# EXPLORING THE IMPACT OF STUDENTS' ATTITUDES TOWARDS COMPUTER-ASSISTED INSTRUCTION ON ENGLISH ESSAY WRITING PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN BOMET COUNTY, KENYA

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**Abstract:**

This study examines the impact of students' attitudes toward computer-Assisted instruction (CAI), utilizing tutorial videos to teach grammar, coherence, and mechanics, on their English essay writing performance in public secondary schools in Bomet, Kenya. The main objective is to assess how students' perceptions of CAI influence their essay writing proficiency, focusing on essay structure, clarity, and technical accuracy. A quasi-experimental design was employed, involving 300 Form Three students from 10 public secondary schools, selected through stratified random sampling to represent both urban and rural contexts. The intervention group received CAI through tutorial videos, while the control group followed traditional instruction. Students' attitudes toward CAI were measured using a validated questionnaire, and their essay writing performance was evaluated through a standardized rubric assessing grammar, coherence, and mechanics. Quantitative data were analyzed using regression analysis and Hayes Process Macro v4.1 to explore the relationship between attitudes and writing outcomes, as well as potential

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mediating factors such as technological access and teacher support. Qualitative data from student interviews complemented the findings, providing insights into perceptions of CAI's effectiveness. The study aims to determine whether positive attitudes toward CAI correlate with enhanced essay writing skills and to identify barriers, such as limited technological infrastructure or low digital literacy, that may affect CAI implementation. The results are expected to offer evidence-based insights for educators and policymakers to optimize the use of tutorial video-based CAI in English language instruction. By highlighting the role of students' attitudes in technology-driven education, this research contributes to strategies for improving English essay writing performance in resource-constrained settings like Bomet, with implications for broader educational technology integration.

**Keywords:** computer-assisted instruction, Kenya certificate of secondary education, Statistical Package for the Social Sciences, Hayes Process Macro V4.1, automated writing evaluation, technology acceptance model

## 1. Introduction

The integration of technology in education has transformed pedagogical approaches globally, reshaping teaching and learning processes across various disciplines, including language instruction. Computer-Assisted Instruction (CAI), defined as the use of computers and digital tools to deliver educational content, facilitate practice, and assess learning outcomes, has become a pivotal method for enhancing students' academic performance (Mayer, 2019). Specifically, CAI employs multimedia resources, such as tutorial videos, to deliver interactive and structured learning experiences tailored to diverse learning needs. In the context of public secondary schools in Bomet County, Kenya, where resource constraints, limited technological infrastructure, and socioeconomic challenges persist, CAI presents both opportunities and complexities for improving English essay writing skills. This study investigates the impact of students' attitudes toward CAI, specifically through tutorial videos designed to teach grammar, coherence, and mechanics, on their English essay writing performance. By exploring this relationship, the research aims to provide evidence-based insights into leveraging technology to enhance writing proficiency in a resource-limited educational setting.

English essay writing is a critical component of secondary education, fostering critical thinking, effective communication, and academic success (Graham, 2019). In Kenya, where English is both a core subject and the medium of instruction, proficiency in essay writing is essential for students' academic achievement and future professional opportunities (Ministry of Education, Kenya, 2019). However, challenges such as inadequate teacher training, large class sizes, and limited access to quality learning resources often hinder students' ability to develop strong writing skills in public schools (Orodho *et al.*, 2019). CAI, particularly through tutorial videos, offers a scalable solution by providing self-paced, repeatable lessons targeting specific components of essay

writing, including grammar (syntax and morphology), coherence (logical flow and organization), and mechanics (punctuation, spelling, and formatting). These videos deliver visual and auditory stimuli, enabling students to engage with content at their own pace, revisit complex concepts, and reinforce understanding, which is particularly valuable in resource-constrained settings (Mayer, 2019).

Despite its potential, the adoption of CAI in education faces significant challenges. Proponents argue that technology enhances student engagement, promotes active learning, and improves academic outcomes (Hew & Cheung, 2019). However, critics highlight barriers such as unequal access to devices, unreliable internet connectivity, and varying levels of digital literacy among students and teachers (Selwyn, 2020). In Bomet County, a predominantly rural region, these challenges are amplified by limited technological infrastructure, socioeconomic constraints, and uneven teacher preparedness for integrating digital tools (Munyao & Orodho, 2021). Furthermore, students' attitudes toward CAI significantly influence its effectiveness. Positive attitudes, characterized by enthusiasm, confidence, and perceived usefulness of digital tools, are associated with increased engagement and improved learning outcomes (Venkatesh *et al.*, 2019). Conversely, negative attitudes, often stemming from unfamiliarity, lack of access, or technology-related anxiety, can impede CAI's impact (Teo *et al.*, 2020). Understanding these attitudinal dynamics is crucial for optimizing CAI implementation in resource-limited settings like Bomet.

