UNIVERSITY OF EDUCATION, WINNEBA

STATUS OF REFLECTIVE TEACHING PRACTICES AMONG BASIC SCHOOL TEACHERS IN SCIENCE CLASSROOM ENGAGEMENTS IN ADA EAST DISTRICT

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A thesis in the Department of Science Education, Faculty of Science Education, submitted to the School of Graduate Studies in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy (Science Education) in the University of Education, Winneba

OCTOBER, 2023

DECLARATION

STUDENT'S DECLARATION

I, Asiwome Kwadzo Amevor, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE:…….

DATE:…….

SUPERVISORS' DECLARATION

We hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis/dissertation/project as laid down by the University of Education, Winneba.

Prof. Mawuadem Koku Amedeker (Principal Supervisor)

Signature:……..……

Date:……..……

Dr. Ishmael. K. Anderson (Co-Supervisor)

Signature:……

Date:……

DEDICATION

This thesis is dedicated to Amevor, and Adzimah Buasapa, families, especially my parents; Rev. R. M. K. Amevor and Madam Charity T. A. Donkor, my siblings; Grace, Grant, Amenuveve. Also, to the E. P. Church Ghana, Sogakope and George Obed, Delayram Amevor.

ACKNOWLEDGEMENTS

My greatest appreciation goes to all who contributed to my efforts in the development of this thesis from its beginning to the end. I wish to specially acknowledge my two supervisors; Prof. M. K Amedeker and Dr. I. K. Anderson in the Faculty of Science, Department of Science Education for their indispensable suggestions and readiness to offer accurate and very clear directives to guide the study and also fine-tune it to its current state. Finally, I wish to register my deepest appreciation to the Ada East basic school science teachers who participated in this study in diverse ways.

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ABBREVIATIONS

T-TEL:	Transforming Teacher Education and Learning
MOE:	Ministry of Education
STS:	Supported Teaching in Schools
PRL:	Professional Reflective Learning
RJD:	Reflective Journal Development
RLC:	Reflective Learning Communities
PRPM:	Professional Reflective Practice Model
IDEAs:	Improved Deductive Educational Assessments
PLIP:	Professional Learning Intervention Process
PLI:	Professional Learning Intervention
PDS:	Professional Development Section
NTC:	National Teaching Council
PVA:	Professional Values and Attitude
PK:	Professional Knowledge
PP:	Professional Practice
RQ:	Research Question

ABSTRACT

Reflective practices are important aspect of professional teaching. This study, sought to determine; types of reflective practices, levels of reflectivity, factors influencing reflections, and challenges teachers face, implementing reflective practices. Quantitative and qualitative designs were used for the study. Basic schools in Ada East District were selected to determine the status of reflective practices in the district. This will enable documentation for future reference as there appears to be no published documentation on the status and quality of reflective practices among basic school science teachers. Mixed-methods approach, was employed using both surveys and interviews to gather data. In all, 165 basic school science teachers out of 420 were randomly sampled. Instruments used were questionnaires, interviews and class observations. Data were collected in two phases. Phase one was quantitative phase, with closed-ended questionnaires administered, and followed by qualitative phase with semi-structured interview guide administered to 20 teachers. An intervention was done using the new model. Results of the study indicated that most of the teachers, before the intervention, did not understand the concept and the use of reflective practice. Post-intervention workshop, showed improvements in teachers' understanding and practices. Challenges identified were lack of in-service training on reflectivity and teacher supervision. The study concludes that basic school teachers' knowledge in reflective practice was low. Implications of the findings are that in-service training on reflective practices and supervision have the potential of improving teachers' science classroom engagements. Hence, education authorities and stakeholders are encouraged to include reflective practices in their in-service training programmes.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter deals with some motivating factors that led the researcher to embark on this study. One of these motivating factors was a statement from John Dewey which indicated that humans as we are, we do not learn only from our experiences, instead, we always learn from reflecting on our experiences. This statement from the researcher's point of view could be a strong foundation upon which modern teaching strategy that would improve teaching and learning at all ages can be established. The chapter also gave a brief definition to some key words to explain further what the study is all about.

It is therefore imperative that the place of reflective practice be appraised to determine whether teachers in Ada East District have knowledge in reflective practice while they engage learners in science teaching. Then, the problems that are apparent in non-use of reflective practice have been discussed. The chapter also outlines the benefits that the outcomes of this study are expected to bring out and the targeted stakeholders that would most likely benefit from the outcomes of the study.

