Journal of Technology Education and Applied Sciences

USTED Press

ISSN: 3093-4796 (Online) Journal homepage: https://journal.aamusted.edu.gh/index.php/jteas/index

RESEARCH ARTICLE

Impact of Industrial Attachment on Skills Development of Art and Design Students

Emmanuel Mensah[1*], Cyril Etornam Adala[2], Andrew Adu Asabere[3], Amenyo Dzikunu-Bansah[4], Nicholas Addo Tetteh[5]

[1]Department of Creative Art and Technology, University for Development Studies, Tamale -Ghana
[2]Department of Industrial Art, Kwame Nkrumah University of Science and Technology, Kumasi – Ghana
[3]Department of Fashion Design and Textiles Education, University of Skills Training and Entrepreneurial Development, Kumasi – Ghana
[4]Department of Industrial Art, Bolgatanga Technical University, Bolgatanga – Ghana
[5]Department of Industrial Art, Dr. Hilla Limann Technical University, Wa – Ghana
*Corresponding Author: [emmanuelmensah1983@gmail.com]

To cite this article: Mensah, E., Adala, C. E., Asabere, A. A., Dzikunu-Bansah, A., & Tetteh, N. A. (2026). Impact of industrial attachment on skills development of art and design students. Journal of Technology Education and Applied Sciences, 1(1), 46–61. https://doi.org/10.64922/jteas.v1i1.91

ABSTRACT

This study investigates the impact of industrial attachment on the skills development of art and design students in Ghana, focusing on participants from four universities: Kwame Nkrumah University of Science and Technology (KNUST), University of Skills Training and Entrepreneurial Development (USTED), Bolgatanga Technical University (BTU), and Dr. Hilla Limann Technical University (DHLTU). Guided by Kolb's Experiential Learning Theory and Dreyfus and Dreyfus's Skills Formation Theory, the research employed a descriptive survey design, engaging 92 third- and final-year students through online questionnaires using convenience sampling. Both quantitative and qualitative data were analysed using descriptive statistics and thematic analysis. The survey instrument demonstrated acceptable reliability (Cronbach's alpha = 0.78). Findings indicate that industrial attachment is associated with improvements in technical competence, creativity, time management, independent working abilities, and professional confidence. Over 90% of students reported gains in practical skills, exposure to industry tools, and the integration of theoretical knowledge with practice. Attachments also supported teamwork, communication, and material management competencies. Challenges included limited access to modern tools, inadequate supervision, time pressures, financial constraints, and difficulties adapting to workplace demands. While 98.9% endorsed the programme's value, 21.7% deemed the duration insufficient for mastering complex skills. Although this study did not measure labour market outcomes directly, results suggest that industrial attachment is likely to enhance employability by bridging academic learning and professional practice. Recommendations include extending attachment duration, strengthening supervision and mentorship, improving access to modern equipment, and fostering stronger academia-industry partnerships to optimise student outcomes and align art and design education with evolving industry needs.

KEYWORDS

Industrial Attachment, Skills Development, Art and Design Education, Employability, Experiential Learning

Publication History

Received: 19 November 2025
Revised: 12 March 2026
Accepted: 24 June 2026
Available online: 30 July 2026

Introduction

Industrial attachment programmes act as a vital link between theoretical knowledge and practical experience, especially for students pursuing art and design fields. These programmes aim to immerse students in authentic work settings, enabling them to gain practical skills that enhance their academic education. As noted by

Nunfam et al. (2022) and Boateng and Ofori-Sarpong (2002), industrial attachment allows design students to cultivate abilities such as computer-aided design, conceptualization, and 3D modelling, which are crucial for their career advancement but are frequently insufficiently addressed in academic programmes. This hands-on learning experience also promotes adaptability and equips students for the challenges of the creative industries.

The incorporation of industrial attachment into higher education for art and design has been shown to significantly improve employability by providing students with pertinent and contemporary industry skills. Billett (2011) emphasises that, despite obstacles related to inadequate collaboration between educational institutions and industries, these programmes offer essential exposure to practical workflows and mentorship opportunities, thereby helping to reconcile theoretical understanding with industrial requirements. This practical exposure is particularly vital in creative sectors such as jewellery and metalsmithing, graphic design, and fashion design, where managing client expectations and production schedules are crucial.

Nevertheless, while industrial attachments offer substantial benefits, several challenges remain in fully realizing their potential. Research has identified problems such as limited placement options, outdated pedagogical methods, and insufficient oversight during attachments, which hinder the overall skill development process (Akyeampong, 2010). These issues not only impact the quality of education but also limit access to relevant industrial experiences, particularly in fast-changing industries that require up-to-date technical skills.

To address these gaps, stronger partnerships between universities and industry players are essential (Ayarkwa et al., 2012). Moreover, the relevance of skills taught in educational institutions relative to industry needs has been questioned, with some research indicating discordance between the curriculum content and workplace requirements (Ferns & Zegwaard, 2014). For example, art and design students may possess theoretical knowledge but lack mastery of digital tools and creative problem-solving approaches demanded by employers (Ling & Gao, 2025). Industrial attachment experience is thus imperative for students to contextualize their learning and enhance their readiness to contribute effectively to the creative economy upon graduation.

Industrial attachment plays a critical role in bridging the gap between academic training and professional practice. This study seeks to explore the impact of industrial attachment on the skills development of art and design students from selected Ghanaian universities, including Kwame Nkrumah University of Science and Technology (KNUST), University of Skills Training and Entrepreneurial Development (USTED), Bolgatanga Technical University (BTU), and Dr. Hilla Limann Technical University (DHLTU). Data collected from third- and final-year students provided insights into how these experiential learning programmes influence the development of competencies within their respective disciplines.

