Report on Bachelor of Education Student Teacher Pedagogy for IDP Foundation, Inc. and Sesame Workshop's Techniques for Effective Teaching

Phase III

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Executive Summary

Project Overview

NORC at the University of Chicago is evaluating the third phase of the Techniques for Effective Teaching (TFET) program. During prior phases I and II, the TFET program partnered with 127 private, low-fee primary schools across eight regions in Ghana to strengthen the capacity of early grade teachers to use child-friendly and inclusive teaching approaches. Phase III is the newest piloting phase of TFET supporting the use of pupil-centered techniques by faculty and student teachers within 46 Colleges of Education in Ghana. Many of TFET's teaching techniques are applicable to instruction at any level.

This report is the final in a series of Phase III reports evaluating the quality of TFET training implementation in Colleges of Education. TFET training was structured as a cascade model of learning at three levels. At the first level, Professional Development Coordinators (PDCs) and Supported Teaching in Schools Coordinators (STSCs) from the 46 colleges participated in a virtual Master training held by Sesame Square between October and November 2020. In January 2021, PDCs and STSCs carried out the first Step-down training on TFET techniques with tutors during weekly professional development meetings at the colleges. The third level of training occurred when tutors embedded TFET techniques into Bachelor of Education courses with student teachers. Conclusions from Phase III research found TFET to be a timely and well-positioned professional development program supporting the on-going work of tutors in implementing the new B.Ed. curriculum, which promotes similar kinds of pupil-centered methods. Moreover, lesson observations of college tutors at eight colleges showed most tutors used a combination of teacher-centered and pupil-centered methods during B.Ed. courses with student teachers.

This final report focuses on the pedagogic orientation of student teachers studying the new B.Ed. curriculum at eight case study Colleges of Education. The report also integrates conclusions from earlier Phase III reporting on curriculum, TFET training, and tutor pedagogy in the eight case study colleges. Overall, this report aims to offer insights into how B.Ed. student teachers think about and enact teaching techniques in the context of broader national reform efforts to overhaul teacher education.

Research Methods and Objectives

This study used a mixed methods design to explore student teacher pedagogy within eight Colleges of Education. Drawing on interviews, surveys, and lesson observations of student teachers, we used a mixed methods approach to examine student understandings and use of pupil-centered methods during practice lessons. Qualitative and quantitative findings produced a rich, comprehensive picture of students' self-reported teaching and learning experiences under the new B.Ed. curriculum, understandings and perceptions of pupil-centered principles, and application of pupil-centered techniques during practice lessons in basic school classrooms.

In March 2022, trained fieldworkers conducted 16 semi-structured interviews with level 200 and 300 students (two students from each of the eight case study colleges). Two months later in May 2022, fieldworkers conducted 32 classroom observations of 24 level 300 student teachers and eight comparison classroom teachers. We selected three students and one comparison classroom teacher per college to explore pedagogic similarities and differences amongst students currently studying the *new* B.Ed. curriculum and amongst teachers who studied under the *old*, phased-out curriculum. Finally, during June and July 2022, we conducted an online survey with 153 student teachers from five of the eight case study colleges to measure students' orientation to pupil-centered approaches.

The research questions for this study focused on student *understandings* and *usage* of pupil-centered methods. Specifically, these are:

- How do student teachers understand the central concepts and principles of pupil-centered pedagogy?
- What kinds of learning experiences do student teachers receive under the new Bachelor of Education curriculum?
- What pupil-centered techniques were evident in the instructional practice of student teachers and comparison teachers? Where evident, how were pupil-centered techniques used during lessons?
- How might the TFET program further support the quality of teacher pedagogy in the context of national reform to teacher education?

The design of this study builds on findings from earlier Phase III research to produce a more complete picture of TFET trainee orientation to pupil-centered pedagogy. Earlier research comprised interviews and surveys with Master and Step-down trainees on TFET training effectiveness, a review of the new Bachelor of Education curriculum, interviews with curriculum experts, and observations of college tutors teaching B.Ed. courses at the eight case study colleges.

Findings and Conclusions

The following are key conclusions from this work organized by theme: 1) the new B.Ed. curriculum, 2) student teacher understandings of pupil-centered pedagogy, 3) the learning environment of classrooms, and 4) classroom pedagogy.

The New B.Ed. Curriculum

- During interviews, all 16 B.Ed. students said college tutors had taught them about different assessment methods, making accommodations for special needs students, and incorporating play into lessons. Most students also said tutors covered positive discipline and differentiation through grouping. Active learning theory, developing low or no-cost teaching materials, and designing hands-on activities were covered less frequently.
- Interviews revealed a majority of students viewed their tutors as role models who positively impacted on how they understood teaching and learning. One quarter of students said they highly valued tutor feedback on learning, although two students reported poor learning experiences where tutors only lectured and gave no feedback.

- All 16 interviewed B.Ed. students said the quality of teaching in primary and secondary schools was at least somewhat *different* from the way tutors taught at colleges. In particular, the prevalence of "teacher talk" or lecturing was more common in basic schools.
- Travel time between 17 partner schools (where lesson observations occurred) and the eight colleges varied from 5 to 25 minutes and, on average, took about 10 minutes. Thus most partner schools were relatively close in proximity to the colleges.
- Half of the 24 mentor teachers (who hosted student teachers during practice lessons) reported earning a bachelor's degree, whereas 88% of comparison teachers reported earning a bachelor's.
- Fifty-eight percent of mentor teachers and 88% of comparison teachers had more than 5 years of teaching experience, while a quarter of teachers had only been teaching 1-3 years. Across 32 mentor and comparison teachers, 21 (66%) said they had received some kind of training on how to support students' teaching practice.
- Eleven of the 24 observed student teachers (46%) reported receiving *no* support at all from a mentor teacher or said they had not been assigned a mentor teacher. Of the 13 students who received mentor support, nearly all were given verbal feedback, while less than half received written notes or scores on their teaching or lesson plans.
- Mentor and comparison teachers showed superficial understandings of pupil-centered teaching by assigning significant control to pupils in the learning progress without regard for the instructional labor required of teachers (e.g., preparation of materials).

Student Teacher Understandings of Pupil-Centered Pedagogy

- During interviews, the majority of students rated pupil-centered techniques, such as pupils working together in groups, as very effective. Half of students rated lecturing and chorusing as very effective while the other half rated these techniques as somewhat or a little effective.
- Survey data showed that 79% of students agreed that pupils listening to the teacher explain ideas is the most important part of a lesson, and 80% agreed that pupil recitation is an effective strategy for learning new information.
- Survey respondents showed a positive orientation to differentiation and grouping methods, mostly negative perceptions of techniques that promote gender equity, and mixed views on independent learning.
- Survey respondents felt most confident to use pupil grouping methods and least confident creating low or no-cost teaching materials.
- Overall, student teachers expressed a mixed orientation to pupil-centered pedagogy that mirrors many of the views college tutors expressed in the Training report.

The Learning Environment of Classrooms

- Half of observed teachers taught classes of more than 40 pupils, and 19% of teachers taught more than 60 pupils in one classroom.
- 79% of student teachers and 50% of comparison teachers kept learners in the same place throughout the entire 45-minute period.

- Across 26 of the 32 lessons (81%), pupils were organized at desks in rows, reflecting a traditional teacher-centered arrangement. During about half of all lessons, pupils sat together at desks or tables in several smaller groups. One third of student teachers used some form of collaborative seating arrangement (e.g., grouping), and 21% used a combination of collaborative and traditional seating during the lesson.
- Most classrooms had at least 4-5 materials on display, significantly more materials than those seen in tutors' college classrooms. All 32 classrooms had a chalkboard and/or a whiteboard. Most rooms had a daily or weekly timetable displayed on the wall. Learners' own work was displayed in a third of classrooms. Less frequently seen were class helper charts and activity corners.
- The most commonly observed positive behavior strategy was explicitly praising pupils for correct answers, seen in 88% of classrooms. Very few teachers made reference to class rules (3%) or helped pupils resolve conflict (6%).
- The most commonly observed negative behavior strategy was shouting at pupils to get their attention, seen in 44% of lessons. Using or threating pupils with corporal punishment (e.g., kneeling) was seen in three classrooms, two of which were comparison teachers.
- Overall, teachers used significantly fewer negative behavior strategies than positive across the 32 lessons.
- The majority of student and comparison teachers appeared prepared for lessons with materials ready. Half of comparison teachers told pupils how much time they had to complete tasks, whereas a quarter of student teachers did so.
- Half of student teachers encouraged girls to participate in a lesson activity, whereas 38% of comparison teachers did so.

Classroom Pedagogy

- The majority of lessons (79%) displayed a *hybrid* or *mostly teacher-centered* pedagogy, indicating a prevalence of teacher-centered techniques, especially oral instruction and chorusing. Moreover, 13 lessons (41%) were *mostly teacher-centered*, and five lessons (16%) were *teacher-centered*.
- By sub-group, half of student teachers and three-quarters of comparison teachers taught *mostly teacher-centered* or *teacher-centered* lessons. Findings indicate strong similarities in pedagogic style across the study sample as well as relatively *fewer* pupil-centered techniques used by comparison teachers. Very few student or comparison teachers taught a *mostly pupil-centered* lesson (where many different pupil-centered methods were used).
- In comparison to prior lesson observations of tutors at the case study colleges, student teachers used relatively *fewer* pupil-centered methods during practice lessons. Although some similarities were seen in the ways tutors and B.Ed. students made connections to pupils' prior knowledge, tutor pedagogy was more differentiated and collaborative. These pedagogic differences are likely due to a combination of factors, especially students' lack of teaching experience, the complexity of methods like differentiation that depend on sound curricular knowledge, large class sizes, and traditional teacher-centered experiences in primary and secondary school.

- The majority of teachers spent half or more than half of the lesson instructing the whole class, a central indicator of teacher-centered pedagogy. Half of comparison teachers and 9 student teachers (38%) did not assign any kind of independent task, where pupils completed exercises on their own.
- Grouping was more commonly seen in 58% of student teacher lessons, compared to 38% of comparison teacher lessons.
- Pupils used their hands to manipulate materials during 31% of lessons.
- During lessons, most teachers asked learners to share their own knowledge or experience and made content relevant by connecting lesson topics to familiar ideas.
- While most teachers used oral questioning to drive instruction (e.g., "How many of us live with our parents and siblings?"), which elicited ideas from pupils, only some teachers gave pupils feedback with explicit criteria for evaluating accuracy of answers or introduced new forms of specialized knowledge with clearly defined concepts.
- During 72% of lessons, some kind of text was read by the teacher and/or by the pupils, most frequently off the chalkboard. Thus, about one quarter of lessons were largely oral.
- Interview and survey data showed that most student teachers understood differentiated instruction as it is presented in the TFET program, but few student teachers used differentiation methods in practice. This finding may be partly explained by the complexity of designing, enacting, and assessing learning activities in different ways for different pupils.
- During 75% of all lessons, there were no differentiated tasks, meaning teachers gave all pupils the same activities to complete during the entire period. Giving pupils a different task to the whole class was only seen during four student teacher lessons.
- During most lessons pupils had opportunities to *see, hear, and speak* about the lesson topic. Pedagogy was mostly undifferentiated, though student teachers displayed a relatively more differentiated pedagogy than comparison teachers.
- All student and comparison teachers measured pupil understanding through oral questioning during whole class instruction, and nearly all teachers prompted pupils to chorus facts or phrases altogether.
- Most teachers used a combination of open and closed questioning, and two thirds moved around the room observing and supporting pupils as they completed tasks.
- In a third of lessons, teacher feedback was absent, potentially signaling content misconceptions and restricting pupils' acquisition of specialized knowledge. In contrast, about half of teachers provided pupils with at least some criteria for assessing learning during lessons.

This study showed partial alignment between student teachers' espoused beliefs and enacted techniques during lessons. For instance, most students reported feeling very confident to use a variety of teaching strategies, though very little differentiation was seen. While student and comparison teacher lessons showed more similarities than differences in structure and style, student teachers used relatively *more* pupil-centered methods that mainly impacted on the organizational arrangement of classrooms and on how teachers presented content to pupils. Phase III research reveals very similar beliefs on teaching effectiveness amongst students and college tutors as well as three areas where TFET may further support implementation of the new B.Ed. curriculum. These are 1) mentor teacher pedagogy, 2) TFET trainee skills for using low-cost materials effectively, and 3) adapting pupil-

centered methods for very large classes. While TFET aligns with much of the instructional work of teacher educators and students in Colleges of Education, TFET participants may benefit from further professional development that addresses research-based challenges to *understanding* and *using* particular pupil-centered techniques in practice.

Research Methodology

This study collected evidence on student teacher understandings and use of pupil-centered methods. Study participants were selected from the third and fourth cohort[1] of students to register for the new B.Ed. curriculum (the first cohort registered in 2018). Interview, survey, and classroom observation data were gathered using a mixed methods approach. Analyses produced a comprehensive picture of B.Ed. students' pedagogic orientation (how students think about and enact teaching approaches). Data were gathered between March and July 2022 by trained fieldworkers across eight case study Colleges of Education in Ghana. This section describes in detail our research sampling, design, and analytical approaches.

Case Study Colleges

TFET Phase III research utilizes a case study methodology to explore various contexts of training implementation. We purposively selected eight colleges that carried out both Master and Step-down training on at least two TFET modules, specialize in Early Childhood or General Education, and are affiliated with each of the four mentoring universities. The eight colleges are spread across seven different administrative regions in Ghana. Three colleges are all female, and one is an all-male college. The eight case study colleges participated in earlier Phase III research, including studies of TFET training efficacy and the extent to which tutors understood and integrated TFET-style techniques into lessons with student teachers. In this final report, we build on earlier work to examine the experiences of students in the eight case study colleges.

Semi-structured Interviews

Sampling of Interview Participants

The interview participant sample comprised 16 student teachers (two from each of the eight case study colleges). At each college we interviewed one level 200 student and one level 300 student to gather varying perspectives on teaching and learning. The average age of interview participants was 24. Of the 16 students interviewed, four specialized in Early Grade, four specialized in Primary Education, and eight specialized in Junior High School. In March of 2022, trained fieldworkers conducted telephonic interviews with each interview participant for approximately 45 minutes. Interviews were recorded and transcribed for analysis.

[1] See Appendix A for a timeline of B.Ed. 4-year cohorts beginning in 2018.

Design of Interview Tool

The student teacher interview tool used a variety of vignettes and scales to examine students' learning experiences within the B.Ed. program. The tool also elicited student understandings of pupil-centered concepts as presented in TFET materials. The tool included several open-ended items for exploring theories of how children learn. We also used closed-ended (structured) items to measure student perceptions of teaching effectiveness. The tool is located in Appendix B.

Analytical Approach

Closed-ended interview data were extracted into Excel for quantitative analyses, offering insight into the similarities and differences between student teacher experiences across the eight colleges. Open-ended remarks were transcribed and coded thematically using Dedoose qualitative analysis software. Across the 16 interviews, some variation between students emerged regarding the qualities of B.Ed. programs and pupil-centered understandings.

Classroom Observations

Sampling of Observation Participants

During May 2022 trained fieldworkers observed 24 level 300 students teaching a practice lesson in a basic school classroom (three students from each of the eight case study colleges). Fieldworkers observed each lesson from the beginning for 45-minutes. Of the 24 lessons, five were co-taught by pairs of students. Co-teaching is a common teacher education method for building pedagogic confidence and practical skills. Observed practice lessons formed part of the B.Ed. Supported Teaching in Schools curriculum. Under the new curriculum, students spend progressively more time observing, assisting, and teaching under the guidance of a mentor teacher within a partner or 'demonstration' school affiliated with a College of Education. Table 1 summarizes the B.Ed. practicum framework for each year of study.

Table 1. B.Ed. Practicum Framework for Student Teachers Years 1-4

Year/Level	Classification	Description of practicum
YEAR 1 (Level 100)	Beginning teaching	Foundations of teaching; observing
YEAR 2 (Level 200)	Developing teaching	One week in the field; developing own teaching philosophy
YEAR 3 (Level 300)	Embedded teaching	Some teaching/co-teaching over one year in the field
YEAR 4 (Level 400)	Extended teaching	4-6 months teaching; capstone to program; portfolio developed

For each college where we observed student teachers, fieldworkers also observed one comparison classroom teacher, that is, a different teacher in the same school where students taught practice lessons. We selected to observe a relatively smaller sample of comparison teachers in this study to explore the pedagogic styles of teachers who studied under the old curriculum. Of the eight comparison teachers, one reported holding a Diploma in Basic Education and seven held a bachelor's degree. The majority of comparison teachers had more than five years of teaching experience and reported teaching at the partner school for at least 2-3 years. Half had been teaching at the school for more than five years.

