ITFP-GH
Institute of Textiles and Fashion Professionals - Ghana

Fashion and Textiles Review

Volume 7, (2026), Pages 98-115
ISSN: 2665-0983 (ONLINE)

Journal homepage: https://journal.itfpgh.com/ftr/index



ORIGINAL ARTICLE

DOI: https://doi.org/10.35738/ftr.v7.2025.36

Assessing the Demands and Expectations of the 21st Century Fashion Education for Tertiary Institutions in Ghana

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Abstract

Purpose: The purpose of this study is to evaluate the alignment between Higher Fashion Education (HFE) curricula in Ghana and the evolving technical and digital demands of the 21st-century global fashion industry. Specifically, the research aims to assess current curriculum effectiveness, examine the integration of Education for Sustainable Development (ESD), and identify specific technological and practical skill gaps, such as digital design literacy and professional finishing, that hinder the international competitiveness of Ghanaian graduates.

Methodology/Design: The study adopted a convergent parallel mixed-methods research design to triangulate quantitative trends with qualitative insights. Data were gathered purposively and conveniently from a sample of 92 participants, comprising students (N=84) and expert stakeholders, including lecturers and technicians (N=8), across Ghanaian fashion institutions. Data was gathered using a questionnaire (Google form) and an interview guide. A quantitative analysis that utilised descriptive statistics and Independent Samples T-tests was carried out to identify perceptual gaps between cohorts, while qualitative data were analysed using Braun and Clarke's six-phase thematic analysis framework to provide a detailed context for the identified skill deficits.

Findings: The findings revealed a significant "optimism gap," where students generally perceive the curriculum as aligned, whereas faculty members identify systemic stagnation. A critical weakness was found in digital technology integration, which recorded the lowest mean score (3.53) due to a persistent reliance on manual methods and a lack of access to Computer-Aided Design (CAD) software. Additionally, a "finishing crisis" was identified, where graduates lack the industrial precision required for the global export market. While institutions excel in fostering cultural literacy and design identity, sustainability (ESD) remains largely theoretical and lacks technical application in core design modules.

Practical and Social Implications: Practically, the study implies an urgent need for a radical "digital pivot" in fashion laboratories, moving away from manual and focusing on instruction toward Industry 4.0 standards like 3D garment simulation. It necessitates a shift to Competency-Based Training (CBT) that prioritises industrial finishing over purely artistic expression. Socially, the research advocates for institutionalised industry-academia "teaching factories" to bridge the unemployment gap, ensuring that the fashion sector can transform Ghana's environmental challenge of textile waste into a competitive economic advantage through technical upcycling.

Originality: This research provides an original contribution by applying the "Design School Model" specifically to the Ghanaian fashion education context to diagnose strategic misalignments. It is one of the first studies in the region to empirically document the "perceptual lag" between student satisfaction and faculty foresight regarding technological readiness. By redefining sustainability as a technical rather than a purely social requirement, the study offers a unique roadmap for localising circular economy principles within a formal vocational curriculum.

Keywords
Fashion education, digitalisation, industry 4.0, sustainable fashion, curriculum alignment, Technical Vocational Education and Training (TVET).

Received: September 09, 2025. **Revised:** January 02, 2026. **Accepted:** April 08, 2026

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DOI: https://doi.org/10.35738/ftr.v7.2025.36

1 | INTRODUCTION

Today's educational landscape, particularly in fashion, is undergoing a profound transformation driven by the need to equip professionals with the knowledge, skills, and attitudes demanded by contemporary industries (Cheng, 2018). This evolution is characterised by a multifaceted approach that integrates rapid technological advancements, shifting consumer preferences, and a heightened emphasis on sustainability (Mpofu et al., 2023; Stevenson, 2022; Williams, 2016). Marouli (2021) assert that the demands of the 21st century extend to social and environmental issues, requiring systemic changes through Education for Sustainable Development (ESD). In the context of developing economies like Ghana, this transformation is viewed as a crucial driver for fostering competent human resources and stimulating economic growth (Pongo et al., 2015; Afeti & Adubra, 2012; Hodges & Karpova, 2009). According to Maarman (2023), the rise of digital platforms and e-commerce has necessitated a significant shift toward digital literacy and online engagement. This requires fashion professionals to master digital strategies alongside traditional design, as echoed by Mapolisa and Tshabalala (2013), who observe that the integration of multimedia resources has expanded learning far beyond the conventional classroom.

Historically, formal fashion education has been critiqued for its rigidity and lack of appeal. Afeti and Adubra (2012) state that institutions must address existing skill deficits by aligning training with industry demands, perhaps by incorporating informal sector training. As the Ghanaian education sector undergoes restructuring, institutions are being compelled to adapt to global expectations. However, several studies reveal significant gaps when Ghanaian tertiary fashion education is measured against 21st-century requirements. There are challenges relating to resource limitations and systemic issues and this hinder effective skill development (Pongo et al., 2015). Adotey et al. (2017) also highlights a persistent disconnect between current curricula and industry needs, often resulting from inadequate review processes. Significant deficiencies also exist in the integration of ethical considerations, where ESD principles are often neglected, despite the industry's significant environmental and social impact (Murzyn-Kupisz & Hołuj, 2021). Similarly, González-Pérez and Ramírez-Montoya (2022) argue that the incorporation of "Education 4.0" components remains insufficient, leaving graduates unprepared for a digitally-driven landscape. This lack of modernisation affects the development of core competencies. Thus, affecting pedagogical practices with curriculum implementers struggling to adapt to the requirements of creativity, critical thinking, and digital literacy (Mutohhari et al., 2021; Imam et al., 2023)

Bednall (2022) underscores the urgent need for flexible, responsive pedagogies and improved teacher training to facilitate these 21st-century competencies. Appiah (2023) however, emphasised the importance of work-based learning (WBL) that bridges the gap between institutional training and the workforce. In the rapidly evolving landscape of the 21st-century fashion industry, characterised by globalisation, digital innovation, and an increasing emphasis on sustainability and ethical practices, a critical assessment of Ghanaian fashion education is imperative. Graduates must now possess a blend of design acumen, marketing skills, and an understanding of online consumer behaviour. By examining these critical factors, this study provides policymakers with insights to revamp curricula, ensuring that students are culturally sensitive and globally competitive. Ultimately, this research evaluates the effectiveness of current fashion education in Ghanaian tertiary institutions, explores essential 21st-century skills, and proposes strategic solutions based on expert opinions to promote sustainable development.