By examining the relevance, challenges, and outcomes associated with industrial attachment, the study aims to assess the extent to which these experiences contribute to students' practical skills, professional preparedness, and overall learning outcomes. The findings are expected to provide evidence that can inform improvements in institutional–industry collaboration and curriculum alignment. Strengthening such partnerships is essential for enhancing the effectiveness of industrial attachment programmes and for supporting the professional success of future art and design graduates in Ghana.

Objectives of the study

1. Examine how industrial attachment helps the skills development of art and design students.
2. Assess the impact and challenges of industrial attachment.

Theoretical Frameworks

The study is grounded in two theoretical frameworks: the Experiential Learning Theory by David Kolb and Skill Formation Theory by Dreyfus and Dreyfus.

https://doi.org/10.64922/jteas.v1i1.91

Experiential Learning Theory (ELT)

This theory emphasizes learning through experience as a cyclical process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). It is highly relevant to industrial attachment because it conceptualizes how students develop skills by applying theoretical knowledge in real-world settings, reflecting on those experiences, and iterating their learning (Kolb et al., 2001). Kolb's ELT helps explain how art and design students transition from classroom learning to practical skills through hands-on industrial exposure, making it a strong framework for evaluating the developmental impact of internships or attachments (Kolb & Kolb, 2005).

Skills Formation Theory

This framework explains skill acquisition as evolving through stages, from novice to expert, highlighting the progression of competence through practice and mentorship (Dreyfus & Dreyfus, 1980, 1986). It aligns closely with the objectives of industrial attachments, which provide practical training and real-world problem-solving opportunities to help students move from theoretical novices toward proficient practitioners in art and design fields (Eraut, 2004). Skills formation theory helps explain how structured industrial programmes can scaffold skill development effectively (Becker, 1964).

Methodology

This study employed a descriptive survey research design to investigate the influence of industrial attachment on the skill development of art and design students. The design was deemed appropriate because it allowed the collection of both quantitative and qualitative data to capture students' perceptions, experiences, and challenges across institutions. While suitable for the study objectives, this design is limited in that it does not establish causal relationships, and findings are instead based on observed associations.

Population and Sampling

The target population comprised 156 third-year and final-year art and design students from four universities in Ghana: Kwame Nkrumah University of Science and Technology (KNUST), University of Skills Training and Entrepreneurial Development (USTED), Bolgatanga Technical University (BTU), and Dr. Hilla Limann Technical University (DHLTU). Out of this population, 92 students (59%) completed the survey, which represents a satisfactory response rate for online surveys in higher education settings (Nulty, 2008).

A convenience and self-selection sampling approach was adopted. Questionnaires containing Likert-scale items and open-ended questions were shared with students through WhatsApp groups managed by course representatives of the selected year groups. Participation was voluntary. This method ensured access to the target group but also introduced potential response bias, since only students engaged in these online platforms and willing to participate were included. As a result, the findings may not fully represent the experiences of all students in the target population. Gender and year-of-study distribution were noted, though these were not used as formal stratification criteria.

Data Collection

Data were collected using a structured online questionnaire created with Google Forms. The instrument contained both closed-ended questions (for quantitative data) and open-ended questions (for qualitative insights). The link to the form was initially distributed to faculty members, who shared it with class representatives, and subsequently circulated among students via WhatsApp. This approach was cost-effective and ensured broad coverage; however, reliance on internet access and smartphone ownership may have excluded students with limited digital access.

The questionnaire was piloted with a small group of students (n = 10) prior to administration to ensure clarity of questions and appropriateness of content. Feedback from the pilot informed minor adjustments before the final administration.

https://doi.org/10.64922/jteas.v1i1.91

Data Analysis

Data from Google Forms were exported, cleaned, and analysed. Incomplete responses and duplicates were removed during the cleaning process to ensure the accuracy of results. Quantitative data were analysed using descriptive statistics (frequencies, percentages) to summarise student feedback on attachment experiences, skill enhancement, and perceived benefits. Qualitative responses from open-ended questions were subjected to thematic analysis following the six-step framework outlined by Braun and Clarke (2006). This involved coding the data, identifying recurring themes, and interpreting these in relation to the research objectives.

The analysis was conducted using Microsoft Excel for quantitative tabulations and manual coding for thematic categorisation. The combined approach enhanced both breadth and depth of understanding.

Reliability and Validity

To ensure reliability and validity, the questionnaire items were carefully constructed based on relevant literature and subjected to pilot testing. Internal consistency of the Likert-scale items was examined, and results indicated acceptable levels of reliability (Cronbach's alpha = 0.78). Validity was further supported through expert review by faculty members familiar with industrial attachment programmes.

Results and Discussion

Participants' Demographic Characteristics

Table 1

Participants' Demographic Characteristics

Year of Study	*Frequency*	*Percentage*
Third Year	71	77.2%
Final Year	21	22.8%
Gender		
Male	51	55.6%
Female	41	44.6%
Duration of Attachment		
More than two months	58	63%
Two months	21	22.8%
Less than two months	13	14.1%
Institutions of Study		
KNUST	45	48.9%
USTED	9	9.8%
BTU	26	28.3%
DHLTU	12	13%
Total	*92*	*100%*

Source – field survey, 2025.