Observation Methodology

A convergent mixed methods design was used to gather complementary forms of data concurrently during classroom observations (Creswell, 2018). These data included open-ended narratives of classroom activity and closed ended judgments of technique uptake. Taken together, both forms of data produced a more complete record of pedagogic quality. In the design of observation tools, we used the Phase III TFET manual and videos to generate a comprehensive list of program indicators to measure what pupil-centered teaching looks like in the classroom (similar to the tutor observation study). A brief survey on teaching and learning experience was also conducted after each observation with study participants and teachers supervising students during practice lessons. Observation tools are located in Appendix C.

While observing lessons in pairs, each fieldworker produced a detailed narrative of teaching and learning activity for 45 minutes. Narratives gathered a combination of verbatim talk (especially teacher questioning and feedback) and descriptions of behaviors, explanations, and materials used during lessons. The time was recorded at five-minute intervals to measure how time was spent during lessons. Fieldworkers referenced lesson narratives while making judgments on closed-ended items after the observation ended. Inter-rater reliability checks were performed at two points in time. First, at the point of data collection, fieldworkers completed closed items in pairs. Second, during the analysis stage, narratives were used to validate closed-ended coding. Fieldworkers participated in a five-day intensive training program covering principles of classroom observation research, TFET techniques, and pupil-centered pedagogy. Fieldwork training offered various opportunities to practice observation methods through virtual simulations and on-site piloting of tools.

Analytical Approach

Using a convergent mixed methods approach, qualitative and quantitative data were first analyzed separately then interpreted together during the evaluation stage. In the first instance, we analyzed closed-ended items in Excel, looking for patterns in the uptake of pupil-centered techniques across study participants. Each pair of open-ended lesson narratives was then read together to produce one complete summary description per classroom. Lesson summaries were used to extract and code pedagogic patterns and processes. This analytic approach sought to explain similarities and differences between lessons, especially *how* techniques were used. Finally, we compared both forms of open and closed-ended data. This approach offered a more complete understanding of the teaching and learning activities observed during lessons taught by students and by comparison teachers.

Each of the 32 lessons was assessed on the extent to which student and comparison teachers used pupil-centered techniques during the 45-minute observation period. Qualitative analyses produced four descriptors to classify four main types of lessons seen in this study, presented in Table 2 below.

Table 2. Measuring the Extent of Pupil-centered Techniques Per Classroom

When the teacher interacts with pupils during the observation period, the teacher:			
Uses little to no P-C techniques *(Teacher-centered lesson)*	**Uses a few P-C techniques** *(Mostly teacher-centered lesson)*	**Uses some P-C techniques** *(Hybrid lesson)*	**Uses many P-C techniques** *(Mostly pupil-centered lesson)*
- -	**-**	**+**	**++**
Uses very few or no pupil-centered techniques during the observation period. The lesson demonstrates a traditional, teacher-centered approach to instruction through a combination of oral whole class instruction ('chalk and talk') and chorusing.	Uses a few pupil-centered techniques during the observation period, such as pupil grouping or connecting content to pupils' everyday experience, but overall, the lesson demonstrates a mostly teacher-centered style where the teacher mainly controls the selection and pacing of lesson content.	Uses a combination of teacher-centered instruction and some pupil-centered techniques, such as collaborative learning activities, connecting content to pupil experience, and/or opportunities for pupils to share ideas with the teacher/class in different ways. Pupils make some choices about lesson content.	Uses many pupil-centered techniques during the observation period with relatively little chalk and talk instruction. Throughout the lesson, pupils mainly influence the content, pacing, and/or structure of the lesson and share ideas, ask questions, and interact with each other.

Lesson type varied on a scale from 'teacher-centered' (- -) to 'mostly pupil-centered' (++). For example, lessons classified as 'teacher-centered' exhibited traditional forms of whole class oral instruction ("chalk and talk") and pupil chorusing. Measures of pupil-centeredness *do not* necessarily reflect teaching effectiveness or the extent to which learning occurred. Rather, measures reflect the extent to which the teacher used or attempted to use pupil-centered methods during the observation period.

Online Survey

Sampling of Survey Participants

Between 20 June and 24 July 2022, NORC sent an online survey to student teachers on pupil-centered pedagogy. Although we sought to distribute the survey to all level 200 and 300 students at all eight case study colleges, and received support from Ghana Tertiary Education Commission, NORC was unable to obtain student email addresses from four of the eight colleges. In total, NORC sent a survey link to 1094 students via email and to 29 students via WhatsApp[2], although only 25% of the sent emails were recorded as opened. Despite these challenges, 179 students participated in the online survey (16% response rate). Of these participants, 26 had not yet answered any questions past the background section by end of the survey period and were thus excluded from the final dataset. Survey data is therefore available for 153 respondents of the online survey.

Survey respondents were located in five of the eight colleges, summarized in Table 3. However, the majority of survey respondents (97%) represented three different colleges spanning three regions and administered by three of the four mentoring universities in Ghana.

[2] NORC initiated a strategy to send survey invites to a random sample of 90 level 200 and 300 students at the eight colleges via WhatsApp. However, survey dissemination was challenged by technical limitations of the WhatsApp platform and was therefore brought to an end before all contacts in the sample could be reached.

Table 3. Summary of Survey Respondent Sample Per College

Case Study College of Education	Number of respondents (N=153)	Percent of total respondents
College 1	3	2%
College 2	1	1%
College 3	55	36%
College 4	54	35%
College 5	40	26%

The age of survey respondents ranged from 19 to 30 years old, with a mean of 23.7 years old. Of the 153 survey respondents, 39% were level 200 students and 61% were level 300 students. More than half of the students (61%) specialized in Junior High School, with the rest specializing in Upper Primary (23%) and Early Grade (16%).

Design of Survey Tool

The online survey elicited responses from student teachers on their education background, understandings of pupil-centered teaching, and level of confidence using a variety of pupil-centered methods as presented by TFET (e.g., supporting positive pupil behavior). The survey included vignettes, imagery, and open and closed-ended questions. A copy of the survey tool is located in Appendix D.

Analytical Approach

At the end of survey dissemination, raw response data was extracted from Qualtrics. For summary statistics of the sample and closed-ended responses, data were imported, cleaned, and analyzed using STATA. Two-sided t-tests were conducted to assess the statistical significance of the difference in mean responses between level 200 and level 300 students. For open-ended responses, raw data were imported, cleaned, and coded using NVivo qualitative analysis software to assess patterns in response frequency. Survey responses provide a descriptive summary of student teacher experiences, perceptions, and understandings of teaching and learning across the eight colleges. Survey data is also especially useful for interpreting qualitative interview and observation data. Throughout the report, survey, interview, and observation data are presented together, producing a more complete picture of student teacher pedagogy.

The New B.Ed. Curriculum

2018 saw the first cohort of students register for the new 4-year Bachelor of Education program. The new B.Ed. is framed by a new national curriculum and teaching standards adopted across all 46 public Colleges of Education in Ghana. The new curriculum displays a pupil-centered, integrated, and competency-based framework prioritizing practical teaching experience, local languages, and pedagogic content knowledge. The Phase III Curriculum Report found that many TFET techniques align with the new teaching standards, especially those pertaining to differentiated teaching and assessment. This section presents findings on the quality of student teacher learning experiences under the new B.Ed. curriculum at the eight colleges. Data are drawn from interviews and classroom observations of student teachers as well as post-observation surveys of mentor and comparison teachers from 17 partner schools where lesson observations occurred.

Student Learning Experiences in College Classrooms

Below we present findings on B.Ed. course coverage and the qualities of tutor pedagogy reported by student teachers during interviews.

B.Ed. Course Coverage

To explore student teachers' exposure to TFET-style techniques, we generated a list of 13 topics central to the TFET program and asked students to indicate whether they had learnt about those topics during courses with tutors. Table 4 summarizes these findings, comparing level 200 with level 300 student responses.

Table 4. Student Reported Topics Covered By Tutors During B.Ed. Courses

Topics Covered by Tutors During B.Ed. Courses	Level 200 students (N=8)	Level 300 students (N=8)	Total (N=16)
Basics of lesson planning	2	7	9
How 'active learning' promotes 'knowledge retention'	5	5	10
Setting up your classroom in a child-friendly way	7	7	14
Strategies that promote positive discipline	6	8	14
Developing low/no-cost teaching and learning materials	2	5	7
How to manage instructional time	5	7	12
Using pupils' ideas, experiences, and interests in lessons	7	8	15
Designing hands-on, interactive activities for pupils to explore	5	5	10
Differentiated teaching through pupil grouping	7	8	15
Using different assessment methods	8	8	16
Making accommodations for pupils with special learning needs	8	8	16
Ways to promote equal participation of boys and girls	6	8	14
Incorporating play or games into lessons	8	8	16

All 16 students said tutors had taught them about different assessment methods, making accommodations for special needs students, and incorporating play into lessons. Most students also said tutors covered various other TFET-style techniques, such as how to use positive discipline,

incorporate pupil ideas into lessons, and differentiate through grouping. While most level 300 students had learnt about lesson planning, very few level 200 students had, likely due to the increased relevance of planning while teaching in basic schools during years 3 and 4. Active learning theory, developing low or no-cost teaching materials, and designing hands-on activities were covered less frequently by tutors.

Perceived Quality of College Tutor Pedagogy

Interviews revealed that a majority of students viewed their tutors as role models who positively impacted on how they understood teaching and learning. Interviews also elicited qualities of college tutor instruction, including techniques students perceived to be effective. Half of student respondents emphasized ways tutors actively engaged them during courses by making content "interesting" and "clear" and using strategies like group work (e.g., think-pair-share), presentations, and research-based activities. One quarter of students described how tutors adapted instruction to meet students' needs and enhance understanding (e.g., modifying the pace of learning). Another quarter said they highly valued tutor feedback on their learning. For example, a level 300 student explained:

> If you are having an opinion and you are in the right direction but it is not all that clear, he will say you have done well but you should have said it this way or it should have been said this way instead of that way.

In contrast two out of 16 students reported poor experiences during courses, where a tutor lectured the entire class without checking for understanding or graded work without giving any feedback on a low mark. Nonetheless, these pedagogic qualities do mirror many of the techniques observed during tutor lessons at case study colleges, where most tutors used some combination of teacher-centered and pupil-centered methods but the quality of feedback varied.

Differences between the instruction of students' schoolteachers and college tutors emerged across respondents. The majority of students said the quality of teaching in primary and secondary schools was significantly *different* from the way tutors taught. The prevalence of "teacher talk" or lecturing was more common in basic schools. According to a level 300 student:

> During my time in primary school or S.S., the teaching method they usually use is teacher-centered, where the teacher dominates most in the class so as a student you just need to sit down and absorb what the teacher gives you. What we are learning now here is student-centered. The teacher serves as a facilitator so he involves the students in most of the activities in the classroom and that makes the student understand what you are giving to them.

These remarks position pupil-centered instruction, covered under the new curriculum, in opposition to teacher-centered pedagogy, though much of Phase III research does show both forms may co-exist in classrooms, including college tutor courses. Moreover, several students explained that former schoolteachers did not use group work or make connections to students' prior knowledge, as college tutors tend to do.

Student Teaching Experiences in Basic Schools

Under the new curriculum, practice teaching forms part of Supported Teaching in Schools (STS), led by an STS coordinator per college. At four of the eight case study colleges, STS coordinators received at least some TFET training. Student teachers are also assigned a mentor teacher, either a tutor or classroom teacher, who provides feedback on their practice teaching activities. In this section we describe B.Ed. student experiences with practice teaching at levels 200 and 300. We also examine characteristics of partner schools where practice lessons occurred (as important sites of pedagogic learning).

Teaching Practice Experience

During years 2 and 3 of the new B.Ed., students spend progressively more time in the field, developing their own teaching philosophy through observation and some practice teaching. To understand how teaching practice varies across the colleges, we assessed whether students had undertaken a range of teaching activities on campus or within a basic school. Findings are presented in Table 5 and compare experiences of level 200 with level 300 students.

Table 5. Types of Completed Teaching Practice Reported by Student Teachers

Types of Completed Practice Teaching	Level 200 students (N=8)	Level 300 students (N=8)	Total (N=16)
Observing a lesson	8	8	16
Designing a lesson plan (or notes)	1	7	8
Creating teaching and learning materials	4	6	10
Teaching a lesson with other student teachers (paired or group teaching)	8	6	14
Teaching a lesson on their own	2	5	7

All students reported observing lessons. A third of students observed lessons on campus (likely peer teaching) while the majority had observed lessons taught by teachers in basic schools. Most level 300 students had designed a lesson plan as part their coursework, whereas only one level 200 student had done so. Half of level 200 and three-quarters of level 300 students had created teaching and learning materials, usually on campus. Most students had co-taught a lesson with their peers on campus, and half of students had taught a lesson on their own, mainly at level 300. Students reported teaching independently both on campus and in a basic school, but not both. It is therefore possible that some level 300 students observed to teach a practice lesson in this study had not previously taught a lesson on their own in a basic school.

Characteristics of Partner Schools and Mentor Teachers

According to Buabeng, Ntow, and Otami (2020), significant variation exists in the quality of partner schools (where students carry out practice teaching) and in the quality of mentor teachers (who support student teaching). Because many partner schools are hard to reach and poorly equipped with inadequately trained staff, the authors call for careful selection of sites that can reinforce the pedagogic knowledge and skills covered by colleges. To explore the qualities of partner schools, this study assessed several features of the schools where student teachers were observed. After each lesson observation we also surveyed comparison teachers, student teachers, and mentor teachers (who hosted

students for observed lessons). Mentor and comparison teachers were classroom teachers working within the partner schools where practice lessons occurred.

The 32 lesson observations occurred in 17 different partner schools. Comparison teacher lessons were observed in the same schools as student teachers. Travel time between the partner school and the College of Education varied from 5 to 25 minutes and, on average, took about 10 minutes. This suggests most partner schools were relatively close in proximity. All partner schools were public. Eleven schools stated English and Twi as official languages of instruction. Five schools were English only and one school was Fante only.

In addition to school access and general characteristics, we assessed the educational backgrounds of mentor and comparison teachers to gauge the quality of partner schools' professional knowledge resources, summarized below.

Table 6. Education and Teaching Experience of Mentor and Comparison Teachers

Education and Experience	Mentor Teacher (N = 24)	Comparison Teacher (N = 8)	Percent of Total (N = 32)
Highest Education Degree			
Diploma/HND	50%	13%	41%
Bachelor's Degree	46%	88%	56%
Master's Degree	4%	0%	3%
Total Teaching Experience			
1 – 3 years	25%	13%	22%
4 – 5 years	17%	0%	13%
5 – 10 years	25%	25%	25%
More than 10 years	33%	63%	41%
Experience at Current School			
Less than 1 year	8%	25%	13%
1 year	8%	0%	6%
2 – 3 years	42%	13%	34%
4 – 5 years	13%	13%	13%
More than 5 years	29%	50%	34%

The education backgrounds of mentor and comparison teachers varied significantly. Half of the 24 mentor teachers reported earning a bachelor's degree, whereas 88% of comparison teachers reported so. One mentor teacher reported earning a Masters, which exceeds the minimum qualification for basic school teachers in Ghana. The majority of teachers had more than 5 years of teaching experience, while a quarter had only been teaching 1-3 years. At partner schools visited in this study, most mentor and comparison teachers had been teaching for at least 2-3 years.

Across the 32 mentor and comparison teachers, 21 (66%) said they had received some kind of training on how to support students' teaching practice. Training covered a wide variety of topics, such as classroom management, the new B.Ed. curriculum, expectations for student teaching assignments, and expected supports and commitments of mentor teachers. Training was conducted by college tutors with the support of Transforming Teacher Education and Learning (T-TEL) staff (a 4-year program in partnership with the Ministry of Education that supported the planning, design, and implementation of the new B.Ed. in the Colleges of Education). Several teachers reported training occurred in 2020 and again in 2021.

Observed level 300 student teachers were asked to identify the kinds of support they received from a mentor teacher, listed in Table 7. Eleven of the 24 students (46%) reported receiving *no* support at all or said they had not been assigned a mentor teacher.

Table 7. Forms of Mentor Teacher Support Reported by Student Teachers

Forms of Mentor Teacher Support Reported by Student Teachers	Student teachers with mentor support (N=13)	Percent of Total (N=13)
Observed you teaching a lesson	8	62%
Observed your lesson plan	5	38%
Gave you verbal feedback or explained teaching techniques	12	92%
Showed you how to use a teaching technique (modeling)	9	69%
Showed you how to use a teaching and learning material	10	77%
Taught together with you (co-teaching)	7	54%
Provided you with written notes or scores on your teaching techniques	6	46%
Provided you with written notes or scores on your lesson plan	3	23%
Other	1	8%

Of the 13 students who received mentor support, nearly all were given verbal feedback or explanations on using a teaching technique. The majority also said mentors showed them how to use teaching materials, observed them teaching a lesson, co-taught during a lesson, and modeled techniques in practice. Less than half of students received written notes or scores on their teaching or lesson plans.

