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Applying Method Study to Evaluate Training Quality and Competency Output in Advanced Level Textile Technology and Design in Zimbabwe

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Abstract
The quality of training in Textile Technology and Design (TTD) is critical for developing competencies required in the clothing and textile industry This study evaluated the quality of training and competency output among Advanced Level Textile Technology and Design (TTD) learners in Zimbabwean secondary schools and examined the extent to which training practices align with curriculum expectations and industry requirements. Guided by the Context, Input, Process and Product (CIPP) evaluation model, the study adopted a convergent mixed-methods survey design. Maximum variation purposive sampling was used to select 26 schools from 121 schools offering Advanced Level TTD in Zimbabwe. The sample included schools from all provinces with varying enrolment levels. Data were collected from 26 teachers and 52 learners through questionnaires, interviews, and observations and analysed using descriptive statistics and thematic analysis. Method study was applied to evaluate garment-construction operations against standard apparel-production procedures. The study found that training quality was moderate, with high exposure to garment assembly operations and limited exposure to preparatory and post-production activities. Traditional methods dominated training activities, accounting for 88.48% (SD = 8.64), while industrial methods accounted for only 11.52% (SD = 8.64). Limited access to CAD, computerized pattern-making systems, and industrial equipment constrained the development of industry-relevant competencies. The findings provide evidence for curriculum review, resource allocation, and future research on competency-based technical education. The study recommends increased investment in modern equipment and technologies, enhanced teacher professional development, comprehensive curriculum implementation, and stronger industry-school partnerships to improve learner competency and industry readiness.

Introduction

The development of a skilled workforce remains a major challenge for education systems worldwide, as countries strive to equip learners with competencies that meet productivity and labour market demands (Sahlberg, 2023). Textile Technology and Design (TTD) education plays an important role in supporting industrial growth and addressing sustainability challenges in the textile and clothing sector (Chirapa, 2021). However, concerns persist regarding the effectiveness of TTD training and learner competency development in Zimbabwe, where learning outcomes have been reported to be unsatisfactory (Chipo, 2022).

Globally, education and training systems continue to face challenges in aligning graduate competencies with industry requirements, particularly in Technical and Vocational Education and Training (TVET) programmes (Alwi, 2026; Nthako, 2025). As a result, effective curriculum planning, implementation, monitoring, and evaluation are essential to ensure relevance to industry and national development needs (Meunmany, 2024). Method study, widely used in the clothing industry to improve productivity, efficiency, and quality, provides a useful framework for evaluating educational processes and training outcomes (Subhashini, 2021).

In developing countries, the clothing and textiles sector remains an important contributor to economic transformation, making quality TTD education essential for developing industry-relevant skills (Ovokeyen, 2025). In Zimbabwe, economic and resource constraints have increased concerns about the competency levels of secondary school graduates and their preparedness for both industry and tertiary education (Chimbindi, 2018).

Given ongoing technological advancements and changes in industry practice, regular evaluation of TTD operations and curriculum implementation is necessary to improve training quality, efficiency, and relevance (Dube, 2024). Despite the widespread application of method study in industry, limited research has applied this approach to evaluate curriculum implementation and competency development within Zimbabwean TTD education. This study therefore addresses this gap by assessing the quality of garment-construction training and competency outcomes among secondary school learners through the application of method study.

Market and technological changes in the clothing and textile industry have increased the demand for graduates with relevant knowledge, technical skills and practical competencies (Singh, 2024). However, concerns have been raised regarding whether secondary school Textile Technology and Design (TTD) training in Zimbabwe adequately prepares learners for further education and employment in the clothing and textile sector (Dube, 2024). Previous studies have identified a mismatch between educational training and workplace skill requirements, creating challenges for graduates entering tertiary institutions and industry (Chimbindi, 2018).

