Investigating the Role of Supported Teaching in School (STS) in Improving the Teaching of Foundational Literacy & Numeracy in Ghana

Inception Report

DECEMBER 1, 2023

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1. Introduction

Since 2016, Ghana has introduced a comprehensive system-wide reform of initial teacher education to address many challenges identified by various stakeholders. Ghana's initial teacher education reforms were supported by a $34 million six-year (2015-2020) package of support from the Foreign Commonwealth and Development Office (FCDO) through Cambridge Education's Transforming Teacher Education & Learning (T-TEL) programme.[1] The starting point of the current reforms was the production of the National Teachers' Standards (NTS),[2] which sets out a common expectation of Ghanaian teachers' knowledge, behaviour, and practice. The NTS provided the foundation for subsequent reforms as they established a common set of agreed requirements which formed the foundation for teacher licensing, which was introduced for all new entrants to the teaching profession in 2018, and a review of the Diploma in Basic Education (DBE) initial teacher education curriculum. This review concluded that the DBE did not provide adequate training for beginning teachers to enable them to meet the requirements of the NTS.

Following the curriculum review, the Ministry of Education decided to replace the DBE with a new Bachelor of Education (B.Ed.) degree in Initial Teacher Education, which was to become the new minimum qualification for anyone aspiring to enter the teaching profession. The B.Ed. is aligned with a National Teacher Education Curriculum Framework (NTECF).[3] The NTECF set out the mandatory requirements that any B.Ed. in Initial Teacher Education programme would need to meet to be accredited by the National Accreditation Board (NAB). The NTECF required specialisations for Early Grade (KG–P3), Upper Primary (P4–P6), and JHS 1–3.

The extension of the practical STS component within the B.Ed. curriculum provides a very significant opportunity for student teachers to learn within different practical settings and is arguably the most important change brought about in Ghana's initial teacher education reforms. The STS has, however, proved the most challenging aspect of the B.Ed. to implement effectively, as evidenced by the findings of a comprehensive Fidelity of Implementation (FoI) assessment carried out by GTEC, with support from T-TEL, across all 46 CoEs in 2022.[4]

We currently have limited evidence to assess the influence of student teachers' experience of STS on their competencies, skills and behaviour. In response to this gap, Transforming Teaching, Education & Learning (T-TEL), in partnership with the University of Cape Coast (UCC) and Education Sub-Saharan Africa (ESSA), seeks to conduct research in Colleges of Education and partner schools across Ghana to investigate the role of Supported Teaching in School (STS) in improving the teaching of Foundational Literacy & Numeracy for student teachers in Years 3 and 4 of their Bachelor of Education (B.Ed.) in Initial Teacher Education (KG-P3 specialism). The study seeks to strengthen the existing evidence base on the STS component and answer the following questions:

i. How does STS influence student teachers' ability to provide effective FLN instruction?
ii. What factors influence their ability to adhere to NTS in teaching at the early grades (KG-P3)?
iii. Is there a correlation between the presence of mentors with strong levels of adherence and understanding of the NTS and B.Ed. KG-P3 specialism student teachers' adherence to the NTS following their STS Year 3 and Year 4 experiences?
iv. What factors explain the effect of the STS experience on student teachers' ability to meet NTS?

[1] The Transforming Teacher Education & Learning (T-TEL) programme ran from 2015 to 2020 and was implemented by Cambridge Education. The Ghanaian team responsible for implementing T-TEL then established a Ghanaian-registered not-for-profit organization called Transforming Teaching, Education & Learning (T-TEL) in July 2020 which is completely independent of Cambridge Education. Further details of T-TEL's work can be found here: Our Work - T-TEL

