

**Teaching Styles and Competency Development of Students in Technical and Vocational
Education and Training in Ugandan TVET Institutions: A Comparative Study of Lira,
Elgon, and Kyema Technical Colleges."**

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Declaration

I, Akongo Dorcas Janet do declare that this dissertation titled "Teaching Styles and Competency Development of students in Technical and Vocational Education and Training Institutions in Uganda", is original and has never been presented for award in any University or institution of higher learning.

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Approval

This dissertation titled "Teaching Styles and Competency Development of students in Technical and Vocational Education and Training (TVET) Institutions in Uganda", has been written under our supervision and is being submitted to the Directorate of Research and Graduate Training with our approval.

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Table of Contents

Declaration.....	Error! Bookmark not defined.
Approval	Error! Bookmark not defined.
Dedication	
Lists of figures	8
Acknowledgements.....	9
Abstract	10
Chapter One: Background to the Study	11
1.1 Background to the Study.....	11
1.1.1 Historical background	11
1.1.2 Theoretical background.....	Error! Bookmark not defined.
1.1.3 Conceptual Perspective	15
1.1.4 Contextual background	21
1.2 Statement of Problem.....	21
1.3. Purpose of the study	22
1.4 Research Objectives.....	22
1.5 Research Questions	23
1.6 Scope of the Study	23
1.7 Significance of the Study	24
1.8 Conceptual Framework.....	25
Chapter Two: Literature Review	27
Introduction	
2.1 Theoretical Review	27
2.2 Review of Related Literature	28
2.2.1 Hands-On Learning and Competency Development among students of TVET Institutions in Uganda	28
2.2.2 Situated Learning and Competency Development among students of TVET Institutions in Uganda	30

2.2.3 Hybrid Integration and Competency Development among students of TVET	
Institutions in Uganda	32
Chapter Three: Methodology	35
Introduction	
3.1 Study Approach	35
3.2 Study Design.....	35
3. 3 Target Population:.....	35
3.4 Sample Size Determination.....	36
3. 5 Data Collection Procedures.....	37
3.6 Data Collection Methods	37
3.6.1 Interview.....	37
3.6.2 Questionnaire Survey	38
3.6.3 Documentary Review	38
3.6.4 Data Collection Instruments.....	38
3.6.5 Interview Guide.....	38
3. 7 Quality Control (Validity and Reliability).....	39
3.7.1 Validity.....	39
3.7.2 Reliability	40
3.7.3 Control of EVs	
3.8 Data Analysis.....	40
3.8.1 Quantitative data analysis.....	40
3.8.2 Qualitative data analysis.....	43
3.9 Administration Procedure	43
3.10 Ethical Considerations	44
3.11 Anticipated Limitations and Delimitations.....	44
Chapter Four: Data Analysis, Presentation, Interpretations and Summery of Findings.....	46
Introduction	
4.1 Presentation, interpretation of findings and summery	47
4.1.1 Part A: Personal Demographic Characteristics.	48

4.2.1 Effect of experiential/hands-on practical learning on competency development among students in TVET institutions.....	52
4.2.2 Influence of Situated Learning on Competency Development among Students in TVET.....	53
4.2.3 Effect of Hybrid Teaching Integration on Competency Development among Students in TVET.....	55
4.2.3 Assessing the Dependent Variable: Competency Development among students in TVET in Uganda	56
4.2.5 Objective four: (H_1) that lecturers' teaching styles have a significant positive relationship with competency development,	61
4.2.5.1 Main Hypothesis (H_1): Lecturers' teaching styles have a significant positive relationship with competency development among students in TVET institutions.....	61
4.2.5.2 Testing Hypothesis H_1 on ANOVA and Measures of Association of lecturers teaching styles and competency development of students in TVET intuitions.....	63
4.2.5.3 Linear regression analysis of the relationship between teaching styles and competency development among students of TVET in Uganda.....	65
4.3 Summary of Findings.....	68
4.3.2	69
Chapter Five : Discussions, Conclusions And Recommendations	71
5.1 Discussion of findings.....	71
5.1.1 Effect of Experiential/Hands-On Practical Learning on Competency Development .	71
5.1.2 The Influence of Situated Learning on Competency Development.....	72
5.1.3 Effect of Hybrid Teaching Integration on Competency Development	72
5.1.4 Assessment of Competency Development among TVET Students	73
5.3.1 Conclusions.....	75
5.3.2 Recommendations.....	75
APPENDICES	85
Appendix A: Consent form	85
Appendix B: Self-administered questionnaire for lecturers/instructors	86
AppendixC: Section: two: Self-administered questionnaire for students	92

Appendix D: Documentary review guide.....	99
Appendix E: Interview guide for key informants.....	101

Lists of Tables

<i>Table 1 Sampling Table</i>	<i>36</i>
<i>Table 2 Reliability Statistics for Key Study Variables used during the study.....</i>	<i>40</i>
<i>Table 3 Shows response rate</i>	<i>47</i>
<i>Table 4 Demographic Characteristics of Respondents</i>	<i>48</i>
<i>Table 5 Demographic information Part B (N = 115).....</i>	<i>50</i>
<i>Table 6shows analysis report on the effect of experiential/hands on practical teaching styles</i>	<i>52</i>
<i>Table 7 shows analysis of effect of situated teaching styles</i>	<i>54</i>
<i>Table 8shows analysis of effect of hybrid teaching styles on competency development</i>	<i>55</i>
<i>Table 9 shows analysis of participants' views on level competency development among TVET students</i>	<i>57</i>
<i>Table 10 Relationship between teaching styles and competency development</i>	<i>61</i>
<i>Table 11One-Way ANOVA Results for Competency Development across Teaching Styles....</i>	<i>63</i>
<i>Table 12 Tested Measures of Association between Teaching Styles and Competency Development</i>	<i>63</i>
<i>Table 13 14shows model summery of teaching styles and competency development among TVET students</i>	<i>66</i>
<i>Table 15 Regression relationship between analysis of teaching styles and competency development among TVET students</i>	<i>67</i>
<i>Table 16 shows table for determining the sample size</i>	<i>102</i>

Lists of figures

<i>Figure 1: Conceptual framework showing the relationship between teaching styles and competency development of students.</i>	<i>25</i>
<i>Figure 2 UTC Lira</i>	<i>103</i>
<i>Figure 3 UTC Elgon</i>	<i>104</i>
<i>Figure 4 UTC Kyema.....</i>	<i>105</i>

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Abstract

Technical and Vocational Education and Training (TVET) is a critical driver of national development, as it provides learners with the hands-on skills required for economic productivity. Despite this recognized importance, there is a notable scarcity of empirical evidence in Uganda regarding how different teaching strategies affect the actual acquisition of professional competencies among TVET students. This study was therefore conducted to address this gap by investigating the relative effectiveness of experiential, situated, and hybrid pedagogical approaches on competency development within Ugandan TVET institutions. The central problem was the deficiency of systematic research on which teaching methodologies most effectively translate into measurable practical skills gains, particularly given the infrastructural and technological constraints facing many TVET institutions in Uganda. The study targeted TVET students and instructors across selected institutions in Uganda. A cross-sectional mixed-methods design was employed, with a quantitative sample drawn from the student population using structured questionnaires, while a subset of instructors and administrators participated in the qualitative component. Semi-structured interview guides were developed to collect qualitative data from key informants, including TVET instructors and institutional administrators. These interviews explored perceptions of pedagogical effectiveness, challenges in implementation, and contextual factors affecting skill acquisition. Structured, close-ended questionnaires were administered to students to gather quantitative data on their exposure to different teaching methods and their self-assessed competency levels. The questionnaires utilized Likert-scale items to measure variables such as frequency of method use and perceived skill improvement. To ensure reliability and validity, quantitative instruments were pre-tested and refined prior to full administration. SPSS version 23 was used for statistical analysis, employing descriptive statistics, Pearson correlation, and linear regression. Qualitative data from interviews and document reviews were analyzed thematically, with findings triangulated against quantitative results and supported by verbatim quotations to enhance credibility and contextual depth. The study found that experiential learning was the most impactful approach, showing a statistically significant positive correlation with competency development ($r = 0.420$, $p < 0.01$) and predicting a 26.3% improvement in learner skills per unit increase in its application ($B = 0.263$, $p = 0.002$). Situated learning also performed well ($M = 3.54$) but lacked statistical significance ($B = 0.147$, $p = 0.125$), while hybrid methods scored lowest ($M = 3.29$) and showed limited predictive value ($B = 0.045$, $p = 0.516$), largely due to poor digital infrastructure. Overall competency acquisition was rated moderate ($M = 2.60$, $SD = 0.91$), with strengths in practical areas like plan interpretation and site management, but persistent weaknesses in computer-aided design and surveying. The study concludes that experiential pedagogy is the most effective strategy for TVET competency development and recommends increased investment in workshop facilities, stronger industry partnerships through structured internships, and targeted capacity-building for instructors to enable effective blended and digitally enhanced learning. Future research should explore longitudinal designs to assess the long-term retention and transfer of competencies acquired through different pedagogical methods. Comparative studies across different regions or types of TVET institutions would also help generalize findings. Additionally, experimental or quasi-experimental studies are recommended to establish causal relationships more definitively, and further investigation into the specific infrastructural and digital barriers to hybrid learning would provide actionable insights for policy and practice.

CHAPTER ONE

1.0 Introduction

The global demand for highly skilled professionals in technical and vocational fields underscores the need for educational institutions to implement effective teaching methodologies. As industries increasingly require graduates who combine theoretical knowledge with practical competence, technical and vocational education systems must adapt to these evolving standards. Hands-on practical experiences, situated learning approaches, and hybrid blended methods are crucial for bridging the gap between classroom learning and real-world applications. These methodologies prepare graduates to address complex challenges in their respective fields, enhancing their readiness for the workforce. Addressing the challenges associated with implementing these teaching styles is vital for aligning educational outcomes with global industry standards, which in turn supports sustained economic growth, skill development, global competitiveness, and sustainable development.

This chapter therefore consists of the background of the study, the problem statement, the research objectives and questions, significance of the study and the theoretical framework.

1.1 Background to the Study

This section presents the historical, theoretical, conceptual and contextual perspectives of the study.

1.1.1 Historical background

The relationship between pedagogical approaches and competency development in technical and vocational education has evolved significantly over time. In pre-colonial Uganda, skills were transmitted through informal experiential learning, where apprentices worked alongside master craftsmen in indigenous trades such as blacksmithing, pottery, weaving, and carpentry. Competency was measured by the learner's ability to produce functional goods independently, and this hands-on, situated approach proved highly effective in producing self-reliant artisans. During the colonial era (1890s–1960s), vocational training was introduced primarily to produce semi-skilled labour for colonial infrastructure projects. Formal trade schools emerged, but instruction remained heavily practical, with workshop-based experiential methods dominating. Competency development was narrowly defined, focusing on repetitive tasks rather than holistic problem-solving, yet the experiential foundation remained intact.

In the post-independence period (1960s–1980s), Uganda's TVET system expanded, but political instability and economic decline led to the deterioration of workshops and equipment. Experiential learning became increasingly difficult to implement, and many institutions reverted to theoretical, lecture-based instruction due to resource constraints. Consequently, competency development declined, as graduates emerged with knowledge but limited practical skills. The 1990s to early 2000s saw renewed interest in TVET, with donor-funded projects reintroducing practical training and exploring situated learning approaches through industry attachments and community-based projects. Competency frameworks began to emphasize not just manual dexterity but also adaptability and problem-solving. However, implementation remained uneven, and competency outcomes continued to be moderate.

From the 2010s to the present, technological advancements and globalization have pressured TVET institutions to adopt hybrid and blended learning approaches, integrating digital tools with traditional hands-on instruction. However, as this study empirically demonstrates, infrastructural and digital readiness constraints have limited the effectiveness of hybrid methods, with experiential learning still outperforming all other approaches. Over this long historical arc, the evidence reveals a consistent pattern: periods characterized by robust experiential and situated learning correspond with higher competency development, while periods dominated by theoretical instruction or poorly implemented hybrid models correspond with lower competency outcomes. This study confirms that experiential pedagogy remains the most reliable pathway to competency development, yet its effectiveness is contingent on sustained investment in workshops, instructor capacity, and industry partnerships lessons that have been known, but not always acted upon, across Uganda's educational history.

Vocational training in Uganda is carried, particularly in technical institutes, technical schools, technical colleges and polytechnics, agriculture colleges, colleges of commerce and the Non-Formal Training Framework under the guidance of the Technical Vocational Education and Training (TVET) Act 2008 (Okumu, 2019). In addition, the TVET Act, 2025 (Act No. 3 of 2025) was enacted to address the shortcomings of its predecessor and to operationalize the TVET Policy 2019, which established an employer-led TVET.

1.1.2 The theoretical background

The study is underpinned by the Human Capital Theory (HCT), which provides a solid framework for examining how various teaching styles affect competency development within Uganda's technical and vocational education sector.

This study is anchored in Human Capital Theory (HCT), which was formally advanced by Theodore W. Schultz (1961) and later elaborated by Gary Becker (1964). Schultz (1961) posited that education and training are investments in human capital that enhance an individual's productive capacity, arguing that "education and training are the key drivers of economic performance." Becker (1964) further extended the theory by distinguishing between general and specific human capital, emphasizing that investments in knowledge and skills yield returns both to the individual (through higher earnings) and to society (through increased productivity and economic growth). The Organization for Economic Co-operation and Development (OECD, 2020) reinforces this perspective, emphasizing that knowledge accumulation and learning capabilities are crucial for economic success in today's global economy.

According to HCT, the quality and effectiveness of educational investments determine the returns in terms of human capital accumulation (Schultz, 1961). In this study, experiential, situated, and hybrid teaching methods represent distinct approaches to investing in learners' human capital. Experiential learning which engages students in direct, hands-on practice is theorized to yield higher returns because it embeds skills through active application, thereby increasing the stock of productive competencies (Becker, 1964). Situated learning, which places instruction in authentic workplace contexts, is similarly expected to enhance human capital by making learning relevant and transferable. Hybrid approaches, which integrate digital tools with traditional instruction, represent a contemporary investment strategy aimed at developing both technical and digital competencies essential for the modern economy (OECD, 2020). HCT thus frames teaching methodologies as strategic investments the more effective the method, the greater the accumulation of valuable human capital.

Human Capital Theory directly defines the dependent variable of this study competency development as the measurable accumulation of human capital. Schultz (1961) argued that competencies the knowledge, skills, and abilities that enable productive work constitute the core of human capital. When learners acquire competencies through education and training, their human capital stock increases, enhancing their employability, productivity, and capacity for innovation (Becker, 1964). The OECD (2020) emphasizes that competencies such as problem-solving, communication, technical proficiency, and adaptability are the very assets that drive economic competitiveness in knowledge-based economies. In this study, competency development is operationalized as the extent to which TVET students acquire professional competencies from engineering plan interpretation to computer-aided design through exposure

to different pedagogical methods. HCT posits that higher competency levels represent greater human capital accumulation, which in turn predicts better labour market outcomes and contributions to national development.

Human Capital Theory provides a theoretical bridge explaining why different teaching methodologies produce varying competency outcomes. The theory suggests that investments in human capital yield returns proportional to their quality and relevance (Schultz, 1961). Empirically, this study found that experiential learning—the most immersive and practice-intensive method—produced the highest competency gains, with a statistically significant positive correlation ($r = 0.420$, $p < 0.01$) and a predictive effect of 26.3% improvement per unit increase ($B = 0.263$, $p = 0.002$). From an HCT perspective, this indicates that experiential methods generate the highest returns on educational investment because they enable learners to acquire competencies that are directly applicable to productive work. In contrast, situated learning showed a weaker, non-significant effect ($B = 0.147$, $p = 0.125$), suggesting that while contextual learning has value, it may require additional investment in structure and support to yield significant human capital returns. Hybrid methods performed poorly ($B = 0.045$, $p = 0.516$), indicating that without adequate infrastructure and digital readiness, investments in blended approaches yield negligible competency gains—a finding consistent with HCT's emphasis that investment quality determines returns (Becker, 1964). The moderate overall competency score ($M = 2.60$) suggests that current investments in TVET pedagogy are yielding only modest human capital accumulation, underscoring the need for strategic reinvestment in evidence-based teaching methodologies.

Human Capital Theory thus provides a robust framework for understanding the relationship between teaching methodologies (independent variables) and competency development (dependent variable). The theory posits that education and training are investments that enhance individuals' productive capacity, with the quality of pedagogical approaches determining the magnitude of returns in terms of competencies. This study's empirical findings that experiential learning significantly predicts competency development while hybrid approaches underperform align with HCT's central proposition that not all educational investments are equally productive. By grounding the study in Human Capital Theory, this research emphasizes that effective TVET pedagogy is not merely an educational concern but a strategic economic imperative: investing in effective teaching methodologies is investing in the human capital that drives national development, global competitiveness, and sustainable economic growth (Schultz, 1961; Becker, 1964; OECD, 2020).

1.1.3 Conceptual Perspective

The efficacy of any educational endeavor is profoundly shaped by the complex interplay of numerous factors, yet few are as central and immediately impactful as the behavior and strategies of the instructor. At the heart of this dynamic lies the core variable of teaching styles, which serves as the primary lens through which this study examines pedagogical practice. The concept of a "teaching style" is not a monolithic or superficial trait; rather, it constitutes a deeply ingrained, multifaceted construct that encompasses an educator's consistent patterns of behavior, decision-making, and interaction within the classroom environment. To study this variable is to analyze the enduring and characteristic methods that an instructor employs to facilitate learning, manage the classroom, and relate to their students. It represents the operationalization of a teacher's educational philosophy, translating abstract beliefs about teaching and learning into concrete, observable actions that define the daily reality of the classroom.

To comprehensively understand this variable, it is essential to deconstruct it into its constituent conceptual parts: "teaching" and "style." The concept of teaching extends far beyond the mere transmission of facts from a knowledgeable source to a passive recipient. In a modern, constructivist paradigm, teaching is a purposeful and complex act of facilitation, designed to guide learners through a structured journey of inquiry, understanding, and skill acquisition. It involves not only the careful selection of content but also the expert orchestration of activities, resources, and assessments to create a supportive environment where meaningful learning can occur. Conversely, the concept of style refers to the distinctive and personal manner in which an activity is performed. It suggests a degree of consistency, predictability, and individuality that is characteristic of a person's approach. When combined, "teaching style" therefore describes the unique and stable pattern of pedagogical behaviors, techniques, and attitudes that a teacher habitually employs to fulfill the professional function of guiding student learning.

The significance of teaching styles is best understood when contextualized within the complex, dynamic ecosystem of the classroom. The modern classroom is not a passive environment but a vibrant social system characterized by the constant interaction of diverse learners, each possessing unique abilities, prior knowledge, motivations, and cultural backgrounds. Within this setting, the teacher's style acts as a primary architect of the classroom climate, profoundly

influencing student engagement, participation, and overall academic self-concept. Furthermore, the concept must be placed within the broader framework of student-centered education, where the focus has shifted from an exclusively teacher-led, didactic model to approaches that prioritize learner autonomy, critical thinking, and collaborative problem-solving. In this context, teaching styles are not evaluated as inherently "good" or "bad," but rather for their appropriateness and effectiveness in achieving specific learning objectives and in responding to the unique constellation of needs presented by a particular group of students.

Finally, to render this abstract concept measurable and useful for empirical investigation, it must be operationalized through specific, observable indicators. Rather than treating teaching styles as a singular, undifferentiated trait, this study adopts a multidimensional framework to capture its complexity. For example, we can operationalize a teaching style through the related variable of instructional delivery, which is measured by observing the balance of teacher-centered activities (such as lectures and demonstrations) versus student-centered activities (such as group projects and problem-based learning). Another key variable is classroom management, which is operationalized through the examination of the teacher's approach to maintaining order, including the degree of control versus autonomy granted to students. A third critical operational dimension is interpersonal interaction, assessed through the quality and nature of teacher-student communication, including the frequency of questioning, the use of feedback, and the general emotional climate fostered in the room. By breaking down "teaching styles" into these distinct, observable variables, this study can systematically analyze its impact and provide a nuanced, evidence-based understanding of its role in the educational process.

make paragraphs for conceptual background by defining variables and variable concept, "competence development", the concepts of "competence" and "development", "competence development, contextualize these and operationalize it.

Conceptual background, structured to define the core variable, deconstruct the concept of "competence development," contextualize its importance in modern education, and provide a clear operational framework.