2 | LITERATURE REVIEW

2.1| Conceptualising 21st-Century Fashion Education

21st-century fashion education is a dynamic and evolving field that prepares future professionals to be technologically proficient, environmentally responsible, globally aware, business-minded, and creatively adaptable; it achieves this by integrating digital tools like CAD, 3D modelling, and VR/AR, prioritizing sustainability through eco-friendly practices and ethical sourcing, embracing globalization and diversity by fostering intercultural understanding and designing for a global market, incorporating business and entrepreneurship education to equip students with essential management and marketing skills, and cultivating crucial 21st-century skills such as critical thinking, problem-solving, and effective communication, thus reflecting the changing demands and complex realities of the modern fashion industry (Bertola, 2018). Fashion education in the 21st century has undergone a profound transformation, driven by the rapid evolution of technology, the growing imperative for sustainability,

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and the increasingly globalised nature of the fashion industry. This shift necessitates a curriculum that equips students with a diverse and adaptable skillset, moving beyond traditional design and sewing techniques (Bertola, 2018). A significant aspect of this transformation is the integration of digital technology. Students are now expected to be proficient in CAD (Computer-Aided Design) software, which allows for digital pattern making, 3D modelling, and virtual prototyping. These tools streamline the design process, enabling faster and more accurate iterations. Moreover, the curriculum now incorporates training on e-commerce, digital marketing, and social media branding, recognising the importance of online presence in today's market. Virtual and augmented reality (VR/AR) are also emerging as valuable tools for virtual fashion shows, digital fittings, and immersive design experiences (Bhalla & Bahar, 2023).

Another critical focus is sustainability. Fashion education is increasingly emphasising eco-friendly materials and practices, ethical production, and circular fashion principles. Students are learning about zero-waste design, which aims to minimise textile waste through innovative pattern cutting and design techniques. There is also a growing awareness of the environmental impact of the fashion industry, prompting educators to address issues like overconsumption and pollution (Ademtsu & Pathak, 2023). The globalisation and cultural diversity of the fashion industry are also reflected in modern education. Students are exposed to global fashion trends and learn to design for a diverse market, fostering intercultural understanding and respect for different aesthetic perspectives. Online collaboration tools facilitate connections with designers and professionals worldwide, expanding students' networks and perspectives (Ademtsu & Pathak, 2023). Furthermore, business and entrepreneurship have become integral components of fashion education. Students gain knowledge of fashion business management, including business planning, financial management, and supply chain logistics. They also learn about brand development, covering branding, marketing, and public relations. Many programmes encourage entrepreneurial skills, empowering students to launch their own fashion businesses. Finally, 21st-century fashion education emphasises the development of essential 21st-century skills. This includes critical thinking and problem-solving, which enable students to analyse trends, identify challenges, and develop innovative solutions. Creativity and innovation are fostered through design projects and experimentation. Collaboration and communication skills are honed through teamwork and presentations, preparing students for effective interaction with clients and colleagues. The educational approaches used to deliver this comprehensive curriculum are also evolving. Online and blended learning provide flexible learning options and access to global expertise. Experiential learning, through internships, industry collaborations, and hands-on projects, offers valuable real-world experience. And interdisciplinary studies, which integrate fashion with other fields like technology, business, and sustainability, provide a holistic and relevant education (Ademtsu & Pathak, 2023).

2.2| The Demands of Today’s Fashion Education

The changing "demands and expectations" in 21st-century fashion education encompass a comprehensive shift across curricula, skills, aptitudes, employment outcomes, and teaching pedagogies; this means a need for curricula that integrates digital technologies, sustainability, and global perspectives, and that students acquire a broader skill set including digital proficiency and entrepreneurship, while educators foster creativity and innovation, preparing graduates for diverse career paths in a competitive global market through innovative teaching pedagogies like online and experiential learning, ensuring relevance and adaptability in a rapidly evolving industry. In the 21st century, fashion education needs require stakeholders to adapt to globalised co-creative production systems, solve the skills gap and prepare students ready for flexible jobs in the clothing manufacturing and creative sectors (Bill, 2011). The demands of the 21st-century on fashion education include addressing changes in the environment, society, ethics, and culture; improving diversity and inclusion; and proving the worth of fashion education outside of higher education to meet the requirements of the industry and larger society. A study by Pongo et al. (2015) highlights the importance of quality assurance in higher education, emphasising the need for continuous evaluation of course content to meet industry standards. This is crucial for ensuring that fashion programmes remain relevant and effective. Fashion has been used to influence society in diverse ways. Bertola (2018) emphasised the relevance of fashion in contemporary society by demonstrating the role fashion plays in mass production and globalisation. Hence, this sector has undergone several transformations in all its fields, including education and training. Historical development of fashion education highlights its adaptation to the evolving needs of the industry. It underscores the transition from conventional apprenticeship systems to more structured educational frameworks that integrate contemporary practices. In order to prepare professionals for a dynamic global fashion industry, the 21st-century demands for fashion education place a strong emphasis on technical

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DOI: https://doi.org/10.35738/ftr.v7.2025.36

skills, international integration, academic mobility, creative and economic components, and business-oriented curricula that include professional software support and hands-on traineeships (Yezhova, 2018).

2.3| Effective Pedagogies in Contemporary Fashion Education

The significance of fashion on the environment and global culture, sustainability and ethical practices are now being given top priority in modern fashion education. Contemporary fashion education employs a variety of effective teaching pedagogies that cater to the evolving needs of students and the fashion industry. It focuses on providing hands-on learning experiences to students (Turturică, 2017); collaborative learning (Gam & Stanley, 2024; Ribeiro & Simões, 2018) and technology integration (An et al., 2022). These methods emphasize creativity, collaboration, and the integration of technology, ensuring that students are well-prepared for their future careers. As fashion education continues to increase in prominence, trainers are being influenced to integrate experiential, differentiated, and blended learning strategies in their teaching and learning processes. Fashion educators are increasingly incorporating sustainable innovation elements, such as zero-waste design and recycling, into the curriculum, which encourages students to engage in responsible practices in their practical project work. Kumar et al. (2024) indicated that this shift gives a reflection of how fashion designers need to consciously be environmentally and socially responsible towards sustainability. Furthermore, teaching pedagogies like case studies and project-based learning have gained traction, facilitating a more hands-on approach that allows students to tackle real-world challenges and apply theoretical concepts in practical settings. The active engagement of students in fashion lessons promotes critical thinking, develops problem-solving skills, fosters a dynamic learning environment (Singh & Svendsen, 2024) while navigating their abilities to fit into the multifaceted nature of the fashion industry. Although active involvement of students is important, Aspinall and Twigger Holroyd (2025) argue that this may lead to students focusing on immediate solutions to sustainable issues, other than critically exploring and challenging existing fashion paradigms. Hence, a scaffolded curriculum that combines work-integrated learning (WIL) was proposed by Singh and Svendsen (2024) for adoption by fashion institutions.