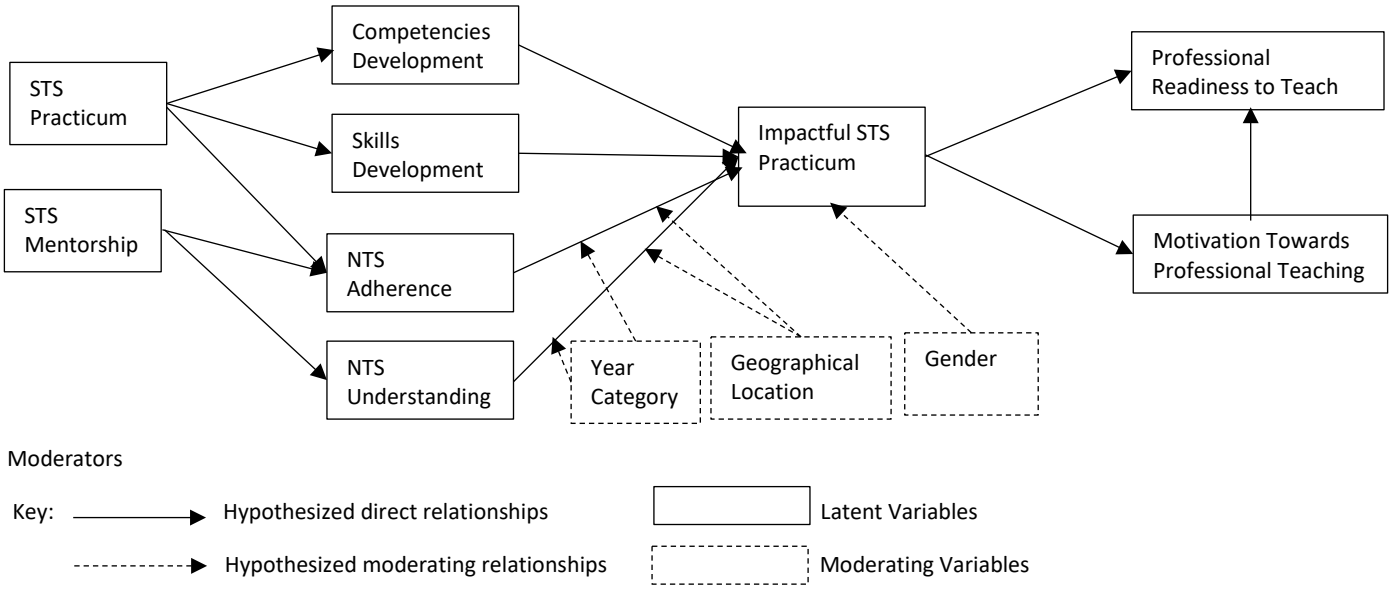
[2] National Teachers' Standards (NTS): https://t-tel.org/download/national-teachers-standards/?wpdmdl=3301&refresh=64297217d167a1680437783

[3] NTECF: https://t-tel.org/download/national-teacher-education-curriculum-framework/?wpdmdl=3287&refresh=64298d37878271680444727

[4] GTEC FoI Report : https://t-tel.org/download/report_fidelity-of-implementation-foi-of-b-ed-programme/?wpdmdl=8130&refresh=642c12e4634d01680610020

v. What is the influence of the STS on the student teachers' development of skills and competencies?
vi. What are the determinants of impactful STS?
vii. What is the relationship between student teachers' motivation towards professional teaching and their professional readiness to teach?
viii. What is the moderating effect of year category (year 3 and year 4) on student teachers' NTS understanding and adherence?
ix. What is the moderating effect of geographical location (urban-rural) on student teachers' NTS understanding and adherence?
x. What is the moderating effect of gender on the factors that determine impactful STS practicum of student teachers?
xi. What can be learnt about STS to improve policy and practice of practicum in pre-service teacher education in Ghana?

Based on the research questions above, we formulated the hypothesised model below to be tested in the study.



2. Research Design and Data Collection

To address the study's research questions and test the hypothesised model, a concurrent explanatory mixed-methods design will be employed. This design involves quantitative and qualitative data collection and analyses. This approach allows for exploring the relationships between variables through quantitative methods and a deeper understanding of the context and experiences of mentors and mentees through qualitative methods. The findings from the quantitative and qualitative components will be integrated during the interpretation and discussion stages. This integration will enable a comprehensive understanding of any changes resulting from the implementation of the STS, draw lessons, and provide insights into the gender-related issues in the STS implementation. The research activities will be aligned with the 2023/2024 and 2024/2025 academic year calendars to ensure that data collection happens as the STS is being implemented by the CoEs and their partner schools.

The quantitative data will be collected using Computer Assisted Personal Interviewing (CAPI) technology. The surveys will obtain data on demographics, experiences, and outcomes related to the STS implementation. Surveys will be administered to mentees for collecting data on demographics,

experiences, and outcomes related to the STS implementation. This will include lesson observation for both mentors and mentees at the start and end of their B.Ed. Year 3 Semester 2 and Year 4 Semester 1 STS placements. In each of the selected schools, the student teachers in the selected classes will self-complete the questionnaire. The locations of the selected schools will be mapped for easy access and allocation of tasks to field staff. Given time constraints, a cross-sectional design will be adopted for students in Level 400 and a pre-post (before and after the mentorship program) me survey design for Level 300 students. For Level 400 students, the impact of the mentorship programme will be measured against the national teaching standards. There will be a pre-post assessment for Level 300 students to examine improvement in competencies skills and adherence between the two time points. Also, the pre and post survey information for the Level 300 students will be measured against the national teaching standards to assess the impact of the mentorship programme. The assessment will also cover their motivation towards the teaching profession and their readiness to teach.