In the contemporary landscape of education and professional training, the ultimate measure of success increasingly transcends the mere acquisition of theoretical knowledge. The central variable that captures this paradigm shift is competence development, which serves as the focal point of this investigation. Competence development refers to the progressive and systematic process through which learners acquire, refine, and integrate the multifaceted capabilities required to perform effectively in real-world contexts. Unlike traditional metrics of academic

achievement that emphasize rote memorization and recall, these variable foregrounds the holistic cultivation of an individual's ability to apply knowledge, demonstrate skills, and exhibit appropriate attitudes in response to complex and often unpredictable situations. To study competence development is to examine the dynamic trajectory of learner growth, tracing how isolated bits of information and nascent abilities coalesce over time into robust, transferable, and practically applicable expertise.

A rigorous understanding of this variable necessitates a careful deconstruction of its two constituent conceptual pillars: "competence" and "development." The concept of competence is itself richly layered, extending far beyond the narrow confines of a discrete skill or a single piece of information. In educational theory, competence is broadly understood as an integrated and functional repertoire of knowledge, cognitive and practical skills, and personal and social abilities that enable an individual to successfully navigate and master specific tasks, challenges, or professional roles. It is inherently contextual and performance-oriented, emphasizing the "know-how" and "know-why" that underpin effective action, rather than simply the "know-what" of declarative knowledge. Complementing this is the concept of development, which denotes a process of growth, maturation, and progressive change over time. Development implies movement along a continuum from a less advanced or integrated state toward a more sophisticated, complex, and capable state. When combined, "competence development" therefore encapsulates a dynamic, longitudinal process whereby an individual's latent potential is systematically activated and shaped, gradually building the comprehensive capacity to meet the demands of their academic, professional, and personal lives.

The profound significance of competence development is best understood when contextualized within the rapidly evolving demands of the 21st-century world. The information age has rendered static, fact-based knowledge increasingly obsolete, as information is now ubiquitously available at one's fingertips. In stark contrast, the ability to critically evaluate information, solve novel problems, collaborate across diverse teams, and adapt to constant change has become paramount. Consequently, educational paradigms worldwide have shifted from a primary focus on content delivery to a competency-based model that prioritizes learning outcomes demonstrable through performance. This contextual shift places competence development at the very heart of curriculum design and pedagogical practice, as educators are now tasked not merely with transmitting a syllabus, but with engineering learning experiences that scaffold and cultivate these higher-order capabilities. Furthermore, this concept is intimately linked to the principle of lifelong learning, as the competencies developed during

formal education must equip learners to continually adapt and upskill throughout their careers in response to ongoing technological and societal transformations.

To render this expansive and abstract concept amenable to empirical investigation and practical application, it must be clearly operationalized through a set of measurable and observable indicators. Rather than treating competence development as a singular, monolithic outcome, this study adopts a multi-dimensional operational framework to capture its complexity. For instance, one related variable is the cognitive competency dimension, which can be operationalized by assessing a learner's ability to perform complex problem-solving tasks, engage in critical analysis, and demonstrate creative thinking through structured performance assessments. A second variable is the practical competency dimension, operationalized by measuring technical proficiency, procedural accuracy, and the effective application of tools and techniques within simulated or authentic work environments, often through portfolios or practical examinations. A third essential variable is the social and behavioral competency dimension, which is operationalized through the observation and evaluation of collaborative teamwork, communication efficacy, ethical decision-making, and self-regulation in group projects and interactive scenarios. Finally, the "development" aspect of the variable can be operationalized longitudinally, by measuring these dimensions at multiple points in time, thereby mapping the learner's progress along a trajectory of growth. Through this rigorous operationalization, the abstract ideal of competence development is transformed into a concrete, empirical construct that can be systematically observed, measured, and enhanced.

Competency development in vocational and technical education is a multifaceted concept encompassing attributes, knowledge, skills, and technical proficiencies essential for various engineering and construction roles. Competencies in fields such as Computer-Aided Design (CAD), structural analysis, construction management, and engineering plan interpretation are crucial for ensuring that professionals meet industry standards and contribute effectively to their workplaces (Ismail & Mohammed, 2015). According to Lasse (2015), competencies are

not merely limited to technical skills but extend to personal traits, attitudes, and cognitive abilities that distinguish superior performers from average ones. This broader view of competencies highlights the importance of both measurable skills and intangible attributes in defining professional effectiveness.

The International Atomic Energy Agency (2019) conceptualizes competency as a comprehensive cluster of related knowledge, attitudes, and skills that impact key roles and responsibilities within a profession. This definition emphasizes that competencies must correlate with job performance and be measurable against established standards, with the potential for enhancement through targeted training and development. Devex (2016) expands this perspective by noting that competencies encompass a spectrum ranging from personal traits to specific work behaviors, including a diverse array of individual characteristics that contribute to professional success.

Tett et al. (2018) further elaborate on competencies by categorizing them into traits (such as creativity and self-knowledge), knowledge (including technical, procedural, and business knowledge), skills (like delivering presentations and coaching), abilities (such as political savvy and strategic agility), and behaviors (e.g., confronting direct reports and active listening). This nuanced framework underscores the complexity of competencies and their role in differentiating effective professionals. Grosch (2017) supports this view by arguing employers' value graduates who exhibit self-efficacy and adaptability, reflecting a range of beliefs and attitudes that enable critical reflection and contextual adaptation.

Industry relevance and career readiness are central to competency development, as they ensure that vocational education aligns with current job market demands. Competencies must be continuously updated to reflect technological advancements and evolving industry standards, ensuring that graduates are prepared to navigate and succeed in their professional environments. Thus, the development of competencies is crucial not only for individual career success but also for the broader economic impact, as competent professionals drive productivity and innovation within their industries.

Teaching styles encompass various methods employed to convey knowledge and skills, aimed at enhancing effective learning and guiding student success (Mwathwana, Mungai, Gathumbi, & George, 2014). These styles involve different approaches used by teachers to deliver instruction, maintaining consistent teaching behaviors across different content areas (Hagati,

Surat, & Noer, 2021; Ghanizadeh & Jahedizadeh, 2016). In technical and vocational education, these styles blend theoretical concepts with practical application, emphasizing hands-on learning and real-world scenarios (Lucas et al., 2012). Educators adapt techniques to various settings, such as classrooms or simulated workplaces, engaging students in authentic tasks that foster practical problem-solving and skills development.

In Technical and Vocational Education and Training (TVET), diverse teaching styles are employed to enhance learning outcomes and student competence. A core focus is hands-on, practical learning, grounded in experiential learning theory, which highlights learning through direct engagement in activities (Kolb, 1984). By participating in laboratory work, fieldwork, and simulations, students apply theoretical knowledge in real-world contexts, significantly improving their understanding and skill proficiency. Research indicates that such practical experiences not only reinforce theoretical concepts but also lead to greater skill retention and job readiness, resulting in students who are more competent in their fields, such as automotive students who gain deeper mechanical insights through hands-on practice (Lucas et al., 2012). Situated and context-bound learning underscores the importance of learning within environments that closely mirror real-world work conditions (Lave & Wenger, 1991). In TVET, this approach involves integrating site visits, industry partnerships, and case studies into the curriculum. For instance, culinary students might practice in professional kitchens or collaborate with local restaurants, gaining relevant experience that enhances their practical skills. This method ensures that students understand the norms and challenges of their professions, leading to increased competence. However, challenges such as ensuring the accuracy of simulated environments must be addressed to maintain the relevance of the training (Faraday et al., 2011).

TVET lecturers use a hybrid teaching style that merges teacher-centred and student-centred approaches. This balance combines direct instruction with opportunities for student engagement and autonomy. Teacher-centred methods deliver foundational knowledge, while student-centred techniques encourage active participation and collaboration (Tsang, 1997). Research suggests that integrating these methodologies results in improved learning outcomes by leveraging the strengths of both approaches, enhancing student motivation, and preparing them for complex careers. By effectively combining structured instruction with practical projects, students become more competent, equipped with both theoretical understanding and practical skills needed for their future roles (Hattie, 2009). This comprehensive approach

ensures that students are prepared for real-world challenges and enhances their overall employability.

1.1.4 Contextual background

In Uganda, education system does not deliver required skills for integration in the labour market and other livelihood opportunities, yet they are required to help learners get, keep and even do well on job (Cuthbert et al., 2015). This suggests that alternative innovations are required in training and assessing the learners. According to Okwelle and Deebom (2017), lack of or inappropriate skills, explains poor labour productivity. Uganda's BTVET Act of 2008 recognizes lack of skills and daunting youth unemployment (MoES, 2017). A study by Bennedy and Oteng (2018) on youths' empowerment in North Eastern Uganda revealed that 94% were lacking skills even after their Vocational Training. Whereas the Uganda Government White paper (1989) on review of education policy also indicated that industrialists often complained about quality of TVET graduates, the graduates in vocational education are still not performing as required in the world of work, blaming it on the training that offers mediocre skills. Thus, inquiring into assessment should not be overemphasized.

This therefore provides the rationale to conduct the study on the contribution teaching styles on the competency development of students in technical and vocational training institutions in Uganda.

1.2 Statement of Problem

In response to the increasing demand for graduates who possess relevant skills and are employable, technical and vocational education and training (TVET) systems need to integrate theoretical knowledge with practical skills (Kim, 2021, TVET Policy, 2019). Institutions that incorporate hands-on experiences, situated learning, and hybrid blended methods are well-positioned to bridge the gap between classroom instruction and real-world application (OECD, 2021). Graduates from such programs often demonstrate advanced practical skills, problem-solving abilities, technical proficiency, and readiness for their careers, aligning with global standards of professional competence (Rawkins, C. 2018) In response to the growing demand for skilled labour, the Ugandan government, in collaboration with the Ministry of Education and Sports and various development partners, has launched several initiatives to enhance Technical and Vocational Education and Training (TVET) (World Bank & UNESCO, 2023). These initiatives involve updating curricula, investing in infrastructure, improving faculty training, fostering industry partnerships, offering scholarships, and integrating modern teaching technologies. However, significant skill gaps persist, manifesting in issues like

building collapses and inadequate project management. Industrialists often criticize TVET graduates for having skills that do not meet current industry requirements (Moses, 2017). Research indicates a disparity between the academic qualifications of TVET graduates and their practical skills. Malachwanzi (2018) noted that graduates often fall short in job performance due to insufficient skills, despite their high academic credentials. Bennedy and Oteng (2018) found that 94% of youths in North Eastern Uganda lacked critical skills even after vocational training. Similarly, Yiga (2022) reported that over 40% of TVET graduates in Central Uganda are inadequately skilled for competitive job markets, with variations based on gender and prior experience. The issues within Uganda's Technical and Vocational Education and Training (TVET) institutions, particularly regarding teaching styles, lack of information and literature about teaching style which has prompted me to investigate teaching styles and competency development of students. This study seeks to explore how different teaching styles influence the competency development of students. Specifically, it will assess the effectiveness of hands-on learning in improving practical skills, examine the impact of situated learning—where students engage in real-world or simulated environments—and investigate the relationship between hybrid integration of traditional and modern teaching methods and student competencies. The findings aim to improve instructional practices and align TVET outcomes with industry needs.

1.3. Purpose of the study

The purpose of this study was to explore how different teaching styles influence the competency development of students in technical and vocational education and training (TVET) institutions in Uganda.

1.4 Research Objectives

The study was be guided by the following objectives;

- i. To assess effectiveness of hands-on learning on competency development among TVET students.
- ii. To examine the influence of situated learning on competency development among TVET students
- iii. Determine the relationship between hybrid integration and competency development of TVET students
- iv. Establish the relationship between teaching styles and competency development among TVET students

1.5 Research Questions

The study was intended to answer the following research questions

- i. How effective are hands-on practical learning experiences teaching style in enhancing practical competencies among students in technical Colleges?
- ii. What is the influence of situated learning on competency development among TVET students?
- iii. What is the effect of hybrid integration on competency development among TVET students?
- iv. (H₁) that lecturers' teaching styles have a significant positive relationship with competency development.

1.6 Scope of the Study

Geographical Scope: The study focused on technical and vocational colleges located in Eastern, Northern and western Uganda. This region has a concentration of institutions with diverse student populations, varying levels of infrastructure development and cultural diversities. By concentrating on these areas, the research aims to provide insights into how teaching styles influence competency development in a setting that combines urban and peri-urban characteristics, potentially reflecting different challenges and opportunities compared to more rural areas.

Content scope: The study content included examining how teaching styles; hands-on, situated, and hybrid blended methods affect competency development in technical, vocational education and training (Civil engineering section). Hands-on learning involves practical activities, whereas situated learning encompasses real-world experiences such as industry partnerships. The hybrid approach combines face to face with online instructions. As far as competence development is, the research will evaluate critical skills like structural analysis, survey, and design of engineering plan, interpretation, costing, construction management and career readiness, incorporating insights from institutional leaders, academics, and students. Additionally, it will explore the role of institutional support and administrative impacts on teaching effectiveness.

Time Scope: The time scope of this study spanned from 2016 to 2024 and focuses on examining the impact of various teaching styles on competency development within the Civil Engineering section of technical, vocational education, and training (TVET). This period

encompasses nearly a decade of educational developments, during which significant shifts in teaching methodologies and technological advancements have influenced instructional practices. By reviewing documents and data from this timeframe, the study aims to provide a comprehensive analysis of how hands-on, situated, and hybrid blended teaching methods have evolved and their effects on students' competencies in Civil Engineering.

1.7 Significance of the Study

This study provided important insights to the Ministry of Education and Sports. The findings may help in developing and implementing a competency-based curriculum that promotes the acquisition of practical and relevant skills among students in technical and vocational institutions.

It may also guide District Education Officers and heads of technical and vocational institutions in encouraging instructors to adopt teaching styles that promote active student engagement. This approach will help improve the learners' skill development and overall competence.

The study may serve as a valuable resource for researchers and academicians interested in exploring similar topics in the future. It will add to the growing body of knowledge on effective teaching methods in vocational and technical education.

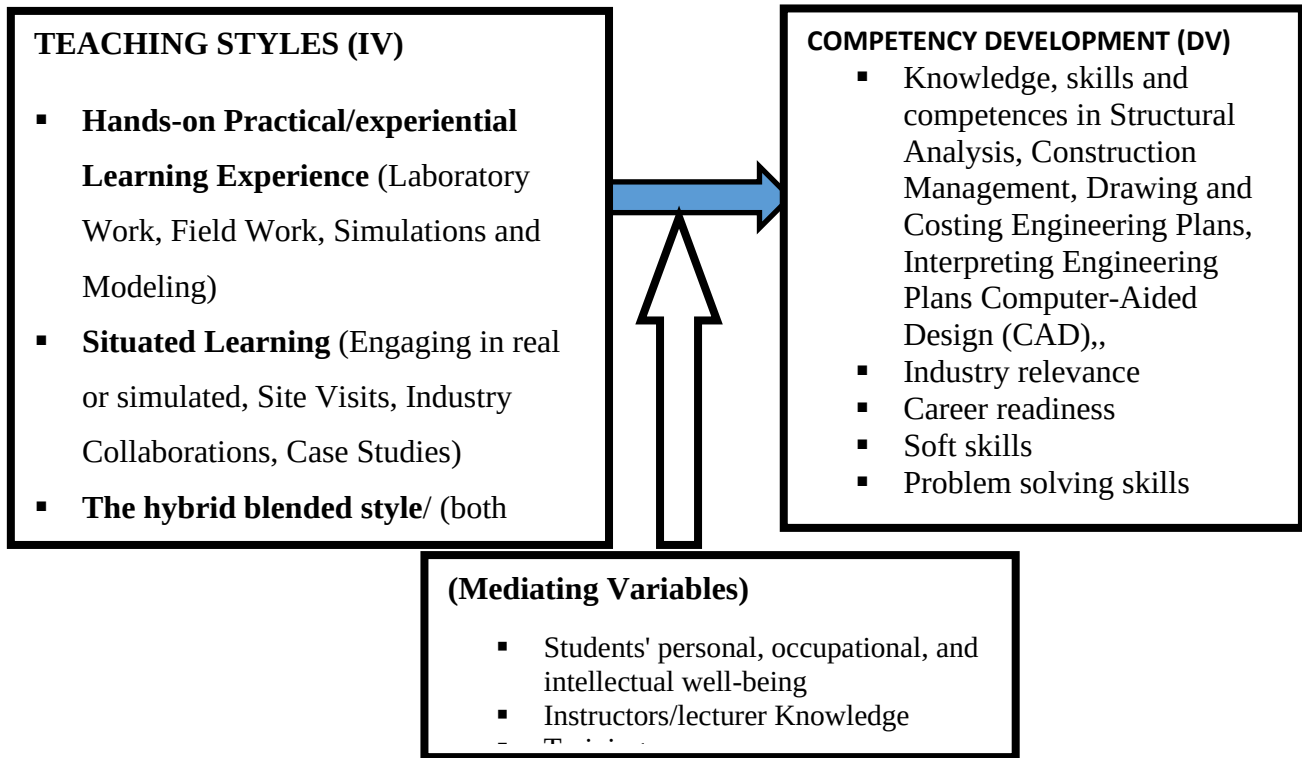
By highlighting the gap between teaching styles and student outcomes, the study addressed the issue of poor employability skills among many technical graduates. It showed how ineffective teaching methods contribute to this challenge.

Research shows that the quality of teaching is closely linked to student performance. Effective teaching brings about meaningful change in learners, helping them achieve specific learning outcomes (Ayeni, 2019).

According to Adunola (2018), for teaching to be effective, instructors will need to be familiar with a range of strategies that match the complexity of the subject matter. This study may therefore examine how various teaching styles influence competency development in technical and vocational education institutions.

1.8 Conceptual Framework

The conceptual framework below describes the relationship between teaching styles (independent variable) and competency development (dependent variable), highlighting how various teaching methods contribute to students' skill enhancement.



Source: Adapted from National Institute of Statistics and Economic Studies (2015), Boahin and

Figure 1: Conceptual framework

The conceptual framework illustrated in Figure 1.1 examines the relationship between different teaching styles and competency development within the realm of civil engineering education in Uganda. This framework identifies teaching styles as the independent variable (IV), focusing on approaches such as hands-on, practical learning experiences, situated and context-bound learning, and hybrid blended styles. Hands-on learning encompasses activities like laboratory experiments, fieldwork, simulations, and modelling, which allow civil engineering students to apply theoretical concepts in practical scenarios. Situated and context-bound learning involves real-world experiences through site visits, industry partnerships, and case studies, aligning academic instruction with actual civil engineering practices. The hybrid blended style combines teacher-centred methods with student-centred techniques, promoting both structured guidance and active student engagement.

Competency development is the dependent variable (DV) in this framework, covering crucial areas such as knowledge, skills, and competencies in structural analysis, survey, construction management, and engineering plan interpretation, including computer-aided design (CAD). This competency development ensures that civil engineering students gain the technical proficiency needed for the field, aligning their learning with industry standards and enhancing their career readiness. The focus on industry relevance ensures that the competencies acquired are pertinent to current civil engineering practices, preparing students effectively for their future careers in the industry.

The framework also considers the mediating variables (MV) that influence the effectiveness of teaching styles on competency development. These include the personal, occupational, and intellectual well-being of students, which affects their overall learning experience and professional growth. Additionally, the framework highlights the significance of instructors' knowledge and clearly defined roles and responsibilities, as well as the consensus between administrators and teachers. These mediating factors support a cohesive educational approach, ensuring that teaching styles are effectively applied to enhance students' competencies and better prepare them for successful careers in civil engineering.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This section reviews literature on teaching styles and competency development in technical and vocational education. It uses Human Capital Theory (HCT) to evaluate the effectiveness of hands-on, situated, and hybrid styles on competency development of TEVT students.

2.1 Theoretical Review

The theory chosen to guide this study is Human Capital Theory (HCT), which provides a solid framework for examining how various teaching styles affect competency development within Uganda's technical and vocational education sector.

Human Capital Theory, which has been a fundamental aspect of economic thought since the 1960s, posits that investments in education and training enhance individual productivity and economic value (Becker, 1962). This theory views individuals as "human capital" whose skills and knowledge contribute to economic growth. The Organization for Economic Co-operation and Development (OECD) emphasizes that knowledge accumulation and learning capabilities are crucial for economic success in today's global economy (OECD, 2020). Schultz (1961) highlights that "Education and training are the key drivers of economic performance," underscoring the critical role of human capital in fostering innovation and productivity.