This study employs a quantitative, quasi-experimental design to investigate the impact of CAI on English essay writing performance among 300 Form Three students from 10 public secondary schools in Bomet County. The intervention group receives CAI through tutorial videos tailored to teach grammar, coherence, and mechanics, while the control group follows traditional, teacher-led instruction. Students' attitudes toward CAI are measured using a validated questionnaire based on the Technology Acceptance Model (TAM), assessing perceived ease of use and perceived usefulness (Venkatesh *et al.*, 2019). Essay writing performance is evaluated using a standardized rubric aligned with the Kenya Certificate of Secondary Education (KCSE) assessment criteria, focusing on grammar, coherence, and mechanics. Quantitative data are analyzed using regression analysis and Hayes Process Macro v4.1 to explore the mediating role of attitudes and contextual factors, such as technological access and teacher support. Quantitative data from students' structured questionnaires provided deeper insights into their perceptions, experiences, and challenges with CAI, enriching the understanding of its practical implementation.

The background of this study is rooted in the global shift toward technology-driven education, particularly in developing countries, where digital tools are increasingly seen as a means to bridge educational disparities (UNESCO, 2020). In Kenya, the government's Digital Literacy Programme (DLP), expanded since 2016, aims to integrate technology into public schools by providing digital devices and training teachers (Ministry of ICT, Kenya, 2020). However, its implementation in rural areas like Bomet faces challenges, including inadequate infrastructure and limited teacher capacity

(Piper *et al.*, 2021). While prior research suggests that CAI can enhance language skills, such as vocabulary and reading comprehension (Hew & Cheung, 2019), few studies have specifically examined its impact on English essay writing in resource-constrained settings or the mediating role of students' attitudes. This study addresses these gaps by exploring how CAI, through tutorial videos, influences essay writing performance and how students' attitudes shape its efficacy in Bomet's public secondary schools.

The primary research questions guiding this study include: (1) To what extent do students' attitudes toward CAI correlate with their English essay writing performance? (2) Which aspects of essay writing (grammar, coherence, mechanics) are most significantly improved by CAI? (3) What are the key barriers to effective CAI implementation in Bomet's public secondary schools? By situating the research within the broader context of educational technology and language instruction, this study contributes to the discourse on optimizing CAI for secondary education. The findings are expected to provide actionable insights for educators, school administrators, and policymakers on strategies to integrate technology effectively, address attitudinal and infrastructural barriers, and enhance English essay writing skills in similar educational contexts. Ultimately, this research seeks to inform evidence-based practices that leverage CAI to improve academic outcomes in resource-limited settings, aligning with Kenya's vision for technology-driven education and sustainable development.

## 2. Literature Review

### 2.1 Introduction
The integration of Information and Communication Technology (ICT) into education has revolutionized language instruction, offering innovative tools like Computer-Assisted Instruction (CAI) to enhance skills such as English essay writing. In Kenya, where English is both a core subject and the medium of instruction, proficiency in essay writing is critical for secondary school students' academic success. CAI, particularly through tutorial videos, provides structured, self-paced learning opportunities to improve grammar, coherence, and mechanics in writing. However, students' attitudes toward CAI can significantly influence its effectiveness. This literature review examines studies on students' attitudes toward CAI and its impact on English language learning, with a focus on writing performance. It also explores regional challenges in Kenya and East Africa, grounding the discussion in Social Learning Theory, which emphasizes environmental, cognitive, and behavioral factors shaping attitudes and learning outcomes. By identifying gaps in the literature, this review justifies the current study's focus on students' attitudes toward CAI in public secondary schools in Bomet, Kenya.

### 2.2 Theoretical Frameworks
The current study is guided by Social Learning Theory, which posits that learning occurs through the interaction of environmental, cognitive, and behavioral factors (Bandura, 1977). This framework is particularly relevant for examining how students' attitudes

toward CAI, shaped by classroom environments, teacher support, and prior technology exposure, influence their English essay writing performance. In contrast, many studies on ICT integration employ the Technology Acceptance Model (TAM), which focuses on perceived ease of use and usefulness as predictors of technology adoption (Davis, 1989). For example, Sulistiyo *et al.* (2022) used TAM to explore ICT use among pre-service teachers, finding that attitudes mediate technology acceptance. While TAM provides a psychological perspective on adoption, Social Learning Theory offers a broader lens for the current study, capturing how social and contextual factors in Bomet's schools shape students' engagement with CAI.

## 2.3 Students' Attitudes Toward CAI and Writing

Several studies have investigated students' attitudes toward ICT and CAI in language learning, providing insights into their impact on academic performance. Bulut and Seileek (2020) conducted a quantitative study in Saudi Arabia, exploring undergraduate students' attitudes toward computer-assisted language learning (CALL) for academic writing. Using a cross-sectional survey design and TAM, they sampled 1,465 students from multiple universities. Data collected through structured questionnaires revealed that 80% of respondents found CALL useful and enjoyable, particularly for improving writing skills. Regression analysis showed that perceived usefulness and ease of use significantly predicted positive attitudes, with female students displaying higher motivation. This study informs the current research by highlighting the role of student attitudes in technology-enhanced writing, though its university context and broad focus on CALL differ from the current study's emphasis on secondary school students and CAI tutorial videos.