Despite these concerns, limited empirical evidence exists on the quality of training and competency development within the TTD subject at secondary-school level in Zimbabwe. In particular, there is insufficient information regarding the extent to which learner competencies align with the expectations of tertiary institutions and the clothing and textile industry. This knowledge gap limits the ability of curriculum planners, teachers and policymakers to improve curriculum implementation. Therefore, this study evaluates the quality of training and competency output in the TTD subject and examines the

extent to which the programme equips learners with the knowledge, skills and competencies required for further education and participation in the clothing and textile sector (Dube, 2024; Chimbindi, 2018; Singh, 2024).

To evaluate the quality of training and competency output in the Textile Technology and Design (TTD) subject in Zimbabwean secondary schools.

Operational Definitions

Quality of Training: The extent to which the TTD training programme provides effective curriculum delivery, adequate instructional resources, appropriate teaching methodologies, practical learning opportunities, and valid assessment practices that enable learners to achieve intended learning outcomes.

Competency Output: A competency output is the observable evidence that an individual can perform a task or role effectively according to established standards

Theoretical Model

The study is based on the Process and Product (CIPP) evaluation model (Stufflebeam, 2023). The model provides a framework for examining the relationship between curriculum expectations, training resources, teaching and learning processes, and learners' competency outcomes. In the context of TTD, it examines curriculum objectives and the expected competencies in garment construction and assesses the availability of equipment, materials and training facilities. Method study evaluates the preparedness of learners for employment or entrepreneurship.

Literature review

Education in Zimbabwe

Education quality in Zimbabwe has faced persistent challenges, including teacher shortages, infrastructure constraints, and economic difficulties, which have affected the achievement of intended educational outcomes (Bhebhe, 2015). In response to concerns about the education system, the Nziramasanga Commission of Inquiry was established in 1998 to review Zimbabwe's entire education sector (Mawere, 2013; Nziramasanga Commission Report, 1999). The Commission's recommendations informed subsequent curriculum reforms, leading to the adoption of the Education with Production (EWP) philosophy, which sought to link classroom learning with practical, real-life productive activities (Nyathi, 2020).

This philosophy influenced the development of the Curriculum Framework for Primary and Secondary Education (2015–2022), which emphasised practical competencies and transformed Technical Education into Technology Education. As part of these reforms, syllabi were revised to promote Design and Technology learning areas (MoPSE, 2015a, 2015b). Within this transformation, Textile Technology and Design (TTD), previously known as Fashion and Fabrics, was reviewed and repositioned as a technological subject aimed at developing practical and technical competencies relevant to the world of work. TTD is now offered at both Ordinary and Advanced Level in Zimbabwean secondary schools, reflecting the national emphasis on competency-based and industry-oriented education (Chirapa, 2021).

TTD Subject for Secondary Schools

The revised Textile Technology and Design (TTD) curriculum in Zimbabwe adopts a production-oriented, competency-based approach that seeks to connect classroom learning with industrial and entrepreneurial practice (Curriculum Development Unit [CDU], 2015–2022). The subject aims to develop learners' creative, technical, scientific and problem-solving skills, enabling them to design, develop and produce clothing products for different purposes and markets (Chirapa & Mberengwa, 2021). It also exposes learners to the technological, economic, cultural, managerial and entrepreneurial dimensions of the textile and clothing industry.

At Ordinary and Advanced Levels, TTD is intended to equip learners with competencies in design development, pattern drafting, garment construction, material selection and quality assurance. These competencies should prepare graduates for employment, self-employment and further education in the textile and clothing sector (CDU, 2015–2022 (Chirapa, 2021)). However, achieving these outcomes depends not only on curriculum content but also on the quality of teaching methods, practical training, equipment and learning environments.

Competency-based education and evaluation model

The competency-based orientation of the TTD curriculum provides the educational basis for assessing whether learners acquire the practical skills required by the textile and clothing industry. However, curriculum objectives alone do not guarantee competency development; their achievement depends on the resources available, instructional approaches and quality of practical training.