In the context of civil engineering education, HCT supports the evaluation of hands-on, situated, and hybrid blended teaching styles for their effectiveness in developing essential competencies. Hands-on learning aligns with HCT's focus on practical skill acquisition through direct experience, as noted by Garrison and Vaughan (2008): "Practical experience is critical in developing competencies that are directly applicable to industry needs." Situated learning, which integrates contextual relevance and real-world applications, complements this approach. Lave and Wenger (1991) argue that "Learning is inherently tied to the context in which it occurs," emphasizing the importance of industry simulations and problem-solving activities in enhancing practical understanding. Hybrid blended teaching, combining in-person and online methods, provides a comprehensive learning experience. Graham (2006) observes, "Blended learning environments provide flexible, accessible, and interactive opportunities that support diverse learning needs," which is crucial for adapting to various educational contexts.

According to HCT, the effectiveness of these teaching styles should be evaluated based on how well they contribute to developing competencies like structural analysis and Computer-Aided Design (CAD), which are essential for career readiness and industry alignment. These

assumptions align with the idea that education and training investments are directly linked to improved economic outcomes and workforce readiness.

But what is contrasting is that while HCT emphasizes the economic benefits of education, it may not fully account for the broader educational environment and diverse learning contexts. For instance, HCT tends to focus primarily on the economic returns of education, potentially overlooking the social and personal development aspects that also contribute to student success (Schultz, 1961). This contrasts with the situated learning perspective, which highlights the importance of contextual factors and real-world applications in education, offering a more holistic view of learning beyond mere economic value.

By investigating these teaching styles, the study aims to provide insights into how they enhance critical skills necessary for civil engineering and align educational methods with industry needs. The findings will be valuable for stakeholders, including technical college leaders, department heads, lecturers, and students, in understanding how to effectively integrate teaching strategies to foster a skilled and adaptable workforce.

2.2 Review of Related Literature

2.2.1 Hands-On Learning and Competency Development among students of TVET Institutions in Uganda

The concept of hands-on learning has become increasingly recognized as a crucial element in technical and vocational education and training (TVET). According to recent research, this approach emphasizes experiential learning, where students engage directly with practical tasks rather than relying solely on theoretical instruction. For example, studies by Moses and Malachwanzi (2022) illustrate that active participation in practical tasks significantly enhances competency levels among vocational students. This finding highlights the importance of experiential learning in developing job-ready skills in technical education. Another scholar, Smith (2021), supports this view by noting that hands-on methods contribute to deeper understanding and improved retention of knowledge. This convergence of findings underscores the role of practical engagement in reinforcing and expanding students' technical skills, providing a solid foundation for understanding how hands-on learning fosters effective skill acquisition.

To effectively analyse the impact of hands-on learning, it is essential to develop a robust theoretical framework. Theories such as Kolb's Experiential Learning Theory, which emphasizes learning through direct experience, offer valuable insights into how practical

activities influence competency development (Kolb, 1984). According to Kolb's theory, learning occurs through a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation, which aligns closely with hands-on learning practices. Kolb's Experiential Learning theory strengthens HCT by providing the learning process that ensures investments in human capital translating into real productivity, innovation, and adaptivity. According to this theory, hands-on- practice engages students directly into practicing tasks investing to practical skills acquisition that produce job-ready, competent workers. Methodologically, many studies utilize qualitative approaches, such as case studies and observational research, to gather detailed insights into how hands-on experiences contribute to skill acquisition. For instance, Smith (2021) employs case studies to explore the effectiveness of hands-on learning in various technical programs. This methodological approach allows for a comprehensive assessment of how practical engagement supports educational objectives within TVET and provides a basis for evaluating the success of hands-on learning strategies.

Despite these insights, the literature reveals several gaps and ongoing debates regarding hands-on learning in technical education. One significant issue is the variability in how hands-on learning is implemented across different institutions and programs, which can lead to inconsistent outcomes (Jones & Taylor, 2020). According to Jones and Taylor, this variability affects the overall effectiveness of hands-on learning and its impact on competency development. Additionally, while many studies advocate for hands-on learning, there is ongoing debate about the optimal balance between theoretical and practical instruction. Some argue that an overemphasis on hands-on activities might lead to neglect of essential theoretical knowledge, which is necessary for a comprehensive understanding of technical subjects (Smith, 2021). This finding contrasts with other empirical studies that suggest integrating theoretical knowledge with practical experiences is crucial for achieving well-rounded competency development. Addressing these gaps involves exploring strategies to standardize hands-on learning practices and effectively integrate them with theoretical components to enhance overall educational outcomes.

Current research supports the effectiveness of hands-on learning in improving competency development but also highlights areas needing further investigation. Evidence from studies such as those by Moses and Malachwanzi (2022) shows that engaging in practical tasks enhances skill acquisition and job readiness. However, the researcher also emphasizes the need for more comprehensive evaluations to understand how different types of hands-on activities

impact various aspects of competency development. This finding indicates that additional empirical studies are necessary to identify successful practices and areas for improvement, ensuring that hands-on learning continues to evolve and contribute effectively to the goals of technical and vocational training programs. By evaluating current research, scholars can pinpoint effective practices and address areas needing refinement, thereby advancing the field and improving the effectiveness of hands-on learning in TVET. Despite demonstrating effectiveness, the literature reveals gaps in hands-on learning within Ugandan TVET institutions. Variability in implementation across programs leads to inconsistent outcomes, and debate persists regarding the ideal balance between theoretical knowledge and practical application. Further research is needed to standardize practices and comprehensively evaluate the impact of different hands-on activities on competency development.

2.2.2 Situated Learning and Competency Development among students of TVET Institutions in Uganda

Situated learning has emerged as a transformative approach in technical education, emphasizing the integration of learning experiences within real-world contexts. This pedagogical strategy aims to bridge the gap between theoretical knowledge and practical application, which is particularly crucial in technical disciplines such as Structural Analysis, Construction Management, Drawing and Costing Engineering Plans, and Computer-Aided Design (CAD). Pioneering research by Brown, Collins, and Duguid (1989) suggests that learning is most effective when it mirrors actual industry practices and challenges. By embedding educational experiences in environments that reflect real-world conditions, situated learning enhances students' ability to develop practical skills and competencies that are directly applicable to their chosen fields. This approach not only improves student engagement but also equips them with the skills necessary to succeed in their professional careers. However, the successful implementation of situated learning requires active participation from both educators and policymakers to create an environment that fosters real-world applicability and relevance.

Research consistently supports the efficacy of situated learning in fostering industry-relevant skills. Studies by Yiga (2022) and Bennett & Oteng (2018) provide compelling evidence that context-bound learning significantly improves students' readiness to meet industry demands. For instance, technical schools in Uganda that incorporate real-world scenarios into their training programs effectively bridge the gap between theory and practice, addressing both socio-cultural and infrastructural realities. Whereas this evidence highlights the benefits of

situating learning within practical contexts, it also indicates that lecturers must take proactive steps to enhance their teaching methodologies. Lecturers should incorporate practical experiences and simulations into their curricula, establish partnerships with local industries, involve professionals in the educational process, and provide students with hands-on projects that mirror real-world challenges. Nonetheless, the success of these strategies relies heavily on a supportive infrastructure and a curriculum that reflects the current needs of the industry.

Despite the advantages of situated learning, technical and vocational education and training (TVET) systems in Sub-Saharan Africa face significant challenges. International reviews of workforce development programs highlight systemic weaknesses in countries like Burundi, Cameroon, Chad, Tanzania, and Uganda. These reviews underscore the need for TVET programs to better align with labour market demands. According to the Organisation for Economic Cooperation and Development (OECD, 2018), equipping students with digital literacy, problem-solving abilities, and social skills is crucial for adapting to the evolving job market. This need has been further underscored by the COVID-19 pandemic, which has accelerated changes in workforce requirements. Policymakers play a crucial role in addressing these challenges by implementing reforms that align educational programs with labour market needs. They should focus on creating policies that support industry-education partnerships, invest in up-to-date training facilities, and ensure that TVET programs are flexible and responsive to changing industry trends. This involves crafting policies that promote continuous professional development for educators and ensure that TVET programs are aligned with the latest technological and industrial advancements.

In response to these challenges, East African governments, along with private and non-governmental partners, are making concerted efforts to revitalize TVET programs. Research supported by the International Development Research Centre (IDRC) has informed skills development reforms in countries such as Kenya, Malawi, Tanzania, Uganda, Zambia, and Zimbabwe. These reforms aim to align TVET programs more closely with labour market needs and address the gaps between existing skills and job requirements. However, persistent issues regarding the alignment of TVET programs with labour market demands and the need for improved research capacity and performance indicate that further efforts are necessary. To ensure those students are prepared from admission, through their stay, and upon exit, educational institutions should implement comprehensive support systems. This includes orientation programs that align students' expectations with industry realities, continuous assessment and feedback mechanisms, and robust career services to aid in job placement and

transition. Lecturers should continuously adapt their teaching practices based on evolving industry standards, while policymakers should enhance the quality and relevance of TVET programs through strategic investments, robust regulatory frameworks, and effective stakeholder collaboration. Continued research and reform are essential to enhance the effectiveness of technical education and ensure that TVET programs prepare students to meet the evolving demands of the job market effectively. Hovering over the topic of situated learning, however, significant challenges persist within TVET systems in Sub-Saharan Africa, including systemic weaknesses and a need to better align programs with evolving labour market demands (OECD, 2018).

2.2.3 Hybrid Integration and Competency Development among students of TVET Institutions in Uganda

Hybrid learning style represents a transformative approach in education, integrating traditional face-to-face instruction with digital technologies to offer a flexible and personalized learning experience. Central to this model is the concept of hybrid integration, which involves strategically combining online and offline learning modalities to create a cohesive and effective educational environment. Hybrid integration leverages a variety of digital tools to complement in-person instruction, enhancing student engagement and learning outcomes. For instance, video clips can be used to provide visual explanations of complex concepts, while websites serve as repositories for supplemental materials and interactive content. Email and text messages facilitate direct communication between students and instructors, allowing for quick updates and support. Additionally, tools like Google Meet, Zoom, and other cloud-based platforms enable real-time virtual sessions that mimic classroom interactions, providing opportunities for live discussions, group projects, and collaborative learning. Group messaging apps such as WhatsApp or Telegram support peer-to-peer communication, fostering collaboration and community outside of scheduled class times. Gedik et al. (2006) and Halili (2016) emphasize that hybrid integration harnesses these diverse technologies to tailor instruction to individual learning preferences and needs, creating a more adaptive and engaging learning experience.

In Sub-Saharan Africa, the implementation of blended learning, including hybrid integration, faces significant challenges due to infrastructural limitations, restricted access to technology, and varying levels of digital literacy. Despite the global recognition of blended learning's potential, these regions often struggle with barriers that impede effective adoption. Schilling and Kember (2014) point out that while blended learning holds promise for enhancing

educational outcomes, its success in Sub-Saharan Africa requires overcoming substantial contextual obstacles. For example, limited access to reliable internet and technological resources can hinder the use of online tools such as video clips and cloud-based platforms. Addressing these challenges involves developing strategies that adapt hybrid integration to the unique needs of these educational environments. Solutions might include leveraging low-bandwidth technologies, providing offline access to digital resources, and offering training to both educators and students to improve digital literacy and facilitate effective use of communication tools like emails and text messages.

In East Africa and Uganda, the integration of blended learning and hybrid models reveals both potential benefits and practical obstacles. Research indicates that while there is considerable interest in incorporating digital technologies, issues such as unreliable internet access and limited technological resources remain significant hurdles (Schilling & Kember, 2014). In Uganda, these challenges are compounded by a lack of access to digital tools and inadequate training for educators in digital pedagogy. For instance, while platforms like Zoom, Google Meet, and WhatsApp offer opportunities for virtual interaction and collaboration, their effectiveness is limited by connectivity issues and the availability of devices. To address these barriers, localized research and solutions are needed that consider the specific educational and technological conditions of East Africa and Uganda. Future studies should explore how hybrid integration can be adapted to these contexts, focusing on practical strategies to utilize digital tools effectively and enhance competency development in technical education. By developing targeted approaches to address these challenges, blended learning can be better harnessed to improve educational outcomes and support skill development in these regions. However, gaps remain in effectively implementing hybrid learning in Uganda and Sub-Saharan Africa due to limited technology access, unreliable internet (Schilling & Kember, 2014), and inadequate digital literacy training (Gedik et al., 2006; Halili, 2016).

Summary of gaps in the literature

The following research gaps highlight critical areas needing further exploration in the context of practical teaching styles in TVET:

Current research on practical teaching styles in Technical and Vocational Education and Training (TVET) lacks localized studies, particularly in Uganda Technical Colleges and regions like Lira, Mbale and Kyema in Masindi. There is a notable absence of research on the

practical application of hands-on, hybrid, and situated teaching styles, with little focus on how these approaches improve job readiness and skills retention. Methodologically, most studies rely on either qualitative or quantitative approaches, leaving a gap in mixed-methods research, which could provide a more comprehensive understanding of teaching effectiveness. Additionally, there is limited insight into how resource constraints and digital literacy challenges impact the integration of hybrid learning in Sub-Saharan Africa. Furthermore, the preparedness of TVET lecturers and the availability of training programs to support practical teaching remain under-researched. Understanding how these teaching methods affect students' long-term outcomes, including job readiness and employment, requires further exploration. Addressing these gaps would inform improvements in TVET programs, ensuring their effectiveness and relevance in Uganda.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter presents the research design, study area, target population, sample strategy. Data methods and instruments, data management and analysis, administration procedure, ethical considerations, assumptions, limitations and delimitations were considered.

3.1 Study Approach

The study used mixed-methods approach to provide a comprehensive understanding of teaching styles and competence development of students in Technical and Vocational Education and Training (TVET) institutions in Uganda. This approach combines quantitative and qualitative methods to deliver both numerical data and in-depth insights, offering a detailed picture of the current state of TVET (Saunders and Lewis (2007).

3.2 Study Design

The study used a cross-sectional design to capture a snapshot of teaching styles and competency development among TVET students at a specific time, allowing for a detailed analysis of current educational conditions (Creswell, 2014). Quantitative data organized with descriptive statistics, including frequency distribution and percentages to identify patterns, and standard deviations to measure data variability (Trochim, 2006; Field, 2013). Qualitative methods complemented this analysis, with ethnographic research immersing the researcher in the educational environment to observe behaviours and beliefs (Hammersley & Atkinson, 2007). Case studies provided detailed insights into specific institutions (Yin, 2018), while phenomenological research explored participants' experiences and narrative research analysed personal stories to understand perceptions of teaching styles (Van Manen, 2016; Czarniawska, 2004).

3.3 Target Population:

The target population for this study included key stakeholders from the civil engineering departments of three technical colleges in Uganda. This group consisted of the Heads of the institutions, who oversee overall management and strategic planning. Deputy Principals, who assist with administrative and academic duties, were also included. The Academic Registrars, responsible for student admissions and records, played a critical role in the academic environment. Heads of Departments (HODs) were essential because of their involvement in curriculum development and departmental management. Lecturers and Instructors, who deliver the civil engineering curriculum and practical training, provided insights into teaching

methodologies and educational challenges. Finally, Students from the civil engineering programs were included to offer their perspectives on learning experiences and the effectiveness of the training. This diverse group ensured comprehensive evaluation of the civil engineering education landscape in the selected colleges.

3.4 Sample Size Determination

To determine the sample size for this study, the researcher utilized the Krejcie and Morgan (1970) Table, which provides a widely accepted method for calculating sample sizes in research.

Table 1: shows sample size

Categories from the three technical colleges	Target population		Sample size	Method of Sampling
Heads of 3 institutions		3	3	Purposive
Deputy Principals		3	3	Purposive
Academic registrar		3	3	Purposive
Dean of students/DOS		3	3	Purposive
Heads of department		3	3	Purposive
Lecturers/Instructors		15	10	Purposive
Students		140	95	Simple random sampling
TOTAL		170	120	

Source: Primary data, 2024

3.4.1 Sampling Techniques: The table above presents the target population and sample size for various respondent categories across three technical colleges. A census approach was used for smaller groups—including heads of institutions, deputy principals, academic registrars, deans of students, and heads of departments—by including all individuals in the sample. For the larger groups of lecturers/instructors and students, simple random sampling was applied, resulting in 10 lecturers selected from a total of 15 and 95 students from a population of 140. This approach ensured both representativeness and feasibility, yielding a total sample size of 120 from a target population of 170.

3.4.2 Sample Size Calculation

The researcher adapted Krejcie and Morgan's (1970) formula is widely used to determine the required sample size for finite populations. The formula is:

$$S = \frac{\chi^2 \cdot N \cdot P \cdot (1-P)}{d^2 \cdot (N-1) + \chi^2 \cdot P \cdot (1-P)}$$

Where: **S** is the sample size, **N** is the population size, **P** is the estimated population proportion (commonly 0.5 for maximum variability), χ^2 is the chi-square value corresponding to the desired confidence level (typically 3.841 for 95%), and **d** is the margin of error (often set at 0.05). For example, with a population of 91, a 95% confidence level, and a 5% margin of error, the required sample size was approximately 115 participants. This formula simplifies the process of ensuring an adequate and representative sample size for finite populations in selected Uganda Technical Colleges.

3.5 Data Collection Procedures

Data collection from the three technical colleges followed a structured approach using emails, WhatsApp, phone messages, calls and appointments with management for accuracy. The process began with planning, outlining objectives and key variables. Reaching students and lecturers were done face to face but with appointments made through emails and WhatsApp. A total of 120 respondents, with 115 confirmed participants, provided the necessary data through these communication methods and scheduled meetings.

3.6 Data Collection Methods

Different methods and techniques were used in collecting both primary and secondary data. These included interviews and questionnaire surveys. The combination of data collection methods increased the validity and reliability of the data in the study (Creswell, 2014).

3.6.1 Interview

Semi-structured interviews were used to gather qualitative information of the primary data from Principals, Deputy Principals, Academic Registrars, Dean of students (DOS), and Directors of studies (DOS). Interviews of this type were suited to working with small samples and were useful for studying specific situations or for supplementing and validating information derived from other sources used for making safety diagnosis (Kothari, 2012). The semi-structured interview was managed verbally and as such its effectiveness heavily depended on the communication skills of the interviewer (Cooper & Schindler, 2011) asserted that, a semi-structured interview encompasses the ability to clearly structure questions and to listen attentively. The questions on the interview guide contained questions on teaching styles and competences development.

3.6.2 Questionnaire Survey

Questionnaire surveys were administered to sampled BTVET institutions lecturers and students to obtain primary data, the survey consisted of both open and closed ended questions on a five-point Likert scale. Each was having six statements that were used for assessing the key variables

3.6.3 Documentary Review

The researcher conducted a documentary review to assess students' performance and progress. This involves examining log books to understand their daily activities and practical engagement. Training reports was analysed to categorize performance levels as Excellent, Very Good, Good, Fair, or Weak, while progress reports tracked overall development and achievements. Additionally, the researcher observed and document students during their field work, internships, and industrial attachments. This included following students to various workplaces to evaluate their practical skills, integration into professional environments, and application of training. Both on-campus and off-campus evaluations provided a comprehensive view of students' performance and training effectiveness.

3.6.4 Data Collection Instruments

Data was collected using instruments appropriate for each category of data source. The tools were critically examined and fine-tuned before the commencement of fieldwork. The following were the data collection instruments:

3.6.5 Interview Guide

The study used structured interview guide for Principals, Deputy Principals, Academic Registrars, and Deans of Students. Interviews are favoured for their ability to gather detailed, personalized data, capture non-verbal cues, and ensure high response rates (Cooper & Schindler, 2014; Folkestad, 2008). They also captured details not covered in questionnaires, providing a more comprehensive understanding of the study subjects.

Self-administered Questionnaire

Primary data was collected using questionnaires, which was the most commonly used method. A questionnaire is a technique of data collection in which each person was asked to respond to the same set of questions in a predetermined order (Cooper & Schindler, 2011). Questionnaires were used as they have an advantage of collecting data from large groups within a short time and less costs. Besides, questionnaires could provide time for respondents to think about responses and were easy to administer and score (Kothari, 2012). They also helped to

reduce the biases which might result from personal encounters and attitudes (Kasomo, 2010). Closed questions was used to collect quantitative primary data from lecturers, instructors and students.

Documentary review guide

The documentary review guide assessed student competencies through log books, practical training reports, and general progress reports, using a simple rating scale of Excellent, Very Good, Good, Fair, and Weak. Each document was evaluated based on specific criteria, such as consistency, task execution, technical knowledge, and overall performance, to provide a clear and concise overview of the student's skills, practical experience, and readiness for the professional field.