2.4| Challenges Facing Contemporary Fashion Education

Contemporary fashion education encounters several challenges that seem to have a long history. Syed Azman et al. (2022) noted inadequacies in most curricula, pedagogies and other related activities in the educational sector that comprehensively deal with sustainability. A review by Ademtsu and Pathak (2023) discusses the discrepancy between the course content and the needs of the industry, emphasising the necessity for hands-on training opportunities. It addresses the difficulties encountered by fashion students and underscores the significance of aligning educational methods with practical, real-world demands. Ademtsu and Pathak further discuss the discrepancy between the course content and the needs of the industry, emphasising the necessity for hands-on training opportunities. Singh and Svendsen (2024) also identified a gap in employability skills for fashion graduates, which is linked with the lack of practical skills integration with theoretical concepts. As a way to bridge academic and industry gaps to enhance graduate employability, Singh and Svendsen (2024) suggest the adoption of an innovative curriculum that integrates work and learning, interdisciplinary projects, mentorship, and reflective assessment. The fashion industry is undergoing a significant transformation due to globalisation, digital innovation, technological advancements, consumer preferences, and sustainability. As a result, the educational needs of professionals in this field remain crucial in the 21st century. By acknowledging and addressing historical barriers and transformational challenges, fashion education can pave the way for a sustainable industry.

2.5| Theoretical Framework

The study found the Design School model of strategy formulation to be the most suitable. The sub-section below elaborates on it with justification.

2.5.1| The Design School Model of Strategy Formulation

The Design School model of strategy formulation, as described by Ahlstrand et al. (1998), emphasises the importance of aligning an organisation's internal capabilities with external opportunities. This model prioritises a structured appraisal of both the external environment, to identify threats and opportunities, and the internal situation, to pinpoint strengths and weaknesses, aiming for a seamless fit between the

DOI: https://doi.org/10.35738/ftr.v7.2025.36

two (Ansoff, 1991). Key assumptions underpin this deliberate, controlled process: strategy formation is a conscious, learned endeavour, directed by a central leader who articulates and disseminates the strategy; the strategy is kept simple, explicit, and unique, reflecting distinct competencies and situational demands; it emerges as a fully formed conception, with thinking preceding action and implementation following complete formulation. This approach relies heavily on SWOT analysis, a tool considered effective for strategic analysis and development (Sarbah & Otu-Nyarko, 2014). The Design School model is highly suitable for this study due to its structured and analytical approach, which aligns perfectly with the study's clear objectives of evaluating and enhancing fashion education in Ghana. The model's emphasis on thorough external analysis, crucial for understanding the 21st-century industry demands and global influences, ensures the curriculum's relevance. Similarly, its focus on rigorous internal analysis allows for a comprehensive assessment of existing curricula, faculty expertise, and resource utilisation. Most importantly, the Design School model's prescriptive nature facilitates the development of actionable recommendations for curriculum enhancement and policy changes, ultimately contributing to sustainable economic growth through improved fashion education, addressing skill gaps, and fostering effective industry-institution collaboration.

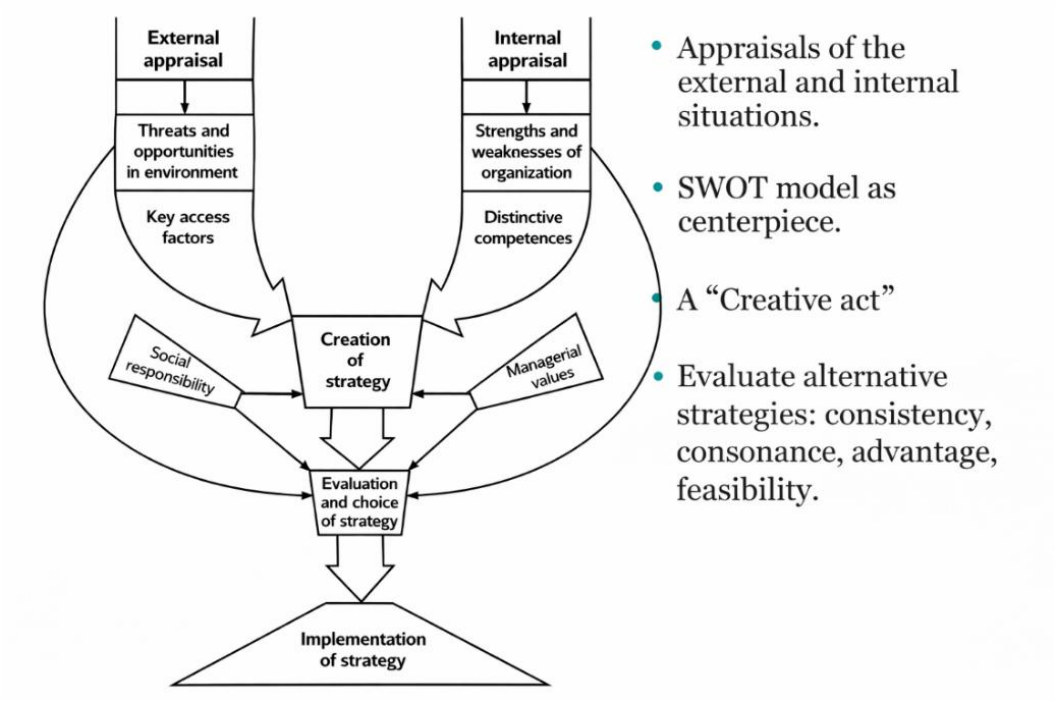


Figure 1. The Design School Model of Strategy Formulation by Ahlstrand et al. (1998).

2.6| Empirical Review

The current discourse on Higher Fashion Education (HFE) reveals a shared consensus among scholars regarding the growing disparity between traditional academic frameworks and the dynamic requirements of the 21st-century industry. Research consistently points toward systemic challenges in quality assurance, the necessity of digital and sustainable integration, and the evolving role of work-based learning.

2.6.1| Quality Assurance and Systemic Challenges

Several studies highlight that the mere existence of quality frameworks is insufficient for institutional success. Pongo et al. (2015) evaluated the challenges of Quality Assurance (QA) in Ghanaian HFE, asserting that educational quality is severely threatened by poor inputs, resource scarcity, and a lack of systematic curriculum review. This perspective is bolstered by Adotey et al. (2017), who note that establishing QA systems does not inherently guarantee quality. Adotey et al. further argue that a lack of understanding among staff and students regarding these systems often hinders their implementation, suggesting that educational quality is influenced by a complex web of human and institutional factors rather than just policy.

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2.6.2| The Shift Toward 21st-Century Skills and Industry 4.0

As the industry transitions into a digital-first era, the demand for specialised competencies has intensified. González-Pérez and Ramírez-Montoya (2022) emphasise the need for "Education 4.0" components, identifying a critical lack of frameworks that support teachers in delivering character-based and meta-learning skills. In agreement, Imam et al. (2023) identify creative and critical thinking as the most vital skills for modern students, asserting that traditional education models must reorient to ensure graduate employability. While Imam et al. (2023) focus on the necessity of these skills, Mutohhari et al. (2021) provide a nuanced contrast by examining the practical application of these competencies in vocational settings. Their findings suggest that while skills like digital literacy and problem-solving are often theoretically identified as "easy" to grasp, a significant perception gap exists between teachers and students, particularly regarding communication effectiveness.