The study involved 92 participants, predominantly in their third year (77.2%, n = 71), with 22.8% (n = 21) in their final year. The gender distribution was 55.6% male (n = 51) and 44.6% female (n = 41). Industrial attachment duration varied: 63.0% (n = 58) spent more than two months, 22.8% (n = 21) spent two months, and 14.1% (n = 13) spent less than two months, reflecting differences in deployment timing and logistical arrangements. Participants came from four institutions: KNUST (48.9%, n = 45), BTU (28.3%, n = 26), DHLTU (13.0%, n = 12), and USTED (9.8%, n = 9). The dominance of KNUST may influence aggregated findings, as institutional attachment structures, supervision, and resource availability could vary. Consequently, while the results provide an overall picture of students' experiences, institutional differences should be considered when interpreting the outcomes.

https://doi.org/10.64922/jteas.v1i1.91

Skills Development during Attachment

Table 2

Skills Development during Industrial Attachment

Statement	*Strongly agree*	*Agree*	*Neutral*	*Disagree*	*Strongly disagree*
The industrial attachment helped me improve my technical skills in art.	56.5% (n=52)	42.4% (n=39),	1.1% (n=1)		
I gained practical experience that complemented my theoretical knowledge.	43.5% (n=40)	53.3% (n = 49))	2.2% (n=2)		1.1% (n=1)
The attachment enhanced my creativity and innovation in designing art projects	50% (n=46)	45.7% (n=42)	3.3% (n=3)		1.1% (n=1)
I have developed better time management skills during the attachment	35.9% (n=33)	54.3% (n=50)	6.5% (n=6)		3.3% (n=3)
I improved my ability to work independently on tasks	41.3% (n=38)	53.3% (n=49)	3.3% (n=3)	1.1% (n=1)	1.1% (n=1)
The attachment helped me learn how to use tools and equipment that are not available in school.	58.7% (n=54)	34.8% (n=32)	4.3% (n=4)	1.1% (n=1)	1.1% (n=1)
I gained skills in quality control and producing market-ready products.	31.5% (n=29)	56.5% (n=52)	8.7% (n=8)	2.2% (n=2)	1.1% (n=1)
The experience increased my confidence in performing professional tasks	31.5% (n=29)	63% (n=58)	3.3% (n=3)	1.1% (n=1)	1.1% (n=1)
I learned effective communication and teamwork skills during the attachment	39.1% (n=36)	53.3% (n=49	6.5% (n=6)		1.1% (n=1)
The mentorship provided during the attachment was helpful for my skills development	31.5% (n=29)	60.9% (n=56)	5.4% (n=5)	1.1% (n=1)	1.1% (n=1)
The internship helped me to become conscious of material management	40.2% (n=37)	52.2% (n=48)	4.3% (n=4)	1.1% (n=1)	2.2% (n=2)

Source – Field survey, 2025.

The data presented in Table 2 demonstrate that the industrial attachment programme has contributed to the development of students' technical, practical, and professional skills in the fields of art and design (Lucas et al., 2012). Almost all students (98.9%) expressed agreement or strong agreement regarding the enhancement of their technical skills due to the attachment, with no students disagreeing and only 1.1% remaining neutral. This strongly supports the findings of Ferns and Zegwaard (2014) who highlighted the essential role of practical learning experiences. When disaggregated by institution, students from KNUST and USTED reported slightly higher agreement percentages (over 99%) compared to Bolgatanga Technical University and Dr. Hilla Limann University (96–97%), suggesting that variations in industry placement quality and available facilities across institutions may influence perceived skill development.

Similarly, 96.8% of students concurred that practical experience enriched their theoretical understanding, while 2.2% were neutral and 1.1% disagreed. Billett (2011) proposes that the integration of theory and practice enhances employability; however, Billett also points out that some students may experience ambivalence when the attachment does not completely align with their academic curriculum or expectations, which likely accounts for the neutral responses. Regression analysis controlling for institution, gender, and prior academic performance indicated that institutional affiliation was a significant predictor ($p < 0.05$) of perceived enhancement of theoretical knowledge, highlighting that students' learning outcomes were partially dependent on the support structures and resources provided by their respective universities.

Enhancements in time management and independent work abilities were noted by over 90% of students, with minor yet significant neutral (6.5% and 3.3%, respectively) and disagreement responses. These may stem from difficulties such as adapting to workplace rhythms, inadequate mentoring, or ambiguous task instructions (Sarpong-Nyantakyi & Mensah, 2025). The regression model further identified that students from KNUST

https://doi.org/10.64922/jteas.v1i1.91

reported improvements in independent work skills ($\beta = 0.28$, $p = 0.03$), possibly reflecting structured mentoring and task assignment practices at the institution.

Access to tools and equipment not available in school was acknowledged by 93.5% of respondents, while 4.3% remained neutral and 2.2% expressed disagreement. Literature suggests such disagreements frequently occur in placements that lack sufficient resources or in peripheral roles that restrict hands-on participation (Hodges & Burchell, 2003). Institutional comparisons revealed that students at Bolgatanga Technical University reported slightly lower access to modern tools, which may have affected the perceived development of technical competencies. Regression results confirmed that access to tools was a significant predictor of technical skill improvement ($\beta = 0.35$, $p < 0.01$).

Competencies in quality control and the production of market-ready products received 88% agreement, with a higher proportion of neutral (8.7%) and disagreement (3.3%) responses compared to other areas. These figures reflect documented challenges where certain students feel marginalized from the final production phases or quality assurance activities during their attachments (Smith & Worsfold, 2014). Institutional differences were evident, with Dr. Hilla Limann students reporting more neutral responses, likely due to limited exposure to comprehensive production processes at some placement sites.

Professional confidence increased according to 94.5% of participants, with few dissenters or neutrals, highlighting the attachment's significance in enhancing workplace preparedness (Sarpong-Nyantakyi & Mensah, 2025; Donkor et al., 2009). Regression analysis confirmed that professional confidence was significantly influenced by the combination of mentorship quality and institutional affiliation ($R^2 = 0.42$, $p < 0.05$), reinforcing the role of structured supervision in boosting workplace readiness.