3. 7 Quality Control (Validity and Reliability)

3.7.1 Validity

To ensure data quality and validity in quantitative research, the researcher employed the Content Validity Index (CVI), The Item-Level Content Validity Index (I-CVI) was calculated using the formula:

$$I - CVI = \frac{\text{Number of experts rating item as relevant (3 or 4)}}{\text{Total number of experts}}$$

An I-CVI value of 0.78 or higher was considered acceptable when using three or more experts (Polit & Beck, 2006). The Scale-Level Content Validity Index (S-CVI) was computed as the average of I-CVI scores across all items. This process helped ensure the instrument accurately represents the key constructs—namely teaching styles and student competency.

Additionally, pre-testing of the instruments was conducted with a small sample of respondents to assess clarity, identify ambiguities, and make necessary adjustments. Continuous expert feedback guided further revisions, ensuring content relevance and comprehensiveness throughout the research process (Creswell, 2014).

For qualitative data, validity was addressed through the principle of trustworthiness, which encompasses credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Credibility was achieved through prolonged engagement, triangulation of data sources, and participant validation (member checking). Transferability was ensured by providing thick descriptions of the context and participants. Dependability involved detailed documentation of methodological processes (audit trail), and confirmability was upheld through reflexivity and

neutrality in data interpretation. Pre-testing and expert review of interview guides were further reinforced the rigor of qualitative instruments.

3.7.2 Reliability

To ensure reliability, the researcher used the test-retest method, administering the instrument to 20 respondents twice, with a one-week interval, and analysing scores using SPSS to calculate the Cronbach's alpha coefficient (Creswell, 2014). A coefficient of 0.7 or higher indicated reliability (Amin, 2005; Kothari, 2011). The researcher considered instrument length, subject heterogeneity, and clarity of instructions (Saunders et al., 2009).

Table 2 Reliability Statistics for Key Study Variables used during the study

Objective	Variable tested	Cronbach's Alpha	N of Items
Objective One	Experiential / Hands-on Teaching Style	0.795	6
Objective Two	Situated Teaching Style	0.707	6
Objective Three	Hybrid Teaching Style	0.797	6
Assessing the DV	Competency Development Among Students	0.814	6

Table 2 shows the reliability statistics for the study's key variables. Experiential or hands-on teaching style demonstrated strong reliability with a Cronbach's alpha of 0.795, indicating consistent measurement across its six items. Situated teaching style showed acceptable reliability at 0.707, reflecting moderate but adequate internal consistency. Hybrid teaching style had a high reliability coefficient of 0.797, confirming the consistency of its assessment items. Competency development among students, the dependent variable, achieved the highest reliability at 0.814, indicating excellent consistency in measuring student competencies. Overall, these results confirm that the study's instruments were reliable and provided stable, consistent data for analysis.

3.8 Data Analysis

3.8.1 Quantitative data analysis

After returning from the field, the researcher coded and compiled the dataset, entering all data technical college by technical college. Descriptive statistics were then computed, including frequencies, percentages, means, and standard deviations, to summarize key characteristics and data variability. In order to test H_1 that *lecturers' teaching styles have a significant positive relationship with competency development* the researcher ran the following analyses:

Pearson correlation was conducted to assess the relationship between lecturers' teaching styles and students' competency development in TVET institutions. The Pearson correlation coefficient (r) measured the strength and direction of a linear relationship between two variables. In this study, it quantified how variations in lecturers' teaching styles affected student competency outcomes. This analysis was carried out to determine whether lecturers' teaching styles—experiential/hands-on, situated, and hybrid—had a significant positive association with competency development, as stated in the alternative hypothesis (H_1). Through these statistical equations, the researcher was able to make sense of different numerical data

i. **Pearson Correlation Coefficient to test (H_1)**

$$r = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum (X - \bar{X})^2 \cdot \sum (Y - \bar{Y})^2}}$$

Where:

- r → Pearson correlation coefficient, measured the strength and direction of the relationship.
- X → Independent variable (teaching styles: experiential/hands-on, situated, hybrid).
- Y → Dependent variable (student competency).
- $\bar{X}$ → Mean of X .
- $\bar{Y}$ → Mean of Y .

ii. **ANOVA F-Test (H_1)**

Analysis of Variance (ANOVA) was employed to determine whether teaching styles caused significant differences in student competency.

It allowed comparison of mean scores across multiple teaching style groups simultaneously. ANOVA separated total variance into **between-group** (teaching style differences) and **within-group** (individual differences) variance.

The method provided the **F-statistic** and significance level for hypothesis testing. It enabled identification of the most effective teaching methods.

$$F = \frac{MS_{between}}{MS_{within}}, \text{ where } MS = \frac{SS}{df}$$

Symbols:

F → was the statistic used to test differences in competency among teaching styles.

MS_ between → represented the mean square between groups, reflecting the variance caused by differences in teaching styles.

MS_ within → represented the mean square within groups, reflecting the variance within each teaching style group.

SS → denoted the sum of squares.

df → indicated the degrees of freedom

iii. Measures of Association (H₁)

The researcher also used Measures of Association to determine the strength and proportion of variance in student competency explained by teaching styles. Eta (η) and eta squared (η²) quantified both the magnitude and practical significance of the relationship, complementing ANOVA results and providing deeper insight into how teaching styles influenced student performance.

$$\eta = \sqrt{\frac{SS_{between}}{SS_{total}}}, \eta^2 = \frac{SS_{between}}{SS_{total}}$$

Symbols:

η: Eta, measure strength of association between teaching styles and competency.

η²: Eta squared, proportion of total variance in competency explained by teaching styles.

SS: _between: Sum of squares between groups (variance due to teaching style differences).

SS_ total: Total sum of squares (total variance in competency).

iv. Linear Regression Model (H₁)

Expanded Linear Regression Equation (H₁)

$$Y = \beta_0 + \beta_1 \frac{(S1 + S2 + S3 + S4 + S5 + S6)}{6} + \beta_2 \frac{(T1 + T2 + T3 + T4 + T5 + T6)}{6} + \beta_3 \frac{(U1 + U2 + U3 + U4 + U5 + U6)}{6} + \epsilon$$

Where:

- Y (represented the competency development score of students in TVET institutions – dependent variable).
- β₀ (referred to the regression intercept, representing the baseline level of competency development when all teaching styles were absent).

- $\beta_1, \beta_2, \beta_3$ (represented the *regression coefficients*, which showed how much each teaching style contributed to competency development; a positive coefficient meant the teaching style improved competency, and a larger coefficient indicated a stronger effect).
- $S1+S2+S3+S4+S5+S6$ (denoted the six indicators of *Experiential / Hands-on Teaching Style* such as practical exercises, laboratory work, workshops, field demonstrations, role-plays, and simulations; their average formed $X1$).
- $T1+T2+T3+T4+T5+T6$ (denoted the six indicators of *Situated Teaching Style* such as context-based learning, apprenticeships, peer learning, field visits, real-world problem solving, and community projects; their average formed $X2$).
- $U1+U2+U3+U4+U5+U6$ (denoted the six indicators of *Hybrid Teaching Style* that combined hands-on and situated approaches with classroom instruction, including blended learning, project-based tasks, technology integration, discussions, demonstrations, and mentorship; their average formed $X3$).
- ϵ : epsilon (referred to the error term, capturing unexplained variation in competency development not accounted for by teaching styles).

Correlations, ANOVA, measures of association and linear regression analysis to assess how different teaching styles—such as hands-on practical learning experiences and hybrid integration—affect practical competencies and overall competency development among TVET students. This analysis helped determine the strength and direction of these relationships and how well various teaching styles predict competency outcomes

.

3.8.2 Qualitative data analysis

For qualitative data, the researcher employed thematic and content analysis. Thematic analysis involved identifying and categorizing recurring themes from interviews, and content analysis quantified the presence of specific words or concepts. Results are presented with direct quotations from participants to provide rich, contextual insights. Additionally, the documentary review was analyzed relevant documents, such as policy papers and reports, through content analysis to identify key themes and patterns.

3.9 Administration Procedure

The researcher obtained an introductory letter from the Dean, Faculty of Education and Humanities of Gulu University then proceeded to the field to collect the study data necessary from the schools chosen for the study. The pre-field visits were made to help identify

respondents, seek for their consent and make relevant appointments for eventual data collection. While in the field, the researcher administered self-administered questionnaires in a convenient place as deemed fit by the school administration. The language to administer the tool was in English since it is officially used as a medium of communication at schools.

3.10 Ethical Consideration

In this study, ethical standards and research protocols were meticulously followed. The researcher first obtained a letter of introduction from the Dean of the Faculty of Education and Humanities at Gulu University to gain access to the selected technical colleges. Prior to data collection, informed consent was secured from all participants, ensuring they understand the study's purpose and their role. Participants were made aware of their rights, including voluntary participation and privacy. The study employed respectful questioning to avoid physical or emotional harm. Confidentiality and anonymity were strictly upheld, with responses anonymized to protect identities, in accordance with Creswell's (2012) guidelines. The research followed rigorous citation practices and institutional ethical standards to ensure integrity and safeguard participants.

3.11 Anticipated Limitations and Delimitations

The study's sampling constraints present a notable limitation, as focusing on a specific subset of technical colleges in Uganda may not fully capture the diversity across all TVET institutions in the country. With a limited sample size, there is a risk of introducing sampling errors or biases, which could affect the generalizability of the findings. To address these issues, the researcher employed stratified and random sampling techniques to enhance representativeness and reduce bias. By including multiple technical colleges within the chosen subset, the study aims to provide a broader perspective. However, the researcher clearly acknowledged these sampling constraints in the study's discussion, noting their potential impact on the findings and generalizability.

Data collection challenges further complicate the study. Variations in how respondents interpret survey and interview questions can lead to inconsistencies and biases in the data. Additionally, logistical issues such as scheduling difficulties and obtaining comprehensive documentary records may affect the completeness of the data collected. To overcome these challenges, the researcher used a structured and validated questionnaire designed to minimize bias and ensure clear responses. Multiple data collection methods, including surveys, interviews, and documentary reviews, were employed to triangulate findings and enhance data

reliability. Regular follow-ups and pre-tests of the instruments were conducted to address potential issues and improve the accuracy of the data.

Institutional variability is another limitation, as differences in practices and resources across institutions may result in variability in competency development outcomes that are not fully captured by the study. The focus on government-supported colleges may not reflect the experiences and challenges faced by private institutions or those in other sectors. To address this, the researcher included a diverse range of colleges within the selected subset and make comparisons between institutions to identify patterns and variations. The study also discussed these limitations and offer recommendations for further research to explore different types of institutions and regions to better understand institutional variability.

Lastly, the study had limited contextual factors such as regional differences, economic conditions, and policy changes, which can influence teaching methods and competency development. The focus on civil engineering diploma programs in government-supported colleges might not capture the experiences of other vocational fields or private institutions. To address these contextual limitations, the researcher acknowledged their potential impact on the study's relevance and applicability. Efforts were made to collect and consider contextual data, and recommendations for future research would include exploring various regions, institutions, and vocational fields to provide a more comprehensive understanding of the educational landscape

CHAPTER FOUR:

ANALYSIS, PRESENTATION, SUMMARY OF FINDINGS

4.0 Introduction

This chapter presents, analyzes, and interprets the findings of the study on *Teaching Styles and Competency Development of Students in Technical and Vocational Education Training (TVET) Institutions in Uganda: A Case of Selected Technical Colleges*. The data presented herein are drawn from responses obtained through questionnaires, interviews, and documentary reviews. This comprehensive approach ensured that both quantitative and qualitative dimensions of the study were captured to provide a holistic understanding of the relationship between teaching styles and competency development.

The primary purpose of the study was to explore how various teaching styles influence the acquisition and enhancement of competencies among TVET students. In line with this, the findings are organized around the key objectives of the study, which include assessing the effectiveness of hands-on learning, examining the impact of situated learning, evaluating the role of hybrid integration, and establishing the overall relationship between teaching styles and competency development.

The findings did not only reveal the prevailing teaching practices within selected technical colleges in Uganda but also highlight the extent to which these methods align with the practical and theoretical demands of modern vocational training. The chapter begins with a presentation of respondents' demographic characteristics, followed by a detailed analysis of each objective of the study.

4.0.1 Response Rate of the Study

To ensure the reliability and validity of the data collected, the study tracked the number of questionnaires distributed and those successfully returned. The response rate is summarized in the table below:

Table 3 Shows response rate

Item	Frequency	Percentage (%)
Questionnaires Distributed	120	100.0
Questionnaires Returned	115	95.8
Questionnaires Not Returned	5	4.2

Out of 120 questionnaires distributed to respondents across the selected technical colleges, 115 were successfully completed and returned, representing a response rate of (95.8%). This high response rate enhances the credibility of the findings and indicates strong participant engagement and cooperation in the study.

4.1 Demographic Characteristics of Respondents

To contextualize the findings of this study on *Teaching Styles and Competency Development of Students in Technical and Vocational Education Training (TVET) Institutions in Uganda*, it is important to examine the demographic profile of the respondents. The data presented in this section—collected through questionnaires, interviews, and documentary reviews—help establish a foundational understanding of the backgrounds, economic conditions, institutional affiliations, and resource availability that potentially shape how students experience and respond to various teaching styles.

4.1 Presentation, interpretation of findings and summery

This study employed a mixed-methods, cross-sectional design in Uganda Technical Colleges Targeting students and lecturers in the department of civil engineering programs. The researcher coded and edited data, then analyzed it using SPSS version twenty-three.

Descriptive statistics summarized frequencies, percentages, means, and standard deviations to describe data variability. In addition to, three other analyses—correlation (r), ANOVA ($F = MS \text{ between} / MS \text{ within}$), regression ($Y_DV = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$)—tested H_1 .

ANOVA assessed differences among IVs (teaching styles) on DV (competency development) across TVET students.

Linear regression and measures of association (Eta, Eta²) predicted DV outcomes from IVs effectively. Qualitative data underwent thematic and content analysis, with findings illustrated through participant quotations and documentary reviews summary. Validity, reliability, and ethical standards were strictly maintained.

4.1.1 Part A: Personal Demographic Characteristics.

This section presents personal demographic characteristics of the 115 respondents to contextualize the study population. Understanding age, gender, marital status, region, and educational background is essential to interpret how these factors may influence learning preferences, engagement with teaching methods, and competency development in TVET institutions.

Table 4Demographic information part A (N = 115)

Characteristic	Category	Frequency	Percent
Age	18 to 24 yrs	68	59.1
	25 to 30 yrs	31	27.0
	30 yrs and above	16	13.9
	Total	115	100.0
Gender	Male	88	76.5
	Female	27	23.5
	Total	115	100.0
Marital Status	Single	93	80.9
	Married	22	19.1
	Total	115	100.0
Region of Origin	Western	6	5.2
	Eastern	45	39.1
	Northern	57	49.6
	Others	7	6.1
	Total	115	100.0
Education Background (Entry to College)	Junior Cert.	4	3.5
	Crafts	40	34.8
	A Level	50	43.5
	Diploma	11	9.6
	Bachelor	9	7.8
	Others	1	0.9
	Total	115	100.0

Age

The majority of respondents (59.1%) were aged 18 to 24 years, followed by (27.0%) aged 25 to 30, and (13.9%) aged 30 and above. This age distribution aligns with the typical enrollment trends in TVET institutions and suggests a population that is still in the formative stage of professional and technical skill development. Younger learners may be more adaptable to

modern and interactive teaching styles such as hands-on learning and hybrid integration, which are central to competency-based education.

Gender

Males made up (76.5%) of respondents, compared to (23.5%) females. This significant gender disparity reflects broader national trends in technical education and might have influenced classroom dynamics, engagement with certain teaching methods, and overall competency outcomes. For example, male-dominated classes may gravitate more towards practical or workshop-based learning, while underrepresentation of females could mean their learning needs are less considered in the design of teaching strategies.

Marital Status

The predominance of single respondents 80.9% indicated that most students were free of significant family obligations, allowing them to fully engage in time-intensive learning methods like project-based or experiential learning. This demographic factor could have positively impacted the effectiveness of immersive teaching styles that require prolonged focus and physical presence, such as internships or industrial attachments.

Region of Origin

Most respondents came from the Northern (49.6%) and Eastern (39.1%) regions, with limited representation from the Western region (5.2%) and others (6.1%). These geographical dynamics could have affected prior exposure to quality education, availability of learning resources, and even language or cultural perceptions of vocational training. As such, teaching styles may need to be adjusted to bridge regional disparities in prior knowledge and learning expectations, ensuring all students have equal opportunity to develop competencies.

Education Background

Respondents entered TVET institutions with diverse academic backgrounds: 43.5% with A-Level, (34.8%) with craft certificates, and smaller numbers with diplomas (9.6%), bachelor's degrees (7.8%), junior certificates (3.5%), or others (0.9%). This diversity presents both a challenge and opportunity for educators. Teaching styles need to be flexible and inclusive, catering to both theory-oriented and skills-based learners to effectively develop competencies across the student population.

4.1.2 Part B: Institutional and Socio-Economic Characteristics

This section gives details the institutional and socio-economic characteristics of the 115 respondents to provide context on their educational environments and backgrounds. Understanding factors such as college affiliation, designation, income levels, funding sources, employment status, and availability of engineering tools were crucial for assessing how these variables influenced access to resources, learning opportunities, and competency development in TVET institutions.

Table 5 Demographic information Part B (N = 115)

Characteristic	Category	Frequency	Percent
Uganda Technical College	UTC-Lira (Lira City)	39	33.9
	UTC-Elgon (Sironko)	37	32.2
	UTC-Kyema (Masindi)	39	33.9
	Total	115	100.0
Designation	Student	97	84.3
	Lecturer/Instructor	18	15.7
	Total	115	100.0
Socio-Economic Background	Low Income	50	43.5
	Middle Income	56	48.7
	High Income	8	7.0
	Others	1	0.9
	Total	115	100.0
Source of Funding	Personal Savings	30	26.1
	Family Support	52	45.2
	Scholarships	26	22.6
	Student Loan	7	6.1
	Total	115	100.0
Employment Status	Yes, Full-time	16	13.9
	Yes, Part-time	14	12.2
	Not Employed Yet	75	65.2
	Internship or Co-option	10	8.7
	Total	115	100.0
Availability of Engineering Tools	Complete Set	8	7.0
	Most of the Tools	15	13.0
	Some Essential Tools	50	43.5
	Only a Few Tools	35	30.4
	No Tools	7	6.1
	Total	115	100.0

Uganda Technical Colleges

The distribution of respondents was balanced across UTC-Lira (33.9%), UTC-Elgon (32.2%), and UTC-Kyema (33.9%). This offered robust comparative view across institutions and ensured the teaching styles analyzed reflect different institutional cultures, facilities, and instructional practices—each of which may differently affect competency development.

Designation

Students constituted (84.3%) of respondents, while lecturers/instructors made up (15.7%). This balance enriched the study, provided insight from both the recipients and implementers of teaching styles. Student feedback revealed how teaching styles impact skill acquisition, while instructors offer perspectives on teaching design and delivery.

Socio-Economic Background

A majority of students came from low (43.5%) and middle-income (48.7%) backgrounds. This economic context has direct implications for teaching styles and competency development, particularly when students face barriers such as inadequate access to personal learning materials or transportation. For example, teaching methods that rely heavily on self-funded resources (e.g., engineering tools or internet access) had disproportionately affected students from low-income backgrounds, limiting their ability to fully develop technical competencies.

Source of Funding

Family support (45.2%) and personal savings 26.1% were the primary sources of funding. Only (6.1%) received student loans. This limited financial security had influenced students' learning engagement and their ability to participate in certain teaching styles that demand additional expenditures (e.g., project-based learning or fieldwork). It reinforces the need for cost-effective, resource-sensitive instructional strategies.

Employment Status

The majority (65.2%) were not yet employed, while others were in full-time (13.9%), part-time (12.2%), or internship roles (8.7%). This employment distribution indicated that most learners depended solely on their studies for skill development. It underscores the importance of teaching styles that simulate real-world scenarios—like situated learning—to bridge the gap between education and the labor market.

Availability of Engineering Tools

Access to engineering tools varied significantly: (43.5%) had only some essential tools, (30.4%) had few, and just (7.0%) had a complete set. Since hands-on learning is a key teaching style in TVET, this disparity presents a major challenge to competency development. Institutions and instructors must either adapt teaching methods to compensate for the lack of tools or improve tool availability to ensure learning outcomes are not compromised.