We will also conduct lesson observations to assess the effectiveness of the STS implementation in promoting gender-sensitive practices, knowledge and application of basic school curriculum and assessment, and adherence to the NTS. The observation will be done by selected professional teachers based on a set of predefined rubrics. In all, 240 observations will be conducted. This will include 80 observational sessions on adherence to the national teaching standards, 80 observations on the teaching of foundational literacy, and 80 observations on the teaching of foundational numeracy.

For the qualitative component, we will adopt a qualitative description design, which allows a researcher to present a detailed account of a phenomenon within its natural context. With less emphasis on abstraction, this design enables researchers to stay close to the data and present rich interpretative summaries of information about the phenomenon under investigation. Being eclectic, qualitative description allows the combination of various data collection methods. Data collection in the qualitative phase will involve in-depth interviews and observation (shadowing) of mentors and mentees.

In-depth interviews will be conducted with selected mentees, mentors, supervisors, heads of mentoring institutions, tutors and other stakeholders to gather insights into their experiences, challenges, and perceptions of the STS implementation. In all, 40 interviews will be conducted and this will involve 8 supervisors, 8 mentors, 8 tutors (non-mentors), 8 principals, and 8 heads of mentoring schools. In addition, we will conduct about 20 interviews each for levels 300 and 400 mentees using maximum variation approach. The participants will be selected to ensure a fair representation of each of the affiliate universities. As much as practicable, the interviews will be conducted using the face-to-face approach and will be recorded with the consent of the participants.

2.1 Sampling Strategy

This section describes the sampling strategy to be adopted for the study. The proposed sampling strategy is to ensure the selection of a representative sample of Colleges of Education (CoE) students across Ghana. The sampling frame for the study will be the list of the 46 Colleges of Education (CoE) provided by the Ghana Ministry of Education (MOE) with the target population being students in the selected CoEs.

A four-stage stratified sampling design is proposed for the study. To ensure a wide geographical spread of selected CoEs, the CoEs will be stratified by the ecological zones in which they are located, their mentoring universities and the sex composition of the CoEs (female only, male only and mixed). The ecological zones comprise the Coastal (Western, Central, Greater Accra and Volta regions), Forest (Ahafo, Ashanti, Eastern, Western North, Bono, Bono East and Oti regions) and Savannah (North-East, Northern, Savannah, Upper East and Upper West regions). The monitoring universities are the Kwame Nkrumah University for Science and Technology (KNUST), the University of Cape Coast (UCC), the

University for Development Studies (UDS), the University of Education (UoE) and the University of Ghana (UG). Table 1 shows the distribution of COEs by stratum. At each sampling stage, a systematic random sampling approach will be used to select CoEs to be included in the study. The map of the CoE and their affiliated institutions is presented in Figure 1.

Table 1 Distribution of CoEs by stratum.

Ecological zone and mentoring university	Sex composition			Total
	Mixed	Female	Male	
Coastal				
University of Cape Coast	2	3		5
University of Education, Winneba	4			4
University of Ghana	4			4
Total	10	3		13
Forest				
Kwame Nkrumah University of Science and Technology	3			3
University of Cape Coast	8	1		9
University of Development Studies	2			2
University of Education, Winneba	4	3	1	8
University of Ghana	1			1
Total	18	4	1	23
Savannah				
Kwame Nkrumah University of Science and Technology	2			2
University of Development Studies	4			4
University of Education, Winneba	3			3
University of Ghana	1			1
Total	10			10
OVERALL TOTAL				
Kwame Nkrumah University of Science and Technology	5			5
University of Cape Coast	10	4		14
University of Development Studies	6			6
University of Education, Winneba	11	3	1	15
University of Ghana	6			6
TOTAL	38	7	1	46

It is proposed that 24 (52.1%) CoEs will be selected to be included in the study. At the first stage of the sampling process, the CoEs will be stratified by the ecological zone in which they are located. The 24 CoEs will be allocated proportionately to the number of COEs in each ecological zone. In this regard, seven CoEs will be selected from the Coastal zone, 12 from the Forest zone and five from the Savannah zone.