Method study is particularly relevant to the process component because it involves systematically recording and critically examining existing work methods to develop more effective and efficient ways of performing operations (Kanawaty, 1992). Applying this approach to garment construction can help identify inefficient procedures, unnecessary movements, inappropriate equipment use and opportunities for improving production methods.

Method study is a systematic approach to recording, examining and improving work procedures to eliminate unnecessary activities, reduce inefficiencies and establish more effective methods of performing tasks (Kanawaty, 1992). It focuses on improving the interaction between people, equipment, materials and work processes to enhance productivity and operational efficiency. Research by Moktadir et al. (2017), demonstrates how method study can identify production bottlenecks, reduce unnecessary work and improve productivity in manufacturing operations. Similarly, Sookdeo (2016), highlights the contribution of work-study techniques to organisational efficiency and performance. In this study, method study is applied to evaluate the quality of garment-construction training in the TTD subject by comparing school-based teaching and practical activities with standard operations in the clothing industry. The analysis examines instructional procedures, equipment utilisation, material management, workflow and practical training activities. Using the method-study questioning approach, activities are critically examined in terms of their purpose, location, sequence, personnel and means of execution. This enables the identification of unnecessary operations, gaps in practical training and inefficient use of resources. The findings can inform improvements in teaching methods, operational efficiency and the acquisition of industry-relevant competencies among TTD learners (Kanawaty, 1992; Moktadir et al., 2017).

Standard for quality training in Textile Technology and Design

The quality of training in Textile Technology and Design (TTD) can be evaluated by examining the extent to which school-based practical activities reflect recognised garment-manufacturing procedures and industry requirements. This study adopts the *Standard Operating Procedure (SOP) Manual for Apparel (2020)* as a reference benchmark for assessing the sequence and quality requirements of garment-production operations. The benchmark is considered alongside the competencies prescribed in the TTD curriculum to determine the relevance of school-based training to workplace practices. The evaluation focuses on the main stages of apparel production, namely design development, pattern making, marker making, fabric spreading and cutting, fusing, sewing, finishing, quality control and packaging. These operations provide criteria for examining the comprehensiveness of practical training, equipment utilisation, material management and workflow in schools. The benchmark is used to evaluate training practices rather than commercial production targets (Nayak & Padhye, 2015). Method study provides a systematic approach to examining these operations, identifying unnecessary activities and establishing more effective procedures (Kanawaty, 1992). Its application in TTD enables the comparison of existing teaching and practical methods with standard garment-manufacturing procedures, thereby identifying gaps in training and opportunities for improving operational efficiency.

Quality control and supervision in garment production

Quality control is an essential component of garment manufacturing because it ensures that production activities and finished products meet established quality requirements. (Mkwanazi, 2017), in a study of an under-resourced clothing manufacturing cooperative, demonstrate the importance of focusing quality-control efforts on critical production activities even where resources are limited. Similarly, ISO 9001:2015 emphasises process monitoring, conformity to requirements and continual improvement as fundamental elements of quality management (International Organization for Standardization (Standardization., 2015). In TTD training, supervision and quality control are important in ensuring that learners follow appropriate production procedures and meet the required standards during practical activities. Teachers, heads of departments and school administrators therefore play important roles in monitoring practical work, providing feedback and assessing completed garments. Method study can complement these supervisory activities by identifying weaknesses in work procedures and opportunities for improving the quality of training.

Technology and modern garment-production methods

Technological advancement has transformed garment manufacturing through the adoption of computer-aided design (CAD), automated pattern development, digital marker making and modern cutting technologies. Datta and Seal (2018) explain that CAD applications improve flexibility in pattern development, grading and marker making while supporting fabric utilisation, accuracy and production efficiency. Nayak and Padhye (2015) also discuss technological developments in garment design, spreading, cutting, sewing and finishing. These developments have implications for TTD training because learners require exposure to relevant technologies and production techniques to acquire competencies that reflect contemporary industry practices. However, the availability of technological resources may differ between schools, potentially affecting the practical experiences offered to learners. Consequently, the evaluation should establish whether schools provide opportunities for learners to use both conventional and modern production methods.