4.2.1 Effect of experiential/hands-on practical learning on competency development among students in TVET institutions

This section presents findings on the effect of hands-on practical learning experiences on competency development among students in TVET. The study aimed to assess how hands-on learning strategies contributed to the development of relevant practical skills and competencies. The research was guided by the question: How effective are hands-on practical learning experiences in enhancing competency development among students in TVET? Hands-on learning was treated as the independent variable, while competency development was the dependent variable –assessed on a five-point Likert scale. The findings are presented using frequency, percentages, mean, and standard deviation to show how students responded to and perceived the impact of hands-on learning. (N = 115)

Table 6 shows analysis report on the effect of experiential/hands on practical teaching styles

Statement In this technical college:	SD (n,%)	Disagree (n,%)	Neutral (n,%)	Agree (n,%)	Strongly Agree (n,%)	Total (n%)	Mean	Std. Dev
Incorporate site visits and industry partnerships	6 (5.2)	12 (10.4)	25 (21.7)	48 (41.7)	24 (20.9)	115 (100)	3.63	1.09
Relate academic concepts to industry practices	9 (7.8)	24 (20.9)	17 (14.8)	45 (39.1)	20 (17.4)	115 (100)	3.37	1.22
Use real-world applications and case studies	5 (4.3)	10 (8.7)	21 (18.3)	45 (39.1)	34 (29.6)	115 (100)	3.81	1.09
Prepare students for industry-specific challenges	5 (4.3)	11 (9.6)	26 (22.6)	50 (43.5)	23 (20.0)	115 (100)	3.65	1.04
Align teaching with civil engineering practices	8 (7.0)	16 (13.9)	25 (21.7)	41 (35.7)	25 (21.7)	115 (100)	3.51	1.18
Focus on practical/contextual learning for career readiness	7 (6.1)	17 (14.8)	29 (25.2)	36 (31.3)	26 (22.6)	115 (100)	3.50	1.17
Average							3.58	1.13

According to the questionnaires administered as in table 6 above the researcher found that hands-on practical learning strategies were generally effective in enhancing competency development among students in TVET institutions. The findings largely aligned with expectations, as high scores were recorded for statements like "Use real-world applications and case studies" (mean = 3.81, 68.7% agreed or strongly agreed, with 45 students strongly

agreeing and 34 agreeing), and "Prepare students for industry-specific challenges" (mean = 3.65, 64.5% agreed or strongly agreed, with 50 students agreeing and 23 strongly agreeing). However, there were noticeable gaps, particularly in linking academic concepts to industry practices, which had the lowest score (mean = 3.37) and 28.7% of students disagreed or strongly disagreed (9 students strongly disagreed, and 24 disagreed). The strategy of incorporating site visits and industry partnerships was also highly rated (mean = 3.63, 62.6% agreed or strongly agreed, with 48 students agreeing and 24 strongly agreeing), indicating a successful approach to bridging theory with practice. These findings suggest that while practical learning strategies such as real-world applications and industry-specific preparations are having a positive impact, there is still a significant gap in aligning academic concepts with industry practices. This gap may hinder students' ability to fully translate theoretical knowledge into practical competencies. To improve the overall effectiveness of TVET programs, it is essential to strengthen the connection between academic learning and industry standards, enhance resources, and ensure that all institutions adopt industry-relevant practices. This will better equip students for the workforce and address the identified gaps in learning.

4.2.2 Influence of Situated Learning on Competency Development among Students in TVET

This section presents findings on the influence of situated learning on competency development among students in TVET. Situated learning referred to instructional activities that took place in real-world or authentic contexts, such as internships, workshops, and field-based projects. The research question addressed was: What is the influence of situated learning on competency development among students in TVET? Situated learning served as the independent variable, while competency development remained the dependent variable. The data analyzed and presented using frequency, percentages, mean, and standard deviation to reflect students' experiences and the impact of context-based learning.

Table 7 shows analysis of effect of situated teaching styles

Statement	SD (n, %)	Disagree (n, %)	Neutral (n, %)	Agree (n, %)	Strongly Agree (n, %)	Total (n, %)	Mean	Std. Dev
Incorporate site visits and partnerships	7 (6.1)	21 (18.3)	16 (13.9)	42 (36.5)	29 (25.2)	115 (100)	3.57	1.22
Relate concepts to current industry practices	6 (5.2)	11 (9.6)	24 (20.9)	56 (48.7)	18 (15.7)	115 (100)	3.60	1.03
Use real-world applications and case studies	4 (3.5)	19 (16.5)	29 (25.2)	44 (38.3)	19 (16.5)	115 (100)	3.48	1.06
Prepare for industry-specific challenges	6 (5.2)	15 (13.0)	24 (20.9)	46 (40.0)	24 (20.9)	115 (100)	3.58	1.12
Align teaching with civil engineering practices	3 (2.6)	13 (11.3)	26 (22.6)	53 (46.1)	20 (17.4)	115 (100)	3.64	0.98
Focus on contextual learning for career readiness	10 (8.7)	22 (19.1)	23 (20.0)	37 (32.2)	23 (20.0)	115 (100)	3.36	1.24
Average							3.54	1.11

The results (table 7) revealed that situated learning positively influences competency development among TVET students. Incorporating site visits and partnerships (mean = 3.57, SD = 1.22) was valued by 61.7% of students who agreed or strongly agreed that it enhanced their learning. Relating concepts to industry practices (mean = 3.60, SD = 1.03) received a positive response from 64.4% of students, while preparing for industry-specific challenges (mean = 3.58, SD = 1.12) was supported by 60.9%. Aligning teaching with civil engineering practices (mean = 3.64, SD = 0.98) had the highest rating, with 63.5% agreeing or strongly agreeing. However, focusing on contextual learning for career readiness (mean = 3.36, SD = 1.24) was less well-received, with only 52.2% of students agreeing or strongly agreeing. The overall average mean score was 3.54 (SD = 1.11), indicating generally positive but varied perceptions. To improve, TVET institutions should refine career readiness programs, enhance real-world case studies, and strengthen industry partnerships for more targeted career preparation.

4.2.3 Effect of Hybrid Teaching Integration on Competency Development among Students in TVET

This section presents findings on the effect of hybrid teaching integration on the competency development of students in TVET institutions. Hybrid teaching integration involved a combination of traditional classroom instruction, online learning tools, and hands-on practical sessions. The guiding research question was: What is the effect of hybrid teaching integration on competency development among students in TVET? Hybrid teaching integration was the independent variable, and competency development was the dependent variable. The results are reported using frequency, percentages, mean, and standard deviation to describe students' responses and evaluate the effectiveness of the hybrid approach.

Table 8 shows analysis of effect of hybrid teaching styles on competency development

Statement In this college, lecturer:	SD (n,)	Disagree (n, %)	Neutral (n, %)	Agree (n, %)	Strongly Agree (n, %)	Total (n,)	Mean	Std. Dev
Lecturers use classroom methods to support blended online learning effectively.	14 (12.2)	18 (15.7)	20 (17.4)	47 (40.9)	16 (13.9)	115 (100)	3.29	1.24
Provide hands-on training to enhance practical learning in class.	11 (9.6)	21 (18.3)	17 (14.8)	40 (34.8)	26 (22.6)	115 (100)	3.43	1.28
Lecturers use e-learning videos to support classroom-based instruction.	19 (16.5)	28 (24.3)	24 (20.9)	36 (31.3)	8 (7.0)	115 (100)	2.88	1.22
Engage students using forums and interactive online simulations.	25 (21.7)	25 (21.7)	17 (14.8)	32 (27.8)	16 (13.9)	115 (100)	2.90	1.39
They use LMS platforms to organize and deliver course content.	22 (19.1)	29 (25.2)	23 (20.0)	29 (25.2)	12 (10.4)	115 (100)	2.83	1.29
Lecturers track progress and give feedback using LMS features.	25 (21.7)	29 (25.2)	24 (20.9)	30 (26.1)	7 (6.1)	115 (100)	2.70	1.24
Average							3.00	1.28

The findings on table 8, of this report revealed both strengths and gaps in the hybrid teaching approach used in TVET institutions. While 54.8% of students agreed that classroom methods effectively support blended learning (mean = 3.29), there were notable gaps in the online components. Only 31.3% felt that e-learning videos supported classroom instruction (mean = 2.88), and 43.4% disagreed with the effectiveness of online simulations (mean = 2.90). Furthermore, 44.3% disagreed that LMS platforms effectively organized and delivered content (mean = 2.83), and 46.9% found feedback tracking to be ineffective (mean = 2.70). To address these issues, it is recommended to improve the interactivity and relevance of online materials and provide lecturers with training to better utilize LMS platforms for engaging students and offering timely feedback.

The findings of this study are consistent with recent research on the use of hybrid learning in Technical and Vocational Education and Training (TVET) institutions, particularly in low-resource settings. As the researcher, I observed that while traditional classroom strategies appeared moderately effective—supported by 54.8% of students (mean = 3.29)—digital components of the hybrid model fell short of expectations.

4.2.3 Assessing the Dependent Variable: Competency Development among students in TVET in Uganda

This section focused on assessing competency development among students in Ugandan TVET institutions, the study's dependent variable. It analyzed quantitative data from student self-assessments and lecturer feedback across six key technical skill areas, complemented by qualitative insights from institutional leaders to provide a comprehensive understanding of students' practical competencies and existing skill gaps.

Table 9 shows analysis of participants' views on level competency development among
TVET students

Technical Area	No Experienc e (n, %)	Basic (n, %)	Interme diate (n, %)	Advanced +Extensive (n, %)	Total (n, %)	Mean	Std. Dev
I can do Computer-Aided Design (CAD)	17 (14.8)	39 (33.9)	40 (34.8)	19 (16.5)	115 (100)	2.57	1.03
Surveying	15 (13.0)	49 (42.6)	38 (33.0)	13 (11.3)	115 (100)	2.43	0.86
I am able to do Structural Analysis	10 (8.7)	47 (40.9)	45 (39.1)	13 (11.3)	115 (100)	2.55	0.85
Manage of Construction sights	11 (9.6)	36 (31.3)	49 (42.6)	19 (16.5)	115 (100)	2.70	0.94
I am able to Draw & Cost Plans	7 (6.1)	50 (43.5)	46 (40.0)	12 (10.5)	115 (100)	2.58	0.85
Able to Interpreting Engineering Plans	9 (7.8)	35 (30.4)	47 (40.9)	24 (20.9)	115 (100)	2.77	0.93
Average						2.60	0.91

This section of table 9 above validated the dependent variable—competency development—by analyzing self-assessments from students and feedback from lecturers in Ugandan TVET institutions. Both groups completed questionnaires evaluating students' knowledge and practical experience across six technical areas. Overall, the results showed moderate competency development, with an average mean of 2.60 (SD = 0.91). The strongest area was Able to Interpreting Engineering Plans (mean = 2.77), followed by Manage of Construction Sites (mean = 2.70), where most students rated themselves as having intermediate to advanced skills. However, gaps were evident in Surveying (mean = 2.43), with 42.6% reporting only basic experience, and I can do Computer-Aided Design (CAD) (mean = 2.57), where nearly half had no or basic skills. These findings suggest a need for more practical exposure, instructor-led skill workshops, and integration of real-world projects to enhance learning in weaker areas.

Interviews with participants—including deputy principals, academic registrars, and department heads from UTC Elgon, UTC Lira, and UTC Kyema—offered in-depth perspectives on students' strengths and areas for improvement during their practical training. Participants evaluated the students' technical knowledge, hands-on skills, readiness for professional roles, and the relevance of their competencies to industry demands. Most noted that students entered training with a foundational yet incomplete understanding of technical concepts. While they could apply theory to routine tasks, they were not yet fully prepared for more complex

responsibilities. Despite these limitations, students demonstrated a strong willingness to learn and showed consistent progress when given guidance and support.

Six out of ten lecturers said, “Students have basic knowledge of technical tasks. They understand theory, but their application is limited. They need supervision to complete even the simpler activities effectively on site.”

Supervisors shared examples where students managed basic engineering tasks such as water fitting, drainage clearing, and temporary road works. These cases illustrated how students attempted to operationalize theoretical knowledge into functional, albeit introductory, industrial outputs.

One academic registrar said, “They helped fit water pipes and cleared blocked channels. Tasks were done slowly, but with persistence and support, most completed their work with growing confidence and care.”

A notable difference in skill levels was attributed to the students’ academic backgrounds. Those who had entered through junior or craft routes were reported to perform better practically, having developed hands-on experience earlier. In contrast, direct-entry students often required more orientation and guidance.

About sixty-three out of one hundred fifteen said, Students from craft levels are more comfortable using tools and solving small problems. Direct entrants often hesitate and wait for instructions, even for familiar procedures taught in class.”

This distinction was consistently affirmed by academic registrars, who emphasized how the mode of entry significantly shaped students’ readiness and initial adjustment during field attachment.

Two out of three academic registrars noted, “Craft-background students adapt quickly to tasks. Their practical exposure gives them a head start, while direct-entry students need time to learn the basics on site.”

Regarding general technical competencies, students were recognized for contributing to actual projects under supervision. Supervisors described students as being open to learning, compliant with instructions, and gradually more confident when repeating familiar tasks. However, few were trusted to operate independently without oversight.

Seven out of ten lecturers said, “Only a few students could work alone without reminders. Most needed detailed instructions and frequent checking, especially when doing trenching or concrete mixing for road surfacing.”

Instances were cited in which students took part in trenching, basic road construction, or assisting with plumbing works. These tasks were considered suitable and allowed the students to build foundational competencies relevant to their field.

One academic registrar said, “They did tarmac and opened blocked channels. They seemed more effective on repetitive tasks, gaining skill slowly. A few needed daily coaching even after several weeks on site.”

Supervisors were then asked about students’ readiness to enter professional settings. While some expressed satisfaction with students’ progress, many were cautious. Students demonstrated good attitude, compliance with workplace expectations, and basic technical alignment, but lacked the confidence and independence often required for industrial settings.

Eight out of ten lecturers said, “They are trying, and they follow site rules. But they still lack speed and initiative. They hesitate when something new appears and often wait to be told what to do.”

In terms of soft skills, areas such as adaptability, problem-solving, and team coordination were repeatedly mentioned as requiring further development. Students’ ability to cope with change or collaborate efficiently remained inconsistent across institutions.

One academic registrar said, “They try to follow team leaders, but many do not speak up or suggest anything. When instructions change, some become confused and delay the team’s work.”

On the relevance of student knowledge and skills to industry standards, most lecturers who supervised agreed that students were well-matched to routine, entry-level industrial duties. Their presence was described as helpful, though limited in strategic impact. With support,

students could deliver value in completing non-complex tasks and supporting full-time technicians.

five out of ten lecturers said, *“They contribute on tasks like measuring, lifting, and clearing. Their presence helps reduce work for our staff, but they cannot yet take on responsibility without guidance.”*

Nonetheless, supervisors warned that unless skills gained during attachments were reinforced or expanded upon after the experience, students would struggle to grow professionally beyond the novice level.

One head of department said, “After attachment, most need structured follow-up. If their skills are not practiced or built upon, they will forget procedures and lose what they’ve gained here.”

In conclusion, the perspectives of field attachment supervisors suggested that students possess foundational technical knowledge and basic competence. They were seen as committed, teachable, and gradually adapting to industrial demands. However, they remain heavily reliant on supervision and needed continued technical, experiential, and soft-skill development to become effective in professional roles. The field attachment period plays a vital role in this growth, but must be supported by further practice and mentorship if students are to meet full industry expectations.

The documentary review, assessing student competencies through log books, field attachment reports, and general progress reports, revealed that most submissions ranged from "Good" to "Fair," with few rated "Very Good." Real-life field attachment reports showed limited application of skills and reflective depth. Students, especially post-A-Level entrants, struggled in practical areas, indicating a need for stronger experiential training and mentorship.

The documentary review, as one of the strategies used for data collection, assessed student competencies through log books, field attachment reports, and general progress reports. The findings revealed that most submissions were rated "Good" to "Fair," with few reaching "Very Good." Real-life field attachment reports showed limited application of skills and reflective depth, especially among post-A-Level entrants, who struggled in practical areas. Field attachment supervisors noted that students had foundational technical knowledge and basic competence but remained reliant on supervision. Continued development in technical,

experiential, and soft skills is necessary, and further mentorship and practice are crucial for students to meet industry expectations.

4.2.5 Objective four: (H₁) that lecturers’ teaching styles have a significant positive relationship with competency development,

Objective Four tested the alternative hypothesis (H₁) that lecturers’ teaching styles positively influence TVET students’ competency development. Correlations analysis assessed the strength of relationships, One-Way ANOVA compared group differences across teaching styles, measures of association quantified effect size, and regression coefficients determined predictive influence of lecturers teaching styles on competency development of students in TVET institutions

4.2.5.1 Main Hypothesis (H₁): Lecturers’ teaching styles have a significant positive relationship with competency development among students in TVET institutions.

Table 10 shows correlations of teaching styles and competency development

		Correlations coefficient			
Variable		A	b	c	d
a. Experiential/hands on teaching style	Pearson Correlation	1	.495**	.356**	.420**
	Sig. (2-tailed)		.000	.000	.000
b. Situated teaching style	Pearson Correlation	.495**	1	.437**	.345**
	Sig. (2-tailed)	.000		.000	.000
c. Hybrid teaching style	Pearson Correlation	.356**	.437**	1	.246**
	Sig. (2-tailed)	.000	.000		.008
d. Competency development among students - TVET	Pearson Correlation	.420**	.345**	.246**	1
	Sig. (2-tailed)	.000	.000	.008	
	N	115	115	115	115
**. Correlation is significant at the 0.01 level (2-tailed).					

Hypothesis Testing and Interpretation correlation results

The main hypothesis (H₁) as in table 10 of fourth objective stated ***that, “Lecturers’ teaching styles have a significant positive relationship with competency development among students in TVET institutions.”*** Pearson correlation analysis was conducted to examine the relationship between experiential/hands-on, situated, and hybrid teaching styles and students’ competency in areas such as structural analysis, construction management, drawing and costing engineering plans, interpreting engineering plans, and computer-aided design (CAD).

The analysis showed that experiential/hands-on teaching had the strongest positive correlation with competency development ($r = 0.420$, $p < 0.01$), and the hypothesis is accepted. The r-

value (0.420) indicates a moderately positive relationship, meaning that as lecturers increase hands-on teaching, students' technical skills and applied competencies improve. The p-value (< 0.01) confirms that this relationship is statistically significant. *Therefore*, TVET institutions should emphasize experiential, practice-oriented learning to maximize student competency.

Situated teaching demonstrated a moderate positive correlation with competency development ($r = 0.345$, $p < 0.01$), and the hypothesis is accepted. The r-value (0.345) shows a moderate association, indicating that context-based, real-world learning enhances students' ability to apply theoretical knowledge. The p-value (< 0.01) confirms the effect is statistically significant. *This means that* incorporating real-life, scenario-based activities in TVET curricula can improve workplace-relevant skills.

The hybrid teaching style exhibited a weaker yet significant positive correlation ($r = 0.246$, $p = 0.008$), and the hypothesis is accepted. The r-value (0.246) indicates a positive but weaker relationship, meaning that while blended approaches contribute to skill acquisition, their effect is smaller than experiential or situated methods. The p-value (0.008) confirms the relationship is statistically significant. *To this end*, Hybrid teaching should be strengthened with practical and context-specific components to enhance competency development. Inter-style correlations also showed moderate positive relationships, indicating that lecturers often combine teaching approaches to further support skill acquisition. Based on the results of the Pearson correlation analysis, the main hypothesis (H_1) is accepted, confirming that lecturers' teaching styles—particularly experiential/hands-on and situated approaches—have a significant positive influence on the competency development of students in TVET institutions.

4.2.5.2 Testing Hypothesis H_1 on ANOVA and Measures of Association of lecturers teaching styles and competency development of students in TVET intuitions

This section presents the analysis testing Hypothesis H_1 , using *Analysis of Variance* (ANOVA) and Measures of Association to examine the effect of lecturers' teaching styles on TVET students' competency development.

Table 11 One-Way ANOVA Results for Competency Development across Teaching Styles

ANOVA						
Variables	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Competency Development * Experiential / <i>Hands-on Teaching Style</i>	Between Groups	15.580	21	0.742	2.067	0.010
	Within Groups	33.382	93	0.359		
	Total	48.962	114			
Competency Development * <i>Situated / Real-Life Teaching Style</i>	Between Groups	11.460	17	0.674	1.744	0.047
	Within Groups	37.502	97	0.387		
	Total	48.962	114			
Competency Development * <i>Hybrid Teaching Style</i>	Between Groups	17.551	22	0.798	2.337	0.003
	Within Groups	31.411	92	0.341		
	Total	48.962	114			

Note: This table used present the results of the One-Way ANOVA, which tests whether differences in competency development among TVET students are statistically significant across the three teaching styles. F-values indicated the ratio of variance between groups to variance within groups, and the Sig. (p-value) column showed whether the differences were statistically significant ($p < 0.05$).