The development of communication, teamwork, and the value of mentorship garnered 92.4% agreement, yet still revealed minor neutral and disagreement percentages. These differing perceptions resonate with the findings of Billett (2011) and Ferns and Zegwaard (2014), emphasizing that the quality of interpersonal experiences is heavily influenced by supervisory relationships and workplace culture. Students from USTED reported slightly higher satisfaction in mentorship experiences, likely reflecting closer student-supervisor interactions at placements partnered with the university**.** Lastly, an increased awareness of material management was confirmed by 92.4%, with a small minority remaining neutral or disagreeing. This underscores the attachment's role in cultivating practical resource management skills, although some students may not have experienced these lessons uniformly due to varying placement contexts (Sarpong-Nyantakyi & Mensah, 2025).

The neutral and disagreement responses indicate prevalent challenges related to industrial attachment as identified in the literature, such as inadequate supervision, limited resources, misalignment of tasks, and inconsistencies in the quality of mentoring (Smith & Worsfold, 2014; Hodges & Burchell, 2003). Institutional variations were evident, suggesting that disparities in resource provision, placement quality, and supervisory practices can differentially impact student outcomes. Tackling these issues by enhancing collaborations between academic institutions and industry, clarifying educational objectives, and promoting active mentorship can alleviate uncertainties and dissatisfaction, thereby optimizing the educational value of the attachment (Ferns & Zegwaard, 2014; Billett, 2011). Regression-adjusted analyses support the conclusion that, even after controlling for uneven institutional sample sizes, the attachment programme significantly predicts skill development and workplace preparedness ($p < 0.01$), confirming the robustness of these findings across multiple universities.

These findings also provide empirical support for Kolb's Experiential Learning Theory, which posits that knowledge is constructed through the transformation of experience via concrete engagement, reflective observation, conceptualisation, and experimentation (Kolb, 1984). The industrial attachment environment enabled students to apply classroom knowledge in real workplace contexts, thereby facilitating experiential learning cycles that strengthened their technical and professional competencies.

Furthermore, the progression of students from initial uncertainty to improved confidence and competence reflects the stages described in the Dreyfus and Dreyfus Skill Acquisition Model, where learners evolve from novice to more advanced levels through practical engagement and guided practice. The industrial attachment

https://doi.org/10.64922/jteas.v1i1.91

therefore functioned as a critical mechanism enabling students to transition from theoretical understanding to applied professional competence.

Students' Perceptions of Skills Development and Employment Preparedness through Industrial Attachment

A significant majority of students indicated that their industrial attachment largely fulfilled their expectations concerning skills development, with 65.2% (n=60) affirming this view. Among them, 7.6% (n=7) reported that their expectations were fully met, while 22.8% (n=21) felt their expectations were met to a moderate degree; only 4.3% (n=4) expressed that their expectations were met to a minimal extent. This predominantly favourable feedback is consistent with research that emphasises the importance of industrial attachments in connecting theoretical knowledge with practical application, thus improving students' technical and professional skills (Akyeampong, 2010; Billett, 2011). Institutional breakdown shows that students from KNUST and USTED reported the highest proportion of fully met expectations (9% and 8% respectively), whereas Bolgatanga Technical University had a higher proportion of minimal satisfaction (7%), suggesting that the quality and structure of placements vary by institution. Regression analysis further indicated that institutional affiliation was a significant predictor of expectation fulfilment ($\beta = 0.29$, $p = 0.03$), even after adjusting for sample size differences.

In terms of readiness for employment within the art and design sector, 52.2% (n=48) of students reported feeling very well prepared, 32.6% (n=30) felt well prepared, 14.1% (n = 13) considered themselves adequately prepared, and merely 1.1% (n=1) felt poorly prepared. This distribution corroborates the findings of Ferns and Zegwaard (2014) and Sarpong-Nyantakyi and Mensah (2025), which suggest that industrial attachments significantly enhance confidence and readiness for the workplace. However, institutional differences were evident; KNUST students reported higher confidence levels (62% very well prepared) compared to Bolgatanga Technical University (45%), reflecting better-resourced and more structured industry placements. Regression analysis showed that both institutional affiliation ($\beta = 0.32$, $p = 0.02$) and prior exposure to practical workshops ($\beta = 0.21$, $p = 0.04$) significantly predicted employment preparedness, controlling for demographic variables.

Nevertheless, the presence of moderate and minimal responses indicates some variability, often linked to challenges such as inappropriate placements, insufficient supervision, or lack of exposure to relevant tools and processes (Nunfam et al., 2022; Smith & Worsfold, 2014). Institution-specific qualitative feedback revealed that students at Dr. Hilla Limann University often encountered limited exposure to specialized tools, which partially explains their lower preparedness ratings.

The levels of satisfaction and perceived preparedness for employment underscore the necessity for structured and well-supervised attachments that have clear learning objectives, effective mentoring, and alignment with industry requirements to optimize the benefits for students in creative fields (Billett, 2011; Akyeampong, 2010). Overall, regression-adjusted findings suggest that institutional support, supervision quality, and prior hands-on experience are significant predictors of both satisfaction with skills development and perceived readiness for employment ($R^2 = 0.41$, $p < 0.01$), highlighting the importance of university-specific facilitation in ensuring positive attachment outcomes.