Lastly, the study assessed mentor and comparison teachers' understanding of pupil-centered instruction. Just over half (53%) defined pupil-centered teaching as "involving pupils" in the teaching and learning process. One quarter of teachers discussed the relationship between teacher and pupil, where the teacher facilitates while the pupil takes "center stage." Six teachers emphasized pupils should do *more than* the teacher (e.g., more talking, working, participating), and five said pupils need to be "actively engaged." These remarks assign significant control to pupils in the learning progress without regard for the instructional labor required of teachers (e.g., preparation of materials, scaffolding questions, differentiated methods).

Student Teacher Needs

Finally, we asked participants at each of the 17 partner schools to describe what student teachers need to succeed in the profession. Most mentor and comparison teachers said B.Ed. students need more practical teaching experiences and skills, such as classroom management and coherent lesson design. Several also mentioned mentor teacher support, access to teaching and learning materials, and a combination of strong subject, curricular, and pedagogic knowledge. A few teachers said students need a strong teacher voice, more self-confidence, and to use more local language dialects during lessons.

On the other hand, to succeed as a B.Ed. student, student teachers said they need more teaching and learning materials, ranging from government finance, ICT, textbooks, lesson plan books, and "conducive" learning spaces with sufficient tables and chairs. A quarter of observed student teachers said they needed greater subject knowledge and a wider repertoire of pedagogic techniques, including skills for *using* teaching materials in practice. Similar to mentor and comparison teachers, students

also stressed the importance of more practical teaching experiences with opportunities for peer teaching and feedback from qualified and experienced mentors.

Conclusions on the New B.Ed. Curriculum

College tutors are seen as role models, who impact positively on student understandings of effective teaching. Level 200 and 300 students reported learning about a wide variety of topics, such as different kinds of assessment methods, but relatively few said tutors had covered how to develop or use materials for hands-on learning. Students contrasted qualities of tutor instruction with a prevalence of lecturing by former schoolteachers. In particular, students value the ways tutors actively engage them during lessons and adapt instruction to meet their needs. While feedback is especially valued, a few students reported some variation in feedback quality (also seen during lesson observations of tutors).

Partner schools for teaching practice were relatively close in proximity to the eight colleges. Less than half of level 300 students reported receiving any support from a mentor teacher prior to lesson observations. Of those students who did receive support, most said mentors gave verbal feedback on their teaching. Findings suggest teachers likely to serve as mentors to students in basic schools may have earned the minimum educational qualification and received some mentorship training, but may not necessarily grasp the conceptual complexity of pupil-centered methods (e.g., differentiation). In addition, potential mentor teachers may not necessarily possess teaching experience that extends beyond the beginning teacher phase (years 1-3). As a result, mentor teachers' practical knowledge and skills (e.g., how to enact techniques, manage behavior, or design learning units) and pedagogic orientation may vary from school to school.

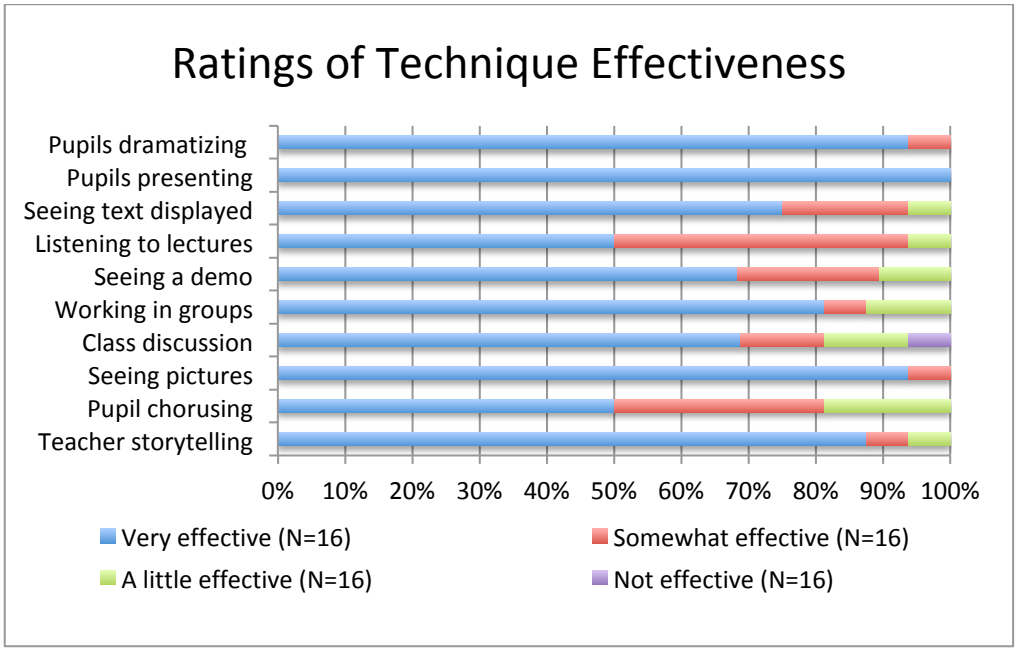
Student Teacher Understandings of Pupil-Centered Pedagogy

A central focus of this study is how student teachers understand the central tenants of pupil-centered teaching as presented within TFET. Below we present survey and interview data that reveals students' theories of learning, perceptions of technique effectiveness, and levels of confidence using various pupil-centered methods.

Perceptions of Technique Effectiveness

Student teacher perceptions of teaching effectiveness were measured in two ways. First, during interviews we asked students to rate a variety of pupil-centered and teacher-centered techniques on a 4-point scale from 'Very effective' to 'Not effective'. Findings are presented in Figure 1.

Figure 1. Student Teacher Ratings of Technique Effectiveness



The majority of students rated pupil-centered techniques, such as pupil presentations and pupils working together in groups, as very effective. In contrast, students had mixed perceptions on the effectiveness of teacher lecturing and pupil chorusing, two teacher-centered techniques. About half of students rated lecturing and chorusing as very effective while the other half rated these techniques as somewhat or a little effective. Seven student teachers explained that chorusing or recitation aids knowledge retention and helps new information "stick in your mind" (e.g., the ABC's).

We also assessed perceptions of technique effectiveness in the online survey by measuring students' level of agreement with statements derived from TFET training material. Table 8 summarizes survey respondents' level of agreement with five statements that are consistent with principles of pupil-centered teaching on a scale from 'Strongly agree' to 'Strongly disagree'. No statistically significant differences were observed between level 200 and 300 students in level of agreement.

Table 8. Student Teacher Agreement with Positive Pupil-Centered Statements

Positive Pupil-Centered Statements	**Number (Percentage)**					
	Strongly disagree	***Disagree***	***Neutral***	***Agree***	***Strongly agree***	***Total***
Pupils learn better when lessons build on their experiences at home and in the community	6 (4%)	4 (3%)	5 (3%)	46 (30%)	92 (60%)	153 (100%)
Independent learning activities help pupils discover answers to problems.	18 (12%)	33 (22%)	37 (25%)	43 (29%)	19 (13%)	150 (100%)
There are many different ways for pupils to achieve the same learning objective.	5 (3%)	0 (0%)	4 (3%)	54 (36%)	88 (58%)	151 (100%)
Pupils working together in small groups helps them learn from one another.	1 (1%)	2 (1%)	0 (0%)	29 (20%)	115 (78%)	147 (100%)

Paying special attention to girls during a lesson can make learning more inclusive.	54 (36%)	52 (35%)	10 (7%)	25 (17%)	7 (5%)	148 (100%)

More than 90% of respondents agreed or strongly agreed that pupils learn better when lessons build on their experiences, that there are many different ways for pupils to achieve the same learning objective, and that pupils working together in groups helps them learn from one another. The statement, "Paying special attention to girls during a lesson can make learning more inclusive," had the lowest mean score amongst level 200 and 300 students, with 71% disagreeing. One quarter of students were neutral about whether independent activities help pupils discover answers, while 34% disagreed.

The online survey also measured students' level of agreement with five negative statements that conflict with the central tenants of pupil-centered teaching.

Table 9. Student Teacher Agreement with Negative Pupil-Centered Statements

Negative Pupil-Centered Statements	N (Percent)					
	Strongly disagree	***Disagree***	***Neutral***	***Agree***	***Strongly agree***	***Total***
The more senses pupils use during a lesson (hear, taste, see, touch, smell), the less information they will remember.	56 (37%)	43 (28%)	6 (4%)	22 (14%)	25 (16%)	152 (100%)
Pupils reciting words or phrases in unison helps them remember new information	5 (3%)	10 (7%)	15 (10%)	79 (53%)	41 (27%)	150 (100%)
Having fun and playing games are not effective ways for pupils to learn new skills.	64 (43%)	70 (47%)	10 (7%)	2 (1%)	4 (3%)	150 (100%)
Shouting at pupils for bad behavior is more effective that praising them for good behavior.	59 (40%)	63 (42%)	13 (9%)	8 (5%)	6 (4%)	149 (100%)
Pupils listening to the teacher explain an idea is the most important part of a lesson.	4 (3%)	11 (7%)	17 (11%)	72 (48%)	46 (31%)	150 (100%)

The majority of respondents (more than 80%) disagreed that having fun and playing games are not effective ways for pupils to learn. A majority also disagreed that shouting at pupils for bad behavior is more effective than praising them. These pupil-centered stances closely align with those presented in TFET and those held by tutors found in the Training report. In contrast, 79% of students agreed that pupils listening to the teacher explain ideas is the most important part of a lesson. This stance conflicts with the pupil-centered idea that teachers should 'facilitate' pupils' active discovery of knowledge. In addition, 80% of respondents agreed that pupil recitation is an effective strategy for learning new information. Pupils memorizing facts and reciting these back to the teacher is a ubiquitous feature of teacher-centered instruction.

Theories of Learning

Evidence from the online survey showed a majority (69%) of students defined pupil-centered teaching as giving pupils agency (control) in the learning process. Remarks depicted pupils as the "focus" or "centerpiece" of lessons who should participate more as the teacher facilitates. Survey data also showed that 11% of respondents defined pupil-centered teaching as building on pupils' prior knowledge, and 8% said it meant addressing the unique learning needs of students. These patterns in understanding are examined more closely below in the ways students talked about teaching during interviews.

How teaching techniques promote learning was explored with student teachers during interviews. When asked what advice you would give a peer on how to teach a pupil-centered lesson, 10 of 16 students (63%) said pupils need to participate more in the learning process, for instance, through group work and demonstrating concepts. When asked *how* those methods aid learning, more than half explained that active participation enables pupils to learn from each other, exposes them to different ideas and opinions, and creates new learning opportunities for "shyer" or "weaker" pupils. One level 300 student explained how class discussions promote learning:

> When [a pupil] presents ideas to the class, [other pupils] will get a feel of how their colleagues also think of the concept and then they merge them with theirs. Even if a colleague's idea might be wrong, hearing from others and the teacher also commenting on it, they will take some things from it.

Half of interview participants mentioned the importance of building new knowledge onto pupils' existing knowledge. Most said this should be done at the beginning of lessons by asking questions that make connections things pupils are familiar with. Several students said that learning builds "from the known to the unknown," reflecting a constructivist principle of learning seen in the remarks of eight college tutors in the Training report. According to a student teacher, pupils bring knowledge resources with them to the classroom as tools for teaching:

> The learners you are going to teach are not just empty drums, but they come into the classroom with some little bits of knowledge but just that their knowledge might not be as yours. So, when you are planning your lessons, involve them, let them bring out what they already know and if there are shortages then you use what you have.

These remarks position pupils as 'knowers' in the learning process. In response to the statement, "Pupils learn better when lessons build on their experiences at home and in the community," all but one student agreed. Students explained that incorporating pupils' "background knowledge" and "community experience" builds a "foundation" for new knowledge, "engages" pupils in the lesson, and "deepens" understanding. The student who disagreed with the statement did not provide any explanation as to why.

Finally, students were asked about the effectiveness of several teacher-centered techniques, such as teacher lecturing. When pupils receive information visually or verbally (e.g., through oral instruction), TFET classifies these techniques as "passive" (as opposed to "active") learning methods. Student views were mixed on teacher-centered methods, especially on the use of chorusing and lecturing. On the one hand, students said teacher explanations and lecturing are boring and lack pupil perspective,

whereas others said lecturing is an important mode of instruction for relaying knowledge. Students said the benefit of chorusing or reciting material was mainly to help pupils remember new information. In contrast, several students said chorusing conflicts with a teacher's ability to gather evidence of individual pupil understanding.

Confidence Using Pupil-Centered Methods

Lastly, the online survey assessed the extent to which student teachers felt confident using eleven techniques covered in the TFET program. Responses were scored on a scale from 1-4, with 1 corresponding to 'Not confident' and 4 to 'Very confident'. Table 10 presents the data on student teacher confidence. No statistically significant differences were observed between level 200 and 300 students in level of confidence.

Table 10. Student Teacher Confidence to Use Pupil-Centered Techniques

How well prepared or confident do you feel to use the following techniques:	N (Percent)				
	Not confident	*A little confident*	*Somewhat confident*	*Very confident*	*Total*
Setting up your classroom in a child-friendly way		8 (6%)	13 (9%)	116 (85%)	137 (100%)
Using pupils' ideas, questions, and personal experiences in your lessons	1 (1%)	5 (4%)	14 (10%)	115 (85%)	135 (100%)
Having pupils work together on activities in small groups	1 (1%)	2 (1%)	4 (3%)	128 (95%)	135 (100%)
Creating low/no-cost teaching and learning materials	14 (10%)	17 (13%)	23 (17%)	81 (60%)	135 (100%)
Supporting positive pupil behavior in your classroom	1 (1%)	4 (3%)	7 (5%)	122 (91%)	134 (100%)
Creating interactive, hands-on activities for pupils to explore new ideas		4 (3%)	12 (9%)	116 (88%)	132 (100%)
Using a variety of teaching strategies or assessments during a lesson		5 (4%)	6 (4%)	123 (92%)	134 (100%)
Making accommodations for pupils with special learning needs	2 (1%)	11 (8%)	17 (13%)	105 (78%)	135 (100%)
Incorporating play or games into lessons	3 (2%)	6 (4%)	17 (13%)	109 (81%)	135 (100%)
Managing your instructional time		10 (7%)	12 (9%)	113 (84%)	135 (100%)
Writing your own lesson plans/notes	1 (1%)	6 (4%)	4 (3%)	125 (92%)	136 (100%)

Generally, student teachers felt confident using most pupil-centered techniques. Students felt most confident having pupils work together on activities in small groups, supporting positive pupil behavior, using a variety of teaching strategies, and writing lesson plans. Students felt least confident making accommodations for pupils with special learning needs and creating low or no-cost teaching and learning materials.

Preparing and using low/no-cost materials was found to be a useful and empowering TFET module for participants across Phase III research. In this study interviews with students showed that 63% had created teaching materials before, 44% had learnt about using materials during courses with tutors, and 40% had received support from a teacher mentor on how to use materials during lessons. During the online survey students were asked to name one example of a low-cost resource and describe how

they would use it to teach a mathematics lesson. Most respondents gave examples of low/no-cost counters like bottle tops, sticks, and stones to teach addition, subtraction, or counting, while very few students described more complex methods (e.g., playing games with dice) or how the learning material actually aided conceptual understanding. These findings on student experience and understanding help explain the relatively low levels of student confidence to create or use low/no-cost materials effectively on their own.

Conclusions on Student Teacher Understandings

Student teachers viewed pupil-centered methods, such as grouping and connecting lesson content to pupil experience, as effective means for relaying and deepening understanding of new knowledge. Several teacher-centered methods were also considered effective. Pupils chorusing and listening to the teacher explain ideas were viewed as important and effective techniques by the majority of interview and survey respondents. Students mainly showed a positive orientation to differentiation and grouping, negative perceptions of techniques that promote gender equity, and mixed views on independent learning. Student teachers felt most confident to use grouping methods and least confident creating low or no-cost teaching materials. Overall, student teachers expressed a mixed orientation to pupil-centered pedagogy that mirrors many of the perspectives college tutors expressed in the Training report.

The Learning Environment

This section draws on classroom observation data to examine the learning environments of 32 classrooms, that is, how classrooms were organized and managed by teachers. We also draw on survey data to assess student teacher understandings of a pupil-friendly environment. According to TFET, a pupil-friendly learning environment promotes respectful relationships, fosters collaboration and encourages positive pupil behaviors. Findings revealed some variation in how teachers viewed, organized, and managed the learning environment.

Pupil Arrangements

Survey respondents were asked to identify one important thing that makes the classroom pictured in Figure 2 below ‘child-friendly’. The image was retrieved from the TFET training manual (p. 21) as an exemplary child-friendly classroom due to its displays, manipulatives, and a supportive teacher walking around to monitor pupils working in groups.

Figure 2. Exemplary Image of Child-Friendly Classroom

Of 153 survey respondents, 74% said pupil grouping or the seating arrangement made the classroom environment child friendly. For instance, students explained, "Such arrangements give opportunity for group discussions" and "tables are arranged so that it's easy for students to collaborate on projects or on analyzing readings." Less frequently mentioned features were the display of materials around the room and sufficient space for the teacher to move freely. These findings suggest student orientation toward the spatial (organizational) dimension of pupil-centered instruction.