At the second stage of the sampling process, the CoEs in the selected zones will be stratified by their mentoring universities in the zones. The CoEs in the zone will then be allocated proportionate to the number of CoEs mentored by each university. From Table 1, in the Coastal zone, UCC mentors five CoEs, UoE mentors four CoEs and UG mentors four CoEs. Thus, in the Coastal zone, three of the CoEs mentored by UCC, two by UoE and two by UG will be selected. In the Forest zone, KNUST mentors three CoEs, nine by UCC, two by UDS, eight by UoE and one by UG (Table 1). Thus, two of those mentored by KNUST, five by UCC, one by UDS and four by UoE will be sampled. In the Savannah zone,

KNUST mentors two CoEs, four by UDS, three by UoE and one by UG. Therefore, allocating proportionately, one CoE mentored by KNUST, two by UDS and two by UoE will be sampled.

At the third stage of the sampling process, the selected CoEs will be stratified by sex composition of the CoEs. Thus, where there is a mix of single-sex and mixed CoEs, the stratification will be undertaken and the number of CoEs to be selected in an ecological zone and mentoring university allocated proportionate to size. Where there was one single-sex CoE, it will be included in the sample. Therefore, at stage third stage of the sampling process, the number of CoEs to be sampled in each stratum is shown in Table 2.

Table 2 Number of CoEs to be sampled in each stratum

Ecological zone and mentoring university	**Sex composition**			**Total**
	Mixed	**Female**	**Male**	
Coastal				
University of Cape Coast	1	2		3
University of Education, Winneba	2			2
University of Ghana	2			2
Total	5	2		7
Forest				
Kwame Nkrumah University of Science and Technology	2			2
University of Cape Coast	4	1		5
University of Development Studies	1			1
University of Education, Winneba	2	1	1	4
University of Ghana				
Total	9	2	1	12
Savannah				
Kwame Nkrumah University of Science and Technology	1			1
University of Development Studies	2			2
University of Education, Winneba	2			2
University of Ghana				
Total	5			5
OVERALL TOTAL	**19**	**4**	**1**	**24**

At the fourth stage of the sampling procedure, in the sampled schools, two Level 300 classes and two Level 400 classes will be randomly sampled to be included in the study. All students in the sampled classes will be eligible to complete the questionnaire. The estimated average class size in a CoE is 40. Thus, the expected sample size for Level 300 and also Level 400 is 2 classes x 40 students x 24 CoEs = 1920. Therefore, the expected total sample size is 3840.