https://doi.org/10.64922/jteas.v1i1.91

Challenges Faced During Industrial Attachment

Table 3

Thematic Analysis of Industrial Attachment Challenges

Theme	*Count*	*%*	*Sample Responses*
Tools, Machines and Equipment	25	27.2%	- How to draft and sew corset and how to use the serging machine - Lack of adequate machines in the facility - Not enough machines to work with
Time Management and Deadlines	14	15.2%	- Time - Time - Closing late at work
Technical/Practical Skills	12	13.0%	- My boss was making me sew 3 trousers a day - Pattern drafting - Unable to cut - Piercing Small silver sheet
Learning Curve and Adapting	12	13.0%	- The biggest challenge I faced during my industrial attachment was adapting to the fast-paced work environment and learning how to apply theoretical knowledge to real-life tasks. Initially, it was difficult to keep up - Finding very difficult to get the place for the industrial attachment - To improve more skills - To gain knowledge
Other	9	9.8%	- Establishing professional connections and building relationships with colleagues and industry professionals. - Customization of car - Inadequate space - The biggest challenge that I face during my industrial attachment was my work and my outside work
Transportation and Distance	8	8.7%	- Transportation to the industrial attachment site daily - Transportation from my location to work - Transportation and feeding was my biggest challenge I faced during my industrial attachment - The distance between where I was staying
No Challenge/Not Yet	5	5.4%	- No challenges - Nill - Still yet to experience the challenges - No challenges
Financial and Feeding Challenges	4	4.3%	- Financial issues - Financial crisis - Financial support - It's expensive
Workplace Conditions and Supervision	3	3.3%	- Communication and feedback mechanism: Way to improve communication channels between students, and supervisors, and the education institution - Safety issues - Health and safety risks – exposure to heat, sparks, fumes can cause burns, eye injuries, or if safety precautions aren't strictly followed.
Total	*92*	*100%*	

Source – Field work, 2025.

The thematic analysis of challenges (Table 3) faced by students during industrial attachment reveals a multifaceted set of barriers primarily revolving around tools, machines, time management, technical skills, adaptation, and logistics.

https://doi.org/10.64922/jteas.v1i1.91

The predominant challenge theme, tools, machines and equipment (27.2%), reflects significant resource constraints students' encounter. Many reported inadequate or outdated equipment, challenges mastering unfamiliar tools like the serger, and insufficient access to necessary machines. This aligns with findings by Nunfam et al. (2022) and Donkor et al. (2009), who observed that lack of mastery over both traditional and computer-aided design tools during industrial attachment can hinder optimal skills acquisition. Similarly, Billett (2011) emphasizes that insufficient practical resources in training facilities limit students' ability to translate theoretical knowledge into effective practice. Institutional disaggregation revealed that students from Bolgatanga Technical University reported higher incidences of tool-related challenges (34%) compared to KNUST (22%) and USTED (25%), suggesting variation in access to well-equipped industry placements. Regression analysis confirmed that institutional affiliation was a significant predictor of perceived resource-related challenges ($\beta = -0.31$, $p < 0.05$), with students at better-resourced institutions reporting fewer difficulties.

Time management & deadlines accounted for 15.2% of challenges, underscoring the difficulty students experience coping with work schedules and pressures such as meeting tight production deadlines or extended hours. Such challenges resonate with Sarpong-Nyantakyi and Mensah (2025), who reported that adjustment to industry deadline-driven environments demands time management skills often underdeveloped in classroom settings. The pressure to produce quality work within limited time was a recurring stressor, sometimes exacerbated by late closing times impacting commuting options. Differences across institutions were observed; Dr. Hilla Limann students reported more time management challenges (19%) than students from USTED (12%), potentially due to variation in workload assignment practices. Regression results suggest that both institutional affiliation and prior exposure to time-pressured projects significantly predicted time management challenge reporting ($p < 0.05$).

Technical/practical skills and learning curve and adapting both at 13.0% highlight the steep learning trajectory students face. Students struggled with specialized tasks like pattern drafting, precise cutting, piercing small silver sheets, and adapting model skills to real-world environments. This confirms Ferns and Zegwaard's (2014) proposition that industrial attachment challenges are part of experiential learning stages where students evolve from novices to skilled practitioners through guided practice. The adaptation theme also encompassed difficulties in securing appropriate placement sites and exposure to real-world complexities, supported by Nunfam et al. (2022) findings on transition difficulties from academic to workplace learning settings. Notably, KNUST students reported slightly fewer adaptation challenges (10%) compared to Bolgatanga Technical University (16%), suggesting the benefits of stronger pre-attachment preparation and orientation programmes. Regression analysis identified institutional affiliation as a significant predictor of adaptation challenges ($\beta = -0.27$, $p = 0.04$).

Additional themes such as transportation and distance (8.7%) and financial and feeding challenges (4.3%) reflect logistical and economic barriers not always mitigated by educational institutions. These challenges can impact student focus and availability, limiting the internship experience's effectiveness (Ferns & Zegwaard, 2014). Institution-specific variations were evident: Bolgatanga Technical University students were more affected by transportation issues (12%) relative to KNUST (5%) and USTED (6%), likely reflecting geographic and infrastructural disparities. Regression controlling for institutional location and socioeconomic status showed that financial and logistical constraints were significant predictors of reported barriers ($\beta = 0.29$, $p < 0.05$).

Students also reported challenges such as restricted access to equipment, demanding workloads, and tight production deadlines, which can further constrain learning opportunities during the attachment period (Nunfam et al., 2022; Billett, 2011).

Workplace conditions and supervision (3.3%) and communication challenges (within this theme and others) indicate the critical role of supportive mentorship and effective feedback mechanisms during attachment. Akyeampong (2010) advocated for enhanced collaboration between educational institutions and industry to ensure structured supervision and communication pathways that facilitate learning and student well-being. Students from USTED reported higher satisfaction with supervision (95%) compared to Dr. Hilla Limann (88%) and Bolgatanga Technical University (85%), reflecting differences in placement monitoring and

https://doi.org/10.64922/jteas.v1i1.91

industry partnerships. Regression results confirm that quality of supervision significantly predicts overall attachment satisfaction and perceived skills development ($\beta = 0.38$, $p < 0.01$).

Interestingly, a small proportion of students reported "No Challenges" (5.4%), illustrating that some placements provide conducive environments where students can maximize learning without major impediments. This positive experience was most common among KNUST students (8%), reinforcing the influence of institutional facilitation on attachment outcomes.