Availability of infrastructure and training resources

Access to infrastructure, particularly electricity, is an important consideration when evaluating the integration of technology into practical training. Zimbabwe's rural electrification statistics indicate that approximately 81% of rural public secondary schools had access to electricity as of 30 June 2025, demonstrating that access was not yet universal (Zimbabwe Energy Regulatory Authority, 2025). This has implications for schools seeking to incorporate electrically powered equipment and computer-based technologies into TTD training. However, electricity access alone does not establish whether schools have adequate production equipment, functional machinery or relevant technological facilities. Therefore, this study examines the availability and utilisation of training resources alongside the methods used in garment construction. This provides a basis for determining whether the practical training environment adequately supports the competencies prescribed in the TTD curriculum.

Level of students' competency output in the TTD subject in secondary schools

Learners' competency output in Textile Technology and Design (TTD) reflects the extent to which acquired knowledge and practical skills can be applied to garment-production tasks and workplace requirements. Industry relevance is an important consideration in assessing competency output because graduates are expected to transition into employment, entrepreneurship and further education. Chirapa and Mberengwa (2021) identify concerns regarding the alignment of Advanced Level TTD training with clothing-industry requirements, particularly the reliance on traditional teaching approaches and limited integration of current industrial technologies. Such concerns highlight the need to examine whether school-based training equips learners with practical competencies relevant to contemporary garment production.

Relationship between training quality and competency output

The relationship between training quality and learner competency is central to evaluating the effectiveness of Textile Technology and Design (TTD) education. Effective training should enable learners to apply theoretical knowledge and practical skills to produce garments that meet acceptable industry standards. However, concerns have been raised regarding the alignment of Advanced Level TTD training with clothing-industry requirements, particularly the continued reliance on traditional teaching approaches and the limited integration of modern industrial technologies (Chirapa & Mberengwa, 2021).

Although the TTD curriculum promotes practical and production-oriented learning, curriculum requirements alone do not guarantee the development of industry-relevant competencies. The alignment between educational provision and workplace expectations remains essential (Chirapa & Mberengwa, 2021). Similarly, the Education 5.0 philosophy emphasises innovation and industrialisation alongside teaching, research, and community service, highlighting the need for learners to acquire competencies that are relevant to contemporary industry needs (Togo & Gandidzanwa, 2021).

The literature suggests that quality TTD training depends on the integration of curriculum expectations, standard garment-production procedures, effective teaching methods, supervision, technology, and adequate resources. However, limited research has systematically examined how garment-construction methods are implemented in secondary schools and the extent to which they support operational efficiency and competency development. Consequently, this study addresses this gap by applying

method study to evaluate existing garment-construction operations, identify weaknesses and opportunities for improvement, and assess their alignment with curriculum and industry expectations. Ultimately, the study seeks to determine how training quality influences learner competency development in Zimbabwean secondary schools.