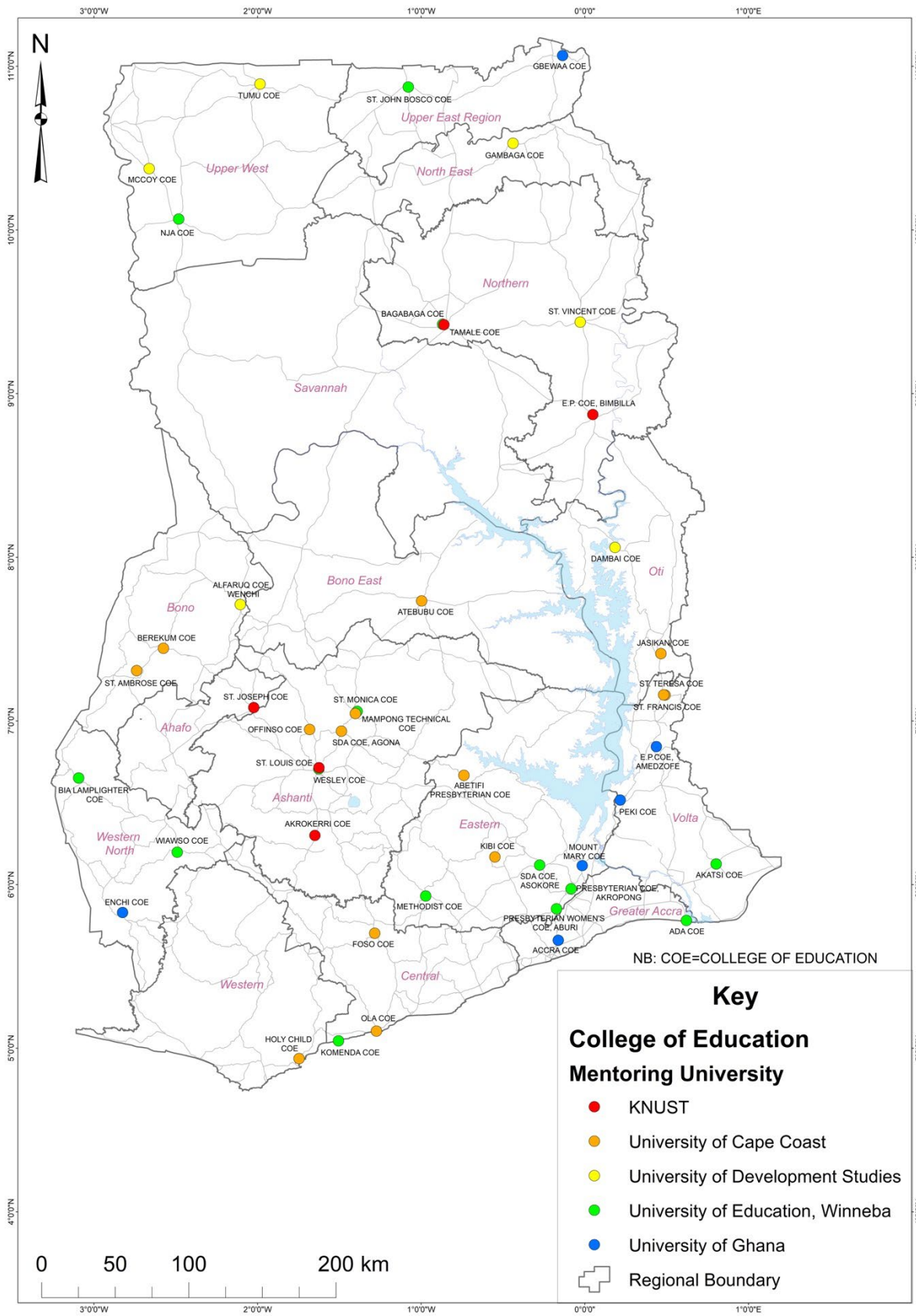


Figure 1. Map of colleges of education and their affiliated institutions

2.2 Data Analysis

We will use descriptive statistics to summarise the data and test hypothesised differences and relationships using inferential statistics. One sample z-test will be used to establish if there are statistically significant differences between student competencies and the national teaching standards. Also, dependent sample test (z-test) will be used to examine significant differences in competencies between the pre and post periods. Structural Equation Modelling (SEM) will be used to examine relationships between variables and test hypotheses of the proposed model. This will comprise of three stages namely, the measurement model, the structural model and the moderation analysis stages (Hair et al., 2017). The measurement model stage will be used to determine the internal consistency (reliability) and validity of the items across the various constructs. The statistical analysis to be used at this stage are item loadings, composite reliability, average variance extracted and Heterotrait-Monotrait (HTMT) ratio (Kline, 2016).

Secondly, the hypothesised paths (hypotheses) will be tested for significance based on bootstrapping of 5000 samples to determine the t-statistics, beta values, confidence interval, effect sizes (f^2), predictive relevance (Q^2) and total variance explained (R^2) by the proposed model.

Thirdly, a multi-group moderation analysis will be conducted to test for the significance or otherwise of the moderating effects of gender, year category and geographical location of student teachers on NTS understanding, adherence as well as determinants of impactful STS practicum. Again, the beta values, t-statistics and the confidence interval will determine the effects as mentioned earlier.

We will also employ thematic analysis to identify patterns, themes, and trends in the qualitative data using Nvivo software. First, the recorded interviews will be transcribed verbatim and read thoroughly to have an overall appreciation of the data. The transcripts will be coded using both inductive and deductive coding methods. Thus, a list of codes will be developed based on NTS while new codes will be developed to capture data extracts that do not align with the NTS. The codes and the associated data extracts will be collated and analysed based on their underlying meanings. We will subsequently organize the codes into themes and sub-themes based on common patterns within their data extracts. We adopted an experiential approach in interpreting the data to emphasize mentees' subjective experiences in their teaching practicum. The final stage of the analysis will involve naming the themes and subthemes as well as writing the qualitative report.