During lesson observations, moderators looked for several indicators of pupil-centered arrangements, including pupils sitting together in groups and the whole class facing each other in some way. Both arrangements make collaborative learning possible. Observations also assessed seating variety, where pupils were arranged in more than one way during the 45-minute period. While most classrooms had seats for all pupils, three student teacher classrooms did not.

Findings showed 79% of student teachers and 50% of comparison teachers kept learners in the same place throughout the entire 45-minute period. Table 11 summarizes the different kinds of learner arrangements seen during lessons taught by student and comparison teachers.

Table 11. Observed Pupil Arrangements

Observed Pupil Arrangements	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Sitting at desks in rows	21 (88%)	5 (63%)	26 (81%)
Sitting together in one group on the floor/mat	1 (4%)	0 (0%)	1 (3%)
Sitting together at desks or tables in several small groups	8 (33%)	7 (88%)	15 (47%)
Sitting in a circle facing each other	1 (4%)	1 (13%)	2 (6%)

Across 26 of the 32 lessons (81%), pupils were organized at desks in rows, reflecting a traditional teacher-centered arrangement. During about half of all lessons, pupils sat together at desks or tables in several smaller groups, enabling the potential for collaborative learning. Very few teachers organized pupils into one group on the floor or in a circle facing each other. A third of student teachers arranged pupils into groups, whereas 88% of comparison teachers did so. Overall, one third of student teachers

used some form of collaborative seating arrangement, and 21% used a combination of collaborative and traditional seating during the lesson. In contrast, three quarters of comparison teachers used collaborative seating arrangements, and half used a combination of collaborative and traditional.

Display of Teaching and Learning Materials

The TFET program depicts a pupil-centered learning environment with teaching and learning materials displayed around the room, especially on walls and tables. Materials may be used to manage classroom behavior (e.g., class rules) or to support teaching and learning (e.g., a map). The display of 16 materials was assessed during lesson observations, listed below in Table 12. Each material was seen at least once except for the happy/sad faces chart, star chart, and computer. Most classrooms had at least 4-5 materials on display, significantly more materials than those seen in tutors' college classrooms.

Table 12. Teaching and Learning Materials on Display

TLMs in Display in Classrooms	Percent of Student (N = 24)	Percent of Comparison (N = 8)	Percent of Total (N = 32)
Chalkboard	75%	75%	75%
Timetable	71%	63%	69%
Image(s)	58%	88%	66%
Whiteboard	54%	63%	56%
Learners' own work	38%	25%	34%
Words matched to pictures	29%	13%	25%
Map(s)	25%	13%	22%
Class rules	21%	25%	22%
Class calendar	8%	38%	16%
Class helpers chart	13%	13%	13%
Activity corners	8%	13%	9%
Other chart(s)	13%	0%	9%
Subject board	8%	0%	6%
Smiley/sad faces chart	0%	0%	0%
Star chart	0%	0%	0%
Computer(s)	0%	0%	0%

All 32 classrooms had a chalkboard and/or a whiteboard. Most rooms had a daily or weekly timetable displayed on the wall. Learners' own work was displayed in a third of classrooms, and one quarter had map(s), class rules, and words matched to pictures pasted onto the walls. Less frequently seen were class helper charts, activity corners, subject boards, and other kinds of charts for learning.

Classroom Management

Challenges with classroom management are typical for pre-service and beginning teachers. Observation data showed that student teachers generally struggled to address conflict and pupil misbehavior during lessons (e.g., pupils talking, not completing tasks, fighting, walking around the room, etc.). At least four host teachers stepped in to help with lesson transitions and by instructing pupils to be quiet. One student teacher nearly lost control of a large grade 3 class, partly by giving too much control to pupils during a small group activity without setting expectations for behavior first. Despite these challenges, findings do show various ways student teachers used discipline techniques,

facilitated routines, and managed time during lessons. We also draw on survey data below to explore how student teachers think about discipline.

Positive Discipline

Positive discipline is a system of classroom management that promotes respect. Teachers refer to class rules, model calm behavior, and praise pupils for following instructions. Much of the Phase III research showed that Master and Step-down TFET trainees found the idea of positive discipline useful and distinctive from other programs but also challenging to put into practice. Class size and traditional Ghanaian discipline were identified as the main obstacles to uptake. During lesson observations of college tutors, most were seen to use relatively more positive behavior strategies than negative. In this study, 88% of interviewed students reported learning about positive discipline strategies during B.Ed. courses.

First, to explore the ways student teachers think about discipline the online survey asked respondents to name one positive discipline strategy they would use if pupils were talking loudly, not paying attention, and distracting others during a lesson. Responses varied widely, with the majority citing a positive strategy that encouraged desired behavior. Changing pupils' seating arrangement was most frequently mentioned by 18% of respondents. Asking students questions to reengage them in the lesson was mentioned by 17% of respondents. Other positive strategies, such as clapping and singing songs, were mentioned less frequently. In contrast, several forms of physical punishment were mentioned by 11% of respondents, such as tapping, kneeling, and standing.

During lesson observations of student and comparison teachers we assessed the presence of 10 positive behavior techniques, listed in Table 13.

Table 13. Observed Positive Behavior Management Strategies

Observed Positive Behavior Strategies	Percentage of Student (N = 24)	Percentage of Comparison (N = 8)	Percentage of Total (N = 32)
The teacher refers students to the class rules	0%	13%	3%
The teacher refers to consequences for breaking class rules	4%	13%	6%
The teacher moves learner name(s) to a Smiley or Sad Faces chart	0%	0%	0%
The teacher explicitly praises learners for good behaviour	29%	50%	34%
The teacher explicitly praises learners for correct answers	88%	88%	88%
The teacher awards learner(s) a star on a Star chart	0%	0%	0%
The teacher models calm and positive behaviour	50%	38%	47%
The teacher resolves conflict by discussing problem(s) and/or solutions with learners	4%	13%	6%
The teacher changes student seating arrangements	17%	13%	16%
The teacher reengages student by asking a content-related question	33%	25%	31%
The teacher instructs learners to place a finger to their lips	17%	0%	13%
Other	17%	25%	19%

Amongst the 32 teachers, a majority (88%) explicitly praised pupils for correct answers during the lesson, usually with the phrase, "Clap for him/her." This was the most commonly seen positive behavior strategy for all teachers in this study. Half of student teachers modeled calm behavior throughout the lesson whereas 38% of comparison teachers did so. In contrast, half of comparison teachers praised pupils for good behavior whereas 29% of student teachers did so. Other kinds of

positive strategies seen during lessons included one-on-one discussions between the teacher and a pupil and reengaging pupils with song and dance. Very few teachers made reference to class rules or helped pupils resolve conflict.

The presence of eight negative behavior strategies was also assessed. Negative strategies discourage unwanted behavior (rather than encouraging desired or positive behavior and relationships). Table 14 summarizes the presence of negative strategies across classrooms.

Table 14. Observed Negative Behavior Management Strategies

Observed Negative Behavior Strategies	Percentage of Student (N = 24)	Percentage of Comparison (N = 8)	Percentage of Total (N = 32)
The teacher shouts at learners to get their attention	46%	38%	44%
The teacher shouts at learners to show disapproval of behaviour	17%	25%	19%
The teacher points out negative behaviour or poor performance of learners	8%	25%	13%
The teacher makes learner(s) stand during class	17%	0%	13%
The teacher takes something away from the learner(s)	4%	0%	3%
The teacher threatens learners with corporal (physical) punishment	4%	13%	6%
The teacher uses corporal (physical) punishment	0%	13%	3%
Other	4%	13%	6%

Amongst student and comparison teachers, the most commonly observed negative behavior strategy was shouting at pupils to get their attention, seen in 44% of all lessons. Using or threating pupils with corporal punishment (e.g., kneeling) was seen in three classrooms, two of which were comparison teachers. Overall, teachers used significantly fewer negative behavior strategies than positive across the 32 lessons.

Classroom Routines

According to TFET, routines are predictable classroom behaviors that create a sense of order and allow pupils to act independently, manage their time, and predict what comes next during the school day. This study assessed the presence of five behavioral routines that pupils carry out *without* the teacher explaining how to do so.

Table 15. Observed Behavioral Routines

Observed Behavioral Routines	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Collecting or handing out materials or texts	25%	25%	25%
Packing away materials or texts	21%	13%	19%
Transitioning from one activity or lesson to the next	8%	13%	9%
Entering and/or exiting the room	50%	38%	47%
Raising a hand before speaking	100%	88%	97%

Teacher use of behavioral routines during lessons was mostly similar between student and comparison teachers. During all 32 lessons at least 1-2 different routines were seen. Pupils raised a hand before

speaking in 97% of lessons and collected or handed out materials in one-quarter of lessons. No relationship between class size and use of routine, as seen in the tutor observation study, was found.

Time Management

TFET covers several time management techniques to support teachers in maximizing time for learning, including setting a daily schedule and assigning pupils class responsibilities. Table 16 presents findings on the use of five techniques for managing time during lessons.

Table 16. Observed Time Management Techniques

Observed Time Management Techniques	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Learners carry out classroom helper duties during the observed period	4%	13%	6%
The teacher refers learners to a timetable or class calendar	4%	0%	3%
The teacher claps her or his hands to get learners' attention	29%	25%	28%
The teacher tells learners how much time they have to complete a task	21%	50%	28%
The teacher appears prepared for the lesson with materials ready	75%	88%	78%

The majority of student and comparison teachers appeared prepared for lessons with materials ready. Half of comparison teachers told pupils how much time they had to complete tasks, whereas a quarter of student teachers did so. About one quarter of all teachers clapped their hands to get pupils' attention. One student teacher made reference to a timetable, and during two lessons, learners were seen carrying out helper duties. Nearly all teachers in this study used 1-2 different techniques for managing time.

Gender Equity and Inclusion

The extent to which teachers supported gender equity and inclusion of pupils with special needs was examined during lessons. During 97% of lessons, pupils were able to easily enter and exit the room. However, during 5 lessons pupils were unable to move around due to crowded rooms. Across lessons, half of teachers taught classes of more than 40 pupils and 19% of teachers taught more than 60 pupils. Although the study did not specifically measure whether pupils had special learning needs, no teachers were seen providing special assistance during the 45-minute observation period. When a pupil with a stammer was unable to answer a question, the student teacher asked a different learner for the answer, despite the host teacher explicitly indicating the learning need.

Finally, we assessed gender equity in the ways teachers supported girl learners during the lesson. Findings are summarized in Table 17.

Table 17. Observed Techniques for Supporting Girl Pupils During Lessons

Gender Equity	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Gives learners examples of women in non-traditional roles or occupations (e.g., women scientists)	0%	0%	0%
Encourages girls to participate in a lesson activity	50%	38%	47%

Assigns a leadership role to girl(s)	0%	0%	0%
Explicitly praises the efforts or ideas of girls	13%	25%	16%

Half of student teachers encouraged girls to participate in a lesson activity (e.g., by explicitly asking for a girl learner to respond to a question or perform a task). Thirty-eight percent of comparison teachers did so. Three student teachers and two comparison teachers explicitly praised the efforts or ideas of girls. No teachers assigned leadership roles to girls or gave pupils examples of women leaders during lessons.

Conclusions on the Learning Environment

The learning environments of the 32 observed classrooms were mostly similar in the ways teachers organized and managed learning activity. Most teachers used a traditional seating arrangement during part of the lesson. Three quarters of comparison teachers also used some form of pupil grouping, whereas one third of student teachers did so. All classrooms had a chalkboard or whiteboard and most displayed 4-5 different materials on the walls. Most commonly seen were imagery and timetables. A majority of teachers (88%) praised pupils (for answers) and shouted to get pupils' attention. Overall, student and comparison teachers used significantly fewer negative behavior strategies than positive. The online student survey also revealed a mostly positive orientation to discipline. Most teachers appeared prepared for lessons, and nearly all teachers used 1 or 2 different time management strategies.

Classroom Pedagogy

This section describes student teacher uptake of pupil-centered methods during lesson observations. In the discussion of findings, we draw on interview and survey data. The section covers a range of pedagogic areas including differentiation, assessment, and use of teaching materials. Findings reveal similarities and differences in the pedagogic styles of student and comparison teachers. A summary of characteristics for each of the 32 lessons is located in Appendix E.

Observed General Lesson Characteristics

Each classroom observation began from the start of the lesson. Most lessons lasted 45 minutes, although seven student teacher lessons ended early, lasting between 25-40 minutes. Pacing instruction is an emerging pedagogic skill for pre-service teachers. The style of teaching across the 32 lessons was more similar than it was different, especially in the ways teachers relayed content and ideas. Similarities in teaching quality were seen amongst and between student and comparison teachers. Most lessons resembled traditional forms of teacher-centered instruction, especially oral ("chalk and talk") whole class instruction, pupil chorusing, and undifferentiated content and methods. However, lesson narratives also showed the use of some pupil-centered techniques, such as connecting content to pupil experience, use of materials, and small group activities. While some creative methods were used, no instances of play-based learning were seen. Most lessons were driven by a combination of closed and open-ended questioning by the teacher (e.g., pupils defining concepts, chorusing facts,

giving examples, etc.). The extent to which teachers explicitly stated specific content, criteria, or disciplinary knowledge varied significantly across classrooms. Lastly, more than half of teachers assigned exercises for pupils to complete independently in writing at the end of the lesson.

Narrative data showed strong similarities in the organization and sequencing of lessons with six common phases. Table 18 presents a brief description of each phase.

Table 18. Observed Lesson Sequencing During Student and Comparison Teacher Lessons

Lesson Phase	Description of Teaching and Learning Activities
Greeting and song	Greeting by the teacher followed by an introductory song that usually includes movement or a prayer led by the teacher or a learner (use of song potentially a behavior management technique for settling/focusing learners for the forthcoming lesson)
Activation of prior knowledge	The teacher asks learners a series of questions connected to things they may already know or be familiar with (either loosely or directly connected to forthcoming lesson content)
Statement of lesson topic	Usually written onto the board by the teacher. Sometimes includes subject, strand, and sub-strand as outlined in the basic education curriculum
Teacher input and guided practice	Most of the 45 minutes is spent here. The teacher presents examples of concepts or ideas, defines, pronounces, or spells concepts or ideas as learners (usually) chorus these in response ("chalk and talk" style of pedagogy). The teacher calls on learners to respond to questions that (usually) require some application of knowledge (e.g., form a sentence using the preposition, 'on'). Some teachers provide feedback on learning. In some classes learners work together in groups while the teacher moves around the room observing/supporting
Independent practice	Learners are given a list of exercises, written onto the board by the teacher. Learners are expected to copy down and complete each exercise on their own, although during most lessons there is very little time allocated to this lesson phase. Most exercises are a combination of 3-5 true/false, fill in the blank, short answer, or multiple-choice tasks. Exercises do not always align with the lesson objectives or content covered. The lesson usually ends while students are still busy working. Some teachers move around the room or call on learners to submit their work for marking. If time runs out, some teachers assign exercises as homework.
Closure	The teacher recaps the lesson by asking learners to state what they learnt during the lesson. Teacher sometimes asks questions on the main topics or concepts covered. Usually occurs while learners are still busy completing exercises.

Grade Level

Of the 32 observations, 22 lessons (69%) were taught at primary level, 8 at JHS level, and 2 at kindergarten level, displayed in Table 19.

Table 19. Grade Level Taught During Observed Lessons

Grade Level Taught	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Kindergarten (KG 1-2)	2	0	2
Lower Primary (P 1-3)	9	3	12
Upper Primary (P 4-6)	7	3	10
Junior High (JHS 7-9)	6	2	8

Lesson Type

While all teachers in this study used teacher-centered methods such as oral instruction and chorusing, 88% used a few pupil-centered methods. Observed pupil-centered methods either modified the organization of pupils (e.g., grouping) or allowed pupils to handle, manipulate, observe, or apply knowledge in a variety of ways (e.g., hands-on activities). The use of particular methods does *not* necessarily mean methods were used effectively in ways that supported learning. Nonetheless, student and comparison teachers did use a few techniques that attempted to promote pupil-centered learning.

Patterns in the pedagogic style of lessons emerged from lesson narratives. These patterns indicate the presence of four general lesson types based on the extent to which teachers used pupil-centered techniques. These were 1) mostly pupil-centered lessons, 2) hybrid lessons, 3) mostly teacher-centered lessons, and 4) teacher centered lessons. Table 20 summarizes findings on observed lesson type amongst student and comparison teachers.