Table 12 Tested Measures of Association between Teaching Styles and Competency Development

Measures of association		
Variables	Eta	Eta Squared
Competency Development * Experiential / Hands-on Teaching Style	0.564	0.318
Competency Development * Situated / Real-Life Teaching Style	0.484	0.234
Competency Development * Hybrid Teaching Style	0.599	0.358

Note: This table shows the strength of association between lecturers' teaching styles and competency development. Eta indicates the strength of the relationship, while Eta Squared represents the proportion of variance in competency development explained by each teaching

style. Larger values denote stronger influence, with hybrid teaching showing the strongest effect.

Interpretations of the Results

Testing Hypothesis H_1 : Experiential/Hands-on Teaching Style and competency development among TEVT students

The analysis for experiential or hands-on teaching—where students actively perform tasks rather than just listen or watch—showed that this method significantly improves competency development. The ANOVA result ($F = 2.067$, $p = 0.010$) tells us that the differences in student competency between various levels of hands-on teaching are unlikely due to chance. The measure of association, Eta Squared = 0.318, indicates that about 32% of the variation in students' competency development can be attributed solely to this teaching method. In practical terms, this means that students who engage in hands-on practice develop stronger technical skills, become better problem-solvers, and are more ready to handle workplace tasks. This effect is moderately strong, suggesting that while hands-on teaching is highly beneficial, other factors such as the learning environment, teacher guidance, and student motivation also contribute to competency outcomes. Conclusion: Experiential teaching has a significant and positive impact on TVET students' competency development.

Testing Hypothesis H_1 : Situated/Real-Life Teaching Styles competency development among TEVT students

Situated learning involves teaching students in ways that connect lessons to real-life scenarios, such as simulating workplace tasks or using authentic problems. The ANOVA results ($F = 1.744$, $p = 0.047$) indicate that students exposed to situated learning showed significantly better competency development than those who were not. The Eta Squared value of 0.234 shows that approximately 23% of the improvement in students' competencies is explained by this teaching style. This means that placing students in realistic, context-driven learning situations helps them link theory with practice, understand real-world applications, and acquire adaptive problem-solving skills. Although the effect is slightly lower than hands-on teaching, it is still meaningful and confirms that contextualized learning plays a vital role in shaping student skills. Conclusion: Situated teaching positively and significantly influences competency development among TVET students.

Testing Hypothesis H_1 : Hybrid Teaching Style and competency development among TEVT students

The hybrid teaching method combines both hands-on practical activities and situated, real-life learning experiences. The ANOVA results ($F = 2.337$, $p = 0.003$) show a highly significant difference in competency development across hybrid teaching levels, with Eta Squared = 0.358, indicating that about 36% of the variation in student competencies is attributable to this method. This is the strongest effect among the three teaching styles. Practically, this means that students who both practice tasks and experience realistic workplace scenarios develop superior technical skills, problem-solving abilities, and workplace readiness compared to those exposed to only one method. The hybrid approach maximizes learning by integrating the strengths of hands-on practice and contextual application, highlighting the value of multi-faceted teaching strategies in TVET settings. Conclusion: Hybrid teaching has the strongest positive impact on students' competency development.

Conclusively: The findings supported the main hypothesis (H_1), which stated that lecturers' teaching styles significantly influence competency development among TVET students. All three approaches hands-on, situated, and hybrid positively impact student competencies, with the hybrid method being the most effective, followed by hands-on, and then situated teaching. Measures of association ($\text{Eta} = 0.578$; $\text{Eta Squared} = 0.334$) indicated that teaching style accounted for a substantial proportion of the variance in competency development, confirming its practical significance. Therefore, lecturers' teaching styles are a major factor in competency development among TVET students

4.2.5.3 Linear regression analysis of the relationship between teaching styles and competency development among students of TVET in Uganda

This section presents the linear regression analysis conducted to examine the influence of lecturers' teaching styles on competency development among students in TVET institutions in Uganda. Competency development, the dependent variable, was measured through students' knowledge, skills, and abilities in key technical areas, including Structural Analysis, Construction Management, Drawing and Costing Engineering Plans, Interpreting Engineering Plans, and Computer-Aided Design (CAD). The analysis aimed to test the main hypothesis (H_1) that *lecturers' teaching styles have a significant positive relationship with competency development*, assessing the predictive contributions of experiential/hands-on, situated, and hybrid teaching approaches.

Model summery analysis results

This analysis was conducted to determine the strength of the relationship between teaching styles and competency development among TVET students, and to assess how much of the variance in competency development can be explained by these teaching styles.

Table 13 14shows model summery of teaching styles and competency development among
TVET students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452 ^a	.205	.183	.59236

The main hypothesis (H_1) stated that lecturers' teaching styles have a significant positive relationship with competency development among TVET students. To test this, linear regression analysis was conducted to assess the predictive contributions of experiential/hands-on, situated, and hybrid teaching approaches.

The model summary revealed an R value of 0.452, indicating a moderate positive relationship between teaching styles and competency development, suggesting that variations in teaching approaches are meaningfully associated with students' competencies. The R Square value of 0.205 shows that approximately 20.5% of the variability in competency development can be explained by the teaching styles included in the model. Adjusting for the number of predictors, the Adjusted R Square of 0.183 indicates that about 18.3% of the variation in student competency is accounted for by these teaching styles.

The Standard Error of the Estimate (0.59236) reflects the average deviation between observed and predicted competency scores, indicating a reasonable level of prediction accuracy for the model. These results suggest that while teaching styles are significant predictors, other factors beyond the model may also influence competency development in TVET students.

In conclusion, the regression analysis supports the acceptance of the main hypothesis (H_1), confirming that lecturers' teaching styles—particularly experiential, situated, and hybrid approaches—positively influence competency development, with the model explaining a meaningful portion of the variance in student outcomes.

Linear regression coefficient results

This section presents the linear regression analysis of lecturers' teaching styles and their influence on TVET students' competency development. The analysis examined the predictive contributions of experiential/hands-on, situated/contextual, and hybrid approaches, quantifying their strength, significance, and effect on students' technical knowledge, skills, and abilities. The main hypothesis (H_1) stated that lecturers' teaching styles have a significant positive relationship with competency development among TVET students.

Table 15 Regression relationship between analysis of teaching styles and competency development among TVET students

Regression Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.981	.314		3.125	.002	.359	1.604
	Experiential / Hands-on Teaching Style	.263	.082	.319	3.225	.002	.101	.424
	Situated / Real-Life Teaching Style	.147	.095	.159	1.547	.125	-.041	.335
	Hybrid Teaching Style	.045	.070	.062	.652	.516	-.092	.183
a. Dependent Variable: Competency Development								

The main hypothesis (H_1) stated that lecturers' teaching styles had a significant positive relationship with competency development among TVET students. Linear regression was conducted to examine the predictive effects of experiential/hands-on, situated/contextual, and hybrid teaching styles on students' competency, measured through knowledge, skills, and abilities in Structural Analysis, Construction Management, Drawing and Costing Engineering Plans, Interpreting Engineering Plans, and CAD.

Experiential/hands-on teaching had a statistically significant positive effect ($B = 0.263$, $Beta = 0.319$, $t = 3.225$, $p = 0.002$, 95% CI [0.101, 0.424]), indicating that a one-unit increase improved competency by 26.3%. This hypothesis was accepted, confirming it as the strongest predictor. The strong effect may be attributed to active engagement, repeated practice, and direct application of technical concepts, which reinforce skill acquisition. Suggestion: TVET institutions should prioritize hands-on workshops, laboratory exercises, and industry-based simulations to maximize competency development.

Situated/contextual teaching had a positive but non-significant effect ($B = 0.147$, $Beta = 0.159$, $t = 1.547$, $p = 0.125$, 95% CI $[-0.041, 0.335]$). The hypothesis for this predictor was rejected, possibly due to limited real-world exposure, insufficiently structured contextual exercises, or inconsistent integration of theory and practice. Suggestion: Enhance real-world learning through field projects, industry attachments, and problem-based learning aligned with curriculum outcomes.

Hybrid teaching showed minimal and non-significant influence ($B = 0.045$, $Beta = 0.062$, $t = 0.652$, $p = 0.516$, 95% CI $[-0.092, 0.183]$), indicating negligible effect. The hypothesis for this predictor was rejected, potentially because blended approaches lacked adequate hands-on or contextual components, or digital tools were underutilized. Suggestion: Strengthen hybrid methods by integrating interactive simulations, virtual labs, and structured practical exercises to enhance their effectiveness.

Overall, the regression analysis confirmed the acceptance of the main hypothesis (H_1) in general, as experiential teaching significantly improved competency development, while situated and hybrid approaches contributed minimally or inconsistently. These findings highlight the necessity for TVET programs to emphasize practice-oriented, contextually relevant, and technologically supported teaching strategies to optimize students' technical skills, problem-solving abilities, and career readiness.

4.3 Summary of Findings

The summary of key findings in this section explains how different teaching methods affected the skill development of students in technical colleges in Uganda. It combined data from surveys and interviews to show who the students were, how well different teaching styles worked, the level of skills students have gained, and how teaching approaches relate to their learning outcomes.

4.3.1 Demographics

The findings on demographics revealed that most respondents were young (59.1%), male (76.5%), single (80.9%), and from low-to-middle income backgrounds. Educationally, 43.5% had A-Level, 34.8% craft, and 3.5% junior certificates. Limited tool access (43.5%) hampers practical training, highlighting the need for inclusive, resource-sensitive, and hands-on teaching approaches in TVET institutions. For Uganda, this underscores the urgency of investing in tools, equitable access, and adaptable teaching to boost youth employability and national skills development.

4.3.2 Objective One: Effect of Experiential/Hands-On Practical Learning on Competency Development

This objective assessed the impact of hands-on practical learning on TVET students' competency development. The findings indicated that practical learning significantly enhanced skills, with 68.7% of students agreeing that real-world applications and case studies contributed meaningfully to their learning (mean = 3.81). Similarly, 64.5% acknowledged that preparation for industry-specific challenges improved their competencies (mean = 3.65). However, a notable gap emerged as only 39.1% of students agreed that academic concepts were adequately linked to industry practices (mean = 3.37). This suggests insufficient integration between theory and real-world applications, limiting full skill acquisition. To address this, TVET institutions should strengthen collaboration with industry stakeholders to better align curricula and teaching content with current professional practices and enhance experiential learning opportunities.

4.3.3 Objective Two: Influence of Situated Learning on Competency Development

Situated learning, including site visits, internships, and industry partnerships, moderately enhanced TVET students' competencies, with 63–64% agreement and mean scores of 3.60–3.64. However, insufficient emphasis on contextual career readiness (52.2%, mean = 3.36) highlighted gaps, suggesting the need to improve internship quality, strengthen industry partnerships, and incorporate career development modules to better prepare students for professional employment.

4.3.4 Objective Three: Effect of Hybrid Teaching Integration on Competency Development among Students in TVET

The study found mixed results for hybrid teaching approaches. While 54.8% of students agreed that classroom methods supported blended learning (mean = 3.29), only 31.3% found e-

learning videos effective (mean = 2.88), highlighting a significant gap in the efficacy of digital learning tools. Competency levels were moderate, with 42.6% rating surveying skills as basic (mean = 2.43) and 59.4% rating engineering plan interpretation as intermediate (mean = 2.77). This reflects limitations in digital infrastructure, e-learning content quality, and instructor preparedness. To improve outcomes, there is a need for investment in reliable digital platforms, development of contextually relevant online materials, and comprehensive training for instructors in hybrid teaching methods.

4.3.5 Assessing the Dependent Variable: Competency Development among TVET Students – A Mixed-Methods Assessment

Overall, competency development among TVET students was moderate (mean = 2.60, SD = 0.91). Students performed best in interpreting engineering plans (mean = 2.77) and managing construction sites (mean = 2.70), indicating strengths in some technical areas. However, significant gaps were found in surveying (mean = 2.43, with 42.6% at basic skill level) and Computer-Aided Design (CAD) (mean = 2.57, with 50% demonstrating minimal or no skills). These deficiencies underscore the urgent need for enhanced practical training, improved access to modern tools and technologies, and increased mentorship programs to raise competency levels in these critical skill areas.

4.3.4 Objective four: Assessed the relationship between Lecturers' teaching styles and competency development among students in TVET

Objective 4 examined the relationship between lecturers' teaching styles and competency development among TVET students. Findings supported the hypothesis that teaching styles significantly influence student competency, with experiential/hands-on teaching showing the strongest positive correlation ($r = 0.420$, $p < 0.01$), followed by situated ($r = 0.345$, $p < 0.01$) and hybrid teaching ($r = 0.246$, $p = 0.008$). ANOVA results indicated significant differences in competency across teaching styles, with measures of association showing a substantial effect (Eta = 0.578; Eta Squared = 0.334). Regression analysis revealed that teaching styles collectively explained 20.5% of the variance in competency ($R^2 = 0.205$), with experiential teaching being the strongest predictor ($B = 0.263$, Beta = 0.319, $p = 0.002$), highlighting the primacy of hands-on approaches in enhancing technical knowledge, applied skills, and workplace readiness among TVET students.

CHAPTER FIVE

DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of key findings, draws conclusions on teaching styles and competency development in Ugandan TVET institutions, and offers practical recommendations for improving technical education outcomes.

5.1 Discussion of findings

5.1.1 Effect of Experiential/Hands-On Practical Learning on Competency Development

The study found that experiential, hands-on learning significantly enhanced competency development among TVET civil engineering students, particularly in technical skills such as interpreting construction drawings, managing site operations, and applying surveying and structural analysis principles. Quantitatively, students rated real-world applications and engineering case studies highly (mean = 3.81, 68.7% agreement), and preparation for industry-specific challenges also received strong endorsement (mean = 3.65, 64.5% agreement). These findings align with Moses and Malachwanzi (2022), who reported that students exposed to practical engineering tasks demonstrated notable improvements in skill acquisition and job readiness. Similarly, Smith (2021) observed that contextualized practical training deepened understanding and facilitated retention of technical knowledge. However, the study identified gaps in linking theoretical concepts to industry practice (mean = 3.37, 28.7% disagreement), reflecting a partial disconnect between classroom instruction and workplace expectations. This contrasts with more integrated programs reported by Bennett and Oteng (2018), where structured industry partnerships minimized theory-practice gaps, suggesting that the variability in TVET implementation influences the effectiveness of competency development.

From a theoretical perspective, the findings support Kolb's (1984) Experiential Learning Theory, demonstrating that learning through concrete experience and reflection enhances the acquisition of technical competencies. The study also partially corroborated Human Capital Theory (Becker, 1962; Schultz, 1961), showing that investment in practical education can boost economic productivity through skill development. However, qualitative results revealed that students' independent problem-solving, application of advanced site operations, and critical reasoning skills were inconsistently developed, indicating that practical exposure alone was insufficient for holistic competency development. This contrasts with studies in more developed vocational systems (e.g., OECD, 2018), where hands-on learning is systematically

combined with mentoring and reflective practice to maximize competency outcomes. Therefore, the study highlighted the need for enhanced curriculum-industry alignment, standardized practical modules, and immersive site-based simulations to ensure that experiential learning translates into fully employable civil engineering competencies.

5.1.2 The Influence of Situated Learning on Competency Development

The study revealed that situated learning, which embeds education within authentic industry contexts, positively influenced competency development among TVET civil engineering students. Quantitative findings indicated that 64.4% of students agreed that relating academic concepts to industry practices enhanced their learning (mean = 3.60, SD = 1.03), while civil engineering-aligned instruction (mean = 3.64) and site visits with industry partnerships (mean = 3.57, SD = 1.22) were highly valued. These results align with Yiga (2022) and Bennett & Oteng (2018), who report that workplace simulations and contextual projects improve student-employer alignment. Qualitative data from field supervisors further indicated that students developed practical problem-solving abilities and better understood industry expectations, supporting Brown, Collins, and Duguid's (1989) argument that authentic, contextually grounded experiences enhance applied learning and skill acquisition.

However, the study revealed that only 52.2% of students felt that situated learning fully prepared them for career readiness (mean = 3.36, SD = 1.24), exposing gaps in soft skills, adaptability, and interpersonal competence. While Human Capital Theory (Becker, 1962; Schultz, 1961) supports the economic rationale for enhancing technical productivity, it underrepresents broader competencies necessary for holistic workforce readiness. From the researcher's perspective, these findings emphasize the need for TVET institutions to integrate structured soft skills training, mentorship programs, and reflective exercises alongside authentic learning experiences, ensuring that graduates not only acquire technical mastery but also the critical thinking, collaboration, and adaptability essential for professional success in civil engineering.

5.1.3 Effect of Hybrid Teaching Integration on Competency Development

The study revealed that hybrid teaching integration has a moderate influence on competency development among TVET civil engineering students. Quantitative results showed that only 31.3% of students consider e-learning videos supportive of classroom instruction (mean = 2.88), while 43.4% disagree about the effectiveness of online simulations (mean = 2.90). Additionally, LMS content organization (mean = 2.83) and feedback tracking (mean = 2.70)

are rated poorly, indicating fragmented implementation. Qualitative insights from field supervisors demonstrate that limited digital literacy, inadequate internet connectivity, and insufficient technological infrastructure hinder the effective integration of hybrid modalities. These findings align with Mtetwa (2023) and Mutebi (2021), who report that blended learning in Sub-Saharan TVET contexts is constrained by structural and pedagogical limitations, and contrast with Gedik et al. (2006) and Halili (2016), who emphasize that hybrid teaching in technologically supported environments enhances both theoretical understanding and practical skill acquisition.

Furthermore, the research indicated that although Human Capital Theory (Becker, 1962; Schultz, 1961) frames hybrid learning as an investment in employability, its practical effectiveness depends on contextual readiness. The study showed that students struggle to integrate online simulations with on-site tasks, limiting competency mastery in CAD modeling, structural analysis, site surveying, and project management. These observations corroborate OECD (2018) and IDRC (2023), who emphasize that aligning vocational education with industry standards improves applied competencies. The study also suggests that faculty development in digital pedagogy, offline-capable platforms, and locally relevant digital content are necessary to bridge the gap between hybrid learning potential and actual competency outcomes, ensuring graduates acquire both technical mastery and adaptive problem-solving skills required for contemporary civil engineering practice.

5.1.4 Assessment of Competency Development among TVET Students

The study revealed moderate competency among students, with the highest performance in interpreting engineering plans (mean = 2.77, 59.4% intermediate to advanced) and managing construction sites (mean = 2.70, 57.2%), while weaknesses were observed in CAD (mean = 2.57, ~50% basic or none) and surveying (mean = 2.43, 42.6%). These results aligned with Kolb's (1984) Experiential Learning Theory, highlighting the importance of hands-on learning, but heavy reliance on supervision and inconsistent performance in advanced tasks such as trenching and concrete mixing indicated gaps in independent technical competence (Bennett & Oteng, 2018). The study also found that hybrid tools were underutilized, with LMS content delivery rated low (mean = 2.83) and feedback tracking ineffective (mean = 2.70), confirming Schilling & Kember's (2014) assertion that infrastructure and digital literacy limitations hinder blended learning. Supervisors reported that 60% of students struggled with tasks requiring independence, emphasizing the need for structured mentorship, follow-up after field

attachments, and targeted reinforcement of weaker technical and soft skills to ensure professional readiness.

5.2.5 Relationship between Lecturers' Teaching Styles and Competency Development

Objective four assessed the relationship between lecturers' teaching styles and competency development among TVET students, testing the main hypothesis (H_1) that teaching styles positively influence student competencies. Pearson correlation analysis indicated that experiential/hands-on teaching had the strongest positive correlation with competency development ($r = 0.420$, $p < 0.01$), corroborating Kolb's (1984) Experiential Learning Theory and the findings of Moses and Malachwanzi (2022), which emphasize that active engagement and reflective practice enhance vocational skill acquisition. Situated teaching demonstrated a moderate positive correlation ($r = 0.345$, $p < 0.01$), aligning with Brown, Collins, and Duguid (1989), who argue that authentic, contextually embedded learning strengthens applied competencies. Hybrid teaching exhibited a weaker but statistically significant relationship ($r = 0.246$, $p = 0.008$), reflecting observations by Schilling and Kember (2014) and OECD (2018) that digital or blended methods often face systemic constraints, limiting their impact on skill development. All correlations were significant, confirming the general positive influence of teaching styles on competency at the correlation level.