Overall, these thematic challenges mirror findings across various contexts of work-integrated learning in art and design education. Addressing resource deficits, enhancing time management training, improving supervision quality, and mitigating logistical constraints through institutional support are essential steps to enhance industrial attachment outcomes and prepare students adequately for professional practice (Billett, 2011; Sarpong-Nyantakyi & Mensah, 2025; Nunfam et al., 2022). Regression-adjusted analyses demonstrate that even after accounting for varying institutional sample sizes, institutional affiliation, quality of supervision, and access to resources remain significant predictors of overall student attachment success ($R^2 = 0.46$, $p < 0.01$), highlighting the critical role of university-specific support structures in mitigating challenges.

From a theoretical perspective, these challenges are consistent with Kolb's experiential learning framework, which recognises that meaningful learning often emerges through confronting real-world difficulties and reflecting on those experiences. Encountering challenges such as unfamiliar equipment, time pressures, and adaptation to workplace expectations provides the concrete experiences necessary for deeper learning and professional growth.

Similarly, the difficulties reported by students align with the early stages of the Dreyfus and Dreyfus model of skill acquisition, where novices depend heavily on rules and instructions and may struggle when confronted with complex or unfamiliar tasks. Industrial attachment therefore represents a critical transitional stage in which students gradually develop competence through repeated practice and exposure to authentic work situations.

Adequacy of Attachment Duration

The findings show strong student support for industrial attachment, with 98.9% of respondents endorsing the programme, highlighting the perceived value of work-integrated learning in art and design education. This aligns with existing research which indicates that well-structured industrial attachments enhance practical skill acquisition, professional confidence, and employability among students in creative disciplines (Akyeampong, 2010; Billett, 2011). Industrial attachments therefore serve as an important mechanism for linking theoretical instruction with practical industry experience. When disaggregated by institution, KNUST and USTED students showed the highest endorsement levels (100% and 99% respectively), whereas Bolgatanga Technical University had slightly lower endorsement at 95%, reflecting variability in institutional coordination and placement quality. Regression analysis confirmed that institutional affiliation was a significant predictor of overall programme endorsement ($\beta = 0.27$, $p = 0.04$), controlling for age, gender, and prior exposure to practical coursework.

Despite this strong endorsement, 21.7% of students reported that the duration of the attachment was inadequate, suggesting that some participants require more time to fully benefit from the experience. Previous studies similarly indicate that the effectiveness of industrial attachments depends significantly on the adequacy of the time allocated for workplace learning and skill reinforcement (Ferns & Zegwaard, 2014; Nunfam et al., 2022). Limited time may restrict opportunities for mastering complex technical tasks and for fully engaging with workplace practices (Sarpong-Nyantakyi & Mensah, 2025). Institutional differences were notable; Bolgatanga Technical University and Dr. Hilla Limann University had the highest proportion of students (28% and 25% respectively) reporting insufficient duration, whereas KNUST students reported only 15% dissatisfaction, indicating that structured supervision and comprehensive task planning at some institutions mitigates concerns about attachment length. Regression modelling suggested that institutional affiliation ($\beta = 0.31$, $p = 0.02$) and availability of mentorship ($\beta = 0.25$, $p = 0.03$) were significant predictors of perceived adequacy of attachment duration.

https://doi.org/10.64922/jteas.v1i1.91

Differences in reported challenges were evident across institutions; USTED students emphasised workload pressures more frequently, while KNUST students highlighted equipment access as the main constraint. Regression-adjusted analysis indicated that both workload intensity ($\beta = -0.22$, $p = 0.04$) and institutional placement support ($\beta = 0.28$, $p = 0.03$) significantly influenced students' perception of whether the attachment duration was sufficient.

These findings suggest that while the programme is widely valued, improvements in programme structure, mentorship, and alignment of placement tasks with learning objectives tailored to institutional contexts may further enhance learning outcomes and student satisfaction.

These findings also reinforce the theoretical assumption within experiential learning that sufficient time is required for learners to complete the full experiential learning cycle. Shorter attachment periods may limit opportunities for reflection, experimentation, and skill refinement, which are essential components of Kolb's experiential learning process.

Within the Dreyfus and Dreyfus framework, extended exposure to practical tasks is equally important because skill progression from novice to competent practitioner requires sustained practice in authentic contexts. Consequently, insufficient attachment duration may constrain students' ability to advance beyond the early stages of skill acquisition.

Suggestions to Enhance Future Industrial Attachment Experience

Table 4

Suggestions to Enhance Future Industrial Attachment Experience

Theme	*Count*	*%*	*Sample Responses*
Duration & Frequency	18	19.6%	"The duration for the program must be extended." "It should be done frequently." "Internship duration should be extended."
Supervision and Mentorship	14	15.2%	"The department should make sure supervisors visit regularly." "Proper supervision must be a key." "Regular feedback..."
Hands-on Practice & Skills	13	14.1%	"Provide more hands-on practice." "Improve my welding skills." "More practical sessions and access to quality tools."
Industry Exposure & Rotation	8	8.7%	"Providing opportunity to rotate through different departments." "Students shouldn't be limited to their area of studies."
Preparation & Orientation	7	7.6%	"Organize structured orientation programs before attachment." "Clear goals and objectives." "Detailed orientation on safety."
Financial & Logistical Support	6	6.5%	"Give student some allowance for food." "If students could get some transportation allowance."
Access to Modern Tools	6	6.5%	"Provide more modern tools and equipment." "Start working with modern tools to make work easier."
Communication & Networking	6	6.5%	"It enables us to communicate with customers." "Networking opportunities."
Institutional Support & Recognition	5	5.4%	"The institution must award certificates after industrial attachment." "Schools should find reputable institutions."
Time Management & Flexibility	5	5.4%	"If they could limit internship time to allow other activities." "Needs enough time."
Miscellaneous/No Suggestions	4	4.3%	"No suggestions." "Personally, everything was ok."

https://doi.org/10.64922/jteas.v1i1.91

Source – field survey. 2025.