Table 20. Summary of Observed Lesson Types

Lesson Type	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Teacher uses *many* P-C techniques *(Mostly pupil-centered lesson)*	1 (4%)	1 (13%)	2 (6%)
Teacher uses *some* P-C techniques *(Hybrid lesson)*	11 (46%)	1 (13%)	12 (38%)
Teacher uses *a few* P-C techniques *(Mostly teacher-centered lesson)*	9 (38%)	4 (50%)	13 (41%)
Teacher uses *little to no* P-C techniques *(Teacher-centered lesson)*	3 (13%)	2 (25%)	5 (16%)

The majority of lessons (79%) displayed a *hybrid* or *mostly teacher-centered* pedagogy, indicating a prevalence of teacher-centered techniques, especially oral instruction and chorusing. During hybrid lessons pupils had opportunities to engage with content in various ways and make a few choices about learning. For example, Comparison Teacher 6 taught a hybrid lesson with group activities that drew on pupils' personal experiences. The teacher also instructed the whole class through oral questioning but did not prompt pupils to chorus any answers or definitions.

By sub-group, half of student teachers and three-quarters of comparison teachers taught *mostly teacher-centered* or *teacher-centered* lessons. During these lessons the teacher mainly controlled the selection, sequencing, and pacing of content through oral instruction, questioning, and at least some

chorusing. These findings indicate strong similarities in pedagogic style across the study sample as well as relatively *fewer* pupil-centered techniques used by comparison teachers. Very few student or comparison teachers were observed teaching a *mostly pupil-centered* lesson (where many different pupil-centered methods were used).

In comparison to observed tutor lessons at the case study colleges, findings from this study showed student teachers used relatively *fewer* pupil-centered methods during practice lessons. While tutors and student teachers were both seen to use chorusing and oral whole class instruction, collaborative learning and differentiated methods were more prevalent in tutor classrooms.

Class Size

Class size varied significantly within the study sample. Across classrooms, class size ranged from 11 to 78 pupils, with the average being about 43 pupils in one class (sd = 19.87). Half of teachers taught classes of more than 40 students, and 19% of teachers taught more than 60 pupils at a time.

Table 21. Summary of Observed Class Size

Class size	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
1-20 pupils	4 (17%)	0 (0%)	4 (13%)
21-40 pupils	8 (33%)	4 (50%)	12 (38%)
41-60 pupils	8 (33%)	2 (25%)	10 (31%)
61-80 pupils	4 (17%)	2 (25%)	6 (19%)

Prior Phase III research suggested a relationship between class size and uptake of pupil-centered techniques. During prior interviews with college tutors, many identified class size as a challenge to using pupil-centered methods. Some tutors taught very large classes of +/- 100 students. Observations of tutor lessons showed tutors were more likely to use pupil-centered methods in classes of *less than* 60 students. We therefore assessed the relation between lesson type and class size to explore whether student and comparison teachers were more likely to use pupil-centered techniques with smaller classes of pupils.

Table 22. Comparing Observed Lesson Type with Class Size

Lesson Type	1-30 Pupils (N=11)	31-60 Pupils (N=15)	61-80 Pupils (N=6)
Teacher uses *many or some* P-C techniques *(Mostly pupil-centered lesson or hybrid)*	55%	47%	17%
Teacher uses *a few* or no P-C techniques *(Mostly teacher-centered or teacher-centered lesson)*	45%	53%	83%

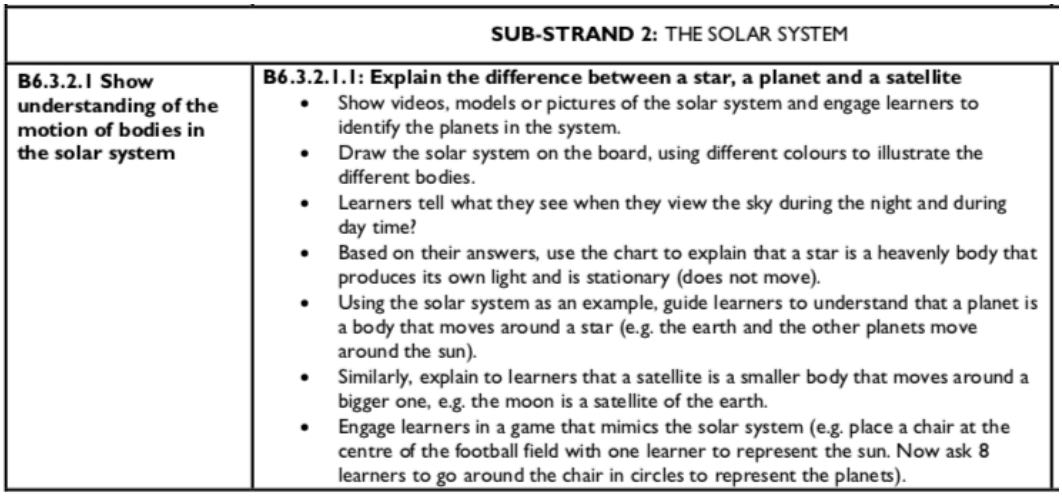
During lessons with more than 60 pupils, teachers were less likely to use pupil-centered methods. In lessons with fewer than 60 pupils, teaching styles varied, where about half used some pupil-centered methods and the other half used a few or none at all. Findings suggest teachers may find pupil-

centered methods, such as hands-on activities, collaborative learning, and differentiation, challenging to implement within very large classes, especially classes of more than 60 pupils. In this study 19% of classes were larger than 60 pupils.

Lesson Coverage

Various subject areas were observed during lessons, listed in Table 23. Lessons aligned with the new basic education curriculum (to particular grade levels, strands, or sub-strands). Figure 3 presents an extract of content standards, indicators, and exemplars reflecting several pupil-centered techniques from the national grade 6 science curriculum.

Figure 3. Extract from Grade 6 *Science Curriculum for Primary Schools (Basic 4-6)*



SUB-STRAND 2: THE SOLAR SYSTEM	
B6.3.2.1 Show understanding of the motion of bodies in the solar system	**B6.3.2.1.1: Explain the difference between a star, a planet and a satellite** • Show videos, models or pictures of the solar system and engage learners to identify the planets in the system. • Draw the solar system on the board, using different colours to illustrate the different bodies. • Learners tell what they see when they view the sky during the night and during day time? • Based on their answers, use the chart to explain that a star is a heavenly body that produces its own light and is stationary (does not move). • Using the solar system as an example, guide learners to understand that a planet is a body that moves around a star (e.g. the earth and the other planets move around the sun). • Similarly, explain to learners that a satellite is a smaller body that moves around a bigger one, e.g. the moon is a satellite of the earth. • Engage learners in a game that mimics the solar system (e.g. place a chair at the centre of the football field with one learner to represent the sun. Now ask 8 learners to go around the chair in circles to represent the planets).

(Ministry of Education, 2019, p. 38)

In this study several student teachers modeled curriculum exemplars during lessons. For example, during a lesson on the solar system, a student teacher used several techniques listed in Figure 3, such as drawing the solar system on the board and asking learners what they see when they view the night sky.

Table 23. Observed Lesson Coverage

	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Language/Literacy	3 (13%)	2 (25%)	5 (16%)
Mathematics/Numeracy	3 (13%)	0 (0%)	3 (9%)
Religious and Moral Education	3 (13%)	0 (0%)	3 (9%)
Science	13 (54%)	4 (50%)	17 (53%)
Other	2 (8%)	2 (25%)	4 (13%)

More than half of observed lessons covered science curricula. Science topics included living and non-living things, parts of a flower, sources of light, and water. Language/literacy was covered during five lessons (four English and one Fante), for instance, on poetry and prepositions. Narrative data also showed teachers supported pupils' literacy skills in other ways during six non-language lessons. Examples include pupils spelling 3-letter words during a science lesson and using their hips to 'draw' each letter in the word 'science'. Three teachers taught a mathematics lesson, and one student teacher supported numeracy during a KG2 science lesson when pupils counted sets of cards. Religious and Moral education (RME) was taught during three lessons on topics like creation and the environment. Finally, four teachers taught other subjects (Social Studies, Basic Design and Technology, and Our World, Our People).

Teacher-Pupil Interactions

How time was spent during the 45-minute observation period is presented in Table 24. The table displays how much time teachers spent instructing the whole group and how much time pupils worked in groups, pairs, or on their own on a learning task. Findings reveal similarities in the ways student and comparison teachers interacted with pupils across the 32 lessons.

Table 24. Observed Teacher-pupil Interactions

Teacher-Pupil Interactions	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Teacher instructs the whole group			
Never	0	0	0
Less than half the time	0	1	1
Half or more than half the time	20	6	26
All the time	4	1	5
Pupils complete tasks in small groups or pairs			
Never	10	5	15
Less than half the time	13	1	14
Half or more than half the time	1	2	3
All the time	0	0	0
Pupils complete tasks on their own			
Never	9	4	13
Less than half the time	15	4	19
Half or more than half the time	0	0	0
All the time	0	0	0

The majority of teachers spent half or more than half of the lesson instructing the whole class, a central indicator of teacher-centered pedagogy. Five teachers (16%) spent the *entire* 45-minutes instructing the class. During 47% of lessons, no grouping or paired learning activities were seen. In the other half of lessons, grouping or pairing was mainly used for less than half the time (sometimes no more than 5 minutes). In contrast, three teachers spent half or more than half the lesson on collaborative learning activities. For example, during a student teacher RME lesson, grade 8 pupils first discussed the creation story in groups then presented their ideas to the class. While pupil presentations were only seen during two lessons (6%) in this study, presentations were seen during

56% of observed tutor lessons. Lastly, half of comparison teachers and 9 student teachers (38%) did not assign any kind of independent task, where pupils completed exercises on their own.

Pupil-centered Learning Opportunities

Four kinds of pupil-centered activities were assessed during each observation, listed in Table 25. Indicators were drawn from TFET modules and selected based on their centrality to pupil-centered teaching.

Table 25. Observed Pupil-centered Learning Opportunities

Pupil-centered Learning Opportunities	Percent of Student (N = 24)	Percent of Comparison (N = 8)	Percent of Total (N = 32)
Pupils work together in small groups or partners on learning tasks	58%	38%	53%
Pupils use their hands to manipulate materials to complete a learning task	29%	38%	31%
Pupils ask the teacher questions	17%	38%	22%
Pupils share individual ideas with the teacher (one learner speaks at a time)	92%	100%	94%

In all but two classes, learners shared their ideas with the teacher, speaking one at a time. Grouping was more commonly seen in 58% of student teacher lessons, compared to 38% of comparison teacher lessons. Pupils used their hands to manipulate materials during 31% of lessons. For instance, during a grade 1 comparison teacher lesson on hygiene, pupils took turns using soap and water to practice hand washing. Least observed across lessons was pupils asking the teacher questions, although this was more frequently observed in 38% of comparison teacher classes. When this occurred, narrative data showed pupils asked the teacher for clarity on something the teacher said or wrote on the board.

Pupil Prior Knowledge

Connecting lessons to pupils' prior knowledge or experience underpins both TFET and the new B.Ed. curriculum. The college tutor observation report found three quarters of tutors asked students to share their personal knowledge of topics during lessons, attempting to build on things students already knew. In 81% of lessons, tutors connected concepts to things student teachers were familiar with or interested in.

In this study all comparison teachers and 79% of student teachers asked at least a few learners to share their own knowledge or experience (e.g., things pupils see on the way to school then classify those things as living or non-living). This typically occurred at the beginning of lessons as an introduction to the lesson topic. Moreover, 100% of comparison teachers and 83% of student teachers made content relevant to pupils by connecting lesson topics to familiar ideas. Standout examples seen during student teacher lessons were:

- Pupils identifying which body parts are used to perform various activities, such as crossing the road or playing Ampe (grade 3 science lesson)
- Pupils identifying common sources of water used for everyday activities like cooking and bathing (grade 4 science lesson)

- Pupils describing who they live with and the role of their primary caregiver for classifying different family structures (grade 7 social studies lesson)

What varied significantly in the connections made to pupil experience was the extent to which teachers moved beyond pupils' everyday experience and introduced *new forms of specialized knowledge* with clearly defined concepts (e.g., nuclear vs. extended family types). While most teachers used oral questioning to drive instruction (e.g., "How many of us live with our parents and siblings?"), which elicited ideas from pupils, only some teachers gave pupils feedback on their ideas that included explicit criteria for evaluating the accuracy or appropriateness of answers. In other words, only some teachers in this study clearly built new knowledge onto pupils' existing knowledge.

Use of Text

During 72% of lessons, some kind of text was read by the teacher and/or by the pupils. No texts were read during seven student teacher lessons or during two comparison teacher lessons. Thus, about one quarter of all lessons were largely oral. Table 26 summarizes *how many* different types of texts were read and *by whom* across the 23 lessons where reading occurred.

Table 26. Types of Texts Read by the Teacher and/or Pupils During Observed Lessons

Texts Read During Observed Lessons	Read by the Teacher	Read by the Pupils	Read by Both
Text created on the board	8	2	10
Textbook	2	0	5
Workbook	0	7	0
Other	0	5	0
Chart or poster	1	2	0
Flash cards	1	0	2
Computer	2	0	0
Text projected onto the board/screen	2	0	0
Worksheet	0	2	0

Pupils *and* teachers reading text off of the chalkboard was most commonly seen during 20 lessons. In some cases, pupils read independently out loud for the class, whereas in others, pupils read altogether in chorus. For example, grade 4 pupils choral read a list of benefits of the sun that a student teacher had written on the board during a science lesson. Pupils also read assigned material from workbooks during seven lessons and from textbooks during five lessons. Other kinds of materials (e.g. sentences written into exercise books) were read by pupils during five lessons. For instance, a comparison teacher supported grade 4 pupils to first write and then read aloud brief narratives of what they did before coming to school. This teaching approach modeled pupil-centered reading of meaningful text. During three lessons, text from flash cards and posters was read. Reading from storybooks or off cell phones (seen during 31% of college tutor lessons) was not observed in this study. Findings show few differences in the use of text between student and comparison teachers and a prevalence of text read off the board by a majority of teachers and pupils.

Summary of Lesson Characteristics

Class sizes varied widely, and half of teachers taught more than 40 pupils. The use of teacher-centered methods was prevalent across the study sample and seen more frequently during comparison teacher lessons. Findings suggest teachers may be less likely to use pupil-centered methods in very large classes of more than 60 pupils. Most lessons displayed whole class oral instruction and chorusing with some reading of text off the board. The use of group and independent tasks was mixed, though grouping was more commonly used by student teachers. Hands-on pupil activities were less common across lessons. While the majority of teachers connected lesson content to familiar ideas, only some teachers introduced clearly defined criteria or concepts that built upon pupils' existing knowledge. Overall, the general pedagogic styles of student and comparison teachers were more similar than different, and all lessons displayed common elements of traditional teacher-centered instruction.

Differentiated Instruction

TFET defines differentiation as using various teaching strategies, activities, and assessments during a single lesson to ensure all pupils achieve the same learning objective. Interview and survey data showed that nearly all students reported learning about differentiation during B.Ed. courses and felt very confident to use various teaching strategies and assessments in lessons. In this section, we draw on interview and observation data to explore in greater depth how students think about and use differentiated techniques during lessons.

Theories of Instructional Differentiation

During interviews, a majority of students (56%) said differentiation meant using various techniques for supporting pupils' diverse learning styles or preferences, such as seeing, acting out, handling, hearing about, and visualizing ideas in different ways. A third of students said differentiation meant giving pupils different tasks to the rest of the class, including to "stronger" and "weaker" learners, and another third said it meant organizing pupils into groups for some kind of collaborative learning activity, such as "think-pair-share" or group presentations. Several student teachers explained that grouping fosters peer learning, where stronger pupils help teach weaker ones. A quarter of students said to differentiate meant allocating more time to those who need it. Only one student said they did not know what differentiation meant.

The online survey also assessed understandings of differentiation. Respondents were asked to name one strategy to differentiate a written vocabulary activity for pupils who struggle with writing. Responses varied widely from simple techniques, such as allocating more time to the activity, to more complex methods like writer's notebooks, games, and workshops. Different ways to gather evidence of understanding included dramatizing, drawing, or discussing the meaning of words in groups (rather than writing words down). Ten percent of respondents said they would audio-record the words/definitions and play the recording back to pupils. The most common differentiation method cited by 18% of respondents was teachers working one-on-one with struggling writers, either by modeling how to write words on paper or assisting with pronunciation. Lastly, 8% of respondents said they would ask struggling writers to recite the words or spell the words aloud.

Most student teachers displayed a pupil-centered orientation to differentiated instruction as it is presented in the TFET program. Student understandings also mirror those of college tutors found in the Training report, who defined the concept in very similar ways with an emphasis on diverse learning styles.

Learning Styles

Lesson observations assessed ten different learning styles as presented by TFET by focusing on *what* pupils did during the lesson. The greater the variety of observed learning styles, the more differentiated the pedagogy. Table 27 summarizes the modes of learning seen during student and comparison teacher lessons.

