular validation considers whether objectives are clear and attainable, content is accurate and logically sequenced, language and format are comprehensible, presentation supports engagement, and activities are useful for achieving the intended competencies. Alexander and Thompson (2021) linked validated materials with clearer instructions and improved practical performance in Home Economics, while Stiggins (2020) emphasized the alignment of learning outcomes, assessment, and instructional resources.

Feedback is central to continuous improvement. Williams and Daniels (2019) argued that teacher and learner feedback helps refine clarity, usability, relevance, pacing, and curricular alignment. Davis and Hill (2023) similarly viewed validation as an iterative process that uses performance evidence and curriculum standards to keep vocational materials responsive to changing competency requirements. Accordingly, the present study evaluated the developed resource across objectives, content, format and language, presentation, and usefulness.

Synthesis and Research Gap

The literature consistently supports competency-based, experiential, self-regulated, and mastery-oriented approaches to vocational learning. It also shows that clothing-construction proficiency depends on sufficient hands-on practice, relevant resources, expert feedback, time, and exposure to industry standards. Supplementary materials can address several of these conditions by organizing content into manageable competencies and providing repeated practice, self-assessment, and flexible access.

However, prior studies have generally concentrated on broad employability, isolated garment competencies, implementation of existing modules, or validation without an institution-specific needs assessment. Limited evidence has examined fourth-year BTLED-HE students' proficiency and challenges and then used the resulting data to design and validate a complete Clothing Construction supplementary resource. The present study addressed this gap through a descriptive-developmental process at Polangui Community College.

The conceptual framework used an input-process-output system with feedback. Inputs comprised students' proficiency in the four clothing-construction competency areas and the challenges encountered. The process included questionnaire preparation and validation, data gathering and statistical analysis, material

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development, and expert review. The output was the validated Clothing Construction Supplementary Learning Material, while the feedback loop represented continuing revision based on evidence and evaluation.