To ensure a gender-responsive approach to the study, we will incorporate the following strategies:

i.) Disaggregation of data by gender: All data collected from mentors and mentees will be disaggregated by gender, enabling the identification of trends, patterns, and disparities in the experiences and outcomes of male and female participants;

ii.) Analysis of gender barriers: We will analyse qualitative data collected from in-depth interviews and focus group discussions to identify potential gender-related barriers affecting teacher educators, teachers, and students;

iii.) Mitigation of potential negative gender-related consequences: The study will assess any potential negative consequences related to gender that could arise from the STS implementation and develop recommendations to mitigate these consequences and promote gender equity;

i.) Gender-sensitive data collection instruments;

ii.) Gender balance in research team;

iii.) Gender-sensitive reporting and dissemination: In our final report and dissemination materials, we will highlight gender-specific findings, trends, and recommendations to promote gender equity in the STS implementation and its impact on mentors, mentees,

and student learning outcomes. The above procedure for gender sensitiveness will be repeated for year category as well as geographical location.

2.3 Expected Outcomes

To achieve the study's aims, several critical outputs or intermediate outcomes have been identified, which are essential for the successful implementation of STS and its contribution to improving FLN in Ghana. These include effective mentor training, strong partnerships between CoEs and partner schools, high-quality STS handbooks and guidelines, regular monitoring and evaluation of STS implementation, integration of STS into the broader B.Ed. curriculum, support for student teachers during STS placements, and continuous professional development for mentors and college tutors.

GESI within the context of this research study means identifying and changing inequalities experienced by people on the grounds of gender, wealth, ability, location, ethnicity, religion, language, etc within the education system. It involves taking actions to reduce inequalities and exclusion in schools and training institutes by ensuring equal rights, opportunities, and respect for all individuals regardless of their background or circumstances.

We recognise that stakeholders and actors in teacher education in Ghana may be at different levels on the GESI-transformation continuum. That means each actor or institution may require a different level of intervention that matches their needs. The GESI-transformation continuum, as shown below, demonstrates the various stages which institutions and agencies may be, on their journey towards becoming GESI-responsive or transformative. There are six stages on the continuum:

The strategy is to work together with the actor(s) to identify the stage they are at on the continuum to inform the nature of support or intervention they require. Ultimately, ensuring GESI-responsiveness in institutions and agencies will contribute to a transformational teacher education system where:

1. Learners experience a system of teaching that removes barriers to enable quality learning.
2. All learners experience differentiated learning that enables them to achieve their fullest potential.
3. School leavers acquire foundational skills and competencies on how to embrace diversity and equality in preparedness for the world of work, further studies and adult life.
4. Learners, especially girls, unlearn negative stereotypes about women leading to a higher level of assertiveness and capacity to engage on diverse issues.
5. Learners, especially boys, unlearn harmful gender norms about men to become more gender-responsive and supportive.

There are several specific GESI issues which we can take account of during the course of this research study:

Issue 1: Issues with inclusive education including lack of data on enrolment and lack of inclusive teaching methods which make provision for learners with special needs or who may require remedial instruction.

Issue 2: Inadequate measures and policy frameworks to ensure the mainstreaming of gender and social inclusion concerns and effective implementation of GESI-related policies.

Issue 3: Deep rooted discriminatory sociocultural and institutional practices can lead to marginalization and exclusion.

Issue 4: Inadequate physical infrastructure to support gender equality and social inclusion in schools.

3. Dissemination

The research team we will organize visits to each CoE to meet with college leaders, tutors, student teachers, mentors, and lead mentors and share findings from the research study. A national learning event, linked to National Education Week or the Ghana Teacher Prize will be organised to share the findings with national stakeholders and policymakers to make commitments and adopt the research findings. UCC have a strong track record of publication in peer reviewed journals so that will also be the case with this research. UCC is also willing to work closely with the Bill & Melinda Gates Foundation to consider opportunities for international dissemination of findings. At least two publications in Scopus indexed journal and a policy brief.

4. Risks and Mitigation Measures

As we embark on this important research, it is important that we identify potential risks that could impede our progress or compromise the reliability of our findings. Being aware of these risks not only allows us to anticipate challenges but also helps us develop proactive strategies to mitigate them. While our team will exercise every effort to conduct the research as smoothly as possible, we believe in being prepared for uncertainties. Below, we outline the key risks identified for this study, along with our proposed mitigation measures. Our aim is to ensure the study proceeds as planned and its outcomes are trustworthy and useful for informing policy and practice in pre-service teacher education in Ghana.