Conceptual Frame Work

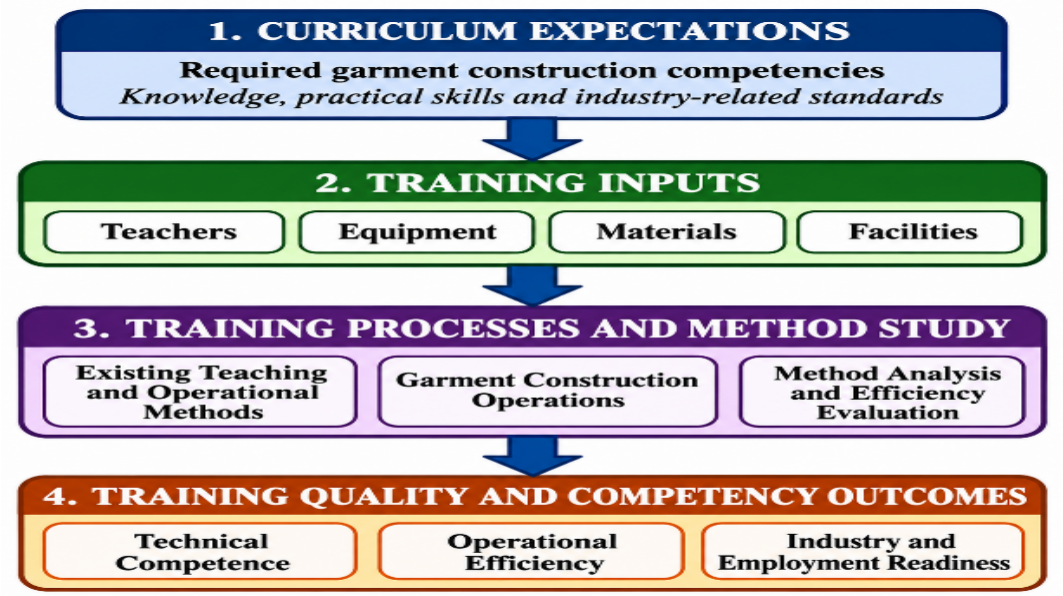


Figure 1: Conceptual Frame Work

The conceptual framework illustrates how curriculum expectations regarding garment-construction competencies are translated into training inputs (teachers, equipment, materials, and facilities) and implemented through training processes and method study. The framework proposes that the quality of these inputs and processes ultimately influences training quality and competency outcomes, including learners' technical competence, operational skills, and industry readiness.

Method

Research Design

This study adopted a convergent mixed-methods survey design to examine the quality of garment-construction training and the competency outcomes of learners studying Textile Technology and Design (TTD) at Advanced Level in Zimbabwean secondary schools. The mixed-methods approach was selected because it enabled the collection and integration of both quantitative and qualitative data, thereby providing a comprehensive understanding of the relationship between training quality and learner competency. Quantitative data were used to determine patterns and trends in training provisions and competency development, while qualitative data provided detailed explanations of participants' experiences and perceptions.

Population and Sampling

Purposive sampling, specifically maximum variation sampling, was used to select 26 schools from the 121 secondary schools offering Advanced Level Textile Technology and Design (TTD) in Zimbabwe. Schools were chosen from all provinces and included both high- and low-enrolment institutions to ensure representation of diverse training contexts. This approach enabled the study to capture variations in curriculum implementation, resource availability, instructional practices, and learner experiences. According to Patton (1990; 2002), maximum variation sampling involves selecting cases that differ on important characteristics in order to identify common patterns across diverse settings and generate information-rich data.

Research Instruments

Three instruments were used for data collection, structured questionnaire was administered to teachers and learners. The questionnaire contained closed-ended and Likert-scale items covering, semi-structured interviews were conducted with teachers to obtain deeper insights into training practices, curriculum implementation, resource availability, and competency development. The interviews allowed participants to elaborate on issues that emerged from the questionnaire finding and an observation checklist was used during school visits to assess the availability and condition of sewing equipment.

Validity and Reliability

To ensure content validity, the questionnaire, interview schedule, and observation checklist were reviewed by specialists in textile technology, curriculum studies, and educational research. Their recommendations were incorporated before the instruments were used. A pilot study was conducted in schools that were not included in the main study. Feedback from the pilot study was used to improve the clarity, relevance, and sequencing of items. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient, and the instrument demonstrated acceptable reliability for educational research. Triangulation of questionnaires, interviews, and observations further enhanced the credibility and trustworthiness of the study findings.

Data Collection Procedures

Data were collected after obtaining permission from the relevant educational authorities, including the Ministry of Primary and Secondary Education and the participating schools. The researcher first administered questionnaires to teachers and learners. Thereafter, observations of garment-construction workshops and practical activities were conducted using the observation checklist. Semi-structured interviews were subsequently carried out with participating teachers to clarify and expand upon issues emerging from the questionnaire and observation data. Data collection was undertaken during scheduled visits to the selected schools.