2.6.3| Sustainability and Pedagogical Innovation

Beyond technical skills, the literature increasingly prioritises ethical and structural reforms. Murzyn-Kupisz and Hołuj (2021) explore this through the lens of sustainability, arguing that designers must lead the way in environmental responsibility. However, they acknowledge significant barriers, such as low consumer awareness and insufficient public support, which complicate the integration of sustainability into fashion curricula. To address these complexities, scholars propose radical shifts in teaching models. Bednall (2022) advocates for the "Owner-Learner Model" (OLM), which encourages individual ownership and co-creation between students and educators. This model reflects a progression from rigid, top-down instruction toward the flexible, industry-aligned curricula suggested by Appiah (2023). Appiah's research provides empirical evidence that work-based learning (WBL) serves as a vital bridge, significantly improving student preparedness by aligning institutional training with the actual demands of the fashion workforce. The primary gaps revealed by analysing existing research in relation to the stated objectives highlight a critical need for context-specific investigation into Ghanaian tertiary fashion education. While studies identify broad issues like quality assurance, 21st-century skill development, and digital integration, they lack the specific contextualization required for Ghana, failing to address the practical application of these concepts within the local fashion industry. Crucially, the crucial aspects of diversity, inclusion, and the integrated implementation of digital technologies alongside sustainability and work-based learning are largely overlooked. Furthermore, the studies lack detailed implementation strategies for policy recommendations and curriculum enhancements, and fail to identify the precise digital skills required or address the essential need for teacher training to support these changes. Therefore, a study focusing on Ghana's unique challenges, practical applications, and actionable solutions is essential to bridge these critical gaps.

3 | METHODOLOGY

3.1| Research Design

This study employed a Concurrent Triangulation Mixed-Methods design, which allows for the simultaneous collection and analysis of quantitative and qualitative data. This approach was selected to provide a more holistic understanding of the Ghanaian fashion education landscape than a single method could offer. By integrating broad statistical trends with deep, descriptive insights, the research achieves a higher degree of validity through the cross-verification of findings.

3.2| Population and Sampling

The study population was lecturers, students and technicians in tertiary institutions in Ghana. The research targeted key stakeholders within the fashion education, specifically from selected Public Universities in the Greater Accra, Central, and Ashanti regions of Ghana. These institutions represent the urban-industrial nexus of Ghana. The study utilised a combined non-probability sampling approach. Convenience sampling was applied to the student population (n=84) to ensure a high response rate among those currently immersed in the curriculum. Purposive sampling was used to recruit a specialised cohort of "key informants" (n=8), including lecturers and technicians. While the non-student sample size is small for robust inferential statistics, their participation was prioritised to achieve data adequacy through expert triangulation, providing the technical context necessary to interpret student perceptions.

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3.3| Data Collection and Instrumentation

Data were gathered via an online survey (Google Forms) and supplemented by follow-up telephone interviews for specific qualitative clarification. The survey was a self-developed instrument based on 21st-century competency frameworks. To ensure content validity, the instrument was reviewed by two senior fashion educators and an industry expert. A pilot study was conducted with 10 participants (not included in the final sample) to refine question clarity. Internal consistency for the Likert-scale items was measured using Cronbach's Alpha, yielding a coefficient of 0.84, indicating high reliability. The quantitative section utilised a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Specific items focused on curriculum relevance and sustainability. To address social desirability bias, responses were kept anonymous. Potential non-response bias was monitored by comparing early and late respondents, with no significant differences found. The qualitative section was carried out via telephone interview with fashion lecturers and technicians, which was recorded for further analysis. Data saturation was achieved when consistent patterns regarding resource scarcity and digital deficits emerged in responses.

3.4| Data Analysis

The study utilised a robust analytical framework to ensure the rigorous integration of findings. For the quantitative analysis, data were input into SPSS (Version 28) and analysed to generate descriptive statistics (mean and standard deviation) that summarised the overall perceptions. An independent samples t-test was performed to compare mean scores between students and non-students, identifying significant perceptual gaps in Industry 4.0 readiness. The qualitative analysis, which yielded responses from open-ended questions during telephone interviews, was analysed thematically. The process followed a rigorous six-phase coding procedure: familiarisation, generating initial codes, searching for themes, reviewing themes, defining themes, and producing the report (Braun & Clarke, 2006). Following the six-phase thematic analysis procedure, the data were rigorously coded. To ensure inter-rater reliability, a second researcher reviewed the coding framework, and discrepancies were resolved through discussion until consensus was reached. True integration (Triangulation) occurred during the discussion phase, where qualitative quotes (attributed by role, e.g., Lecturer-01 or Student-05) were used to explain the reason behind the statistical trends. This ensures that the data sources are not merely presented in parallel but are fundamentally synthesised to provide a comprehensive answer to the research questions.

3.5| Ethical Considerations

The conduct of this research was governed by strict adherence to established ethical protocols to ensure the protection of participants and the integrity of the data. Prior to the commencement of the study, all respondents - including students, lecturers, and technical staff - were provided with comprehensive information regarding the study's purpose, the voluntary nature of their participation, and their right to withdraw at any stage without consequence. Informed consent was obtained digitally through the survey instrument and verbally during telephone interviews, ensuring that all participants were fully aware of the research objectives. To safeguard privacy and encourage honest feedback regarding institutional challenges, a rigorous anonymisation process was implemented; personal identifiers were removed, and participants were assigned alphanumeric codes, such as LT-01 or ST-05, for all reporting and thematic analysis. Furthermore, data security was maintained through the use of encrypted, password-protected storage accessible only to the researcher, effectively mitigating risks associated with data breaches. By maintaining transparency and neutralising power dynamics between students and faculty, the study ensured that the reported findings were an authentic reflection of the current state of fashion education in Ghana, free from undue influence or fabrication.

4 | RESULTS

As established, this study sought to evaluate the current state and effectiveness of fashion education in Ghanaian tertiary institutions to determine its alignment with 21st-century industry demands, promote sustainable development, and provide actionable recommendations for curriculum enhancement to foster economic growth. The following analysis addresses each specific objective, drawing insights from both descriptive and inferential statistics derived from the survey data.

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4.1| Assessment of Curriculum Alignment with Industry Demands

The data reveal a generally positive perception of how well current curricula reflect the needs of the Ghanaian fashion market.

Descriptive Analysis: The overall mean score for this objective reached 4.18 (SD = 0.68). This indicates that respondents "Agree" that the training is reasonably effective in preparing graduates for global industry standards.

Inferential Analysis: An Independent Samples t-test was conducted to compare perceptions between students and non-students. A statistically significant difference was found $t(90) = 2.28$, $p = 0.025$). Students reported a higher mean agreement M = 4.19) compared to the faculty/staff group (M = 4.00). This suggests that while students feel relatively confident in the curriculum, educators - perhaps possessing deeper industry foresight - are more cautious in their assessment of institutional alignment.

4.2| Integration of Education for Sustainable Development (ESD)

Sustainability remains a burgeoning area within Ghanaian fashion education, as evidenced by a moderate agreement score.