1. **Risk: Enumerators are not sufficiently proficient at using the lesson observation tool to generate robust data as to adherence to the NTS**
    - Mitigation: T-TEL, UCC and ESSA recognize that this is a key risk and we will invest significant time in selecting the 70 enumerators and ensuring that they are given sufficient training to use the tool appropriately. We will also ensure that all enumerators have trialled use of the tool, under the supervision of expert observers, and that they are able to use it as intended. Wherever possible we will make use of enumerators who have prior experience and a demonstrated track record of using the lesson observation tool in field situations. We are confident that the lesson observation tool is a robust instrument as we have been refining it since 2015 and have used it in numerous evaluation studies.
2. **Risk: Insufficient Engagement** – We understand that the robust participation from student teachers, mentors, and other stakeholders is the backbone of this study, we anticipate that there might be some low engagements from some of these stakeholders, which could impact data quality and reliability.
    - Mitigation: We will take a proactive approach which involves engaging the CoEs, GES, and teacher unions; we will explain the purpose of the study to them, we will be very open about the study and also plan the fieldwork in accordance with the academic calendar.
3. **Risk: Data Privacy and Security** – With the vast amount of data to be collected, safeguarding participants' privacy and confidentiality might be a critical concern.
    - Mitigation: We plan to address this risk by following the measures contained in Ghana's Data Protection Act, 2012 (Act 843). We will anonymise all data collected. We are very committed to upholding ethical research practices.

4. **Risk: Budgetary Constraints** – Inadequate funding could limit the scope of the study or hamper its completion.
    - Mitigation: Our strategy includes meticulous budgeting, frequent expenditure monitoring, use of internal funds and proactively seeking additional funding if necessary.
5. **Risk: Ambiguous Findings** – The intricate nature of educational practices may result in findings that are hard to interpret or inconclusive.
    - Mitigation: Our approach entails a robust and adaptable research design, openness to refining the research trajectory as it unfolds, and a commitment to providing comprehensive analysis even in the face of indeterminate conclusions.

5. Project Implementation Plan

The implementation plan is described in the following sections:

Activity 1: Kick Start/Inception Meeting

The project partners will discuss with the Bill and Melinda Gates Foundation representative on the scope of work, technical approaches to the project, staff to be engaged and time schedule. During this meeting, the parties will seek clarifications on collaborative engagements and discuss channels of communication among others. The meeting would also offer the client the opportunity to seek clarification on the technical issues, if necessary.

Activity 2: Fine Tuning of the Project Implementation Strategy

The research team will work on the proposal to fine tune the technical component taking into consideration any changes that might have taken place since the design of the study.

Activity 3: Project Progress Meetings (T-TEL, UCC, BMGF)

We propose a **quarterly** project progress meeting between T-TEL and UCC teams to serve as a formative evaluation platform for the entire project period. However, on the side of BMGF, we propose that meetings will be held **monthly** to discuss the project progress.

Activity 4: Desk Review and Development of Data Collection Tools and Protocols

Questionnaires, interview guides, observation guide, training manuals and data collection protocols will be developed in line with the objectives of the project.

Activity 5: Validation of Data Collection Tools and Protocols

Both pre-test and pilot study will be conducted in selected Colleges of Education and their partner schools to test the data collection instruments. Validation workshops will be held with key stakeholders to validate the data collection instruments.

Activity 6: Ethical Clearance

An application for ethical clearance will be submitted to the Institutional Review Board of the University of Cape Coast for prior to data collection.

Activity 7: Sampling and Mapping of Locations for Data Collection

Colleges of education will be sampled for inclusion in the study. These sampled colleges will be required to provide the various schools that their pre-service teachers will conduct their STS practicum as well as the total number of pre-service teachers involved in the entire STS. Based on the above, the locations will be mapped out first and individual schools identified for data collection.

Activity 8: Reconnaissance Survey and Planning of Fieldwork

Reconnaissance visits will be conducted to the selected Colleges of Education and their partner schools. It will offer the research team the opportunity to plan the fieldwork including planning for logistics and community entry to ensure seamless execution of the project.

Activity 9: Recruitment and Training of Enumerators

We will recruit and train field assistants and supervisors. All potential field assistants will be persons with at least a post-secondary school education, experienced in data collection, possess excellent work ethics and interpersonal skills, and be computer literate with expertise in using CAPI for data collection.

A week residential training will be organized for the field assistants. The main components of the training will include familiarization with the data collection instruments, the use of computer for recording the responses, mock survey and ethical considerations. Pre-testing of the data collection instruments will be done on the third day of the training and issues arising from the pre-test will be resolved. All the research team members will be available to supervise the pre-testing of the instrument. After this, a pilot study will be conducted to further validate the suitability of the instruments. All issues on the data collection instruments will be addressed during the final section of the training.