Data Analysis

Quantitative data obtained from questionnaires were coded and analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise responses and identify trends relating to training quality and competency development. Qualitative data from interviews and observations were transcribed and analysed using thematic analysis. The analysis involved familiarisation with the data, coding, identification of categories, development of themes, and interpretation of findings in relation to the study

objectives. The quantitative and qualitative findings were then integrated through methodological triangulation, enabling comparisons across datasets and strengthening the overall interpretation of results.

Ethical Considerations

Ethical approval for the study was obtained from the Chihnoyi university research ethics committee. Permission to conduct the study was also granted by the Ministry of Primary and Secondary Education and participating schools. Participants were informed about the purpose of the study and their voluntary participation. Written informed consent was obtained from teachers. For learners below the age of eighteen years, parental/guardian consent and learner assent were obtained before participation. Confidentiality and anonymity were maintained by assigning codes rather than using participants' names, and all information collected was used solely for research purposes.

Study Limitation

The learner sample consisted of Lower Sixth (Form 5) students who had not yet completed the full two-year Advanced Level TTD programme. Consequently, their exposure to some advanced garment-construction operations may have been incomplete at the time of data collection. This limitation should be considered when interpreting competency outcomes.

Results

Quality of training in the TTD subject for secondary schools in Zimbabwe
Frequency (f) and Percentage (%) Table for Teachers (N=26) and Learners (N=52).

Table 1: Quality of training in the TTD Subject

Operation	Teachers Always f (%)	Learners Always f (%)	Mean (M)	SD	Interpretation
Design Development	2 (7.7)	3 (5.8)	1.87	0.50	Moderate Exposure
Pattern Making	2 (7.7)	3 (5.8)	1.87	0.50	Moderate Exposure
Marker Making/Laying Out	23 (88.5)	45 (86.5)	2.81	0.53	High Exposure
Cutting	26 (100.0)	8 (15.4)	1.98	0.56	Moderate Exposure
Notching/Transferring Markings	23 (88.5)	45 (86.5)	2.79	0.58	High Exposure
Fusing/Ironing	20 (76.9)	39 (75.0)	2.67	0.62	High Exposure
Sewing Operation	26 (100.0)	52 (100.0)	3.00	0.00	High Exposure
Quality Control	22 (84.6)	52 (100.0)	3.00	0.00	High Exposure
Finishing	4 (15.4)	8 (15.4)	1.40	0.75	Low Exposure
Packaging	4 (15.4)	1 (1.9)	1.23	0.46	Low Exposure

Table 1 indicate that the quality of training in the TTD subject was moderate, with greater emphasis placed on garment assembly operations than on preparatory and post-production activities. Sewing operations recorded the highest level of exposure, with both teachers and learners reporting 100% participation. High exposure was also reported for marker making/laying out (teachers = 88.5%; learners = 86.5%), notching/transferring markings (teachers = 88.5%; learners = 86.5%), quality control (teachers

= 84.6%; learners = 100.0%), and fusing/ironing (teachers = 76.9%; learners = 75.0%), demonstrating strong emphasis on garment assembly skills.

In contrast, design development and pattern making received only moderate attention. Most teachers (73.1%) and learners (75.0%) indicated that these activities were undertaken only sometimes, while 19.2% reported that they were never conducted. Similarly, cutting recorded a moderate mean score (M = 1.98, SD = 0.56). These findings suggest inconsistent exposure to important preparatory stages of garment production.

The lowest levels of exposure were observed in finishing and packaging**.** The majority of teachers and learners reported that finishing (teachers = 73.1%; learners = 75.0%) and packaging (teachers = 73.1%; learners = 78.8%) were never undertaken. Correspondingly, finishing (M = 1.40, SD = 0.75) and packaging (M = 1.23, SD = 0.46) recorded the lowest mean scores, indicating limited exposure.