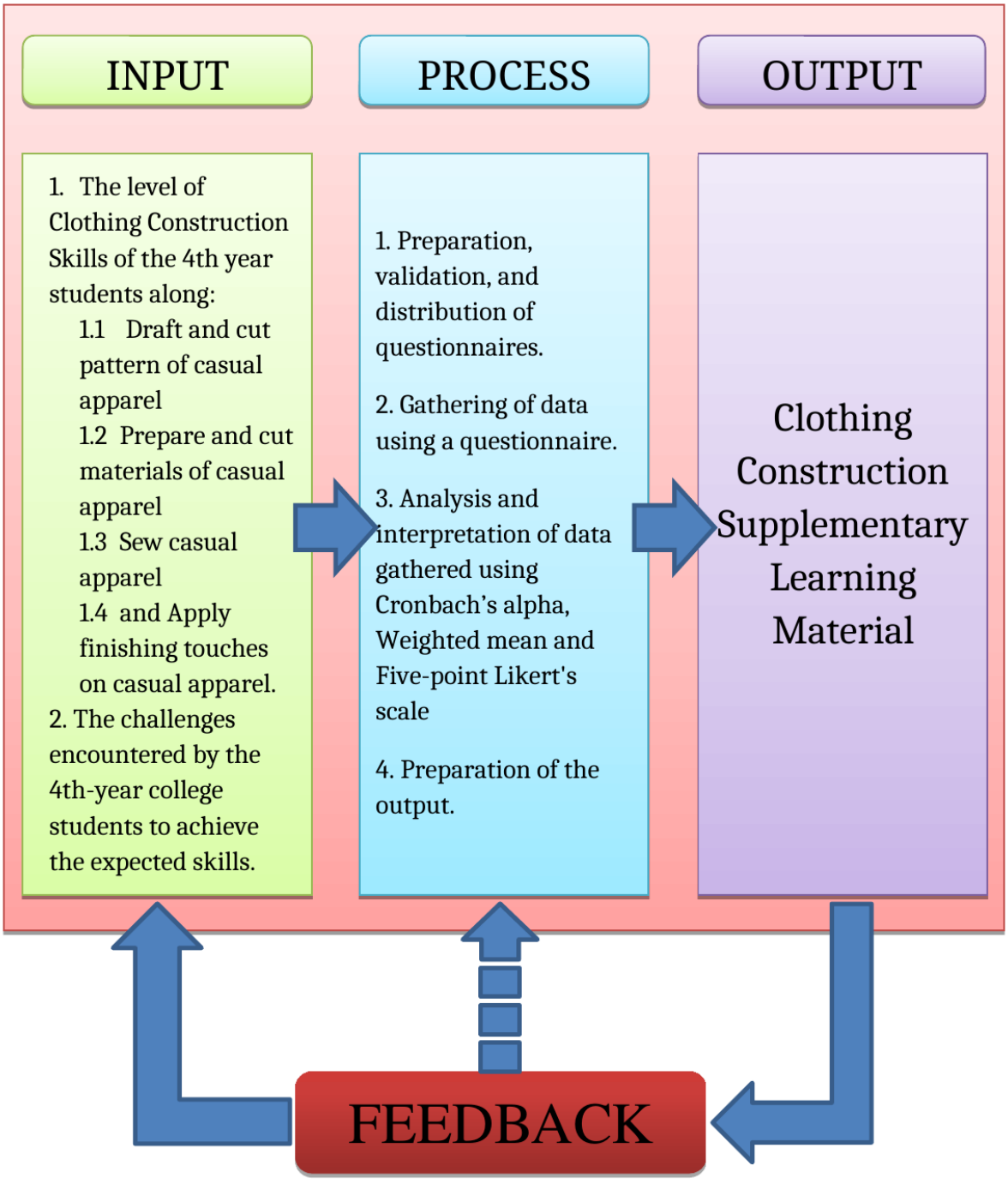

Figure 1. *Conceptual Framework of the Study*

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METHODS

Research Design

The study employed a descriptive-developmental research design. The descriptive component established the existing clothing-construction proficiency and challenges of the respondents, while the developmental component used the findings to design and validate supplementary learning materials. No variables were manipulated. The design was appropriate because it generated an empirical profile of learner needs and translated that profile into an instructional product.

Research Locale

The study was conducted at Polangui Community College in Polangui, Albay, during Academic Year 2024–2025. The locale offers the Bachelor of Technology and Livelihood Education major in Home Economics, in which Clothing Construction is included as a major course.

Participants and Sampling Technique

The student respondents comprised all 78 fourth-year BTLED-HE students officially enrolled in two sections: 38 from BTLED 4A and 40 from BTLED 4B. Total enumeration was used to include the entire target cohort, and all 78 students returned the questionnaire, producing a 100% response rate. Five experts validated the developed material. The validators consisted of a TESDA trainer and TLE teachers who held National Certificate II and/or Trainers Methodology Certificate I credentials in relevant clothing-construction areas.

Research Instrument

The primary instrument was a researcher-developed survey questionnaire prepared with reference to TESDA Training Regulations and the competency-based curriculum for apparel-making programs. The instrument assessed proficiency in four domains: drafting and cutting patterns for casual apparel, preparing and cutting materials, sewing casual apparel, and applying finishing touches. A second part measured challenges encountered in attaining the expected skills. Responses were recorded through a five-point Likert scale.

The draft was critiqued by the research adviser, the Dean of the Graduate School and Research, and panel members for content relevance, language, consistency, and administration time. It was then dry-run with BTLED graduates of Polangui Community College and subjected to reliability testing using Cronbach's alpha. A separate expert-validation tool was adapted and refined to assess the supplementary material in terms of objectives, content, format and language, presentation, and usefulness.

Data Gathering Procedure

After securing formal permission from the College Dean, the researcher distributed the student questionnaire through Google Forms. The researcher monitored completion, retrieved all 78 responses, and conducted informal interviews to enrich the interpretation of the quantitative results. The responses were organized, tabulated, and prepared for analysis. The developed supplementary material and validation tool were subsequently provided to the five experts and retrieved after evaluation.

Development and Validation Procedure

The results of the proficiency and challenge assessments guided the preparation of the Clothing Construction Supplementary Learning Material. The material was organized around the four core competencies and included sequenced explanations, illustrations, practical and enhancement activities, self-checks, assessment tasks, and support for independent learning. Expert ratings and comments were then used to determine curricular validity and identify aspects requiring refinement.

Data Analysis

Cronbach's alpha was used to examine the internal consistency of the questionnaire during the dry run. Weighted means were computed for each indicator and domain. For proficiency, means from 4.20 to 5.00 were interpreted as highly proficient and 3.40 to 4.19 as proficient. For challenges, means from 3.40 to 4.19 were interpreted as much a challenge. For validation, means from 4.20 to 5.00 were interpreted as strongly agree.

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Rankings were used to identify the strongest skills, most prominent challenges, and highest-rated validation dimensions.

Ethical Consideration

The researcher obtained institutional permission before data collection and informed respondents of the purpose of the survey. The questionnaire assured respondents that their answers would be treated confidentially. Names and email addresses were excluded from the analysis file to protect privacy, and the gathered information was used only for the study and development of the instructional material.