Activity 10: Data Collection

Data collection will be conducted in the selected Colleges of Education and their partner schools by the trained field assistants. Data collection will be done in two phases. Phase one will be among the year 3 students and their mentors and phase two will be among the year 4 students and their mentors. At the end of each day of data collection, the supervisors will check completed questionnaire thoroughly with the enumerators to ensure strict adherence to the protocol. Daily debriefing will also offer the teams the opportunity to share experiences and challenges encountered during the day to be better prepared for the next day.

As part of the quality checks, the field coordinators and the consultants will perform daily spot checks of 5% of schools visited.

Activity 11: Data Entry, Cleaning and Transmission

Experienced and trained enumerators using Android enabled toolkits built on Open Data Kit (ODK) platform will be deployed to collect quantitative data. The electronic platform will be robustly built to ensure that data that are wrongfully keyed as well as inconsistent responses are rejected. After data collection, we will carefully clean the datasets.

With regards to the qualitative study, all audio recordings will be transferred from digital recorders to laptops and transcribed for detailed analysis. The audio recordings will be anonymised, labelled with unique identifiers and backed up in database. After transcription, the audio files will be deleted from the digital recorders.

Activity 12: Data Analysis and Reporting

Data analysis will be conducted soon after the data cleaning. Quantitative data will be exported into SPSS for final data quality checks before converting them into Comma Separated Values (CSV) and analysed using Partial least Squares Structural Equation modelling. The results will be presented in the form of tables, figures and graphs. Complex statistical procedures such as measurement model analysis, structural model paths analysis, moderating effects and importance-performance map analysis will be performed for key indicators of interest to establish statistical relationships, effects, importance and performance of the predictive constructs. Overall, we will also indicate the coefficient of determination for total variance explained by the specified model.

Qualitative data will be analysed thematically and managed using NVivo version 11. Reporting of qualitative findings will follow the Consolidated criteria for reporting qualitative research. Quality/trustworthiness of the qualitative data will be pursed through thick descriptions, debriefing and member-checking. Both inductive and deductive techniques will be applied to the text data.

Activity 13: Dissemination Workshops/Seminars

We propose to have stakeholder engagements in the form of workshops and seminars to disseminate the findings of the project and their implications for policy and practice in teacher education in Ghana. Different stakeholders (Ministry of Education/Ghana Education Service, Principals of Colleges of Education, Students of Colleges of Education etc.) will be engaged at different times for engagements based on the implications of the findings in their specific contexts.

Activity 14: Manuscript Preparation for Journal Article Publication

As part of the dissemination plan, we will develop at least a manuscript out of the results (quantitative and qualitative) of the project. This is proposed to be submitted to Scopus-indexed journal for publication for wider visibility. The publication will also provide the opportunity to duly acknowledge the funders, Bill and Melinda Gates Foundation for their support.

Activity 15: Submission of Final Report

A comprehensive final report based on the tables, figures and graphs of the results will be submitted to the client. The final report will cover; Executive Summary; Rationale and Objectives; Methodology; Findings; Conclusions; Recommendations and Annexes.

Activity 16: Close Out Meeting

Finally, there will be meeting to formally end the project. The purpose of this meeting is to have a final evaluation of the entire project in terms of deliverables, strengths, and weaknesses and make concrete recommendations and suggestions for future projects. It will afford both teams (funders and grantees) to also measure their satisfaction and expectations on the entire project implementation process.

6. Gantt Chart

Activity	**Duration/Time frame**							
	Year 1 (Period 1)	**Year 2 (Period 1)**			**Year 2 (Period 2**	**Year 3 (Period 2)**		
	Third quarter October-December 2023	**First quarter January-March 2024**	**Second quarter April-June 2024**	**Third quarter July-September 2024**	**Fourth quarter October-December 2024**	**First quarter January-March 2025**	**Second quarter April-June 2025**	**Third quarter July-August 2025 (end of project)**
Kick-start/ inception meeting								
Fine tuning the project implementation plan								
Project progress meeting (T-TEL-UCC)								
Project progress meetings (T-TEL-UCC and BMGF)								

Desk review and development of data collection tools and protocols								
Application for ethical clearance								
Validation of data collection tools and protocols (expert review, pre-test/pilot test)								
Sampling and mapping of locations for data collection								
Reconnaissance survey and planning of fieldwork								
Recruitment and training of enumerators								
Data collection phase 1 (Year 3)								
Data collection phase 2 (Year 4)								
Data entry, cleaning and transmission								

Data analysis and reporting								
Dissemination workshops/seminars								
Development of manuscript (s) and submission for publication								
Submission of final report								
Close out meeting								