1.1 Background to the Study

At all levels of education, reflective practices always play very crucial roles in teaching and learning. In addressing the key issues in this study, Adeyemi (2023) described status as a current state or condition of an individual in relation to others or with respect to circumstances . In this study therefore the status of reflective teaching practices, one of the key components of the new curriculum has been determined.

Reflective practices are essential to the growth of both students and teachers at the basic school level, which includes primary and junior secondary education. Moon (2002) described reflective practice as a form of mental processing that we use to achieve a purpose or outcome. Vloet (2009) also confirmed that it is required of all basic school teachers, to employ reflective practices to mirror their actions *before, during,* and *after* teaching.

Basically, teachers play leading and invaluable roles in the implementation and determination of a successful curriculum, especially at the basic school level in Ghana. Reflective practice during classroom engagements at the basic school level is an issue of growing importance in education. This issue of reflective practice refers to the intentional and orderly process where teachers critically analyse and evaluate their own teaching practices and the learning experiences, as well as those of their students in order to improve teaching and learning outcomes.

In order to improve teaching and learning experiences, reflective practice entails critical evaluation of one's own teaching strategies, students' learning results, and the classroom atmosphere. According to T-TEL (2018), it is only when teachers can question and examine their practices and competencies, as being right or wrong, that they adjust and stimulate quality instruction.

Observing, reflecting, and acting to change things are therefore seen as a singular cyclical process that makes teaching and learning more interactive. The practice also affords students to equally assess their learning progress and identify areas of strength and weakness, while teachers play important roles by recognizing areas of strength and areas for development in their daily teaching approaches.

These crucial roles played by basic school teachers rank them the single most important players in the development of education locally and internationally. Quality of teaching outcomes always remains the focus of every government all over the world or organizations towards educational reforms, where effective curriculum implementation takes the centre stage. Being the target, and imperative of all education reforms, the inclusion of reflective practice in teacher education, especially at the basic school level, aligns with a position that it is only when teachers can question and examine their own practices and competencies, as being right or wrong, that they adjust and stimulate quality instruction (T-TELL, 2018). Prior to the introduction of the concept by T-TEL in 2018, the University of Education, Winneba, Ghana, had earlier developed a policy that guided the pre-service teachers in their STS. The university of education Winneba (UEW) emphasised the importance of reflective practices for student teachers. The University developed a reflective journal for student teachers to guide them in keeping records of their classrooms and school engagements. This journal intended to help student teachers regularly reflect on their experiences during their supported teaching in schools (STS).

It is therefore important to note that reflective practice is a crucial component of professional development for teachers all over the world, including those who teach in primary schools in Africa, yet, there it is not a lot of writing on this subject by researchers from an African perspective. This can be an issue especially in the setting of basic schools and most particularly during science classroom engagements at the same basic level. This section highlights on the reflective behaviours of African basic school teachers and also from global perspectives in their interactions with students.

A study by Humaira and Jane (2008) in Pakistan revealed that reflective practice was essential for improving inclusive education in basic schools, supporting the claims of

some prior studies. They discovered that teachers need to engage in reflective conversations if their practices are to improve. It was further emphasised that teachers who used reflective practice were more willing to modify their lesson plans to accommodate different learning styles, including those of students with impairments.

Adigun and Akindele (2018) also carried out a related study in Nigeria. The study looked at how reflective behaviours affected the effectiveness of instruction and the results of student learning. The study discovered that reflective practice improved students' learning outcomes and also improved teachers' pedagogical skills. The study further indicated that in order to enhance teachers' effectiveness and improve student learning, Nigerian teachers should consistently engage in reflective practices.