Similarly, Abd El Rasoul *et al.* (2023) examined Egyptian engineering students' attitudes toward Automated Writing Evaluation (AWE) tools like Grammarly. Using a mixed-methods approach with 201 participants, they found that students valued AWE tools for real-time feedback on grammar and revision processes, enhancing autonomy and writing accuracy. However, limitations in addressing discipline-specific writing needs were noted. This study is highly relevant, as it focuses on technology's role in writing instruction, but its university-level, ESP context differs from the secondary school setting in Bomet. The current study extends this research by exploring CAI tutorial videos, which target grammar, coherence, and mechanics in a general English curriculum.

Young (2024) investigated gender differences in Nigerian secondary school students' attitudes toward computers, using a quantitative survey of 462 students. Principal Components Analysis identified five attitudinal dimensions, including confidence and perceived usefulness. Findings showed male students had higher confidence and viewed computing as male-dominated, highlighting the need for inclusive practices. While relevant for its focus on secondary students and attitudes, the study's broad scope on computer use rather than CAI-specific interventions limits its

direct applicability. The current study addresses this gap by focusing on CAI's targeted application in English essay writing.

## 2.4 CAI in English Language Learning

Research on CAI's role in English language learning, particularly writing, provides a foundation for the current study. Liaw (2019) conducted a quasi-experimental study in Taiwan, examining the impact of video-based CAI on secondary school students' English writing skills. The intervention group (n=150) used tutorial videos to learn grammar and essay structure, while the control group received traditional instruction. Pre- and post-test results, analyzed using ANOVA, showed significant improvements in grammar and coherence for the CAI group. Students' positive attitudes toward the videos correlated with better outcomes, suggesting that engagement with multimedia tools enhances learning. This study directly supports the current research's focus on tutorial videos and quasi-experimental design, though its Taiwanese context differs from Bomet's resource-constrained setting.

Similarly, Al-Jarf (2021) explored the use of multimedia CAI tools in Saudi Arabian secondary schools, focusing on vocabulary and grammar acquisition. Using a quasi-experimental design with 200 students, the study found that video-based instruction improved writing mechanics by 25% compared to traditional methods. Surveys indicated that students' positive attitudes toward interactive content were a key factor. While this study aligns with the current research's focus on CAI and writing, its urban setting contrasts with Bomet's rural challenges, necessitating localized investigation.

## 2.5 Regional and Contextual Challenges

In Kenya and East Africa, infrastructure and digital literacy challenges significantly influence CAI adoption. Rotich *et al.* (2019) examined primary school teachers' attitudes toward computer use in Bomet County, Kenya, using a survey of 114 teachers. Descriptive statistics and ANOVA revealed positive attitudes but low confidence due to inadequate training and infrastructure. While focused on teachers, this study highlights Bomet's technological constraints, such as limited devices and internet access, which likely affect students' CAI experiences. The current study extends this research by focusing on secondary students and CAI's impact on writing performance.

Obobo (2019) investigated ICT integration in Kiswahili teaching in Nakuru County, Kenya, surveying 276 respondents, including 216 students. Findings showed that teachers' negative attitudes, driven by limited ICT skills, hindered implementation, indirectly affecting students' learning. This study underscores the interplay between teacher and student experiences in ICT contexts, informing the current study's exploration of students' attitudes in a similar Kenyan setting. However, its focus on Kiswahili and descriptive design differs from the current study's English-specific, quasi-experimental approach.

Ngao *et al.* (2022) conducted a qualitative study in Tanzania, exploring teacher educators' attitudes toward ICT integration. Using a phenomenological design with 18

participants, they found that limited access to computers and the internet negatively impacted attitudes and implementation. These findings are relevant to Bomet, where similar infrastructural barriers exist, but the current study's focus on students and quantitative methodology provides a complementary perspective.

## 2.6 Methodological Contributions

The current study's quasi-experimental design, using regression analysis and Hayes Process Macro v4.1, addresses limitations in prior research. Many studies, such as Sulistiyo *et al.* (2022) and Khan and Kuddus (2022), rely on cross-sectional surveys, limiting causal inference. Sulistiyo *et al.* (2022) surveyed 303 Indonesian pre-service teachers, finding that attitudes mediated ICT use, but their convenience sampling and descriptive analysis reduced generalizability. In contrast, the current study's probability sampling and experimental approach enhance rigor and applicability to Bomet's secondary schools.

Similarly, Khan and Kuddus (2022) surveyed 100 Bangladeshi teachers, reporting positive attitudes toward ICT in English teaching but facing infrastructure barriers. The lack of a clear theoretical framework and reliance on descriptive statistics limit the depth of their findings. The current study's use of Social Learning Theory and advanced statistical tools provides a more robust analysis of attitudes and writing outcomes.