The mean scores further confirmed that sewing operations and quality control had the highest exposure levels (M = 3.00, SD = 0.00), followed by marker making (M = 2.81, SD = 0.53), notching/transferring markings (M = 2.79, SD = 0.58), and fusing/ironing (M = 2.67, SD = 0.62), all of which were rated as high exposure. Design development (M = 1.87, SD = 0.50), pattern making (M = 1.87, SD = 0.50), and cutting (M = 1.98, SD = 0.56) reflected moderate exposure.

Overall, both frequency and mean-score results show that training in the TTD subject concentrated mainly on garment assembly operations while giving comparatively less attention to design development, finishing, and packaging. As a result, learners were not consistently exposed to the complete garment production cycle required for comprehensive industrial garment production.

Observation Results on Exposure to Garment Construction Operations (n = 10 Schools)

Table 2: Exposure to Garment Construction Operations Quality of training in the TTD Subject

Operation	Fully Observed n (%)	Partially Observed n (%)	Not Observed n (%)
Design Development	1 (10%)	7 (70%)	2 (20%)
Pattern Making	1 (10%)	7 (70%)	2 (20%)
Marker Making	8 (80%)	1 (10%)	1 (10%)
Cutting	8 (80%)	2 (20%)	0 (0%)
Notching/Transferring Markings	8 (80%)	1 (10%)	1 (10%)
Fusing	7 (70%)	2 (20%)	1 (10%)
Sewing	10 (100%)	0 (0%)	0 (0%)
Quality Control	8 (80%)	1 (10%)	1 (10%)
Finishing	2 (20%)	2 (20%)	6 (60%)
Packaging	1 (10%)	1 (10%)	8 (80%)

Observational data largely confirmed the findings from teachers and learners. Sewing was fully observed in all schools (100%), demonstrating its central role in TTD practical instruction. High levels of implementation were also observed for marker making (80%), cutting (80%), notching/transferring markings (80%), and quality control (80%).

In contrast, design development and pattern making were fully observed in only 10% of schools and partially observed in 70%, indicating limited and inconsistent implementation. Similarly, finishing was not observed in 60% of schools, while packaging was not observed in 80% of schools.

These findings suggest that schools concentrated on core garment construction operations while giving less attention to the preparatory and post-production stages. The observations therefore support the conclusion that learners were not consistently exposed to all stages of garment production.

Methods used during training and the level of learners' competency output in the TTD subject in secondary schools in Zimbabwe.

Table 3: Methods used in garment production operations among 26 schools

Operation	Industrial Methods n (%)	Traditional Methods n (%)
Design Development	9 (17.3)	43 (82.7)
Pattern Making	3 (5.8)	49 (94.2)
Marker Making	5 (9.6)	47 (90.4)
Cutting	3 (5.8)	49 (94.2)
Notching/Transferring Markings	5 (9.6)	47 (90.4)
Fusing/Ironing	3 (5.8)	49 (94.2)
Sewing Operation	18 (34.6)	34 (65.4)
Quality Control	5 (9.6)	47 (90.4)
Finishing	5 (9.6)	47 (90.4)
Packaging	5 (9.6)	47 (90.4)
Supervision	5 (9.6)	47 (90.4)
Mean ± SD	**11.52 ± 8.64**	**88.48 ± 8.64**

Table 3 shows that garment-construction training in the TTD subject relied predominantly on traditional methods, with an overall mean of 88.48% (SD = 8.64) compared to 11.52% (SD = 8.64) for industrial methods. Traditional approaches dominated most operations, including pattern making, cutting, and fusing/ironing (94.2% each), while exposure to industrial methods was generally below 10%. Sewing recorded the highest exposure to industrial methods (34.6%), although traditional sewing equipment remained more common (65.4%). Learner interviews and classroom observations further indicated that technologies such as CAD were primarily taught theoretically and were rarely available for practical application.