RESULTS AND DISCUSSION

Clothing Construction Skills of BTLED-HE Students

Table 1. *Summary of the Level of Clothing Construction Skills*

Competency Area	WM	Verbal Interpretation	Rank
Draft and cut pattern for casual apparel	4.22	Highly Proficient	4
Prepare and cut materials for casual apparel	4.44	Highly Proficient	1
Sew casual apparel	4.27	Highly Proficient	3
Apply finishing touches on casual apparel	4.30	Highly Proficient	2
Overall	4.31	Highly Proficient	—

Legend: 4.20–5.00 = Highly Proficient; 3.40–4.19 = Proficient.

Table 1 shows that the fourth-year BTLED-HE students were highly proficient in all four major competency areas, with an overall weighted mean of 4.31. Preparing and cutting materials received the highest mean (4.44), followed by applying finishing touches (4.30), sewing casual apparel (4.27), and drafting and cutting patterns (4.22). The pattern indicates that students were most confident in material preparation and cutting, procedures that are highly visible, frequently practiced, and supported by direct demonstrations.

The domain means nevertheless conceal specific procedures that remained only at the proficient level. In drafting and cutting, performing simple calculations obtained 4.13 and pattern manipulation obtained 3.83. In sewing, altering a completed garment obtained 4.12, while studying the causes of quality deviations under finishing obtained 4.13. These tasks require diagnosis, adaptation, computation, and corrective judgment rather than straightforward reproduction of routine procedures. The findings are consistent with Kusi and Mensah (2022), who associated pattern interpretation and manipulation difficulties with limited feedback and inadequate visual support, and with Reyes and Javier (2021), who emphasized the resource and guidance demands of accurate pattern and sewing work.

The generally high proficiency suggests that the existing course enabled students to acquire the fundamental performance outcomes prescribed by TESDA-aligned instruction. However, competency-based education requires mastery across both routine and higher-order procedures. Ventayen (2019) and Yusop et al. (2022) emphasized measurable performance and authentic demonstration before progression. Supplementary instruction should therefore focus not only on repeating strengths but also on providing targeted exercises in calculations, pattern adaptation, garment alteration, and quality analysis.

Challenges Encountered in Skills Acquisition

Table 2. *Challenges Encountered by Students in Achieving the Expected Skills*

Challenge	WM	Verbal Interpretation	Rank
Lack of practical experience	3.79	Much a Challenge	1
Insufficient learning resources	3.76	Much a Challenge	2
Time constraints for skill acquisition	3.73	Much a Challenge	3
Limited exposure to industry standards	3.71	Much a Challenge	4
Difficulty in understanding technical concepts	3.58	Much a Challenge	5
Inadequate guidance and feedback	3.55	Much a Challenge	6
Lack of self-confidence	3.53	Much a Challenge	7

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Overall	3.66	Much a Challenge	—

Legend: 3.40–4.19 = Much a Challenge.

All seven indicators were perceived as much a challenge, with an overall mean of 3.66. Lack of practical experience ranked first (3.79), followed by insufficient learning resources (3.76), time constraints (3.73), and limited exposure to industry standards (3.71). These results indicate that students' remaining skill gaps were not principally caused by lack of interest, but by restricted opportunities to practice, access appropriate resources, work within sufficient time, and observe authentic industry procedures.

The pattern reflects recurring concerns in vocational education. Higgins (2020) found that restricted access to authentic learning environments and expert instruction limits technical development. Javed and Ali (2022) likewise reported that learners struggle to convert theoretical knowledge into practical performance when programs provide insufficient hands-on application. Jones and McDonald (2020) and Sumsion and Goodwin (2020) further stressed that industry alignment, practice, and expert feedback are necessary for technical mastery.

The comparatively lower-ranked challenges—difficulty understanding technical concepts, inadequate guidance and feedback, and lack of self-confidence—remain educationally important because they interact with practice conditions. Students who cannot repeatedly observe and perform procedures may become uncertain about calculations, pattern manipulation, alteration, or quality assessment. A structured self-paced resource can partially address these barriers by extending practice beyond class time, presenting procedures in manageable steps, and allowing learners to review examples before attempting performance tasks (Layco, 2020; Lee & Kim, 2023).