Descriptive Analysis: The overall mean for ESD integration was 3.93 (SD = 0.82). While leaning toward agreement, the higher standard deviation suggests a lack of uniformity in how sustainability and ethical production are taught across different institutions.

Inferential Analysis: No statistically significant difference was observed between groups ($p = 0.534$). Students (M = 3.95) and non-students (M = 3.50) share a similar moderate view. However, the lower mean score from non-students indicates a pedagogical recognition that ESD principles are not yet fully systemic or deeply embedded into the technical modules.

4.3| Identification of Skill Deficits and Industry Gaps

This objective identifies critical areas where institutional training lags behind workforce requirements.

Descriptive Analysis: The combined mean for perceived skill gaps (Q12 & Q13) was 3.98 (SD = 1.03). High scores here represent a strong consensus that graduates lack sufficient practical skills. Interaction between institutions and professionals (Q14) scored lower at 3.83 (SD = 0.96), highlighting a significant need for improved engagement. Notably, the benefit of increased collaboration (Q16) received the highest agreement of the study (M = 4.54, SD = 0.62).

Inferential Analysis: While there was no significant difference in the perception of skill gaps ($p = 0.881$), a highly significant difference appeared regarding the benefits of collaboration ($p = 0.000$). Non-students (faculty/technicians) registered a perfect mean of 5.00, indicating unanimous agreement that industry-academia linkages are the most critical solution to current deficits.

4.4| Incorporation of Digital Technologies

Digital integration emerged as the weakest pillar of the current fashion education framework.

Descriptive Analysis: This area received the lowest overall score of 3.53 (SD = 1.08). This score, sitting near the "Neutral" threshold, suggests that 3D design software and online platforms are likely under-resourced or inaccessible to a significant portion of the sample.

Inferential Analysis: The comparison between students (M = 3.53) and non-students (M = 3.75) yielded no significant difference ($p = 0.529$). Both cohorts agree that the incorporation of Industry 4.0 tools is insufficient, identifying a clear area for urgent policy intervention and resource allocation.

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4.5| Diversity, Inclusion, and Global Influences

The curriculum appears most successful in its cultural and social dimensions.

Descriptive Analysis: The overall mean was 4.02 (SD = 0.67). Respondents generally agree that Ghanaian fashion education successfully integrates diverse cultural influences and prepares students for a globalised market.

Inferential Analysis: There was near-perfect parity between students (M = 4.02) and non-students (M = 4.00), with a p-value of 0.809. This suggests a unified perception that the social and cultural aspects of the curriculum are well-established.

Table 1. Summary of Descriptive and Inferential Statistics (N=92)

Objective / Analysis Area	Overall Mean (M)	Std. Dev (SD)	Student Mean	Non-Student Mean	P-value (2-tailed)
Curriculum vs. Industry Demands	4.18	0.68	4.19	4.00	**0.025***
ESD/Sustainability Integration	3.93	0.82	3.95	3.50	0.534
Perceived Skill Gaps	3.98	1.03	3.99	3.75	0.881
Increased Collab. Benefit	4.54	0.62	4.53	5.00	**0.000***
Digital Technology Integration	3.53	1.08	3.53	3.75	0.529
Diversity & Global Influence	4.02	0.67	4.02	4.00	0.809

**Statistically significant at the 0.05 level.*

4.6| Qualitative Analysis

This section presents the findings from the qualitative component of the study, derived from open-ended survey questions and semi-structured telephone interviews. To maintain transparency and address reviewer requirements for proper attribution, excerpts are labelled by participant roles: ST (Student), LT (Lecturer), and TN (Technician/Research Assistant).

4.6.1| Theme 1: 21st-Century Skill Requirements

The analysis reveals a powerful consensus on the skills required to transition Ghana's fashion industry from a traditional craft-based sector to a globally competitive one. A primary necessity identified is the integration of high-level technology and modern construction techniques. One facilitator emphasised that the industry requires a "*quality education that is tailored specifically to the needs of the 21st century*," explicitly naming "*pattern adaptation, freehand cutting, and CAD" as non-negotiable competencies* (LT-02). This highlights a collective desire to move beyond manual methods that currently bottleneck production speed. Furthermore, the data underscores a critical deficit in original innovation and professional finishing. Participants noted a prevalent industry culture where "*we like copying or imitating other people's work*," resulting in products that lack a unique value proposition (ST-14). This is compounded by a lack of technical "*finishing*" skills, which serves as a barrier to export. As one technician noted, "*The industry lacks finishing techniques; this is our major problem. We are not able to finish our products to meet international standards and this delimits our ability to compete on the international market*" (TN-01). Finally, marketing skills were highlighted as the essential "bridge" to the global world, ensuring that Ghanaian fashion moves beyond local consumption into the digital global marketplace (ST-45).

4.6.2| Theme 2: Systemic Challenges Facing Fashion Education

The qualitative data identifies deep-seated systemic challenges that hinder the progress of fashion education in Ghana, with the "*knowledge level of trainers*" being the most significant hurdle. Respondents were candid about the pedagogical limitations of current staff, with one stating, "*The knowledge level is challenging because what we know is what we impact*" (LT-04). There is a perceived lack of enthusiasm among some veteran instructors to adopt new digital tools, which stagnates the learning environment.

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DOI: https://doi.org/10.35738/ftr.v7.2025.36

This human resource gap is further exacerbated by a severe lack of modern infrastructure. Infrastructure deficiencies are perhaps the most visible challenge, with a stark contrast between institutional resources and global industry standards. Participants lamented the state of existing facilities: "*The Labs are under-resourced. Students still use the hand sewing machine, whereas in advanced countries they use digitalised industrial machines and computerised technology*" (TN-03). This lack of "requisite resources" extends to basics such as "*dummies for draping*," which are often missing or in disrepair. These physical limitations are worsened by the "*large class size*" phenomenon in public universities, where one instructor may be responsible for a practical class of 150 students, making individual technical guidance nearly impossible (LT-01).

4.6.3| Theme 3: Suggestions for Educational Reform and Growth

The suggestions for improvement provided by participants serve as a direct corrective to the identified gaps, focusing on digital immersion and faculty retooling. The most prominent recommendation is the formal incorporation of "Information Technology" into the fashion curriculum. A contributor urged the sector to move toward the "*IT level, inculcating digital technology and other software... we even need to expose our students to AI (Artificial Intelligence)*" (ST-09). This shift is seen as the only way to ensure Ghanaian graduates remain relevant in a market increasingly dominated by digital design and e-commerce. In addition to technology, there is a call for a fundamental shift in technical assessment, prioritising "professional finishing" and "faculty upgrades." A facilitator observed that while students possess high creative energy, their "*finishing was poor,"* suggesting that curricula should mandate the "*application of the right finishes to every product made*" (TN-02). Crucially, the data suggests that reform must start with the educators themselves. One respondent noted that "*trainer/facilitators need to update and upgrade their skills to meet current global needs*," as most were trained in "*the manual way of doing things*" (LT-03). Regular workshops and international conferences were suggested as vital mechanisms for this professional development.