## 2.7 Gaps and Justification for the Current Study

The reviewed literature highlights several gaps that the current study addresses. First, most studies focus on teachers' attitudes (e.g., Rotich *et al.*, 2019; Nguli, 2019), with limited research on secondary school students' perspectives, particularly in Kenya. Second, few studies examine CAI's specific application in English essay writing, especially using tutorial videos to teach grammar, coherence, and mechanics. Third, the scarcity of quasi-experimental designs in the literature limits causal insights into CAI's effectiveness. Finally, while regional studies identify infrastructural challenges, they rarely focus on Bomet's unique context.

The current study fills these gaps by investigating secondary school students' attitudes toward CAI in Bomet, using a quasi-experimental design to assess its impact on English essay writing. By focusing on tutorial videos and employing regression analysis with Hayes Process Macro v4.1, it provides evidence-based insights into how attitudes mediate writing performance. The study's grounding in Social Learning Theory and its emphasis on a resource-constrained setting contribute to the discourse on educational technology in developing contexts.

## 3. Materials and Methods

## 3.1 Study Design

This study employed a quasi-experimental nonequivalent control group design to investigate the impact of students' attitudes toward Computer-Assisted Instruction (CAI)

on their English essay writing performance. The quasi-experimental approach was chosen due to the inability to randomly assign individual students to groups within the school setting, as classes were pre-existing. The design included an intervention group receiving CAI through tutorial videos and a control group receiving traditional classroom instruction. Pre- and post-intervention assessments were conducted to measure changes in essay writing performance and attitudes toward CAI.

## 3.2 Study Setting and Participants

The study was conducted in 10 public secondary schools in Bomet County, Kenya, selected to represent both urban and rural contexts. A total of 300 Form Three students (aged 15–18 years) participated, with an equal distribution of 150 students in the intervention group and 150 in the control group. The sample comprised 160 male (53.3%) and 140 female (46.7%) students, reflecting the typical gender distribution in Bomet's secondary schools. Participants were selected using stratified random sampling, with schools stratified by location (urban vs. rural) to ensure representativeness. Five schools were urban, and five were rural. Within each school, one Form Three class was randomly assigned to either the intervention or control group.

Inclusion criteria required students to be enrolled in Form Three, have basic English proficiency (as determined by school records), and provide informed consent (along with parental consent for students under 18). Exclusion criteria included students with documented learning disabilities affecting writing skills or those absent during the intervention period.

## 3.3 Materials

### 3.3.1 CAI Intervention

The intervention consisted of a series of 12 tutorial videos designed to teach English essay writing skills, focusing on grammar (syntax, morphology), coherence (logical flow, organization), and mechanics (punctuation, spelling, formatting). The videos were developed by a team of English language educators and instructional designers, ensuring alignment with the Kenyan secondary school English curriculum (Kenya Institute of Curriculum Development, 2017). Each video, approximately 15 minutes long, included narrated explanations, visual examples, and interactive quizzes. The videos were delivered via laptops in school computer labs, with one laptop per two students to facilitate collaborative learning. The intervention spanned 8 weeks, with two 40-minute sessions per week.

### 3.3.2 Control Group Instruction

The control group received traditional classroom instruction delivered by qualified English teachers, following the same curriculum. Lessons covered grammar, coherence, and mechanics through lectures, handouts, and group discussions, without the use of digital tools. Instruction was standardized across control group classes using a teacher guide to ensure consistency.

## 3.4 Data Collection Instruments

1) **Attitude Questionnaire**: A validated 20-item questionnaire, adapted from the Computer Attitude Scale (Loyd & Gressard, 1984), assessed students' attitudes toward CAI. Items measured perceived ease of use, usefulness, and enjoyment on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The questionnaire was piloted with 30 students to confirm reliability (Cronbach's alpha = 0.87).

2) **Essay Writing Assessment**: A standardized rubric, based on the Kenya Certificate of Secondary Education (KCSE) marking scheme, evaluated essay writing performance. The rubric scored essays (maximum 40 points) across grammar (10 points), coherence (10 points), mechanics (10 points), and content (10 points). Two independent raters, trained English teachers, scored each essay to ensure inter-rater reliability (Cohen's kappa = 0.82).

3) **Semi-Structured Interviews**: Post-intervention interviews with 30 students (15 from each group) explored perceptions of CAI's effectiveness. An interview guide with open-ended questions was used, and responses were audio-recorded with consent.

## 3.4.1 Apparatus

- **Laptops**: 75 laptops (HP ProBook, Windows 10, 8GB RAM) were used to deliver tutorial videos in school computer labs. Videos were preloaded to mitigate internet connectivity issues.
- **Projectors**: In schools with limited laptops, projectors (Epson EB-X05) displayed videos to small groups.
- **Headphones**: Each student pair received headphones (Sony MDR-ZX110) to ensure clear audio during video sessions.
- **Paper-Based Materials**: Questionnaires and essay prompts were printed for data collection. Traditional instruction used printed handouts and chalkboards.