Table 27. Learning Styles Observed During Lessons

Learning Styles: What the Pupils Do During the Lesson	Percent of Student (N = 24)	Percent of Comparison (N = 8)	Percent of Total (N = 32)
See images, pictures, maps, or demonstrations to visualize the lesson topic	54%	63%	56%
See words written on paper, the board, or a chart to read the lesson topic	92%	88%	91%
Listen to explanations, songs, or stories on the lesson topic	75%	100%	81%
Speak out loud about the lesson topic	88%	100%	91%
Perform a song or skit related to the lesson topic	54%	25%	47%
Move their bodies to dramatize or act out ideas related to the lesson topic	25%	0%	19%
Use their hands to build, sort, create, or manipulate objects or ideas	25%	25%	25%
Write words/letters on paper, the board, or other materials to represent ideas	54%	75%	59%
Write numbers on paper, the board, or other materials to represent ideas	25%	0%	19%
Draw images or symbols to represent ideas	21%	13%	19%

During all comparison teacher lessons and most student teachers' lessons, pupils had opportunities to *listen* to explanations, songs, or stories on the lesson topic and *speak* out loud about the lesson topic. Pupils *seeing* words written onto paper, the board, or a chart was also commonly observed during 91% of lessons. These findings substantiate a prevalence of oral pedagogy amongst student and comparison teachers and align with the dominant learning style enacted during college tutor lessons.

Pupils *wrote* independently onto paper during 54% of student teacher lessons and in 75% of comparison teacher lessons. Most observed writing was pupils copying down exercises from the board and completing these in exercise books. Where pupil writing was not seen, lessons were largely oral, driven by teacher-led questioning and instruction. Pupils were able to *perform* songs or skits and/or *see imagery* or demonstrations of concepts during about half of lessons. For example, a student teacher invited two learners to model the 'part to whole' relationship by sharing half an orange during a grade 4 mathematics lesson. During three other student teacher lessons, pupils went outside to observe real-life examples of concepts in their environment (e.g., RME lesson on living/non-living things and a science lesson on the solar system).

Across classrooms, most teachers used techniques that supported 4-5 different learning styles, though a wider variety of learning styles were supported by student teachers. Pupils writing numbers to represent ideas and moving their bodies to act out ideas were not observed during any comparison teacher lessons.

Differentiated Learning Tasks

Lesson observations examined whether teachers gave some pupils different tasks to the whole class or gave all pupils the same task. Findings are summarized in Table 28.

Table 28. Differentiation of Learning Tasks Observed During Lessons

Learning Tasks	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Gives all pupils the same activities to complete during the entire period (**no differentiation**)	17 (71%)	7 (88%)	24 (75%)
Gives some pupils or groups of pupils a *different* task to the whole class (**some differentiation**)	4 (17%)	0 (0%)	4 (13%)
Provides some pupils with an *additional* learning task when they finish tasks quickly (**some differentiation**)	1 (4%)	1 (13%)	2 (6%)
Does not give learners any tasks or activities to complete during the lessons (**not applicable**)	3 (13%)	1 (13%)	4 (13%)

During 75% of all lessons, there was no differentiation, meaning teachers gave all pupils the same activities to complete during the entire period. Giving pupils a different task to the whole class was only seen during four student teacher lessons. For instance, a student teacher assigned different topics to different groups of pupils for discussion (i.e., sources of water, importance of water, and qualities of good drinking water). Two teachers gave some pupils an additional learning task when they finished their work quickly. Three student teachers and one comparison teacher did *not* assign any tasks to pupils during the entire 45-minute period, demonstrating an absence of individualized assessment.

Differentiated Grouping

Finally, during observed lessons where grouping occurred, moderators assessed the criteria teachers used to organize pupils into groups.

Table 29. Pupil Grouping Criteria Observed During Lessons

When the teacher uses grouping, pupils are put into groups:	Student (N = 14)	Comparison (N = 2)	Total (N = 16)
With other learners of the same learning abilities	2	0	2
With other learners of different (mixed) learning abilities	2	1	3
Not sure. Can't tell how learners are grouped.	6	1	7
Other	4	0	4

Across classrooms, pupil grouping was more commonly seen during 14 student teacher lessons. Only two comparison teachers grouped pupils for learning. Where grouping did occur, teachers usually assigned groups a topic for oral discussion, albeit briefly. Group discussion usually elicited pupils' prior knowledge or experience on the lesson topic. Thereafter, during some lessons, groups shared their ideas with the teacher. During five lessons where grouping occurred, teachers organized pupils by ability (three teachers mixed abilities, and two teachers grouped pupils of the same ability). In four other instances, pupils chose their own partners, worked together with neighboring peers, or were grouped randomly through numbering. In about half of lessons where grouping occurred, moderators were unable to discern any grouping criteria.

Summary of Differentiated Instruction

Overall, student teachers expressed similar understandings of differentiation compared to college tutors. Most students understood differentiation as supporting pupils' diverse learning styles. Across lessons, pupils mainly engaged with lesson content through speaking about the lesson topic, listening to the teacher explain ideas, and seeing content displayed on the chalkboard. These styles of teaching indicate a prevalence of traditional teacher-centered instruction across classrooms. However, during some lessons pupils engaged with content in other ways, especially writing, drawing, seeing images and demonstrations, or performing songs. During three quarters of lessons, teachers gave all pupils the same activities to complete. Giving different pupils different tasks was only seen in four lessons taught by student teachers. Finally, where grouping occurred during half of lessons, teachers organized pupils by ability or used other methods such as random assignment. Overall, observed teacher pedagogy was mostly undifferentiated, though student teachers displayed a relatively more differentiated pedagogy than comparison teachers.

Assessment of Learning

Assessment is a process of gathering information about learning to measure the extent to which pupils achieved the objective(s) of a lesson. Interview data showed that all student teachers reported learning how to use different assessment methods during B.Ed. courses. Below we examine how teachers actually gathered evidence of pupil learning and used that knowledge to further support learning during lessons. We assessed the kinds of questions teachers asked and the kinds of feedback teachers gave.

Learning Objectives

TFET states lesson quality depends on clearly defined learning objectives, which indicate what pupils should be able to know or do by the end of a lesson. Lesson observations showed 42% of student teachers stated the learning objectives *before* teaching the lesson, whereas one quarter of comparison teachers did so. Moreover, learning objectives did not necessarily align with assessments.

Forms of Assessment

All student and comparison teachers asked pupils to answer questions on their own, and 84% gave many different pupils opportunities to do so. However, questioning was largely oral, seen during whole class instruction. Independent assessment, where pupils completed tasks on their own (e.g., in

their exercise books) occurred in 59% of lessons. Chorusing, where the teacher prompted pupils to respond collectively to questions or instructions, was used by a majority of teachers during 91% of lessons in several different ways, including:

- Statement of criteria, definitions, facts, or concepts
- Pronunciation of concepts, phrases, or sentences (sometimes written onto the board)
- Answering yes/no to the teacher's question

For example, pupils chorused, "Living things are things that have life" several times during a grade 1 science lesson, though the meaning of 'life' was not clearly defined. Overall, few differences were seen amongst teachers who displayed a mostly communalizing orientation to assessment.

Types of Questioning

Narrative data showed most teachers spent the majority of time during lessons using a combination of oral whole class questioning and explanations to drive lessons forward. In this study we assessed the types of questions teachers asked pupils during whole class instruction. In the analysis of lesson narratives, we classified whether teacher questions were *open* (allowing for more than one possible answer from pupils) or *closed* (requiring yes/no, one word, or short restricted responses).

Table 30. Types of Observed Teacher Questioning

Types of Teacher Questioning:	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
Probing, where the teacher asks learners to expand on their response to a question in more detail	11 (46%)	6 (75%)	17 (53%)
Open ended, where the teacher asks questions that allow for more than one possible answer (teacher is looking for different explanations or examples from learners)	21 (88%)	8 (100%)	29 (91%)
Closed ended, where the teacher asks questions that call for a yes/no, one word, or restricted response (teacher is looking for one right answer from learners)	23 (96%)	8 (100%)	31 (97%)

Across lessons nearly all teachers used a combination of open and closed questioning. Closed questions usually began with the word, 'what' and sought a fact, classification, or definition, for example, "What is the next thing you will do to solve the problem?" "What is a fraction?" and "Is X a living or non-living thing?" Open questions usually began with the word, 'why' where the teacher sought explanations or reasoning, such as, "Why does air help your clothes dry faster?" Open questions also sought examples of concepts, for instance, "Give two examples of non-luminous bodies." Within the study sample, questioning styles were mostly similar but varied somewhat in the extent to which teachers probed or elicited more detail from pupils, seen in 75% of comparison teacher lessons and 46% of student teachers lessons.

Quality of Feedback

In the assessment of teacher feedback, narrative data showed similarities and differences across lessons, summarized below in Table 31. The provision of explicit teacher feedback has been associated with positive learning outcomes for pupils, especially in developing country contexts (Westbrook *et al,* 2013).

Table 31. Observed Teacher Feedback on Pupil Learning

Forms of Teacher Feedback on Pupil Learning	Student (N = 24)	Comparison (N = 8)	Total (N = 32)
The teacher clearly indicates whether a learner's response is right or wrong	17 (71%)	5 (63%)	22 (69%)
The teacher takes time to explain why a learner's response is right or wrong	10 (42%)	5 (63%)	15 (47%)
The teacher takes time to re-explain or re-teach an idea or concept when learners have difficulty understanding	10 (42%)	3 (38%)	13 (41%)
Moves around the room looking at what groups and/or individual learners are doing	21 (88%)	5 (63%)	26 (81%)
Provides support to small groups or individual learners while they complete learning tasks	16 (67%)	5 (63%)	21 (66%)

A majority of teachers moved around the room observing what pupils were doing as they worked. Two thirds of teachers supported pupils while they completed a task. During whole class instruction, 69% of teachers clearly indicated whether a pupil's response to a question was right or wrong, either by praising pupils (e.g., "Good, you are right" or "Yes, let's clap for him/her!") or calling on a different learner (e.g., "No, who else can help us?"). Thus, during 31% of lessons, the teacher did *not* indicate whether pupil responses were correct. In some cases, teachers accepted incorrect answers by saying, for instance, "Good, that is his idea" or "Don't laugh at her, no answer is wrong," then moved on to ask other pupils for their answers. Interviews with student teachers showed a few believed teachers should not tell pupils whether their answers are incorrect in front of the whole class; teachers should rather say 'good job' and explain the answer to the pupil later. While acknowledging pupil effort may foster motivation, providing *no* criteria for evaluating learning may signal content misconceptions to the rest of the class. Further, the absence of any evaluative criteria may restrict pupils' acquisition of new forms of specialized knowledge.

In contrast, analyses of feedback showed 47% of teachers took time to explain why pupil responses were right or wrong at least part of the time (e.g., by repeating definitions). When pupils had difficulty understanding an idea, 41% of teachers re-explained or re-taught content in a different way. For example, during a grade 4 mathematics lesson the student teacher gave some indication (albeit limited) of what counts as a correct answer, rather than calling on a different learner:

T: Which two numbers will you multiply to get 8?

L1: 1 and 2

T: No, take your time. I am looking for two numbers that give you 8 when you multiply.

L1: 1 and 8

T: Good, any others?

L2: 2 times 4

T: Very good

In a similar way, during a grade 4 English lesson a comparison teacher gave explicit feedback to a pupil on his narrative after the pupil read it aloud to the class. The teacher said, "Start it well by saying, 'When I woke up in the morning…" and proceeded to explain sentence structure, rather than only praising the pupil's effort.

Summary of Assessment Techniques

All student and comparison teachers measured pupil understanding through oral questioning during whole class instruction, and nearly all teachers prompted pupils to chorus facts or phrases altogether. Most teachers used a combination of open and closed questioning, and two thirds moved around the room observing and supporting pupils as they completed tasks.

Assessment quality varied significantly across the 32 lessons in two main ways. First, pupils demonstrated learning o*n their own in writing* in just over half of lessons. Second, the *quality of feedback* teachers gave to pupils on their learning differed. In a third of lessons, teacher feedback was absent, potentially signaling content misconceptions and restricting pupils' acquisition of specialized knowledge. The absence of feedback on learning may be explained by the belief that all answers or ideas should be treated as valid, revealed during student teacher interviews. In contrast, about half of teachers provided pupils with at least some criteria for assessing learning during lessons.

Use of Teaching and Learning Materials

Phase III research found that Module 4 on developing low-cost materials was especially useful and empowering for trainees. The Training report found that many college tutors defined pupil-centered teaching as "hands-on," where students actively discover knowledge themselves. Eighty-two percent of TFET trainee survey respondents (PDCs, STSCs, tutors) reported feeling very confident training other teachers to create hands-on activities. However, student teachers reported feeling least confident in creating materials on their own and many said they needed more materials to succeed in teaching.

In what follows, we examine evidence from classroom observations on the *use* of lesson materials, where pupils or teachers actively manipulate materials to explore or model ideas or concepts. Table 32 shows who handled various kinds of teaching and learning materials during lessons covering a variety of subjects, including English, mathematics, and science.

Table 32. Observed Materials Used by Teachers and/or Pupils During Lessons

Materials Used During Observed Lessons	Used by the Teacher	Used by the Pupils	Used by Both
Board and chalk/markers	21	1	4
Other materials	10	1	5
Flash cards	1	0	4
Science lab equipment	3	0	1
Computer(s)	1	0	0

The chalkboard was the most frequently used material by teachers during 25 lessons. Excluding the chalkboard, hands-on materials, such as flash cards and science equipment, were used by the teacher and/or pupils during 20 lessons (63%). In some cases, teachers and pupils handled more than one kind of material during a single lesson. During a few lessons, teachers or both the teacher and pupils used science lab materials (e.g., litmus paper) and/or flash cards. During 16 lessons (12 student teachers and four comparison teachers), other kinds of creative low or no-cost materials were used, such as:

- A bucket, water, and soap to practice handwashing during a grade 1 science lesson on personal hygiene
- Manila cardstock with pictures/words of living and non-living things during a KG2 science lesson
- Sand, sugar, and oil mixed with water to model solvent, solute, and solution during a grade 9 science lesson
- Various flowering plants to identify parts of a flower during a grade 7 science lessons
- Sand, water, and cups to demonstrate qualities of safe drinking water during a grade 4 science lesson
- Paper, bricks, and tamping rod to model production of a molding block during a grade 8 design and technology lesson

Across the 32 lessons, *teachers* handled materials more often than pupils, likely due to large class sizes or access to sufficient materials. Further, the use of hands-on materials was more commonly seen amongst student teachers, compared to materials handled by college tutors, who mainly used the chalkboard and computer to support instruction. Few differences in the use of hands-on materials were seen between student and comparison teachers.

Conclusions on Classroom Pedagogy

Classroom observations revealed similar styles of pedagogy across lessons. The majority of teachers spent most of the time instructing the whole class and used a combination of open and closed-ended questioning. During most lessons the teacher connected content to pupils' prior experience and read text off the board, usually concepts, criteria, or examples of the lesson topic. Pupils primarily engaged with lesson content through speaking, listening, and seeing text on the board or on charts. Pupil chorusing of lesson content was seen across nearly all lessons. In more than half of lessons, pupils completed the same set of exercises while the teacher moved around the room to observe pupils as they worked. Thus, very little differentiation was seen across classrooms. In some classes, no independent activities were assigned to pupils and no texts were used at all. Overall, observations

revealed a prevalence of teacher-centered methods seen through a combination of whole class instruction, oral assessment, and chorusing of lesson content.

Despite these similarities, several differences also emerged in the extent to which teachers attempted to incorporate pupil-centered methods into lessons. First, about half of teachers used grouping to elicit pupil ideas, which was relatively more common amongst student teachers. In addition to the chalkboard, other kinds of hands-on, low/no-cost materials were used by teachers or pupils during 63% of lessons. While teachers handled materials more often than pupils (e.g., to demonstrate concepts), likely due to large classes, pupils used low-cost materials on their own in a third of lessons, which spanned a range of subject areas. Lastly, assessment methods varied in the extent of pupil writing and quality of teacher feedback on learning. Although two thirds of teachers gave pupils some indication of whether their responses were correct or satisfactory, less than half actually explained why. Thus, about a third of teachers gave pupils little to no feedback on their learning, accepting all answers as valid and potentially signaling misconceptions to the rest of the class. Differences in the quality of assessment were observed in both student and comparison teacher lessons.

Conclusions

Findings on student teachers' pedagogic orientation showed *partial* alignment between espoused beliefs and enacted techniques. On the one hand, teacher-centered techniques, such as oral instruction and chorusing, were prevalent during lessons, and most students agreed that teacher explanations and pupil recitation were important or effective. In contrast, nearly all students reported feeling very confident to use a variety of teaching strategies and assessments, though very little differentiation was seen during lessons. In a similar way, most students reported high levels of effectiveness and confidence to using grouping, while just over half grouped pupils in practice. As a result, student teacher beliefs were more pupil-centered than the enacted pedagogy of practice lessons, likely due in part to students' limited practical teaching experience.