4.6.4| Theme 4: Opportunities for Growth and Global Integration

Despite the systemic challenges, the data highlights several promising avenues for growth, particularly through digital collaboration and industry linkages. The rise of the internet is viewed as a transformative opportunity: "*Students have the opportunity to collaborate nowadays... there are opportunities for exchange programs within local and international communities*" (ST-22). These digital and physical exchanges are seen as a way to expose students to "*tools, equipment, and facilities that may not be available in the local Clothing Lab*" (ST-61). There is also a strong sentiment that fashion education remains a highly viable path for economic empowerment and job creation. Industry players noted that the sector offers "*first-hand employment" for graduates who can master the 21st-century skills outlined in this study"* (LT-05). Beyond corporate employment, the "*entrepreneurial opportunity" is seen as a social safety net, as "clothing is a basic need of man,*" ensuring that even those who do not join large firms can meet their personal needs and contribute to the local economy through small-scale innovation.

4.6.5| Theme 5: Specific Technologies for Curriculum Integration

The analysis concludes with a specific technological roadmap designed to modernise the practical curriculum. The most frequently cited technology is Computer-Aided Design (CAD), which respondents view as the modern standard for pattern drafting and garment design. One expert expressed, "*It is time, especially when it comes to fashion designing and pattern drafting... the use of CAD is essential*" (LT-02). This is seen as part of a larger move toward "*3D and simulation programmes*" that allow students to visualise garments before a single piece of fabric is cut. Additionally, the transition from "hand-sewing machines" to "*digital and industrial sewing machines*" is prioritised. Participants noted that industrial machines are "*able to perform multiple tasks*" and produce a level of precision that manual machines cannot match (TN-01). The integration of modern "*machine attachments and feet*" was also highlighted as a critical but often overlooked detail that facilitates "*holding down hems professionally*" (TN-03). Tools such as "*eyelet machines, beading machines, and glue guns*" were identified as essential for achieving the high-quality finishing required for international competitiveness.

DOI: https://doi.org/10.35738/ftr.v7.2025.36

4.7| Triangulation of Findings

This chapter synthesises the quantitative results and qualitative insights to provide a comprehensive evaluation of fashion education in Ghana. By triangulating the statistical data (N=92) with the thematic excerpts from students (ST), lecturers (LT), and technicians (TN), the study identifies critical areas of strategic alignment and misalignment.

4.7.1| The Paradox of Curriculum Alignment

The quantitative analysis revealed a high mean agreement of 4.18 regarding curriculum alignment. However, a significant perceptual gap was identified between students (M=4.19) and non-students (M=4.00, p=0.025). The qualitative data explains this "optimism gap". Students often perceive the curriculum as aligned because it meets their immediate learning expectations, whereas faculty members, who possess greater industry foresight, identify deeper deficiencies. As LT-04 noted, "*The knowledge level is challenging because what we know is what we impact*." This suggests that while the curriculum appears robust on paper, its delivery is limited by the "manual way of doing things" that many trainers still adhere to.

4.7.2| Digital Deficits and the Industry 4.0 Gap

The lowest quantitative score in the study (3.53) was recorded for the incorporation of digital technologies. This statistical "weak link" is vividly reflected in the qualitative themes, where respondents lamented the continued use of "*hand sewing machines*" while the global industry has moved toward "*digitalised industrial machines*" (TN-03). There is a unified consensus (p=0.529) across both groups that digital integration is insufficient. The qualitative "roadmap" provided by participants - specifically the demand for CAD and 3D simulation - highlights exactly where the curriculum must evolve to bridge this gap.

4.7.3| The "Finishing" Crisis and Skill Gaps

A critical finding emerged from the synthesis of Objective 3 (Skill Gaps). While both groups agreed that gaps exist (M=3.98), a highly significant difference (p=0.000) was found regarding the benefit of collaboration. The qualitative analysis provides the "why": faculty and technicians (TN-01) identify "*finishing techniques*" as the primary reason Ghanaian products cannot compete internationally. The perfect mean score of 5.00 from non-students regarding industry collaboration underscores a desperate professional realisation that institutions cannot solve the "finishing crisis" without direct industry immersion and work-based learning (WBL).

4.7.4| Sustainability (ESD) as a Moderate Priority

The moderate mean score for ESD integration (3.93) indicates that while sustainability is present, it is not yet a core technical competency. The qualitative data reveal that sustainability is often discussed theoretically rather than applied through circular economy techniques or "*right finishes*" (TN-02). The lack of a significant difference between groups (p=0.534) suggests a shared, but somewhat passive, understanding of environmental responsibility that has yet to translate into a competitive industry advantage.

4.7.5| Cultural Strength vs. Technological Weakness

The most successful area of the Ghanaian fashion curriculum is its integration of Diversity and Global Influences (M=4.02). Quantitative parity between groups (p=0.809) confirms that institutions excel at teaching cultural sensitivity and local design identity. This is supported by qualitative claims that the industry is a "*highly profitable venture*" rooted in local needs (LT-05). However, the discussion suggests that while the "soul" of Ghanaian fashion education is strong, its "engine" (the technological and technical finishing) requires urgent modernisation to sustain this cultural success in a globalised market.

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5 | DISCUSSION

5.1| The Paradox of Curriculum Alignment and Industry Readiness

The quantitative analysis revealed a generally positive perception of curriculum alignment, yet a significant perceptual gap exists between cohorts. The qualitative data explains this "optimism gap"; while students perceive the curriculum as aligned because it meets their current academic milestones, faculty members - possessing greater industry foresight - identify systemic deficiencies. As LT-04 noted, the knowledge impact is limited by the knowledge level of the trainers themselves. This finding aligns with Adotey et al. (2017), who argues that the existence of quality systems does not guarantee quality output if the implementers lack a deep understanding of evolving standards. Furthermore, the reliance on traditional methods reported by LT-03 corroborates the concerns of Afeti and Adubra (2012) regarding the rigidity of formal fashion education. The data suggest that while the curriculum appears robust on paper, its execution is hindered by what Pongo et al. (2015) described as poor educational inputs, specifically the reliance on outdated pedagogical techniques.

5.2| Digital Deficits and the "Education 4.0" Gap

The incorporation of digital technologies emerged as the most significant weakness in the Ghanaian HFE framework, receiving the lowest agreement scores across all objectives. This statistical finding is mirrored in the qualitative themes, where respondents lamented the continued use of manual hand-sewing machines while global competitors utilise digitalised industrial workstations. There is a unified consensus across both cohorts that digital integration is currently insufficient. These results provide empirical weight to the arguments of González-Pérez and Ramírez-Montoya (2022), who assert that the integration of Education 4.0 components remains inadequate in modern landscapes. The qualitative roadmap suggested by participants - specifically the urgent demand for CAD and 3D simulation software - identifies the exact technological leap required to satisfy the digital strategies demanded by the 21st-century market, as noted by Maarman (2023).