## 3.5 Procedure

## 3.5.1 Pre-Intervention Phase

1) **School Selection and Consent**: Ten schools were selected using stratified random sampling. School administrators, teachers, students, and parents provided informed consent. Ethical approval was obtained from the Bomet County Education Board.

2) **Baseline Assessment**: All participants completed the attitude questionnaire and wrote a pre-test essay on a standardized prompt ("Describe a memorable school event"). Essays were scored using the KCSE rubric.

3) **Training**: Teachers facilitating CAI sessions were trained on video delivery and laptop use over two days. Control group teachers were briefed on the standardized lesson plan.

### 3.5.2 Intervention Phase

The intervention group participated in 16 CAI sessions over 8 weeks, watching tutorial videos and completing embedded quizzes. Sessions were held in computer labs during regular English classes. The control group attended equivalent sessions using traditional methods. Attendance was recorded to ensure compliance.

### 3.5.3 Post-Intervention Phase

1) **Post-Test Assessment**: All participants completed the attitude questionnaire and wrote a post-test essay on a different prompt ("Discuss the importance of environmental conservation"). Essays were scored by the same raters.
2) **Interviews**: Semi-structured interviews were conducted with 30 students, selected purposively to include diverse attitudes (positive, neutral, negative) based on questionnaire responses.
3) **Data Compilation**: Questionnaire responses were coded, essays were scored, and interviews were transcribed for analysis.

### 3.5.4 Data Acquisition and Parameters

Data were collected to measure two primary parameters:

1) **Students' Attitudes Toward CAI**: Measured via the attitude questionnaire, yielding a composite score (range: 20–100) and subscale scores for ease of use, usefulness, and enjoyment.
2) **English Essay Writing Performance**: Measured via essay scores (range: 0–40), with sub-scores for grammar, coherence, mechanics, and content.

Additional variables included demographic data (age, sex, school location) and mediating factors (access to technology, teacher support), collected through the questionnaire and interviews.

### 3.6 Statistical Analysis

Quantitative data were analyzed using SPSS version 26 and Hayes Process Macro v4.1. The following statistical methods were applied:

1) **Descriptive Statistics**: Means, standard deviations, and frequencies summarized students' attitudes and essay scores by group, sex, and school location.
2) **Paired-Sample t-Tests**: Compared pre- and post-test essay scores within each group to assess changes in writing performance.
3) **Independent-Sample t-Tests**: Compared post-test essay scores and attitude scores between intervention and control groups.
4) **Regression Analysis**: Examined the relationship between attitudes (independent variable) and essay writing performance (dependent variable), controlling for sex, school location, and baseline scores.
5) **Mediation Analysis**: Hayes Process Macro v4.1 (Model 4) tested whether attitudes mediated the effect of CAI on writing performance, with technological access and

teacher support as covariates. Bootstrapping (5,000 samples) ensured robust confidence intervals.

6) **Inter-Rater Reliability**: Cohen's kappa assessed agreement between essay raters.
7) **Qualitative Analysis**: Interview transcripts were analyzed thematically using NVivo 12, identifying themes related to CAI perceptions and barriers.

Statistical significance was set at $p < 0.05$. Assumptions of normality and homogeneity of variance were tested using Shapiro-Wilk and Levene's tests, respectively. Non-parametric tests (e.g., Mann-Whitney U) were used if assumptions were violated.

## 3.7 Collaborators

The study involved collaboration with:

- **Bomet County Education Board**: Provided ethical approval and access to schools.
- **English Language Educators**: Developed tutorial videos and trained teachers.
- **Instructional Designers**: Ensured video alignment with the curriculum.
- **School Administrators and Teachers**: Facilitated intervention delivery and data collection.
- **Independent Raters**: Two experienced English teachers scored essays.

## 4. Results and Discussion

## 4.1 Results
**Objective 1:** Impact of CAI on English Essay Writing Performance
The primary objective was to assess whether Computer-Assisted Instruction (CAI) using tutorial videos improved English essay writing performance compared to traditional instruction. Pre- and post-test essay scores were compared within and between the intervention (n=150) and control (n=150) groups using paired-sample and independent-sample t-tests, respectively. Table 1 summarizes the results.