While student and comparison teacher lessons showed more similarities than differences in structure and style, student teachers did use relatively *more* pupil-centered methods. Observed pupil-centered methods mainly impacted on the organizational arrangement of classrooms (e.g., organizing pupils into groups) and on how content was presented to pupils (e.g., demonstrations, flash cards, etc.). Impacts on instructional content (what was taught) were mainly seen in the ways students connected topics to familiar ideas or concepts. However, only some teachers clearly built new (clearly defined) knowledge and concepts onto pupils' existing knowledge and experience. A lack of feedback on learning or criteria for assessment potentially signaled content misconceptions and emptied lessons of disciplinary knowledge. Further, the curriculum report found that teacher feedback was an important skill required by the new B.Ed. curriculum, associated with improved learning outcomes, but not sufficiently covered by TFET.

Findings across TFET Phase III research reveal very similar beliefs on teaching effectiveness amongst students and college tutors. Both generally believe pupil-centered teaching is effective, involves building lessons on pupils' prior knowledge, and depends on active engagement with ideas. Many

also believe pupil recitation and teacher lecturing are effective strategies. In contrast, lesson observations showed similarities and differences in the pedagogic style of tutors and students. Teacher-centered methods were prevalent across all lessons, and most tutors and students attempted to use a few pupil-centered techniques. What varied was the use of collaborative learning and differentiated methods (assigning different tasks to different pupils), which were more prevalent during tutor lessons despite student consensus on effectiveness. Hands-on materials were more commonly used amongst student teachers, compared to college tutors, who mainly used the chalkboard to support instruction. Overall, tutor pedagogy was relatively *more* pupil-centered, differentiated, and collaborative, compared to student teacher lessons.

Conclusions across Phase III research point to three areas where TFET may further support implementation of the new B.Ed. curriculum. First, the quality of teachers likely to serve as mentors to students during teaching practice may vary, particularly in years of experience and understandings of pupil-centered pedagogy. Second, most TFET participants (including student teachers) believe hands-on teaching is important but were not consistently able to use low-cost materials in practice, especially in ways that promote conceptual understanding. Third, findings suggest teachers are less likely to use pupil-centered methods in very large classes of more than 60 pupils. Although TFET represents the Ghanaian perspective throughout most content, examples of techniques in practice are conducted with smaller classes of +/- 20 pupils. While TFET aligns with much of the instructional work of teacher educators and students, training participants may benefit from further professional development that addresses research-based challenges to *understanding* and *using* pupil-centered techniques in practice.

Recommendations

Below are three recommendations to align TFET more closely with the needs of teacher educators and student teachers discussed above.

- Adapt TFET training to support a variety of teacher educators, including mentor teachers in basic schools. Thirty percent of the new pupil-centered B.Ed. curriculum is designed to support the practical experiences of student teachers in basic schools. Thus, in addition to colleges, basic schools are important sites of pedagogic learning. Supported Teaching in Schools Coordinators may be well positioned to support TFET training in basic schools.
- Offer additional training to Phase III participants specifically on recruiting, creating, and using low-cost TLMs from the local environment in ways that enhance pupils' conceptual understanding.
- Revise TFET materials to include strategies for adapting pupil-centered methods in large classes, especially for classes of more than 60 pupils.

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Appendix

Appendix A Timeline of 4-year B.Ed. Student Teacher Cohorts Beginning 2018-2021

YEAR	COHORT 1	COHORT 2	COHORT 3	COHORT 4
2018	Year 1			
2019	Year 2	Year 1		
2020	Year 3	Year 2	Year 1	
2021	Year 4	Year 3	Year 2	Year 1
2022	Service year	Year 4	Year 3	Year 2
2023		Service year	Year 4	Year 3
2024			Service year	Year 4
2025				Service year

Appendix B Student Teacher Interview Tool

Student teacher Interview RECORD NUMBER_____	TFET Techniques for Effective Teaching Sesame Workshop IDP Foundation, Inc. NORC @ the University of Chicago

About this instrument

This instrument is designed to elicit information from student teachers on their understanding of the pupil-centered concepts in TFET materials. The respondent should be a level 200 or 300 student at one of the case study colleges of education.

Before completing this tool, please refer to the associated interview protocol and script.

Data collector:	
Date:	
College name:	
Respondent name:	

CONFIDENTIALITY **Please sign below to indicate your consent to the confidentiality agreement**	I understand that my participation in this study is voluntary. I understand that I may refuse to answer any of the questions and that I may end the interview at any time. I understand that my decision to participate or end the interview will not in any way affect me or my college. I understand that this questionnaire and written record of my responses will be treated as confidential and neither my name nor any name referenced will be used in any written report.
SIGNATURE	

1. STUDENT BACKGROUND

1.1	What is your age?
A	

1.2	What is your current level in the Bachelor of Education program?	**Tick appropriate line**
A	Level 100	
B	Level 200	
C	Level 300	
D	Level 400	

1.3	What is your specialism pathway?	**Tick appropriate line**
A	Early Grade (KG-P3)	
B	Upper Primary (P4-P6)	
C	Junior High School	
D	Senior High School	
E	Not sure/undecided	
F	Other. Specify:	

2. BACHELOR OF EDUCATION PROGRAM

2.1	Which of the following types of **teaching practice** have you completed?	**Yes, during a B.Ed. course while on COE campus**	**Yes, during supported teaching at a basic school**	**No**
A	Observing a lesson			
B	Designing a lesson plan (lesson notes)			
C	Creating teaching and learning materials			
E	Teaching a lesson *with* other student teachers (paired or group teaching)			
F	Teaching a lesson on your own			
H	Other. Specify:			

2.2	What kinds of **RESOURCES** do student teachers need to be successful in their teaching practice? (*Probe for specific examples)*
A	

2.3	Which of the following topics have been covered in the courses you have taken so far?	**Yes, definitely**	**Not sure**	**No, not covered**

A	Basics of lesson planning			
B	How 'active learning' promotes 'knowledge retention'			
C	Setting up your classroom in a child-friendly way			
D	Strategies that promote positive discipline			
E	Developing low/no-cost teaching and learning materials			
F	How to manage instructional time			
G	Using pupils' ideas, experiences, and interests in lessons			
H	Designing hands-on, interactive activities for pupils to explore			
I	Differentiated teaching through pupil grouping			
J	Using different assessment methods			
K	Making accommodations for pupils with special learning needs			
L	Ways to promote equal participation of boys and girls			
M	Incorporating play or games into lessons			

2.4	As a student teacher, what is one of the **most IMPORTANT** things you have learnt about effective teaching? Please explain. (*Prompt if needed*: *What does effective teaching look like?)*
A	

2.5	**WHO** has had the biggest impact on the way you think about teaching? Who has taught you the most? Please explain. (*Probe for details on the person's role (e.g. tutor, mentor teacher) and what specifically was learnt from them)*
A	

2.6	Please think about the **TEACHING METHODS** you are learning at your college. How are these methods different from the way you were taught in school? How are they similar? Please explain.
A	

3. PUPIL-CENTERED TEACHING

3.1	Imagine a student teacher comes to you for advice on how to teach a **learner-centred lesson**. What advice would you give him or her? Please explain. *(Probe for how those techniques actually promote student learning)*
A	

3.2	In your view, what does it mean to **differentiate** your instruction? What are some techniques you would use to differentiate a lesson for students? Please explain what makes those techniques effective. *(Probe for how those techniques actually promote student learning)*

A	

3.3	I am going to read a statement. After I finish, please state whether you agree or disagree. "Pupils learn better when lessons build on their experiences at home and in the community." Please explain your response (why do you agree or disagree).
A	

3.4	How effective are the following teaching techniques? *Please explain your responses.*	**Not effective (0)**	**A little effective (1)**	**Somewhat effective (2)**	**Very effective (3)**
A	**Storytelling** by the teacher				
B	Pupils **chorusing** or reciting material				
C	Pupils **looking** at pictures of concepts				
D	Whole class **discussion** about a topic				
E	Pupils **working together** in groups to solve a problem				
F	Pupils **viewing** a demonstration by the teacher				
G	Pupils **listening** to the teacher explain a topic				
H	Pupils **seeing** information written on the board				
I	Pupils **presenting** ideas to the class				
J	Pupils acting out or **dramatizing** a story or concept				
K	*Please explain your responses. (**Probe for WHY techniques are/are not effective**)*				

4. FINAL THOUGHTS

4.1	Is there anything else you would like to share about your experience as a student teacher?
A	

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIE

Appendix C Student Teacher Classroom Observation Tools

Classroom Observation Tool #1 STUDENT TEACHER	TFET Techniques for Effective Teaching Sesame Workshop IDP Foundation, Inc. NORC @ the University of Chicago

College name:

Participant name:

Student teacher: ☐ **Comparison teacher:** ☐

School name:

Date of observation:

Fieldworker name:

Instructions:

1. Complete Part 1 of the tool
2. Ask the teacher to observe a lesson
3. Inform the teacher that you will only observe for **45 minutes**.
4. Complete Part 2 while you wait for the teacher to begin
5. Complete Part 3 while observing by writing a detailed narrative report of the full observation period
6. Complete Part 4 in the classroom before you leave
7. Make certain that you have taken the required photographs
8. Complete Part 5 outside the classroom with the second fieldworker
9. Read through your narrative carefully and make any necessary changes/translations
10. Label photographs with the first 3 letters of the college, teacher's first name, and grade level (e.g. MCC_RIC_KG1_materials; STE_RIC_KG1_lessonplan)

Part 1: Introduction

Complete this part before the lesson begins with information from the principal, head teacher, or classroom teacher when needed.

1.1	**Please specify the grade level of the class being observed.**
A	

1.2	**What is the school's official (approved) language used for instruction?**	**Tick one line**
A	English	
B	Twi	
C	Fante	
D	Ga	
E	Ewe	
F	French	
G	Other. Specify language(s):	

1.3	**What is the school type?**	**Tick one line**
A	Public	
B	Private	
C	Other. Specify:	

1.4	**Please specify in minutes the total travel time between the school and the college of education.**
A	

Part 2: Classroom Environment

Complete this part while you wait for the lesson to begin

2.1	**How many learners have seats?**	**Tick one line**
A	All the learners have seats	
B	More than half the learners have seats	
C	Fewer than half the learners have seats	
D	None of the learners have seats	

2.2	**Does the classroom have a roof and four closed walls?**	**Tick one line**
A	Yes	
B	No	

2.3	Which of the following teaching and learning materials are on display in the classroom?	Observed	Not observed
A	Chalkboard		
B	Whiteboard		
C	Subject board		
D	Activity corners		
E	Class calendar		
F	Timetable		
G	Smiley and Sad Faces Chart		
H	Class rules		
I	Star chart		
J	Other chart(s). Specify:		
K	Map(s)		
L	Images(s)		
M	Class helpers chart		
N	Learners' own work (text or art-based)		
O	Words matched to pictures		
P	Computer(s)		
Q	Other. Specify:		

2.4	Take one photo that captures as many teaching and learning materials as possible.	Tick
A	Photo taken	

Part 3: Observation Narrative

3.1	**Complete a record of the full observation period in the table below. Record at *at least* 5 minute intervals**

Time	What the teacher and learners do

Part 4: Post Classroom Observation

*Complete this part after the teaching observation is finished, **before** leaving the classroom.*

4.1	Learner presence	Number
A	How many **girls** are present in the class during the observation?	
B	How many **boys** are present in the class during the observation?	
C	How many **total** learners are present in the class during the observation?	

When completing sections A - D below, please follow participant guidelines indicated in bold.

A. HOST TEACHERS & COMPARISON TEACHERS ONLY (ITEMS 4.2 - 4.4)

4.2	**Education:** *Ask teacher: What is the highest educational qualification you have completed?*	**Tick one line**
A	SSS/WASSCE (SHS)	
B	Post-secondary Certificate	
C	Diploma/HND	
D	Bachelors Degree	
E	Masters Degree	
H	Other. Specify:	

4.2	**Teaching experience:** *Ask teacher: How long have you been a teacher?*	**Tick one line**
A	Less than 1 year	
B	1 – 3 years	
C	4 – 5 years	
D	5 – 10 years	
E	More than 10 years	

4.3	**Teaching experience:** *Ask teacher: How long have you been teaching AT THIS SCHOOL?*	**Tick one line**
A	Less than 1 year	
B	1 year	
C	2 – 3 years	
D	4 – 5 years	
E	More than 5 years	

4.4	*Ask teacher: In your view, what is PUPIL-CENTERED teaching?*

B. HOST TEACHERS ONLY (ITEMS 4.5 - 4.6)

4.5	*Ask teacher: Have you received any training on how to support student teachers' practice teaching?*	**Tick one line**
A	Yes	
B	No	
C	*If yes, please explain a) WHO trained you and b) WHAT the training was about.*	

4.6	*Ask teacher: What is ONE important thing you think student teachers need to succeed in classroom teaching?*

C. STUDENT TEACHERS ONLY (ITEMS 4.7 – 4.8)

4.7	**Instructional support:** *Ask student: Which of the following things has your mentor teacher done to support your learning to teach?*	**Yes**	**No**
A	Observed you teaching a lesson		
B	Observed your lesson plan		
C	Gave you verbal feedback or explained teaching techniques		
D	Showed you how to use a teaching technique (modelling)		
E	Showed you how to use a teaching and learning material		
F	Taught together with you (co-teaching)		
G	Provided you with written notes or scores on your teaching techniques		
H	Provided you with written notes or scores on your lesson plan		
I	Other. Specify:		

4.8	*Ask student: What is ONE important thing you think student teachers need to succeed in the Bachelor of Education program?*

D. STUDENT TEACHERS & COMPARISON TEACHERS ONLY (ITEM 4.9)

4.9	**Take one photo of *the lesson plan* that captures as much information as possible about the observed lesson.**	**Tick appropriate line**
A	Photo taken	
B	N/A. The teacher is not able to produce a lesson plan.	

Part 5: Sesame TFET Program Techniques

*Complete this section **after** the teaching observation. Consult Part 3 where necessary.*

General

5.1	Classroom observation period:	Record hh:mm
A	Start time	
B	End time	

5.2	Which *subject(s)* did the teacher explicitly cover during the observed period?	All of the time	Half or more than half the time	Less than half the time	Never
A	Language/Literacy				
B	Mathematics/Numeracy				
C	Religious and Moral Education				
D	Science				
E	Creative Arts				
F	ICT				
G	History				
H	Physical Education				
I	Geography				
J	Other. Specify:				

5.3	How was time spent during the observed peiod?	All of the time	Half or more than half the time	Less than half the time	Never
A	Teacher instructs the whole group (lecturing)				
B	Learners complete tasks in small groups or pairs (group work)				
C	Individual learners complete tasks independently (on their own)				
D	Learner(s) instruct the whole group (presentations)				
E	Whole group discussion where teacher and learners contribute ideas together				
F	No teaching or learning occured				

5.4	The teacher uses the following language(s) while teaching:	All of the time	Half or more than half the time	Less than half the time	Never
A	English				
B	Twi				
C	Fante				
D	Ga				
E	Ewe				

F	French				
G	Other: Specify langauge:				

5.5	Did the teacher or learners use any text(s) during the observed period?	Tick one line
A	Yes	
B	No (skip item 5.6)	

5.6	Which of the following types of texts were read?	By the teacher	By the learners	Not observed
A	Textbook			
B	Storybook (reader)			
C	Workbook			
D	Worksheet			
E	Chart or poster			
F	Flash cards			
G	Text projected onto the board/screen			
H	Text created on the board			
I	Cell phone			
J	Computer			
K	Other. Specify:			

5.7	Did another teacher instruct learners during the observed period?	Tick one line
A	Yes. Specify who:	
B	No, the teacher taught the lesson on his/her own	

MODULE 1: Fundamentals of Teaching

5.1.1	During the observed period, the *learners:*	Observed	Not observed
A	Work independently on learning tasks		
B	Write independently onto paper		
C	Work together in small groups or partners on learning tasks		
D	Use their hands to manipulate materials to complete a learning task		
E	Ask the teacher questions		
F	Share individual ideas with the teacher (one learner speaks at a time)		

MODULE 2: Developing a Child-friendly Learning Space

5.2.1	How are learners organized throughout the observed period?	Observed	Not observed
A	Sitting at desks in rows		
B	Sitting together in one group on the floor/mat		
C	Sitting together at desks or tables in several small groups		
D	Sitting in a circle facing each other		

MODULE 3: Positive Discipline and Classroom Management

5.3.1	Which of the following POSITIVE behaviour management strategies were observed?	Observed	Not observed
A	The teacher refers students to the class rules		
B	The teacher refers to consequences for breaking class rules		
C	The teacher moves learner name(s) to a Smiley or Sad Faces chart		
D	The teacher explicitly praises learners for good behaviour		
E	The teacher explicitly praises learners for correct answers		
F	The teacher awards learner(s) a star on a Star chart		
G	The teacher resolves conflict by discussing problem(s) and/or solutions with learners		
H	The teacher models calm and positive behaviour		
I	The teacher changes student seating arrangements		
J	The teacher reengages student by asking a content-related question		
K	Other. Specify:		