Regression model analysis further revealed that teaching styles collectively explained 20.5% of the variance in competency development ($R = 0.452$, $R^2 = 0.205$, Adjusted $R^2 = 0.183$), demonstrating moderate predictive validity and supporting H_1 at the model level. Linear regression coefficients identified experiential teaching as the strongest predictor ($B = 0.263$, Beta = 0.319, $p = 0.002$), affirming that structured practical activities—such as CAD modeling, site surveying, structural analysis, and project management—substantially enhance student competencies, consistent with Kolb (1984) and Moses & Malachwanzi (2022). Situated teaching had a positive but non-significant effect ($B = 0.147$, $p = 0.125$), suggesting that limited real-world exposure or inconsistent integration of theory and practice may constrain its impact, echoing Brown, Collins, and Duguid (1989). Hybrid teaching had minimal influence ($B = 0.045$, $p = 0.516$), with field supervisors highlighting challenges such as low digital literacy, limited infrastructure, and misaligned simulations, reflecting prior critiques by Schilling & Kember (2014). Overall, these findings underscore the primacy of experiential and contextually relevant pedagogies while highlighting systemic interventions—faculty training, curriculum modernization, and infrastructural investment—needed to optimize all teaching approaches for workforce-ready competency development in Ugandan TVET civil engineering programs.

5.3.1 Conclusion

The findings demonstrate that teaching styles play a crucial role in shaping student competencies across all TVET institutions. Experiential learning proved to be most effective, it also indicated that hands-on, practical approaches best prepare students for technical careers. Situated learning holds promise but requires systemic improvements to maximize its impact. The limited success of hybrid methods highlights the need for better digital infrastructure and training. Overall, these results suggest that strengthening practical teaching, updating curricula, and investing in technology are essential to producing skilled graduates who can drive Uganda's industrial and economic development.

5.3.2 Recommendations

Based on the findings, the following recommendations are proposed to strengthen teaching approaches and enhance competency development in TVET institutions:

TVET institutions and government agencies should increase allocation of time and resources for practical training such as laboratory work, fieldwork, and hands-on workshops, ensuring that all students have access to essential tools and equipment to support active, real-world learning experiences.

Industry stakeholders, in partnership with TVET institutions, should strengthen collaboration through structured internships, industry-led projects, and regular site visits, which can be integrated into curricula to bridge the gap between classroom learning and industry expectations.

Education authorities and development partners should support the development of hybrid teaching approaches tailored to low-bandwidth and offline environments, while also providing digital literacy training for both educators and students to ensure inclusive and effective participation in blended learning.

Curriculum developers, professional associations, and training institutions should direct investment toward areas where students show lower proficiency, such as surveying and digital design, and ensure these domains are incorporated into experiential learning methods to strengthen both understanding and application.

University administrations and teacher training institutes should implement continuous professional development programs to equip lecturers with modern pedagogical strategies,

enabling them to effectively deliver experiential, situated, and hybrid teaching while emphasizing student engagement, feedback, and alignment with competency-based education principles.

Finally, government, development partners, and institutional leaders should ensure equal access to practical tools, digital resources, and financial support for students from disadvantaged backgrounds, since reducing disparities will improve learning outcomes and support inclusive skills development across all demographic groups.

5.3.3 Suggested Areas for Further Research

Long-Term Impacts of Teaching Styles on Graduate Employability: Track former students' job performance and career progression to assess the real-world impact of each teaching style.

Effectiveness of Teacher Training Programs in TVET: Explore how training and certification of instructors affect their teaching methods and student outcomes, especially in experiential and hybrid contexts.

Digital Pedagogy and E-Learning Feasibility in Rural Areas: Study the adaptability of digital platforms in low-resource settings, focusing on offline-compatible hybrid learning tools.

Gender and Inclusivity in TVET Participation and Competency: Investigate how gender dynamics influence learning outcomes and access to technical training.

Alignment between TVET Curricula and Industry Demands: Assess how well TVET programs reflect the evolving needs of employers, particularly in technical and construction sectors.

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APPENDICES

Appendix 1: Consent form

I give consent to participate in this study

I have read through the research information statement explaining why the study is to be carried out and understand that;

1. My role in this particular study will be voluntary
2. All information that I will give shall be treated with privacy and strict confidentiality
3. My name shall not be used in any written reports about the study
4. I therefore confirm that I have read and understood the necessary information and am competent to execute the agreement.

Participant's Name.....

Signature Date

Researcher's Name.....

Signature..... Date

Appendix2: self-administered questionnaire for lecturers/instructors

Teaching Styles and Competency Development of students in Technical and Vocational Education Training Institutions in Uganda

Dear Respondent

I am Akongo Dorcas Janet, a student of Gulu University pursuing Master degree in Educational Management. As a necessity for the award of this degree, I am carrying out a research on 'Teaching Styles and Competency Development of students in Uganda Technical colleges in Uganda. You have been selected to take part in the study. I therefore request you to provide necessary information required. Your participation will help us better understand and appreciate how teaching styles help in competency development of students in technical and vocational education training institutions in Uganda. The opinion you will give shall be kept strictly confidential and the information will strictly be for this research study. I will appreciate your involvement in the study.

RESEARCHER SIGN-----

PARTICIPANT SIGN-----

Section A: General Information: Please tick (✓) where applicable
SECTION ONE: SELF-ADMINISTERED QUESTIONNAIRE FOR LECTURERS/INSTRUCTORS
A) Demographic Background

A1 Age: Please indicate your age by selecting one of the following options:

1 ☐ Under 30YRS 2 ☐ 30-40 3 ☐ 41- 50 4 ☐ 51 and above

A2 Gender: What is your gender? Please select one of the following:

1 ☐ Male 2 ☐ Female 3 ☐ Other

A3. Region of Origin: What is your region of origin? Please choose one of the following regions or specify another:

1 ☐ Western 2. ☐ Eastern 3. ☐ Southern 4. ☐ Northern

☐ Other: _____

A4. Educational Background: What is your highest level of education?

1. ☐ Diploma 2. ☐ Higher Diploma 3. ☐ Bachelor Degree 4 ☐ Others: _____

A5 Socioeconomic Background: What is your family's approximate annual income? (Select one):

1 ☐ Low-income 2 ☐ Middle-income 3 ☐ High-income 4 ☐ other: _____

A5. Employment Status: Are you currently employed? (Select one):

1. ☐ permanent 2. ☐ Temporary 3. ☐ on probation 4. ☐ Internship/college practice.

A6. Other Sources of Funding if any: 1. ☐ construction projects. 2. ☐ plumbing projects
3. ☐ surveying projects 4. ☐ others -----

A7 Marital Status: what is your current marital status?

What is your marital status?

1 ☐ Single 2 ☐ Married 3 ☐ Separated 4 ☐ Divorced 5 ☐ widowed

A8. Availability of Engineering Tools: How would you describe the current availability of engineering tools for your civil engineering department?

1. ☐ I have a complete set of engineering tools required

2. ☐ I have most of the tools needed

3. ☐ I have some of the essential tools

4. ☐ I have only a few tools

5. ☐ I do not have any tool

Thank you for completing this section

Section B: Teaching Styles dimensions (IV)

This section is about Teaching Styles and Competency Development of students in Technical and Vocational Education Training Institutions in Uganda. It has three sub-sections which include hands –on, situated and the hybrid or blended style. You are required to respond to each statement in all the subsection by ticking the appropriate option in your opinion using the scale SD = Strongly Disagree; D = Disagree; NS = Not Sure; A = Agree and SA = Strongly Agree.

SN	ITEMS	SD	D	NS	A	SA
SN	Statements on hands on, practical, experiential teaching/learning styles					
	Because the lecturers engage students during lessons through practical and experiential learning, in this college, there is:					
S1	A significant improvement in applying theoretical knowledge to real-world situations, enhancing our technical skills and practical abilities.	1	2	3	3	5
S2.	Greater understanding of technical concepts through practical tasks like laboratory experiments and fieldwork, which also aids in better retention of information.	1	2	3	3	5

S3.	Increased engagement and motivation from participating in practical activities, providing valuable opportunities to develop job-ready skills.	1	2	3	3	5
S4.	Better preparation for real-world technical challenges, with practical tasks integrated into the curriculum strengthening our ability to adapt to industry demands.	1	2	3	3	5
S 5.	Significant improvements in overall learning outcomes compared to traditional lecture-based methods, with practical approaches proving more effective.	1	2	3	3	5
S6	A deeper understanding of complex technical subjects through active participation in practical activities, ensuring readiness for professional challenges.	1	2	3	3	5
SN	Statements on Situated and context bound teaching and learning styles					
In this college, all the lecturers:		SD	D	NS	A	SA
T1	Incorporate site visits and industry partnerships to enhance practical skills and competency development.	1	2	3	4	5
T2.	Relate academic concepts to current industry practices, bridging the theory-practice gap.	1	2	3	4	5
T3.	Use methods that integrate real-world applications and case studies to improve understanding.	1	2	3	4	5
T4.	Prepare students to overcome industry-specific challenges effectively.	1	2	3	4	5
T5.	Align teaching methods with civil engineering practices to positively impact competency development.	1	2	3	4	5
T6	Focus on practical and contextual learning approaches to enhance career readiness.	1	2	3	4	5
SN	Statements on Hybrid/blended Style(HS)	SD	D	NS	A	SA
U1.	Lecturers effectively use traditional classroom-based teaching methods, such as lectures and practical demonstrations, to complement online learning.	1	2	3	4	5
U2.	Lecturers incorporate hands-on training and practical exercises in their face-to-face instruction to enhance the learning experience.	1	2	3	4	5
U3.	Lecturers regularly utilize e-learning modules and instructional videos to support and supplement face-to-face teaching.	1	2	3	4	5
U4.	Lecturers engage students through online forums and interactive simulations to enhance their understanding of course material.	1	2	3	4	5
U5.	Lecturers effectively use Learning Management Systems (LMS) to organize and deliver online course content.	1	2	3	4	5
U6	Lecturers utilize LMS features to track learner progress and provide timely feedback.	1	2	3	4	5

Section C: Competency Development (DV)

This section is about competency development in technical and vocational education training institute. It has six sub-sections which include Knowledge, skills and competences in a) Computer-Aided Design (CAD), b) Structural Analysis, c) Surveyed) Construction Management, e) Drawing and Costing Engineering Plans, f) Interpreting Engineering Plans. You are required to respond to each statement in all the subsection basing on your experience/competency level by ticking the appropriate option in your opinion using the scale as in table below

1 ☐	No Practical Experience
2 ☐	Basic Practical Experience:
3 ☐	Intermediate Practical Experience
4 ☐	Advanced Practical Experience
5 ☐	Extensive Practical Experience

Please rate your proficiency and practical experience in under listed competency for development technical and vocational dimensions considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

D) Computer-Aided Design (CAD) Knowledge, skills and competences:

Please evaluate students' proficiency and hands-on experience with Computer-Aided Design (CAD), considering aspects such as technical knowledge, skill development, practical application, work quality, industry relevance, and career readiness:

1 ☐	No Practical Experience: No experience with CAD or related software; lack of technical knowledge.
2 ☐	Basic Practical Experience: Limited experience with simple projects or tutorials, such as creating basic 2D floor plans.
3 ☐	Intermediate Practical Experience: Experience from coursework projects or assisting with design tasks, like contributing to detailed design models in class assignments.
4 ☐	Advanced Practical Experience: Significant experience through professional projects or internships, such as working on CAD drawings for client projects or construction plans.
5 ☐	Extensive Practical Experience: Extensive involvement, including leading CAD design projects and making substantial professional contributions, such as managing large-scale design projects and mentoring others in CAD

Surveying Knowledge, skills and competences

Please assess your proficiency and practical experience in Surveying, focusing on aspects such as technical knowledge, skill acquisition, practical application, work quality, industry relevance, and career readiness:

1 ☐	No Practical Experience: No hands-on experience with surveying techniques or equipment.
2 ☐	Basic Practical Experience: Introductory experience from fieldwork exercises or academic tasks, such as using a basic surveyor's level in class.
3 ☐	Intermediate Practical Experience: Experience from conducting surveys or participating in field projects, like measuring land boundaries or assisting in construction site surveys.
4 ☐	Advanced Practical Experience: Proficient in professional surveying tasks and specialized equipment, such as using advanced total stations or GPS systems for complex surveys.
5 ☐	Extensive Practical Experience: Extensive experience, including leading major surveying projects and taking on significant professional roles, like overseeing large-scale land surveys or managing survey teams.

- a) **Structural Analysis Knowledge, skills and competences** (*the study of how structures respond to loads and forces essential in civil engineering for ensuring the safety and stability of various structures such as buildings, bridges, and dams*)

Please rate your level of practical experience in structural analysis, considering factors such as technical knowledge, skills acquisition, practicality, work standard, industry relevance, and career readiness:

1 ☐	No Practical Experience: I have no practical experience in structural analysis and lack relevant knowledge, skills, and exposure.
2 ☐	Basic Practical Experience: I have basic experience through coursework or academic exercises, with limited skill development and practical application.
3 ☐	Intermediate Practical Experience: I have intermediate experience from projects or internships, demonstrating a solid standard of work, technical competence, and moderate industry relevance.
4 ☐	Advanced Practical Experience: I have advanced experience from real-world projects and professional assessments, showcasing high skills acquisition, a strong standard of work, and significant industry engagement.
5 ☐	Extensive Practical Experience: I have extensive experience, including leading complex projects and high-level professional involvement, reflecting exceptional technical knowledge, expertise, and career preparedness.

- b) Construction Management Knowledge, skills and competences:** (This field focuses on supervising and guiding construction projects, including the management of resources, timelines, and finances, while ensuring compliance with legal and regulatory standards.)

Please rate your proficiency and practical experience in Construction Management, considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

1 ☐	No Practical Experience: students have no hands-on experience in construction management.
2 ☐	Basic Practical Experience: students have fundamental experience through project planning tasks or academic exposure.
3 ☐	Intermediate Practical Experience: students have some experience from assisting with construction projects or through internships.
4 ☐	Advanced Practical Experience: students have significant experience from leading projects or holding management roles in a professional setting.
5 ☐	Extensive Practical Experience: students have extensive experience, including overseeing major construction projects and handling high-level professional duties.

f) Drawing and Costing Engineering Plans

Please rate your proficiency and practical experience in drawing and costing engineering plans, considering technical knowledge, skill development, practical application, work quality, industry relevance, and career readiness:

1 ☐	No Practical Experience: most students have no experience or understanding of engineering plans.
2 ☐	Basic Practical Experience: most students have some experience from academic assignments; limited skills.
3 ☐	Intermediate Practical Experience: most students experience in detailed plans for projects and professional settings; good skills.
4 ☐	Advanced Practical Experience: students have developed real-world plans with high-quality work and strong industry relevance.
5 ☐	Extensive Practical Experience: students have led major projects with exceptional skills, high-quality work, and significant industry impact.

Interpreting Engineering Plans

Please rate students' proficiency and practical experience in interpreting engineering plans, considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

1 ☐	No Practical Experience: they have not engaged in interpreting engineering plans and lack practical experience in this area.
2 ☐	Basic Practical Experience: they have a foundational understanding of engineering plans from coursework or simple projects, with limited hands-on application.
3 ☐	Intermediate Practical Experience: they have practical experience interpreting and analysing plans for various projects or professional settings, demonstrating a solid grasp of the concepts.
4 ☐	Advanced Practical Experience: they are skilful in independently interpreting complex engineering plans and providing valuable insights in professional contexts, showcasing a high standard of work.
5 ☐	Extensive Practical Experience: most students have extensive experience leading to the interpretation of critical engineering plans and have developed significant expertise, demonstrating high industry relevance and career readiness.

Thank you for your Participation

Appendix3 Section: two: Self-administered questionnaire for students

A) Demographic Background

A1 Age: Please indicate your age by selecting one of the following options:

1 ☐ Under 18 2 ☐ 18-24 3 ☐ 25-30 4 ☐ 31 and above

A2 Gender: What is your gender? Please select one of the following:

1 ☐ Male 2 ☐ Female 3 ☐ Other

A3 Marital Status: what is your current marital status?

What is your marital status?

1 ☐ Single 2 ☐ Married 3 ☐ Separated 4 ☐ Divorced 5 ☐ widowed

A4. Region of Origin: What is your region of origin? Please choose one of the following regions or specify another:

1 ☐ Western 2. ☐ Eastern 3. ☐ Southern 4. ☐ Northern

☐ Other: _____

A5. Educational Background: What was your highest level of education before starting your diploma? Please select one of the following:

1. ☐ Junior Cert 2. ☐ Crafts 3. ☐ "A" Level 4 ☐ Other: _____

A6 Socioeconomic Background: What is your family's approximate annual income? (Select one):

1 ☐ Low-income 2 ☐ Middle-income 3 ☐ High-income 4 ☐ Other: _____

A6. Employment Status: Are you currently employed? (Select one):

1. ☐ Yes, full-time 2. ☐ Yes, part-time 3. ☐ No 4. ☐ Internship or Co-op position.

A7. Source of Funding for Diploma: How are you funding your diploma studies? (Check all that apply) 1. ☐ Personal savings 2. ☐ Family support 3. ☐ Scholarships 4. ☐ Student Loans

A8 Availability of Engineering Tools: How would you describe the current availability of engineering tools for your civil engineering coursework and fieldwork?

1. ☐ I have a complete set of engineering tools required

2. ☐ I have most of the tools needed

3. ☐ I have some of the essential tools

4. ☐ I have only a few tools

5. ☐ I do not have any tool

A8.

Thank you for completing this section

Section B: Teaching Styles

This section is about Teaching Styles and Competency Development in Technical and Vocational Education Training Institute in Uganda. It has three sub-sections which include hands-on, situated and the hybrid or blended style. You are required to respond to each statement in all the subsection by ticking the appropriate option in your opinion using the scale SD = Strongly Disagree; D = Disagree; NS = Not Sure; A = Agree and SA = Strongly Agree.