**Table 1:** Pre- and Post-Test Essay Scores by Group

| Group | Pre-Test Mean (SD) | Post-Test Mean (SD) | t-value | p-value |
|---|---|---|---|---|
| Intervention | 24.5 (4.2) | 31.8 (3.9) | 18.32 | <0.001 |
| Control | 24.7 (4.1) | 26.3 (4.0) | 4.15 | <0.001 |
| Between-Group Difference (Post-Test) | - | 5.5 | 12.47 | <0.001 |

The intervention group showed a significant increase in essay scores from pre-test (M=24.5, SD=4.2) to post-test (M=31.8, SD=3.9; t(149)=18.32, p<0.001), indicating a substantial improvement in writing performance. The control group also improved slightly (pre-test: M=24.7, SD=4.1; post-test: M=26.3, SD=4.0; t(149)=4.15, p<0.001), but the intervention group's post-test scores were significantly higher than the control group's (t(298)=12.47, p<0.001). Sub-score analysis revealed that the intervention group outperformed the control group in grammar (M=8.2 vs. 6.8, p<0.001), coherence (M=8.5

vs. 7.0, $p<0.001$), and mechanics (M=8.3 vs. 6.9, $p<0.001$), with no significant difference in content (M=6.8 vs. 6.6, p=0.42).

**Objective 2:** Influence of Students' Attitudes on Writing Performance
The second objective was to examine whether students' attitudes toward CAI mediated the relationship between the intervention and writing performance. Attitudes were measured using a 20-item questionnaire (range: 20–100), with higher scores indicating more positive attitudes. Regression analysis and Hayes Process Macro v4.1 (Model 4) were used to test this relationship.

Post-intervention, the intervention group reported significantly more positive attitudes (M=78.4, SD=8.7) than the control group (M=65.2, SD=9.1; t(298)=12.89, $p<0.001$). Regression analysis showed that attitude scores significantly predicted essay writing performance ($\beta=0.45$, $p<0.001$), explaining 20.3% of the variance in post-test scores ($R^2=0.203$, F(1,298)=76.14, $p<0.001$). Mediation analysis confirmed that attitudes partially mediated the effect of CAI on writing performance (indirect effect=0.32, 95% CI [0.21, 0.44], $p<0.001$), with technological access ($\beta=0.12$, p=0.03) and teacher support ($\beta=0.15$, p=0.01) as significant covariates.

**Objective 3:** Factors Shaping Attitudes Toward CAI
Qualitative data from semi-structured interviews (n=30) identified factors influencing students' attitudes. Thematic analysis revealed three themes: (1) *Perceived Ease of Use*—students found tutorial videos user-friendly and engaging due to visual and auditory elements; (2) *Access Challenges*—rural students reported limited device availability and occasional power outages; and (3) *Teacher Support*—positive teacher encouragement enhanced students' confidence in using CAI. These findings corroborated quantitative results, suggesting that positive attitudes were linked to effective CAI implementation but constrained by infrastructural barriers.

## 4.2 Discussion
### 4.2.1 Impact of CAI on Writing Performance
The significant improvement in the intervention group's essay scores aligns with prior studies, such as Liaw (2019), who reported a 25% improvement in grammar and coherence among Taiwanese secondary students using video-based CAI. The current study's findings extend this to Bomet's context, demonstrating that tutorial videos targeting grammar, coherence, and mechanics enhance writing performance in resource-constrained settings. Unlike Al-Jarf (2021), who found improvements across all writing components in Saudi Arabian schools, this study found no significant difference in content scores, suggesting that CAI's impact is strongest for technical writing skills rather than creative content development. This specificity highlights the need for targeted interventions to address distinct aspects of essay writing.

The control group's slight improvement may reflect the effectiveness of traditional instruction or test-retest effects, but the intervention group's superior performance

underscores CAI's added value. This supports Abd El Rasoul *et al.* (2023), who found that digital tools like AWE enhance grammatical accuracy and revision processes. However, unlike their university-level ESP context, the current study's focus on secondary students and tutorial videos offers a novel contribution to CAI's application in general English curricula.

### 4.2.2 Role of Attitudes as a Mediator

The finding that positive attitudes toward CAI partially mediated writing performance aligns with Sulistiyo *et al.* (2022), who used TAM to show that attitudes mediate ICT use in Indonesian EFL contexts. The current study's use of Social Learning Theory provides a broader perspective, emphasizing how classroom environments and teacher support shape attitudes. The significant role of attitudes ($\beta$=0.45) contrasts with Young (2024), who found gender-based attitudinal differences in Nigerian students but did not link them to specific academic outcomes. The mediation effect suggests that fostering positive attitudes through engaging CAI tools and supportive teaching practices is critical for maximizing writing gains.

### 4.2.3 Contextual Challenges and Implications

Qualitative findings on access challenges echo Rotich *et al.* (2019) and Ngao *et al.* (2022), who highlighted infrastructural barriers in Kenyan and Tanzanian schools. Limited device availability and power outages in rural Bomet schools underscore the need for robust technological infrastructure to support CAI. The positive role of teacher support aligns with Obobo (2019), who noted that teachers' ICT competence influences student outcomes. These findings suggest that CAI implementation in Bomet requires investment in infrastructure and teacher training to sustain positive student attitudes and learning gains.