Availability of Modern Technologies and Industrial Methods

The findings revealed a dominant reliance on traditional methods, which recorded a mean of 88.48% (SD = 8.64) compared to 11.52% (SD = 8.64) for industrial methods. This supports observations by Datta and Seal (2018) and Nayak and Padhye (2015) that modern clothing production increasingly depends on technological systems such as CAD, computerized pattern making, automated marker making, and industrial production technologies. Learners reported that such technologies were mainly discussed

theoretically and were rarely available for practical use. Similar concerns have been highlighted in TVET literature, which links limited technological resources to inadequate development of industry-relevant competencies (Nthako, 2025). Within the CIPP framework, these findings indicate weaknesses in programme inputs, particularly equipment and technological resources.

Competency Development and Industry Relevance

The study found that learners acquired foundational garment-construction competencies but had limited exposure to industrial production environments. Industrial-method exposure was highest in sewing operations (34.6%), while most other operations recorded exposure levels below 10%. These findings support Chirapa and Mberengwa (2021), who questioned the preparedness of TTD graduates for modern industry. Although competency-based education aims to equip learners with transferable workplace skills, reliance on traditional methods may limit learners' ability to adapt to contemporary industrial settings characterised by digital technologies and automated production systems. The findings also align with Education 5.0 principles, which emphasise innovation, industrialisation, and problem-solving (Togo & Gandidzanwa, 2021).

Method Study Perspective on Training Practices

Using method study as an analytical framework revealed that garment-construction training often omitted important production stages such as industrial design development, finishing, packaging, and technology-supported supervision. According to Kanawaty (1992), method study seeks to improve efficiency by examining existing work procedures. The omission of key production stages suggests incomplete workflows that limit learners' understanding of industrial garment-manufacturing processes. This finding is consistent with Moktadir et al. (2017) and Sookdeo (2016), who emphasise that efficient production depends on the integration of all operational stages. As a result, current training practices do not fully reflect standard industrial procedures.

Relationship Between Training Quality and Competency Output

The findings demonstrated a direct relationship between learner exposure and competency development. Operations that received frequent attention, such as sewing, marker making, quality control, and notching, showed stronger competency development, whereas design development, finishing, and packaging received limited exposure and consequently lower competency development. This supports competency-based education principles, which emphasize repeated engagement in authentic practical activities as the basis for competence acquisition. The findings also support the CIPP model's assumption that effective outcomes depend on adequate inputs and processes (Stufflebeam, 2023). Therefore, gaps in resources and training experiences may reduce the achievement of desired competencies.

Research Gap

The study addressed a significant gap in the literature by applying method study to evaluate garment-construction training in Zimbabwean secondary schools. While previous studies focused on curriculum content, industry alignment, and resource challenges (Chirapa & Mberengwa, 2021; Dube, 2024), limited research had examined how training methods and operational practices influence competency development. By linking training operations, methods, and learner competencies, the study contributes empirical evidence on the effectiveness and industry relevance of TTD training and demonstrates the

usefulness of method study as a framework for evaluating vocational and technical education programmes.

Discussion Summary

The overall findings indicate that TTD training provides learners with essential garment-construction skills but remains constrained by limited technological integration, inadequate industrial resources, and incomplete coverage of the garment production cycle. The dominance of traditional methods, coupled with insufficient exposure to industrial technologies and post-production activities, limits the development of competencies required in contemporary clothing and textile industries. The study therefore highlights the need for improved resource provision, greater adoption of modern technologies, and comprehensive training that covers the entire garment production process to enhance learner competency and industry readiness.

Conclusion

The study concludes that the quality of training in the TTD subject is moderate and remains largely dependent on traditional garment-construction methods. While learners acquire fundamental skills in garment assembly, limited exposure to modern technologies, industrial methods, design development, finishing, and packaging constrains the development of comprehensive industry-relevant competencies. Therefore, schools and policymakers should strengthen curriculum implementation by improving access to modern equipment and technologies, enhancing teacher training, promoting industry-school partnerships, and ensuring that learners are exposed to all stages of the garment production cycle. Such measures would improve training quality, industry relevance, and learners' preparedness for tertiary education and employment in the clothing and textile sector.

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