5.3| The "Finishing" Crisis and the Necessity of Collaboration

A critical finding emerged regarding skill gaps, where a stark difference in perception was observed concerning the benefits of industry collaboration. While students acknowledge its importance, faculty and technicians registered unanimous, absolute agreement on its necessity. The qualitative data explains this urgency: TN-01 identified substandard finishing techniques as the primary reason Ghanaian products struggle to compete internationally. This underscores the skill deficit highlighted by Afeti and Adubra (2012) and validates Appiah's (2023) assertion that Work-Based Learning (WBL) is the most effective bridge between institutional training and industry demands. The overwhelming agreement among faculty suggests that the "finishing crisis" cannot be solved within the classroom alone; it requires the real-world experience and industry-academia linkages that Pongo et al. (2015) and Appiah (2023) advocate for.

5.4| Sustainability (ESD) and Ethical Stagnation

The integration of Education for Sustainable Development (ESD) remains a burgeoning area, perceived with moderate success but lacking deep technical application. The qualitative data reveal that sustainability is often discussed theoretically rather than being applied through circular economy techniques or specific technical finishes. The lack of a significant difference between groups suggests a shared, but somewhat passive, understanding of environmental responsibility. This moderate level of integration reflects the findings of Murzyn-Kupisz and Hołuj (2021), who noted that while sustainability is recognised, it often lacks a multidimensional approach in the curriculum. The results suggest that Ghanaian fashion education is in the early stages of the systemic change (Owusu-Agyeman, 2021), yet to move from general awareness to the practical ethical practices required for sustainable development.

5.5| Cultural Strength vs. Technological Fragility

The most successful area of the Ghanaian fashion curriculum is its integration of diversity and global influences. Parity between groups confirms that institutions excel at teaching cultural sensitivity and local design identity. Qualitative claims that the fashion industry is a highly profitable venture rooted in local needs further support this perceived strength. However, the discussion suggests a strategic misalignment: while the internal strength of "cultural identity" is high, the internal weakness of "technological incapacity" prevents institutions from fully exploiting global market opportunities. This confirms the diagnostic power of the Design School Model - demonstrating that cultural richness alone

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cannot compensate for the 21st-century digital literacy and critical thinking gaps identified by Imam et al. (2023) and Mutohhari et al. (2021).

6 | IMPLICATIONS OF THE STUDY

6.1| Research Implications

The findings of this study contribute significantly to the theoretical understanding of vocational and creative arts education in developing economies. By applying the Design School Model of strategic management, this research empirically validates that a successful educational strategy depends on the precise alignment of internal capabilities with external industry demands. The study demonstrates that while Ghanaian institutions possess an internal strength in cultural and diverse design literacy, this asset is currently "trapped" by internal weaknesses in technological infrastructure. This provides a theoretical framework for future researchers to analyse the "readiness gap" in other vocational sectors, shifting the academic focus from mere curriculum content to the structural capacity for delivery. Furthermore, the discovery of a statistically significant "optimism gap" between students and faculty introduces an important consideration for educational research methodology. It suggests that student satisfaction surveys in vocational settings may suffer from a "perceived competence" bias if the students have not been exposed to global industry benchmarks. Researchers are therefore encouraged to utilise the multi-perspective triangulation approach used here to ensure that "quality" is measured not just by student sentiment, but by expert and industry-informed criteria. This adds a layer of rigour to the discourse on Quality Assurance (QA) in Higher Fashion Education (HFE). Finally, this research redefines the role of Education for Sustainable Development (ESD) within the Ghanaian fashion context. It moves the academic conversation from a general social responsibility framework toward a technical, solution-oriented research niche. The study implies that future research should focus on "Localised Circularity" - investigating how specific Ghanaian vocational skills, like traditional craftsmanship, can be digitally scaled to solve the environmental challenges posed by the second-hand clothing trade. This creates a new pathway for research into indigenous sustainable technologies within the fashion sector.

6.2| Practical Implications

For policymakers and government agencies, the study suggests that the current "one-size-fits-all" funding model for technical universities is inadequate to meet the high-tech requirements of the modern fashion industry. There is a practical need for specialised "Creative Technology Grants" to facilitate the acquisition of CAD software and industrial-grade machinery. Without targeted government intervention in digital infrastructure, national policies aimed at boosting garment exports and creating jobs through the fashion sector will likely fall short of their targets. Government agencies must therefore view fashion education as a high-tech industrial priority rather than a traditional craft. For institutional heads and curriculum developers, the study necessitates a shift toward a Competency-Based Training (CBT) model that prioritises industrial precision over purely artistic expression. The identified "finishing crisis" implies that institutional marking rubrics and assessment criteria must be restructured to penalise substandard construction. Practically, this means that labs must be transformed into "Teaching Factories" where the environment simulates the speed, technology, and quality control of a professional production floor. This change is essential to ensuring that graduates are "market-ready" upon completion. The implications for faculty development are equally critical, suggesting that the "trainer effect" is currently a bottleneck to progress. Since many lecturers were trained in manual methods, there is a practical requirement for institutionalised "digital retooling" programmes. Faculty members should be encouraged, or even mandated, to undergo industrial sabbatical programmes to refresh their technical knowledge. This would ensure that the person at the front of the classroom is as technologically savvy as the global industry requires, effectively bridging the knowledge gap between the "manual past" and the "digital future." Lastly, for the fashion industry itself, the findings imply that designers and manufacturers must move from being passive critics of education to active co-creators. The unanimous faculty agreement on the benefits of collaboration suggests an "open door" for industry-led masterclasses and structured internship programmes. Practically, industry stakeholders should participate in curriculum advisory boards to ensure the talent pipeline is specifically tailored to their operational needs. This collaborative approach turns the "skills gap" into a shared opportunity for innovation and national economic growth.

DOI: https://doi.org/10.35738/ftr.v7.2025.36

7 | LIMITATIONS OF THE STUDY

While this study provides a critical diagnosis of the Ghanaian fashion education sector, it is important to acknowledge certain constraints that may affect the generalizability of the findings. These limitations, however, offer fertile ground for subsequent academic inquiry. One primary limitation of this research is the sample size and composition, particularly regarding the non-student cohort. While the total sample (N=92) provided sufficient data for an exploratory mixed-methods analysis, the small number of lecturers and technical staff (n=8) limited the depth of inferential statistical testing for that specific group. Although their "key informant" status provided high-validity qualitative depth, a larger faculty sample across more regions would allow for a more robust comparison of institutional performance between public and private sectors. Another limitation concerns the geographic scope of the study. The research focused primarily on tertiary institutions within the Greater Accra and Ashanti regions. While these areas are undoubtedly the industrial hubs of Ghana's fashion economy, the exclusion of institutions in the Northern or Western regions may have overlooked unique regional challenges, such as differences in resource allocation or the integration of traditional indigenous textile techniques. Furthermore, the reliance on self-reported data via online surveys introduces the potential for social desirability bias, where respondents might overstate their alignment with modern trends like sustainability.