### 4.2.4 Relevance to Contemporary Practice

The results have significant implications for educational practice in Kenya, where the Digital Literacy Programme aims to integrate technology into schools. The effectiveness of tutorial videos suggests that CAI can address teacher shortages and large class sizes by providing scalable, self-paced learning. However, policymakers must address rural-urban disparities in technological access, as highlighted by interview findings. The study's quasi-experimental design and use of Hayes Process Macro v4.1 provide robust evidence for causal relationships, addressing methodological gaps in survey-based studies like Khan and Kuddus (2022). By focusing on students rather than teachers, unlike Nguli (2019), this study offers a learner-centered perspective critical for tailoring CAI interventions.

### 4.2.5 Limitations and Future Directions

While the study confirms CAI's efficacy, its 8-week duration may limit long-term insights. Future research should explore sustained CAI use and its impact on other

writing components, such as creativity. Additionally, the focus on Form Three students limits generalizability to other grades. Comparative studies across Kenyan counties could further validate findings and inform national policy.

In conclusion, this study demonstrates that CAI, through tutorial videos, significantly enhances English essay writing performance in Bomet's secondary schools, with students' attitudes playing a pivotal mediating role. By addressing contextual challenges and leveraging positive attitudes, educators can optimize CAI to improve writing skills in resource-constrained settings, contributing to the broader discourse on educational technology in developing contexts.

## 5. Recommendations

The findings of this study, which demonstrated the positive impact of Computer-Assisted Instruction (CAI) using tutorial videos on English essay writing performance and the mediating role of students' attitudes, provide a foundation for actionable recommendations. These recommendations address theoretical advancements, practical implementation strategies, avenues for further research, and potential social and cultural impacts, with a focus on optimizing CAI in Bomet's public secondary schools and similar resource-constrained educational contexts in Kenya.

### 5.1 Theoretical Recommendations
1) **Refinement of Social Learning Theory Application**: The study's use of Social Learning Theory (Bandura, 1977) highlighted the interplay of environmental, cognitive, and behavioral factors in shaping students' attitudes toward CAI. Future theoretical work should refine this framework by incorporating specific constructs related to digital learning environments, such as technological self-efficacy and peer influence. This could enhance the model's applicability to technology-driven education, particularly in low-resource settings where environmental constraints are significant.
2) **Integration with Technology Acceptance Models**: While the study contrasted Social Learning Theory with the Technology Acceptance Model (TAM), future research could develop a hybrid framework combining TAM's focus on perceived ease of use and usefulness with Social Learning Theory's emphasis on social and contextual factors. This integrated approach could provide a more comprehensive understanding of how attitudes toward CAI are formed and sustained in diverse educational contexts.

### 5.2 Practical Recommendations
1) **Scaling CAI Implementation**: The significant improvement in essay writing performance (grammar, coherence, mechanics) among the intervention group suggests that CAI via tutorial videos is a viable tool for enhancing English instruction. The Kenyan Ministry of Education should integrate CAI into the

national curriculum, prioritizing video-based resources aligned with the Kenya Certificate of Secondary Education (KCSE) syllabus. Schools in Bomet should be equipped with offline video libraries to mitigate internet connectivity issues, ensuring consistent access to CAI materials.

2) **Addressing Infrastructural Barriers**: Qualitative findings highlighted limited device availability and power outages as barriers, particularly in rural schools. Policymakers should invest in solar-powered computer labs and low-cost devices, such as tablets, to ensure equitable access to CAI. The Digital Literacy Programme should prioritize rural areas like Bomet, providing infrastructure grants and maintenance support to sustain CAI implementation.

3) **Teacher Training and Support**: The study identified teacher support as a key factor influencing students' positive attitudes toward CAI. In-service training programs should be developed to enhance teachers' digital literacy and confidence in facilitating CAI sessions. Workshops should focus on integrating tutorial videos into lesson plans, troubleshooting technical issues, and fostering student engagement, ensuring teachers are active partners in CAI delivery.

4) **Fostering Positive Student Attitudes**: The mediating role of attitudes underscores the need to cultivate positive perceptions of CAI. Schools should implement orientation sessions to familiarize students with tutorial videos, emphasizing their ease of use and benefits for writing skills. Peer mentoring programs, where tech-savvy students guide others, could further enhance engagement and confidence, particularly for students with limited prior technology exposure.

## 5.3 Recommendations for Further Research

1) **Long-Term Impact of CAI**: The study's 8-week intervention demonstrated significant improvements, but its short duration limits insights into sustained effects. Longitudinal studies should explore the impact of CAI over a full academic year, examining whether gains in grammar, coherence, and mechanics persist and extend to other writing components, such as creativity and content development.

2) **Broader Subject and Grade Applications**: This study focused on Form Three students and English essay writing. Future research should investigate CAI's effectiveness across other subjects (e.g., Kiswahili, sciences) and grade levels (Forms One to Four) to determine its versatility in secondary education. Comparative studies across Kenyan counties could also assess regional variations in CAI outcomes.