Developed Clothing Construction Supplementary Learning Material

The study used the identified strengths, lower-rated procedures, and reported challenges to develop a supplementary resource organized into four competency areas: drafting and cutting patterns for casual apparel, preparing and cutting materials, sewing casual apparel, and applying finishing touches. The material followed a progression from fundamental operations to more complex applications and incorporated objectives, explanations, illustrations, guided tasks, practice activities, self-checks, and performance-oriented assessments.

The design directly reflected the study's theoretical foundations. Hands-on activities supported concrete experience and active experimentation; reflection and self-checks encouraged learners to monitor their progress; and sequenced tasks promoted mastery before advancement. This structure is consistent with Saragih et al. (2025), Layco (2020), and McGaghie et al. (2023). It also responds to Gagné and Briggs's (2019) emphasis on defined outcomes, systematic instruction, guided practice, and feedback.

By aligning the content with TESDA-related competencies, the material connected the BTLED course with industry-relevant expectations. It was intended as a supplementary rather than replacement resource, enabling teachers to reinforce difficult competencies and allowing students to use available time more efficiently. Its self-directed format also addressed the challenges of insufficient classroom time and varied rates of learning.

Curricular Validation of the Supplementary Learning Material

Table 3. *Summary of Curricular Validation Results*

Validation Dimension	WM	Verbal Interpretation	Rank
Objectives	4.84	Strongly Agree	5
Content	5.00	Strongly Agree	1
Format and language	4.96	Strongly Agree	3
Presentation	4.93	Strongly Agree	4
Usefulness	4.98	Strongly Agree	2
Overall	4.94	Strongly Agree	—

Legend: 4.20–5.00 = Strongly Agree.

The expert validators strongly agreed with every validation dimension, producing an overall mean of 4.94. Content received a perfect mean of 5.00, indicating that the lessons were relevant to the objectives, logically arranged, sufficiently discussed, supported by examples and practice tasks, and accompanied by appropriate self-

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checks. Usefulness ranked second at 4.98, reflecting the validators' judgment that the material could motivate learners, support self-paced mastery, encourage independence and positive study habits, and serve as a valuable resource for both students and teachers.

Format and language obtained 4.96, presentation obtained 4.93, and objectives obtained 4.84. Although all were within the strongly agree range, the relatively lower rating for objectives indicates an opportunity to continue refining formulation, organization, and dissemination of learning targets. Similarly, the presentation ratings suggest that attractiveness, examples, completion time, and reinforcement statements should be monitored during actual classroom use even though the material already met the validators' standards.

The validation results support the principle that vocational resources become more usable and aligned through systematic expert review. Roberts and Martin (2022) and Co et al. (2021) emphasized needs analysis, design, feedback, revision, and revalidation, while Williams and Daniels (2019) identified feedback as essential to clarity, relevance, pacing, and usability. The high ratings therefore establish curricular validity but do not replace field implementation. Effectiveness should be examined after students and instructors use the material under actual course conditions.

CONCLUSION

The fourth-year BTLED-HE students demonstrated high overall proficiency in the four major Clothing Construction competency areas. Their strongest performance was in preparing and cutting materials, while comparatively lower proficiency was observed in pattern manipulation, simple calculations, alteration of completed garments, and analysis of quality deviations. These findings show that the students possessed a sound foundation but still required targeted support in procedures involving adaptation, diagnosis, and higher-order technical judgment.

Skills acquisition was constrained by limited practical experience, insufficient learning resources, time restrictions, limited exposure to industry standards, difficulty with technical concepts, inadequate feedback, and low self-confidence. The supplementary learning material developed from these findings addressed the four core competencies through sequenced, self-directed, and practice-oriented content. Expert validation across objectives, content, format and language, presentation, and usefulness yielded an overall mean of 4.94, establishing that the material was curricularly valid and suitable for supporting Clothing Construction instruction. The study contributes an institution-responsive resource that links identified student needs with TESDA-aligned competency development.

Recommendation

Polangui Community College and other institutions offering BTLED-Home Economics should adopt the validated supplementary learning material as a support resource for Clothing Construction, particularly for competencies that obtained lower ratings. Instructors should combine the material with expanded hands-on sessions, sufficient practice time, functional tools and materials, industry demonstrations or exposure, and timely individualized feedback. Additional exercises should concentrate on calculations, pattern manipulation, garment alteration, and quality-deviation analysis.

School administrators should support the reproduction, digital access, updating, and instructor orientation required for effective implementation. The material should be piloted in actual classes and evaluated through pretest-posttest, performance-based, or mixed-method studies to determine its effect on mastery, confidence, retention, and transfer to authentic garment-production tasks. Feedback from students, teachers, and industry practitioners should guide continuing revision and revalidation.

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