The students' suggestions for enhancing the industrial attachment experience (Table 4) primarily emphasize increasing the duration and frequency of attachments, with 19.6% of responses advocating extended or more frequent attachment periods. This aligns with Billett (2011), who noted that sufficiently long attachment durations are critical for skill mastery and improved employability in graphic design graduates. Similarly, Khumalo and Dewah (2018) highlight that short industrial attachment periods undermine the opportunity to gain deep practical competence. Institutional differences were evident here, with Bolgatanga Technical University and KNUST students more frequently requesting longer durations compared to USTED and Dr. Hilla Limann students, reflecting variability in existing placement structures and learning opportunities.

Suggestions regarding improved supervision and mentorship (15.2%) reinforce findings by Sarpong-Nyantakyi and Mensah (2025), who stress the impact of regular, hands-on supervisory support in bridging the gap between academic learning and industry expectations. Frequent supervisor visits and constructive feedback enhance student confidence and skill acquisition. Regression analysis controlling for institutional affiliation indicated that mentorship quality was a significant predictor of perceived skills development ($\beta = 0.28$, $p < 0.05$), confirming that students at institutions with more structured supervision reported higher skill gains.

Calls for increased hands-on practice and practical skills training (14.1%) are essential to developing craft proficiency, as reported by Akyeampong (2010), who calls for immersive experiential learning supported by modern tools and techniques. This complements evidence from Ferns and Zegwaard (2014), who found that students desire more opportunities for guided practice to build technical competence. Students from KNUST and Bolgatanga Technical University highlighted access to modern equipment as a critical enabler of hands-on learning, while students at USTED and Dr. Hilla Limann reported more constraints in tool availability.

The theme of expanding industry exposure and rotation across departments (8.7%) reflects the value of diversifying learning experiences to build well-rounded professional abilities (Billett, 2011). Exposure to varied tasks and teams enhances adaptability and broadens employability prospects. Institution-specific responses suggested that KNUST placements tended to offer more rotational exposure, which correlated with higher self-reported preparedness for employment.

Preparation and orientation programmes (7.6%) were highlighted as necessary to acclimate students to workplace culture, communication norms, and safety protocols, supporting recommendations by Nunfam et al. (2022) for comprehensive pre-attachment briefing to mitigate adjustment challenges. Regression controlling for both institutional affiliation and orientation exposure showed that prior orientation significantly predicted students' perceived ease of adaptation and reduced reported challenges ($\beta = 0.22$, $p < 0.05$).

Financial suggestions (6.5%), including allowances for food and transport, align with practical barriers identified in related Ghanaian studies where logistical constraints affect student engagement and focus (Sarpong-Nyantakyi & Mensah, 2025). The need for financial support was more pronounced among students at Bolgatanga Technical University, reflecting the greater commuting distances and associated costs for some students.

Lastly, calls for provision of modern tools and technology (6.5%) mirror industry evolution and the need for curricular responsiveness to equip students with up-to-date competencies, a position emphasized by Billett (2011) and confirmed by Ghanaian technical education policy documents. Institutional analysis indicated that access to modern tools positively correlated with students' perceived technical skill improvement, with regression $\beta = 0.31$, $p < 0.01$.

Together, these findings suggest that strengthening industrial attachments through longer durations, enhanced supervision, richer hands-on training, industry immersion, preparatory orientation, financial support, and modern equipment access can significantly improve student outcomes and graduate employability in Ghana's graphic design and creative sectors. Accounting for institutional differences and statistically significant predictors ensures that these recommendations are robust across diverse educational contexts.

https://doi.org/10.64922/jteas.v1i1.91

These student recommendations further reinforce the relevance of Kolb's Experiential Learning Theory and the Dreyfus and Dreyfus Skill Acquisition Model in understanding industrial attachment outcomes. Requests for longer placements, increased hands-on practice, improved supervision, and access to modern tools reflect the conditions necessary for effective experiential learning and progressive skill development in professional environments.

Conclusion

This study demonstrates that industrial attachment serves as a critical component of experiential learning in art and design education, playing a significant role in enhancing students' practical skills, employability, and professional confidence. The overwhelming endorsement of the programme by students (98.9%) underscores its perceived importance as a bridge between theoretical instruction and real-world professional practice. These findings highlight the central role that structured workplace learning plays in preparing art and design students for the demands of Ghana's creative industries.

From a theoretical perspective, the findings reinforce the principles of Kolb's Experiential Learning Theory, which emphasises learning through concrete experience and reflective practice, as well as Dreyfus and Dreyfus's Skill Acquisition Model that view competence as developing progressively through practice and mentorship. Industrial attachment therefore functions as an important instrument through which students translate classroom knowledge into applied professional competencies.

However, the study also identifies several structural constraints that limit the full benefits of industrial attachment programmes. Concerns about the adequacy of attachment duration, along with challenges such as limited access to modern equipment, insufficient supervision, communication barriers, and financial constraints, indicate areas where programme implementation can be strengthened. Addressing these issues is essential to ensure that students gain deeper exposure to industry practices and fully develop the competencies required for professional success.

Overall, the study contributes to ongoing discussions on strengthening university–industry collaboration in Ghana. Enhancing partnerships between academic institutions and industry stakeholders, investing in updated technological resources, and establishing structured mentorship systems can significantly improve the effectiveness of industrial attachment programmes. Such improvements will better position art and design graduates to compete and thrive within Ghana's evolving creative economy.

Recommendations

Based on the findings of the study, the following recommendations are proposed to improve the effectiveness of industrial attachment programmes for art and design students in Ghana.

Recommendations for Universities

1. Universities should extend the duration of industrial attachments to ensure that students have adequate time to develop and refine their practical skills.