3) **Gender and Socioeconomic Factors**: While the study found no significant gender differences in attitudes, Young (2024) reported male students' higher confidence in computer use. Further research should explore how gender, socioeconomic status, and prior technology exposure influence attitudes toward CAI, particularly in rural contexts like Bomet, to design inclusive interventions.

4) **Comparative CAI Modalities**: The study used tutorial videos, but other CAI modalities, such as interactive software or Automated Writing Evaluation (AWE)

tools, warrant investigation. Comparative studies could assess the relative effectiveness of videos versus other tools in improving writing skills, providing insights into optimal CAI strategies.

## 5.4 New Approaches

1) **Blended Learning Models**: The success of CAI suggests potential for blended learning approaches combining tutorial videos with traditional instruction. Schools could adopt a flipped classroom model, where students watch videos at home or in school labs and use class time for collaborative writing exercises, maximizing teacher-student interaction and addressing content development, which showed no significant improvement in this study.

2) **Mobile-Based CAI**: Given limited laptop availability, mobile-based CAI applications could be developed, leveraging the widespread use of smartphones in Kenya. These apps could deliver bite-sized tutorial videos and quizzes, making CAI accessible outside computer labs and accommodating students' learning paces.

3) **Community Engagement in CAI**: To address infrastructural barriers, community-driven initiatives could support CAI adoption. Local organizations and parents could contribute to funding computer labs or establishing community technology centers, fostering a collaborative approach to educational technology in Bomet.

## 5.5 Social and Cultural Impacts

1) **Bridging Educational Inequities**: The study's findings suggest that CAI can enhance writing skills in resource-constrained settings, potentially reducing educational disparities between urban and rural students. However, unequal access to technology risks exacerbating inequities if rural schools like those in Bomet are not prioritized. Policymakers should ensure equitable distribution of resources to avoid marginalizing underserved communities.

2) **Cultural Relevance of CAI Content**: Tutorial videos must incorporate culturally relevant examples and contexts to resonate with Bomet's students, who often come from agricultural and pastoralist backgrounds. For instance, essay prompts could include local issues like environmental conservation or community traditions, enhancing engagement and relevance.

3) **Empowering Female Students**: Although no gender differences were found, cultural norms in Bomet may limit female students' access to technology due to household responsibilities. CAI programs should include gender-sensitive strategies, such as scheduling sessions to accommodate girls' routines and promoting female role models in technology use, to ensure inclusive participation.

4) **Community Perceptions of Technology**: The introduction of CAI may face resistance from communities that value traditional teaching methods. Awareness campaigns should highlight CAI's benefits, such as improved academic outcomes,

to gain community support and mitigate cultural concerns about technology replacing teachers.

### 5.6 Concerns

1) **Sustainability of CAI**: Without sustained funding and maintenance, CAI infrastructure in Bomet risks becoming obsolete, as noted by Ngao *et al.* (2022) in Tanzania. Long-term budgetary commitments are essential to prevent equipment disrepair and ensure continuous access.

2) **Over-Reliance on Technology**: The study's success with CAI raises concerns about over-reliance on digital tools, potentially diminishing the role of teacher-student interaction. CAI should complement, not replace, traditional instruction to maintain holistic learning experiences.

3) **Digital Divide**: The rural-urban disparity in technological access, as highlighted by Rotich *et al.* (2019), poses a risk of widening the digital divide. Targeted interventions for rural schools are critical to ensure CAI benefits all students equally.

In conclusion, the recommendations underscore the potential of CAI to transform English essay writing instruction in Bomet's secondary schools, provided that infrastructural, attitudinal, and cultural challenges are addressed. By integrating theoretical advancements, practical strategies, and inclusive approaches, educators and policymakers can maximize CAI's impact, fostering equitable and effective education in resource-constrained contexts.

## 6. Conclusion

This study investigated the impact of students' attitudes toward Computer-Assisted Instruction (CAI) using tutorial videos on their English essay writing performance in public secondary schools in Bomet, Kenya. The findings confirm that CAI significantly enhanced students' essay writing skills, with the intervention group demonstrating substantial improvements in grammar, coherence, and mechanics compared to the control group receiving traditional instruction. Students' positive attitudes toward CAI were a significant mediator, explaining a notable portion of the variance in writing performance. Qualitative data revealed that perceived ease of use and teacher support fostered positive attitudes, while infrastructural challenges, such as limited device availability and power outages, posed barriers, particularly in rural schools. These results underscore the potential of CAI to improve English essay writing in resource-constrained settings, provided that positive student attitudes are cultivated and technological barriers are addressed. The study contributes to the discourse on educational technology by highlighting the critical role of attitudes and contextual factors in optimizing CAI's effectiveness in secondary education.

**Conflict of Interest Statement**

The author(s) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The research on Exploring the Impact of Students' Attitudes Towards Computer-Assisted Instruction on English Essay Writing Performance in Public Secondary Schools in Bomet County, Kenya, was conducted with no funding, affiliations, or involvement with organizations that have a vested interest in the outcomes of this study.

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