SN	ITEMS	SD	D	NS	A	SA
SN	Statements on hands on, practical, experiential teaching/learning styles					
	Because the lecturers engage us during lessons through practical and experiential learning, in this college, there is:					
S1	A significant improvement in applying theoretical knowledge to real-world situations, enhancing our technical skills and practical abilities.	1	2	3	3	5
S2.	Greater understanding of technical concepts through practical tasks like laboratory experiments and fieldwork, which also aids in better retention of information.	1	2	3	3	5
S3.	Increased engagement and motivation from participating in practical activities, providing valuable opportunities to develop job-ready skills.	1	2	3	3	5
S4.	Better preparation for real-world technical challenges, with practical tasks integrated into the curriculum strengthening our ability to adapt to industry demands.	1	2	3	3	5
S 5.	Significant improvements in overall learning outcomes compared to traditional lecture-based methods, with practical approaches proving more effective.	1	2	3	3	5
S6	A deeper understanding of complex technical subjects through active participation in practical activities, ensuring readiness for professional challenges.	1	2	3	3	5
Section C: ATEMENTS ON SITUATED AND CONTEXT BOUND TEACHING AND LEARNING STYLES						
In this college, lecturers:		SD	D	NS	A	SA
T1	Incorporate site visits and industry partnerships to enhance practical skills and competency development.	1	2	3	4	5
T2.	Relate academic concepts to current industry practices, bridging the theory-practice gap.	1	2	3	4	5
T3.	Use methods that integrate real-world applications and case studies to improve understanding.	1	2	3	4	5
T4.	Prepare students to overcome industry-specific challenges effectively.	1	2	3	4	5
T5.	Align teaching methods with civil engineering practices to positively impact competency development.	1	2	3	4	5
T6	Focus on practical and contextual learning approaches to enhance career readiness.	1	2	3	4	5
SECTION D		SD	D	NS	A	SA
Statements on Hybrid/blended Style (HS)						

U1.	Lecturers effectively use traditional classroom-based teaching methods, such as lectures and practical demonstrations, to complement online learning.	1	2	3	4	5
U2.	Lecturers incorporate hands-on training and practical exercises in their face-to-face instruction to enhance the learning experience.	1	2	3	4	5
U3.	Lecturers regularly utilize e-learning modules and instructional videos to support and supplement face-to-face teaching.	1	2	3	4	5
U4.	Lecturers engage students through online forums and interactive simulations to enhance their understanding of course material.	1	2	3	4	5
U5.	Lecturers effectively use Learning Management Systems (LMS) to organize and deliver online course content.	1	2	3	4	5
U6.	Lecturers utilize LMS features to track learner progress and provide timely feedback.	1	2	3	4	5

Section E Competency Development (DV)

This section is about competency development in technical and vocational education training institute. It has six sub-sections which include Knowledge, skills and competences in a) Computer-Aided Design (CAD), b) Structural Analysis, c) Survey, d) Construction Management, e) Drawing and Costing Engineering Plans, f) Interpreting Engineering Plans. You are required to respond to each statement in all the subsection basing on your experience/competency level by ticking the appropriate option in your opinion using the scale as in table below

	Section E 1, competency Development (DV) Computer-Aided Design (CAD)
1 ☐	No Practical Experience
2 ☐	Basic Practical Experience:
3 ☐	Intermediate Practical Experience
4 ☐	Advanced Practical Experience
5 ☐	Extensive Practical Experience

Please rate your proficiency and practical experience in under listed competency for development technical and vocational dimensions considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

Computer-Aided Design (CAD) Knowledge, skills and competences:

Please evaluate your proficiency and hands-on experience with Computer-Aided Design (CAD), considering aspects such as technical knowledge, skill development, practical application, work quality, industry relevance, and career readiness:

	Section E 2, competency Development (DV)
1 ☐	

	No Practical Experience: No experience with CAD or related software; lack of technical knowledge.
2 ☐	Basic Practical Experience: Limited experience with simple projects or tutorials, such as creating basic 2D floor plans.
3 ☐	Intermediate Practical Experience: Experience from coursework projects or assisting with design tasks, like contributing to detailed design models in class assignments.
4 ☐	Advanced Practical Experience: Significant experience through professional projects or internships, such as working on CAD drawings for client projects or construction plans.
5 ☐	Extensive Practical Experience: Extensive involvement, including leading CAD design projects and making substantial professional contributions, such as managing large-scale design projects and mentoring others in CAD

Surveying Knowledge, skills and competences

Please assess your proficiency and practical experience in Surveying, focusing on aspects such as technical knowledge, skill acquisition, practical application, work quality, industry relevance, and career readiness:

	Section E 3 competency Development (DV) Surveying Knowledge, skills and competences
1 ☐	No Practical Experience: No hands-on experience with surveying techniques or equipment.
2 ☐	Basic Practical Experience: Introductory experience from fieldwork exercises or academic tasks, such as using a basic surveyor's level in class.
3 ☐	Intermediate Practical Experience: Experience from conducting surveys or participating in field projects, like measuring land boundaries or assisting in construction site surveys.
4 ☐	Advanced Practical Experience: Proficient in professional surveying tasks and specialized equipment, such as using advanced total stations or GPS systems for complex surveys.
5 ☐	Extensive Practical Experience: Extensive experience, including leading major surveying projects and taking on significant professional roles, like overseeing large-scale land surveys or managing survey teams.

d) Structural Analysis Knowledge, skills and competences (the study of how structures respond to loads and forces essential in civil engineering for ensuring the safety and stability of various structures such as buildings, bridges, and dams)

Please rate your level of practical experience in structural analysis, considering factors such as technical knowledge, skills acquisition, practicality, work standard, industry relevance, and career readiness:

	Section E 4 competency Development (DV) Structural Analysis <i>Knowledge, skills and competences</i>
1 ☐	No Practical Experience: I have no practical experience in structural analysis and lack relevant knowledge, skills, and exposure.
2 ☐	Basic Practical Experience: I have basic experience through coursework or academic exercises, with limited skill development and practical application.
3 ☐	Intermediate Practical Experience: I have intermediate experience from projects or internships, demonstrating a solid standard of work, technical competence, and moderate industry relevance.
4 ☐	Advanced Practical Experience: I have advanced experience from real-world projects and professional assessments, showcasing high skills acquisition, a strong standard of work, and significant industry engagement.
5 ☐	Extensive Practical Experience: I have extensive experience, including leading complex projects and high-level professional involvement, reflecting exceptional technical knowledge, expertise, and career preparedness.

e) Construction Management Knowledge, skills and competences: (This field focuses on supervising and guiding construction projects, including the management of resources, timelines, and finances, while ensuring compliance with legal and regulatory standards.)

Please rate your proficiency and practical experience in Construction Management, considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

	Section E 5 competency Development (DV) Construction Management Knowledge, skills and competences
1 ☐	No Practical Experience: I have no hands-on experience in construction management.
2 ☐	Basic Practical Experience: I have fundamental experience through project planning tasks or academic exposure.
3 ☐	Intermediate Practical Experience: I have some experience from assisting with construction projects or through internships.
4 ☐	Advanced Practical Experience: I have significant experience from leading projects or holding management roles in a professional setting.

5 ☐	Extensive Practical Experience: I have extensive experience, including overseeing major construction projects and handling high-level professional duties.
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f) Drawing and Costing Engineering Plans

Please rate your proficiency and practical experience in drawing and costing engineering plans, considering technical knowledge, skill development, practical application, work quality, industry relevance, and career readiness:

	Section E Competency Development (DV)
	Drawing and Costing Engineering Plans
1 ☐	No Practical Experience: No experience or understanding of engineering plans.
2 ☐	Basic Practical Experience: Some experience from academic assignments; limited skills.
3 ☐	Intermediate Practical Experience: Experience in detailed plans for projects and professional settings; good skills.
4 ☐	Advanced Practical Experience: Developed real-world plans with high-quality work and strong industry relevance.
5 ☐	Extensive Practical Experience: Led major projects with exceptional skills, high-quality work, and significant industry impact.

Interpreting Engineering Plans

Please rate your proficiency and practical experience in interpreting engineering plans, considering aspects such as technical knowledge, skill development, practical application, quality of work, relevance to the industry, and readiness for your career:

1 ☐	No Practical Experience: I have not engaged in interpreting engineering plans and lack practical experience in this area.
2 ☐	Basic Practical Experience: I have a foundational understanding of engineering plans from coursework or simple projects, with limited hands-on application.
3 ☐	Intermediate Practical Experience: I have practical experience interpreting and analysing plans for various projects or professional settings, demonstrating a solid grasp of the concepts.
4 ☐	Advanced Practical Experience: I am skilled in independently interpreting complex engineering plans and providing valuable insights in professional contexts, showcasing a high standard of work.
5 ☐	Extensive Practical Experience: I have extensive experience leading the interpretation of critical engineering plans and have developed significant expertise, demonstrating high industry relevance and career readiness.

Where:

- Y=D+
- YSA+
- YSUR+
- YCM+
- YDC+EP/0

Appendix 4: Documentary review guide

Student Competency Assessment Templates

1. Log Book Assessment

	Criteria	✓ Excellent	✓ Very Good	✓ Good	✓ Fair	✓ Weak	Remarks
	Accuracy & Completeness	Entries are consistently accurate and complete	Mostly accurate with minor inconsistencies	Generally accurate, may lack detail	Sometimes incomplete or inaccurate	Often inaccurate or missing	
	Depth of Reflection	Insightful, critical analysis with clear lessons	Thorough understanding of experiences	Adequate but lacks depth	Basic, sometimes superficial	Minimal or no analysis	
	Skill Application	Exceptional application, problem-solving, innovation	Strong application, some problem-solving	Effective with limited advanced application	Basic application, some difficulties	Struggles with application	
	Consistency	Entries consistently up-to-date	Mostly consistent and timely	Generally consistent, some gaps	Irregular entries and gaps	Frequently inconsistent or missing	
	2. Practical Training Report						
	Criteria	✓ Excellent	✓ Very Good	✓ Good	✓ Fair	✓ Weak	
	Performance Assessment	Exceeds goals, high-quality output	Meets most goals with good quality	Basic performance, some goals achieved	Minimal performance, inconsistent quality	Falls short, low-quality work	
	Skill Proficiency	Exceptional technical skill and expertise	Strong skill, minor gaps	Adequate, needs improvement	Basic, with noticeable gaps	Limited skills, major gaps	
	Feedback & Improvement	Seeks and uses feedback effectively	Responds well, noticeable improvement	Accepts feedback, gradual growth	Limited response, minimal improvement	Ignores feedback, no improvement	

	Achievement of Objectives	Meets/exceeds all milestones	Meets most objectives	Achieves basic goals	Struggles with several objectives	Fails to meet objectives	
	3. General Progress Report						
	Criteria	✓Excellent	✓ Good	✓ Good	✓ Fair	✓ Weak	
	Growth Over Time	Exceptional development, major progress	Strong growth, clear improvement	Steady progress	Minimal growth	No progress or decline	

Appendix 5: interview guide for key informants

Assessing Teaching Styles and Competency Development in Technical and Vocational Training Institution in Uganda

Dear Respondent

I am Akongo Dorcas Janet, a student of Gulu University pursuing Master degree in Educational Management. As a necessity for the award of this degree, I am carrying out a research on 'Teaching Styles and Competency Development in Technical colleges in Uganda. You have been selected to take part in the study. I therefore request you to take part in the study since your participation will help us better understand and appreciate how teaching styles helps in competency development of students in technical and vocational education training institute in Uganda. The opinion you will give shall be kept strictly confidential and the information will strictly study research. I will appreciate your involvement in the study.

Questions:

Interview Guide for Field Attachment Supervisors

(In college and filled where they are attached)

To assess students' general technical knowledge, skills, competencies, readiness for the field, and industrial relevance:

1. General Technical Knowledge and Skills

- a) How would you rate the student's technical knowledge and skills on a scale of 1 to 5, with 1 being poor and 5 being excellent?
1 2 3 4 5
- b) 2. Can you provide specific examples where the student effectively applied their technical knowledge and skills during their attachment? How did their performance align with industry standards?

2. Competencies in General Technical Work

- i. Do the students demonstrate strong competence in handling technical tasks?
 - a. Yes / No (if yes of no why)
- ii. Describe a particular project or task where the student showed notable competence. What was their impact on the project's success? How did they handle technical challenges?

3. Readiness for the Field of Work

- i. How ready do you believe the student is to transition from academic training to a professional role? And why?
- ii. 2. How do the students demonstrate their understanding of industry practices and expectations? What strengths and areas for improvement were most evident in their preparation for the field?

4. Industrial Relevance

- a) Do the student's skills and knowledge align well with the tasks and requirements of your industry?
Yes / No
- b) What is the impact of the student's work on your organization? How do their performances contribute to or enhance the relevance of their role within the industry?

Thank you for your Participation

Table 16 shows table for determining the sample size

Table 3.1									
<i>Table for Determining Sample Size of a Known Population</i>									
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384
<i>Note: N is Population Size; S is Sample Size</i>					<i>Source: Krejcie & Morgan, 1970</i>				

Appendix 9: maps showing location of UTC Lira, Elgon and Kyema

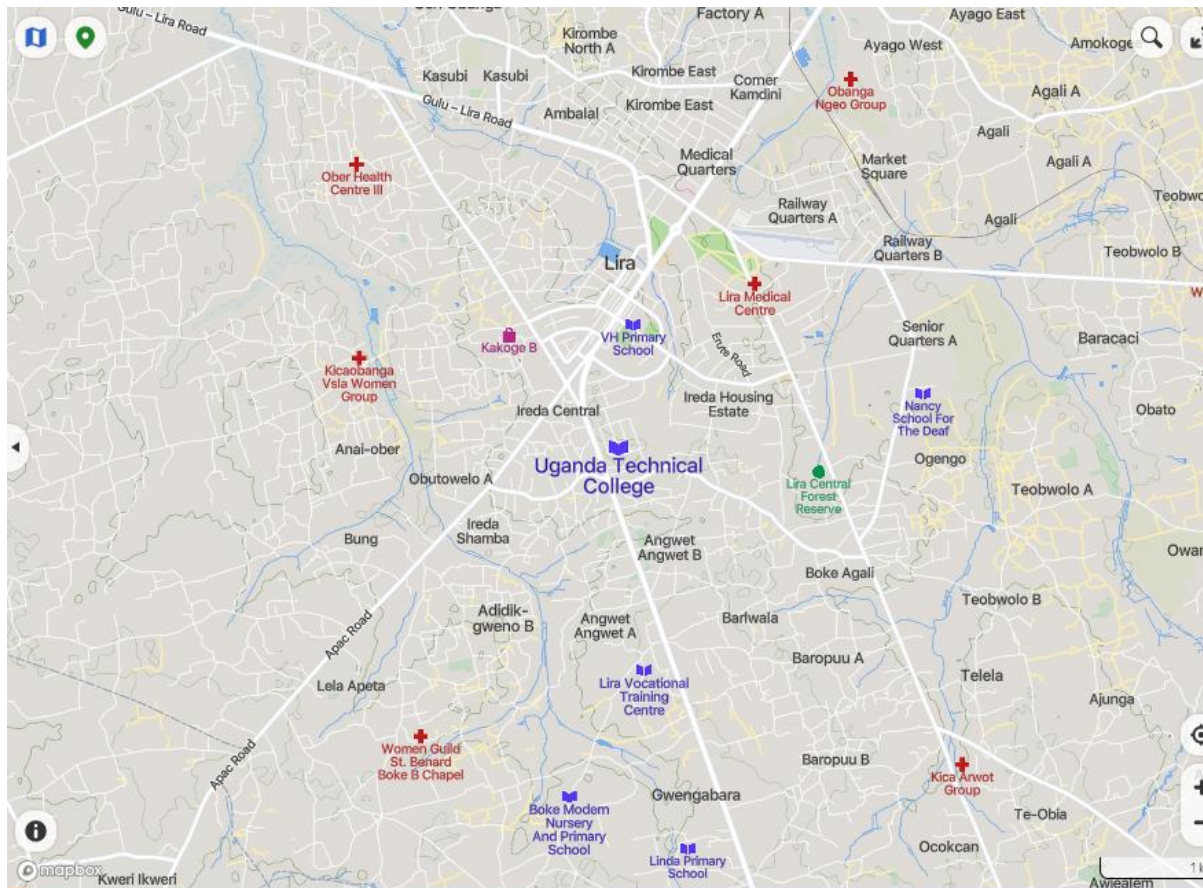


Figure 2 UTC- Lira

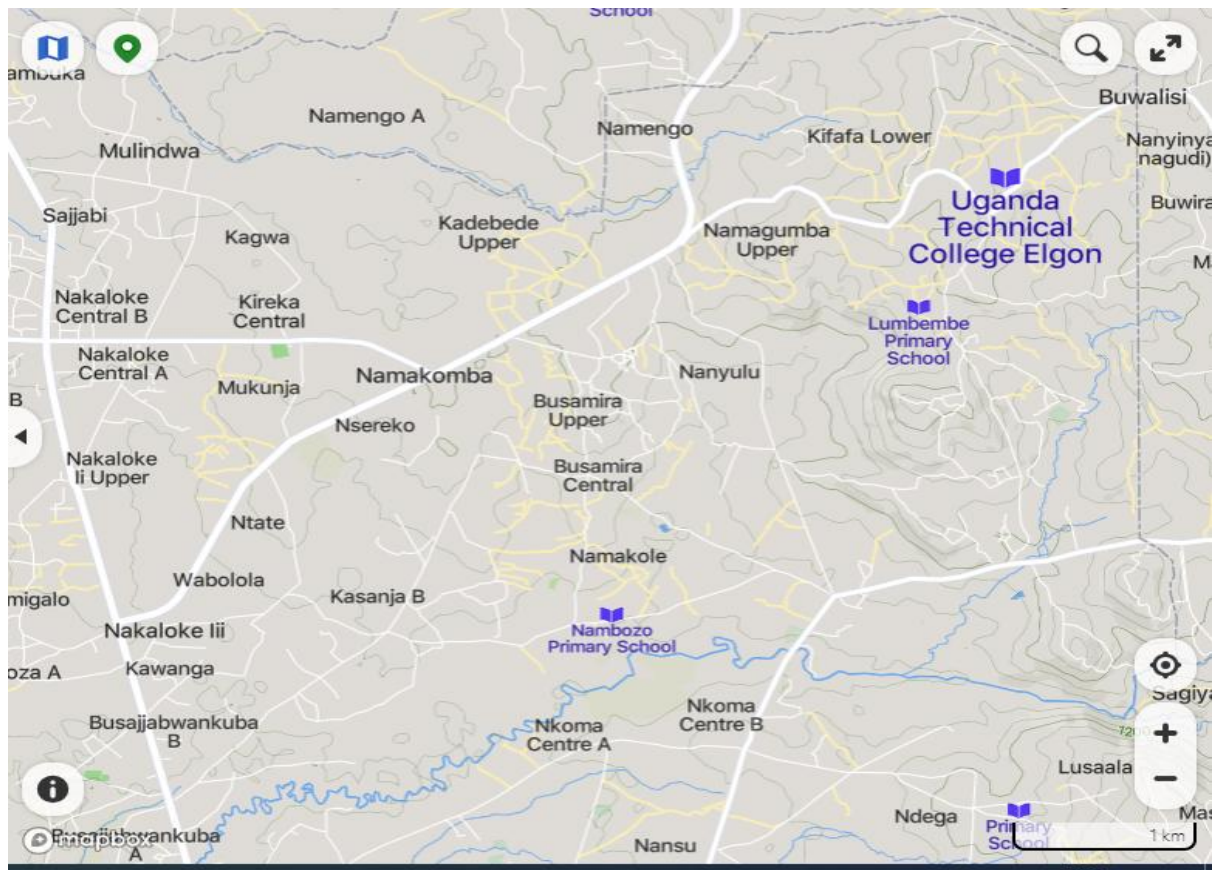


Figure 3 UTC- Elgon

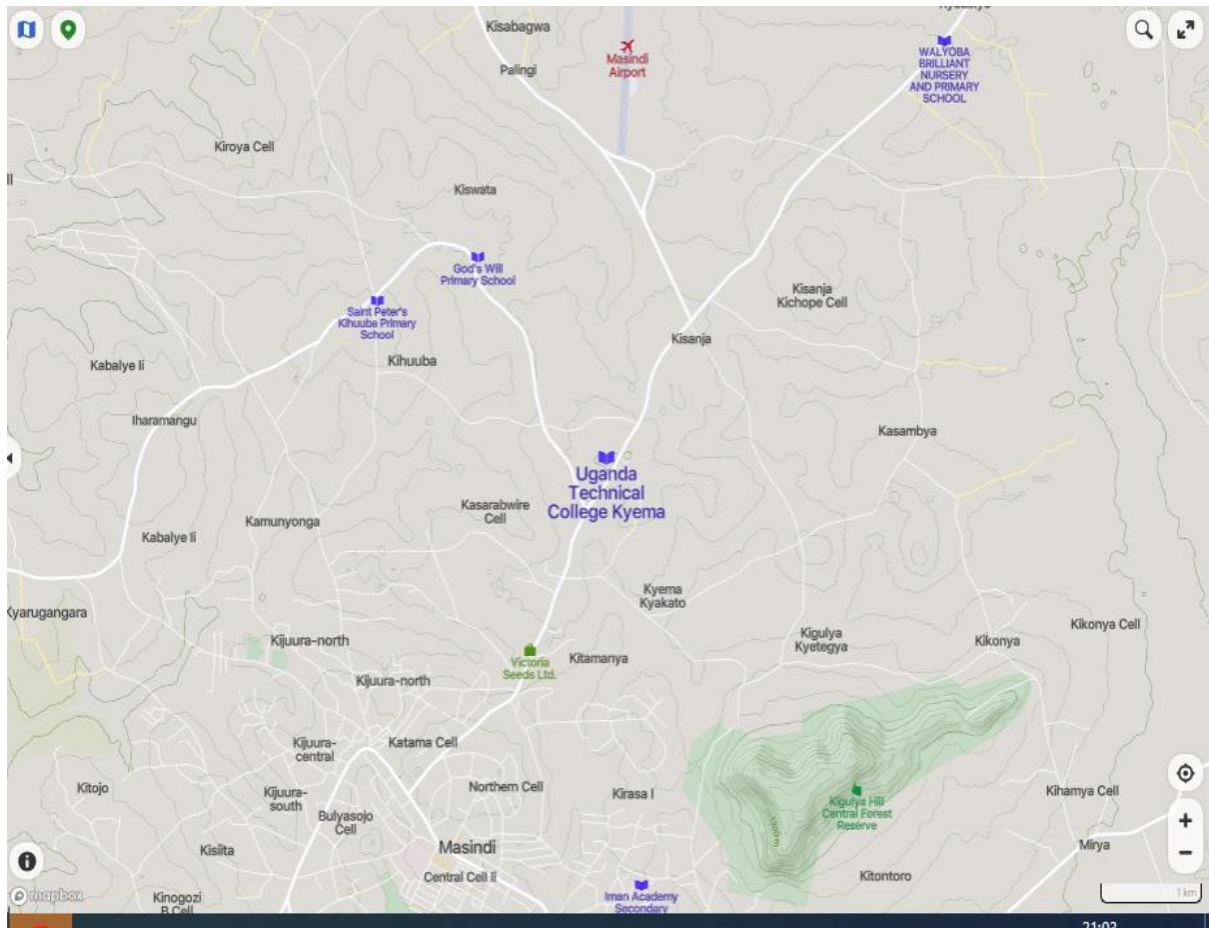


Figure 4 UTC - Kyema