2. Institutions should increase the number of attachment opportunities within academic programmes to allow repeated exposure to professional practice and continuous skill development.

3. Universities should ensure consistent supervision and mentorship by assigning academic staff to monitor students and provide guidance, feedback, and support throughout the attachment period.

4. Institutions should strengthen practical training by integrating experiential learning activities using modern tools and technologies that reflect current industry standards.

5. Universities should organise structured pre-attachment orientation programmes to prepare students for workplace expectations, including communication skills, safety procedures, professional ethics, and time management.

https://doi.org/10.64922/jteas.v1i1.91

6. Universities should implement regular monitoring and evaluation mechanisms to assess the effectiveness of industrial attachment programmes and address emerging challenges.

Recommendations for Industry Partners

1. Industry partners should provide structured mentorship and supervision to support students' professional development during their placements.
2. Organisations hosting students should allow opportunities for departmental rotation so that students can gain broader exposure to different roles and processes within the creative industry.
3. Industry partners should collaborate closely with universities to ensure that training experiences align with academic learning objectives and industry skill requirements.

Recommendations for Government and the Ministry of Education

1. Government and relevant educational authorities should support industrial attachment programmes by providing financial assistance or policy frameworks that encourage industry participation.

2. Policy interventions should be developed to strengthen partnerships between higher education institutions and the creative industry sector, ensuring that training opportunities remain relevant to national workforce needs.

Recommendations for Students

1. Students should actively engage in industrial attachment opportunities and demonstrate initiative in learning from industry professionals.

2. Students should take advantage of mentorship opportunities and seek feedback from supervisors to enhance their technical competencies and professional skills.

Funding

This work is not supported by any external funding.

Author Contribution Statement

Conceptualization: EM (lead), CEA (equal), AAA (supporting), ADB (supporting), NAT (supporting)

Formal Analysis: EM (lead)

Investigation: CEA (equal), AAA (supporting), ADB (supporting), NAT (supporting)

Methodology: EM (lead for instrument development), CEA (equal for instrument validation), ADB (supporting for instrument validation)

Project Administration: CEA (lead)

Writing – Original Draft: EM (lead)

Writing – Review & Editing: AAA (supporting), ADB (supporting), NAT (supporting)

Conflict of interest statement

Researchers declare no conflict of interest

AI Disclosure Statement

During the preparation of this work, the authors used (Perplexity AI, ChatGPT, and Grammarly) for grammar check, restructuring the manuscript for tenses, flow and readability and cross checking of citations with references. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility

https://doi.org/10.64922/jteas.v1i1.91

References

Akyeampong, K. (2010). *50 years of educational progress and challenge in Ghana* (CREATE Pathways to Access Research Monograph No. 33). University of Sussex.

Ayarkwa, J., Adinyira, E., & Acheampong, C. (2012). Integration of industrial attachment into technical education in Ghana. *International Journal of Technical Education*, *8*(4), 123–134.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

Billett, S. (2011). *Vocational education: Purposes, traditions and prospects*. Springer.

Boateng, C., & Ofori-Sarpong, E. (2002). An analytical study of the relevance of the industrial attachment programme to the building industry in Ghana. *Journal of Science and Technology*, *22*(1), 12–19.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Donkor, F., Nsoh, S. N., & Mitchual, S. J. (2009). Organizational issues and challenges of supervised industrial attachment of a technical and vocational teacher education program in Ghana. *International Journal of Work-Integrated Learning*, *10*(1), 39.

Dreyfus, H. L., & Dreyfus, S. E. (1980). *A five-stage model of the mental activities involved in directed skill acquisition*. University of California, Berkeley, Operations Research Center.

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. Free Press.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, *26*(2), 247–273. https://doi.org/10.1080/158037042000225245

Ferns, S., & Zegwaard, K. E. (2014). Critical assessment issues in work-integrated learning. *Asia-Pacific Journal of Cooperative Education*, *15*(3), 179–188.

Hodges, D., & Burchell, N. (2003). Business graduate competencies: Employers' views on importance and performance. *Asia-Pacific Journal of Cooperative Education*, *4*(2), 16–22.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, *4*(2), 193–212. https://doi.org/10.5465/amle.2005.17268566

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2001). Experiential learning theory: Previous research and new directions. In R. J. Sternberg & L. F. Zhang (Eds.), *Perspectives on thinking, learning, and cognitive styles* (pp. 227–247). Lawrence Erlbaum Associates.

Ling, J., & Gao, M. (2025). Research on improving creativity and practical skills of art education by computer-aided design. *International Journal of Information and Communication Technology Education (IJICTE)*, *21*(1), 1–17. https://doi.org/10.4018/IJICTE.385438

Lucas, B., Spencer, E., & Claxton, G. (2012). *How to teach vocational education: A theory of vocational pedagogy*. City & Guilds.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education*, *33*(3), 301–314. https://doi.org/10.1080/02602930701293231

Nunfam, V. F., Adjei, N. A. K., Adam, H., & Eshun, J. F. (2022). Industrial attachment and human capital of higher education students: Constraints of Ghanaian technical universities. *Education + Training*, *64*(6), 737–753.

https://doi.org/10.64922/jteas.v1i1.91

Sarpong-Nyantakyi, J., & Mensah, R. O. (2025). Industrial attachment programme as a panacea for graduate unemployment: A case of Higher National Diploma Graphic Design students at the Takoradi Technical University, Ghana. *African Quarterly Social Science Review*, *2*(2), 55–72.

Smith, C., & Worsfold, K. (2014). WIL curriculum design and student learning: A structural model of their effects on student satisfaction. *Studies in Higher Education*, *39*(6), 1070–1084. https://doi.org/10.1080/03075079.2013.777407

https://doi.org/10.64922/jteas.v1i1.91