5.3.2	Which of the following NEGATIVE behaviour management strategies were observed?	Observed	Not observed
A	The teacher shouts at learners to get their attention		
B	The teacher shouts at learners to show disapproval of behaviour		
C	The teacher points out negative behaviour or poor performance of learners		
D	The teacher makes learner(s) stand during class		
E	The teacher takes something away from the learner(s)		
F	The teacher asks a learner to leave the classroom		
G	The teacher threatens learners with corporal (physical) punishment		
H	The teacher uses corporal (physical) punishment		
I	Other. Specify:		

5.3.3	Throughout the observed period, the teacher:	All of the time	Half or more than half the time	Less than half the time	Never
A	Uses positive classroom management strategies				
B	Uses negative classroom management strategies				

MODULE 4: Developing and Teaching with Creative Low-Cost Materials

5.4.1	Teaching and learning materials *used (handled)* during the observed period:	By the teacher	By the learners	Not observed
A	Flash cards			
B	Play dough			
C	Paint			
D	Counters			
E	Legos			
F	Board and chalk/markers			
G	Computer(s)			
H	Science lab equipment			

I	Materials created during class. Specify:			
J	Other. Specify:			

5.4.2	Did the learners go outside to collect materials for a lesson?	Tick one line
A	Yes. Specify material:	
B	No	

5.4.3	Did a community member visit the class to teach the learners about a topic?	Tick one line
A	Yes. Specify who and what topic:	
B	No	

MODULE 7: Time Management

5.7.1	Time Management:	Observed	Not observed
A	Learners carry out classroom helper duties during the observed period		
B	The teacher refers learners to a timetable or class calendar		
C	The teacher claps her or his hands to get learners' attention		
D	The teacher tells learners how much time they have to complete a task		
E	The teacher appears prepared for the lesson with materials ready		

MODULE 8: Practical Ways to Make the Classroom Fun and Interactive

5.8.1	Does the teacher ask learners to share their ***PERSONAL*** experience or knowledge of the topic during the lesson?	Tick one line
A	The teacher asks ***most*** learners to share their own knowledge or experience	
B	The teacher asks ***some*** learners to share their own knowledge or experience	
C	The teacher asks a ***few*** learners to share their own knowledge or experience	
D	No	

5.8.2	In the explanations of content, does the teacher make connections to things that learners are familiar with and/or interested in?	Tick one line
A	Yes. Specify interest:	
B	No	

5.8.2	Learning styles: During the observed period, *learners* have opportunities to:	Observed	Not observed
A	**See** images, pictures, or maps to visualize the lesson topic		
B	**See** words written on paper, the board, or a chart to read the lesson topic		
C	**Listen** to explanations, songs, or stories on the lesson topic		
D	**Speak** out loud about the lesson topic		
E	**Perform** a song or skit related to the lesson topic		
F	**Move** their bodies to dramatize or act out ideas related to the lesson topic		
G	**Use** their hands to build, sort, create, or manipulate objects or ideas		
H	**Write** words/letters on paper, the board, or other materials to represent ideas		
I	**Write** numbers on paper, the board, or other materials to represent ideas		

J	**Draw** images or symbols to represent ideas		

MODULE 9: Differentiated Instruction

5.9.1	When the teacher interacts with learners, he or she:	Tick one line
A	Gives all learners the **same** activities to complete during the entire period (no differentiation)	
B	Gives some learners or groups of learners a **different** task to the whole class (some differentiation)	
C	Does not give learners any tasks or activities to complete during the period (not applicable)	

5.9.2	When the teacher uses grouping, learners are put in groups:	Observed	Not observed
A	With other learners of the **same learning abilities**		
B	With other learners of **different (mixed) learning abilities**		
C	With other learners who share the **same interests**		
D	With other learners who share the **same gender**		
E	With other learners who share the **same language**		
F	Not sure. Can't tell how learners are grouped.		
G	Other: Specify:		

5.9.3	When learners finish their work before the rest of the class, the *teacher*:	Observed	Not observed
A	Provides learner(s) with an additional learning task		
B	Asks learner(s) to support others who are still working on a task		

MODULE 10: Assessment and Evaluation

5.10.1	Objectives: Does the teacher tell learners what they should be able to know or do *before* teaching the lesson?	Tick one line
A	Yes	
B	No	

5.10.2	Assessment: During the observed period, the *teacher:*	Observed	Not observed
A	Asks *individual learners* to answer questions or do a task on their own		
B	Gives *many different learners* opportunities to answer questions on their own		
C	Prompts learners to repeat words, answers, or definitions all together		
D	Moves around the room looking at what groups and/or individual learners are doing		
E	Provides support to small groups or individual learners while they complete learning tasks		
F	Gives learners a test or quiz on the lesson content		
G	Assigns learners homework or tasks to complete after class		

5.10.3	**Questioning: During the observed period, the *teacher:***	**Observed**	**Not observed**
A	Asks questions that call for a yes/no, one word, or very short response (teacher is looking for one right answer from students)		
B	Asks questions that allow for more than one possible answer (teacher is looking for different explanations from students)		
C	Asks learner(s) to expand on their response to a question in more detail (probing)		
D	Directs learners to ask the teacher questions		
E	Directs learners to ask each other questions		

5.10.4	**Feedback: When *individual* learners respond to the teacher's questions or conduct a task:**	**Observed**	**Not observed**
A	The teacher stops and focuses on mistakes that learners make		
B	The teacher *clearly indicates* whether a learner's response is right or wrong		
C	The teacher takes time to explain *why* a learner's response is right or wrong		
D	The teacher takes time to *re*-explain or re-teach an idea or concept when learners have difficulty understanding		

MODULE 11: Girls Education and Inclusion in the Classroom

5.11.1	**Gender equality: When the teacher interacts with learners:**	**To a large extent**	**To some extent**	**Hardly ever**	**Never**
A	Boys have opportunities to participate in learning activities				
B	Girls have opportunities to participate in learning activities				
C	Boys have opportunities to respond to questions				
D	Girls have opportunities to respond to questions				

5.11.2	**Gender equity: During the observed period, the *teacher:***	**Observed**	**Not observed**
A	Gives learners examples of women in non-traditional roles or occupations (e.g. women scientists)		
B	Encourages girls to participate in a lesson activity		
C	Assigns a leadership role to girl(s)		
D	Explicitly praises the efforts or ideas of girls		

MODULE 12: Ensuring an Inclusive Learning Environment

5.12.1	**Are all learners able to easily enter and exit the classroom space?**	**Tick one line**
A	Yes	
B	No	

5.12.2	Is there enough space in the classroom for all learners to move around easily (including learners with physical disabilities)?	Tick one line
A	Yes	
B	No	

5.12.3	During the observed period, does the teacher provide special assistance to learners with emotional, physical, or other identifiable learning needs?	Tick one line
A	Yes. Specify:	
B	No	

MODULE 13: Early Childhood Development

5.13.1	Which behavioural routines do *learners* carry out without the teacher explaining how to do so?	Observed	Not observed
A	Collecting or handing out materials or texts		
B	Packing away materials or texts		
C	Transitioning from one activity or lesson to the next		
D	Entering and/or exiting the room		
E	Raising a hand before speaking		
F	Other. Specify:		

MODULE 14: Learning through Play with Early Learners

5.14.1	During the observed period, does the teacher incorporate a creative play-based activity or game to facilitate learning?	Tick one line
A	Yes. Specify activity:	
B	No	

GENERAL COMMENTS (e.g. other kinds of observations, things the teacher told you, etc.)

Classroom Observation Tool #2 STUDENT TEACHER	TFET Techniques for Effective Teaching Sesame Workshop IDP Foundation, Inc. NORC @ the University of Chicago

College name:

Participant name:

Student teacher: ☐ **Comparison teacher:** ☐

School name:

Date of observation:

Fieldworker name:

Instructions:

1. Complete Part 3 while observing by writing a detailed narrative report of the full observation period
2. Make certain that you have taken the required photographs
3. Complete Part 5 of Tool #1 outside the classroom with the second fieldworker
4. Read through your narrative carefully and make any necessary changes/translations
5. Label photograph with the first 3 letters of the college, teacher's first name, and grade level (e.g. MCC_RIC_KG1_materials; STE_RIC_KG1_lessonplan)

Part 3: Observation Narrative

3.1	**Complete a record of the full observation period in the table below. Record at *at least* 5 minute intervals**

Time	What the teacher and learners do

Appendix D Student Teacher Online Survey

Student Teacher Questionnaire	TFET Techniques for Effective Teaching Sesame Workshop IDP Foundation, Inc. NORC @ the University of Chicago

Dear participant

Good Day. As part of a partnership between Ghana Tertiary Education Commission (GTEC) and IDP Foundation, NORC at the University of Chicago warmly invites you to participate in a study on understanding teachers' experiences of preparing for, conducting, and assessing pupil-centered learning. This study has been approved by the Ghana Health Service Ethics Review Committee. As a Bachelor of Education student, your opinion is important. Your participation would only take 15 minutes of your time to share your understanding of pupil centered teaching approaches. If you are interested in participating in this research, please follow this link:

CONFIDENTIALITY **Please sign below to indicate your consent to the confidentiality agreement**	I understand that my participation in this study is voluntary. I understand that I may refuse to answer any of the questions and that I may end the survey at any time. I understand that my decision to participate or end the survey will not in any way affect me or my college. I understand that this questionnaire and written record of my responses will be treated as confidential and neither my name nor any name referenced will be used in any written report.
SIGNATURE	

1. INFORMATION ABOUT YOU

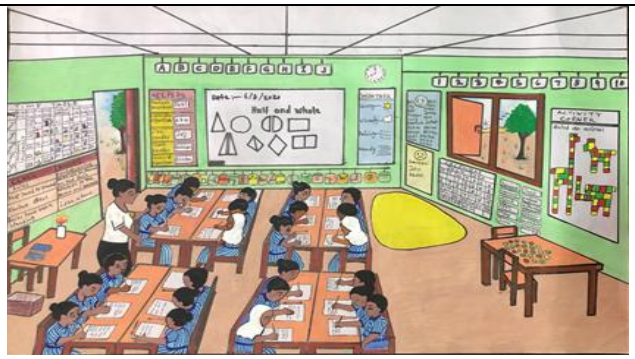
1.1	What is the name of your college?
A	

1.2	What is your age?
A	

1.3	What is your current level in the Bachelor of Education program?	Tick appropriate line
A	Level 100	
B	Level 200	
C	Level 300	
D	Level 400	

1.4	What is your specialism pathway?	Tick appropriate line
A	Early Grade (KG-P3)	
B	Upper Primary (P4-P6)	
C	Junior High School	
D	Senior High School	
E	Not sure/undecided	
F	Other. Specify:	

2. TECHNIQUES FOR EFFECTIVE TEACHING

2.1	In the picture below, what is ONE important thing that makes this classroom PUPIL-CENTERED?
	
A	

2.2	Imagine you are teaching a lesson and you hear two of your pupils talking loudly. You see they are not paying attention and are distracting other pupils in the class. What is ONE thing you would do to promote POSITIVE DISCIPLINE in your classroom?
A	

2.3	**Name one LOW-COST RESOURCE you would use to teach a mathematics lesson on measurement. HOW would you use this resource in your lesson?**
A	

2.4	**Please choose which option best represents your view on the following statements about teaching:**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
A	Pupils learn better when lessons build on their experiences at home and in the community					
B	The more senses pupils use during a lesson (hear, taste, see, touch, smell), the less information they will remember					
C	Independent learning activities help pupils discover answers to problems					
D	There are many different ways for pupils to achieve the same learning objective					
E	Pupils reciting words or phrases in unison helps them remember new information					
F	Having fun and playing games are not effective ways for pupils to learn new skills					
G	Pupils working together in small groups helps them learn from one another					
H	Shouting at pupils for bad behavior is more effective than praising them for good behavior					
I	Paying special attention to girls during a lesson can make learning more inclusive					
J	Pupils listening to the teacher explain an idea is the most important part of a lesson					

2.5	**In your view, what is PUPIL-CENTERED LEARNING?**
A	

2.6	**Imagine you are planning a reading lesson that teaches pupils new VOCABULARY from a text. Your pupils will create flash cards by writing each word and definition, but there are a few students in your class who struggle with writing. What is ONE strategy you would use to DIFFERENTIATE the lesson activity for those few students?**
A	

3. STEP-DOWN TRAINING EXPERIENCE

3.2	How well prepared or CONFIDENT do you feel to use the following teaching techniques:	Not confident	A little confident	Somewhat confident	Very confident
A	Setting up your classroom in a child-friendly way				
B	Using pupils' ideas, questions, and personal experiences in your lessons				
C	Having pupils work together on activities in small groups				
D	Creating low/no-cost teaching and learning materials				
E	Supporting positive pupil behavior in your classroom				
F	Creating interactive, hands-on activities for pupils to explore new ideas				
G	Using a variety of teaching strategies and assessments during a lesson				
H	Making accommodations for pupils with special learning needs				
I	Incorporating play or games into lessons				
J	Managing your instructional time				
K	Writing your own lesson plans/notes				

4. FINAL THOUGHTS

4.1	Is there anything else you would like to share about your experience as a student teacher?
A	

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS QUESTIONNAIRE.

Appendix E Summary of Observed Lesson Characteristics

Teacher	Grade Level	Subject	No. of pupils	Lesson topic	Learning objective	Supported Literacy Skills	P-C rating
1.1	B6	Science	38	Solar system	Identify and describe elements of the solar system	No	-
1.2	B3	Science	22	Body parts	Describe how different body parts are used to perform everyday activities	Yes	+
1.3	B4	Math	42	Fractions	Define and represent fractions	No	- -
2.1	B5	Science	48	Sources of light	Define concept of light; identify sources and uses of light; categorize sources of light into artificial and natural sources	Yes	+
2.2	B4	Science	46	Sources of water	Identify sources of water; explain uses of water and the main qualities of safe drinking water	No	+
2.3	B3	Science	52	Water purification	Describe methods of water purification	No	+
3.1	B3	RME	53	Creation	Describe and interpret events represented in imagery of the creation story	No	+
3.2	B3	English	53	Grammar	Identify verbs and formulate sentences using a variety of action words	Yes	-
3.3	B2	English	55	Prepositions	Form simple sentences (verbally and in writing) using variety of prepositions.	Yes	-
4.1	JHS 1	Social Studies	26	Family	Define the concept of family; explain the importance of different types of families (nuclear and extended) and roles and responsibilities of mothers and fathers	Yes	-
4.2	JHS 2	RME	27	Creation	Describe attributes of the Christian God and explain the story of creation	No	+
4.3	JHS 1	Math	14	Multiplication	Solve 1-digit multiplication of whole numbers	No	-
5.1	B1	Science	71	Living/non-living things	Define concept of living and non-living things and give examples and characteristics of each concept	No	- -

5.2	B3	Science	76	Living/non-living things	Define concept of living and non-living things and give examples and characteristics of each concept	Yes	-
5.3	B4	Math	78	Highest common factor	Define concept of highest common factor; find the HCF between two or three 1-digit numbers	No	- -
6.1	B2	Science	33	Body parts	Identify body parts; describe everyday uses of different body parts and ways to care for and clean the body	No	-
6.2	B4	Science	77	Solar system	Describe characteristics of the solar system, including the relation between the sun and planets and the benefits of the sun to planet Earth	Yes	+
6.3	B2	Science	20	Air	Describe characteristics of air and its everyday uses	No	+
7.1	KG1	Oral language (Fante)	12	All about me	Formulate simple sentences that describe images of common household objects and activities; formulate simple sentences about oneself in response to a given set of questions	Yes	+
7.2	B4	RME	28	Environment	Describe the environment and the effects of activities that harm it, e.g., deforestation	No	++
7.3	KG2	Science	11	Living/non-living things	Define living and non-living things and state examples of each; classify variety of things as living or non-living	No (supported numeracy)	+
8.1	JHS 3	Science	30	Substances and mixtures	Define with examples and classify types of substances and mixtures; compare differences between solvents, solutes, and solutions; explain why substances do/do not dissolve	No	-
8.2	JHS 1	Science	39	Parts of a flower	Define different parts of a flower and describe their function	No	-
8.3	JHS 2	Basic Design and Technology	47	Molding block	Identify, explain, and apply skills for handling different kinds of materials and tools to produce a molding block	No	+

CT 1	B1	Our world, our people	Missing	Personal hygiene	Describe the steps for handwashing	No	-
CT 2	B2	Science	64	Size	Define concept of 'size'; classify and compare familiar 'small' and 'big' objects	No	-
CT 3	B6	Our world, our people	49	Plants and animals	Explain the importance of animal waste to plants	Yes	++
CT 4	JHS 2	Social Studies	28	Conflict	Define conflict and describe various sources and types of conflict	Yes	-
CT 5	B4	English	77	Poetry	Formulate sentences using vocabulary words selected from a poem	Yes	- -
CT 6	B4	English	34	Narratives	Narrate personal experiences in writing that includes an introduction, body, and conclusion	Yes	+
CT 7	B1	Science	21	Water	Identify sources and uses of water	No	- -
CT 8	JHS 3	Science	57	Acid	Identify chemical elements from groups within the periodic table and describe characteristics of acid	No	-