8 | CONCLUSION AND FUTURE STUDIES

The study found a generally positive perception of curriculum alignment, yet a significant "optimism gap" exists between students and faculty. While students often feel the curriculum is adequate for their immediate academic needs, fashion educators - who possess deeper industry foresight - identified significant lapses in how theoretical knowledge is translated into 21st-century professional standards. This suggests that while the curriculum appears robust on paper, its implementation often fails to keep pace with the rapid industrial shifts of the global fashion market. The integration of sustainability remains in a burgeoning, primarily theoretical stage. While respondents acknowledged the importance of ethical production and environmental responsibility, the data reveal a lack of deep, technical application. Sustainability is currently treated as a standalone "awareness" topic rather than being woven into core technical modules like zero-waste pattern drafting or sustainable textile sourcing. Both cohorts agree that while the "spirit" of ESD is present, the practical "tools" for sustainable innovation are largely absent from daily classroom activities.

A critical finding of this study is the "finishing crisis" - a profound gap in the technical garment construction and professional finishing required for international competitiveness. Respondents highlighted a major deficit in "industrial-grade" technical skills, noting that graduates often lack the precision needed for large-scale manufacturing. There is a near-unanimous consensus among faculty that this gap can only be bridged through mandatory industry-academia collaboration and structured work-based learning, as current lab environments do not simulate high-pressure industrial standards. Digital integration emerged as the most significant weakness in the Ghanaian fashion education framework. The study found a severe lack of access to essential 21st-century tools such as Computer-Aided Design (CAD), 3D simulation software, and digital manufacturing equipment. This "digital divide" is compounded by a lack of faculty readiness, with many trainers reporting that they are still predominantly reliant on manual methods. This finding identifies an urgent need for an "Education 4.0" pivot to prevent Ghanaian graduates from being excluded from the global digital design economy. The most successful objective of current fashion education in Ghana is the integration of cultural diversity and global design influences. The study found that institutions excel at teaching students to synthesize Ghanaian heritage (such as traditional textiles and motifs) with contemporary global trends. This high level of cultural literacy ensures that graduates possess a strong, unique design identity. However, the findings suggest that while the "cultural engine" is strong, it is currently limited by the technological and technical "infrastructure" gaps identified in the other objectives.

Given the identified technological gap, future studies should conduct a longitudinal assessment of the impact of digital design tools on graduate employability in Ghana. As institutions begin to adopt CAD and 3D simulation software, research is needed to track whether these specific technical interventions lead to a measurable increase in export-ready production and a reduction in the identified "finishing crisis." This would provide the longitudinal evidence required for long-term policy shifts in TVET funding. There is also a significant opportunity for research into Indigenous Sustainable Technologies. While this study

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highlighted that sustainability (ESD) is currently theoretical, future research could explore how traditional Ghanaian craftsmanship, such as kente weaving or adinkra printing, can be technologically "scaled" using circular economy models. Investigating how to transform the environmental burden of second-hand clothing waste into a localised industrial resource through "technical upcycling" would be a groundbreaking area for Ghanaian fashion scholars. Finally, a comparative regional analysis between Ghana and other emerging African fashion hubs, such as Nigeria or South Africa, would be highly beneficial. Comparing the curricula and industry-academia linkage models of these nations could reveal "best practice" frameworks for the West African sub-region. Such a study would assist in developing a harmonised continental standard for fashion education, aligning with the goals of the African Continental Free Trade Area (AfCFTA).

8.1| Recommendations

To address the strategic misalignment, technological gaps, and technical deficits identified in this study, the following recommendations are proposed. These actions aim to modernise fashion education in Ghana by fostering high-level digital literacy, technical precision, and sustainable innovation.

Strategic Curriculum Modernisation and Industry Alignment: Educational institutions must transition from traditional, craft-based pedagogy to a Competency-Based Training (CBT) framework that mirrors 21st-century global standards. Curriculum developers should initiate immediate reviews of current modules to prioritise technical finishing, industrial pattern-making, and fashion business management. This shift ensures that student academic milestones are synchronised with actual industry requirements for export-quality production, effectively bridging the "optimism gap" identified in the research. By aligning training with the "Industry-Academia Collaboration Theory," institutions can maintain relevance through continuous feedback loops with active practitioners.

Radical Digital Pivot (Education 4.0): The government and institutional heads should prioritise the "digitalisation" of fashion labs to move beyond manual garment construction. Direct investment is required for Computer-Aided Design (CAD) software licenses, such as CLO3D or Optitex, alongside hardware like digital pattern cutters and 3D body scanners. Furthermore, institutions must mandate digital upskilling for trainers, transitioning facilitators from "manual-only" instruction to digital-physical hybrid teaching. This pivot is essential to bridge the digital infrastructure bottleneck and enable Ghanaian graduates to participate in the global virtual fashion economy.

Institutionalising Industry-Academia Linkages: To resolve the identified "finishing crisis," practical training must move beyond the classroom and into industrial settings. Tertiary institutions should establish mandatory Work-Integrated Learning (WIL) programmes where students spend a significant portion of their final year in industrial attachments or specialised "Teaching Factories." To support this, the government should introduce tax incentives or grants for fashion houses that host student-incubators or participate in curriculum advisory boards. Such collaborations provide the real-world rigor needed to master professional finishing and large-scale production efficiency that cannot be simulated in overcrowded school labs.

Technical Integration of Sustainability (ESD): Sustainability must evolve from a theoretical awareness topic into a technical design discipline within the fashion curriculum. This involves incorporating circular design principles - such as zero-waste pattern cutting and the upcycling of imported second-hand clothing - into core technical modules. Schools should also partner with environmental agencies to create "Upcycling Laboratories" where students learn to transform textile waste into high-value exports. This approach moves the conversation from general social responsibility to practical, technical innovation, turning a national environmental challenge into a competitive economic advantage.

Leveraging Cultural Heritage through Modern Technology: While the cultural soul of Ghana's fashion education is a documented strength, it must be supported by modern technical engines to achieve global reach. Educators should integrate digital design tools to preserve and scale traditional motifs, such as teaching students to use digital textile printers for applying traditional symbols to sustainable fabrics. This ensures that Ghana's unique design identity is not just preserved as a craft but is made "export-ready" through high-quality construction and digital scalability. This fusion of heritage and technology will allow the Ghanaian fashion industry to maintain its cultural uniqueness while meeting global industrial standards.

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ACKNOWLEDGMENTS

The authors would like to acknowledge all study participants who availed themselves of the opportunity to be interviewed or to participate in the survey.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as datasets generated or analysed during the current study are qualitative in nature, hence anonymity is maintained.

CONFLICT OF INTEREST STATEMENT

The author declares no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used Quillbot, Microsoft Excel, SPSS, and Mendeley in order to check grammar, paraphrase and summarise literature, improve clarity of expression, retrieve and analyse data and organise references. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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DOI: https://doi.org/10.35738/ftr.v7.2025.36

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