In Ghana, the Ministry of Education's policies have made it clear that teachers must use reflective techniques to help them achieve educational goals in the classroom (MOE, 2017). In line with this viewpoint, enhancing reflective teaching practices among teachers at the pre-service before the in-service period has become a priority for all teacher education institutions. This is also directed towards increasing focus on teachers' lifelong professional development and progress. Teacher education development and growth in Ghana emphasised the constraints of a reflective practitioner, drawing on the view that teaching is indeed a complex task. It is neither straight forward nor mechanical, and requires reconstruction of plans and activities for success in the classroom (MOE, 2017). Consequently, philosophical assumption from the above statement shows that through reflective teaching practice, teachers will derive meaning from their own experiences, and thereby improve on their works. This improvement can only occur through internal dialogue or in consultation with the perspectives of other members of staff including teacher trainees on STS. Reflective

practice is considered as a cognitive examination of one's professional practices in totality, including what the teacher could have done. This forms an integral part of the basic school curriculum focusing on classroom engagements among basic school teachers in Ghana.

Ada East District is one of the Districts in Ghana, where professional teachers are trained. It is therefore very important to embark on crucial research of this nature to determine the status of the quality classroom reflective practices in the district. It is required of all basic school teachers, and more specifically basic school science teachers to employ reflective practices to mirror their actions in terms of classroom practices before, during, and after teaching or instruction (Vloet, 2009). In view of the classroom practices, the growth of research interest is very crucial. This indicates that the topic of reflective practices in the classroom is currently more widespread in Ghana's teacher education curriculum than it was in previous decades (MOE, 2017). In line with this assertion, it is necessary to find out whether classroom engagements in Ghana's basic schools amplify new realisations and demands for reflection as demanded by the new curriculum. The basic school science teachers' level of knowledge before the study and after the study would be of very great significance to the success of this study. Thus, the Ada East District which has similar quality of teachers as well as same curriculum like other districts in Ghana, has been used for this research. In addition, the respondents and the research areas used in this study have common identities that are also relatively close especially in teacher-characteristics and qualifications, curriculum use and mode of lesson deliveries in Ghanaian schools. The findings from this study could be mirrored to predict what goes on in other districts with similar characteristics across Ghana. This study therefore may lead to the creation of a positive and inclusive learning environment

that would at all times promote active participation and engagements among teachers and students, and also foster the development of critical thinking and problem-solving skills.

1.2 Statement of the Problem

Anecdotal evidence showed that reflective teaching practices were hardly carried out or practised at basic schools especially in Ada East District of Ghana. It was evident that reflective teaching practice was still at its developmental stage in Ghana, (T-TEL, 2018). Some major challenges identified in this area showed that there were only few studies on how basic school teachers engaged in reflective practices in their teaching activities (MoE, 2015). Various policy documents have been explicit on the need for teachers to use reflective practices to facilitate the achievements of the educational goals of the classroom (Amakyi & Ampah-Mensah, 2016). Clearly, through the works of T-TEL between 2016 and 2018, reflective practice has been advocated as in other African countries for use in partner schools in Ghana during off-campus teaching practice of teacher-trainees (T-TEL, 2018)

Additionally, it appears there are only a few studies in Ghana on how teachers use the reflective teaching approach (Salifu et al., 2017; Dampson, & Apau, 2018). Also, to the best of knowledge of the researcher, there is limited empirical evidence on:

i. the current status of reflective teaching practices among basic school teachers,
ii. the extent to which basic school teachers in Ada East District incorporate reflection into their science classroom engagements
iii. the levels of reflective practices of basic school teachers during science classroom engagements,

iv. the perceived level of knowledge on benefits of reflective practices among basic school teachers,

v. the factors that facilitate or hinder the adoption of reflective practices.

As it stands, these issues remain very critical gap that needs to be filled.

1.3 Purpose of the Study

This study sought to determine the status of reflective teaching practices among basic school teachers in science classroom engagements in Ada East District of Ghana.

1.4 Objectives of the Study

Five objectives that guided the study were to**:**

1. Determine the types of reflective practices adopted by basic school science teachers in the Ada East District of Ghana.
2. Determine the level of reflectivity demonstrated by basic school science teachers in the Ada East District of Ghana.
3. Determine factors that influence reflections among basic school science teachers during their classroom engagements in the Ada East District of Ghana.
4. Determine the type of challenges faced by basic school science teachers in Ada East District of Ghana in adopting reflective practices**.**
5. Develop a model to enhance the status of reflective teaching practices among basic school teachers in Ada East District of Ghana.

1.5 Research Questions

This study was guided by the following set of questions:

1. What reflective practices are adopted by basic school science teachers who teach science in the Ada District of Ghana?
    a. What knowledge do the basic school science teachers have about reflective practices?
    b. What is the extent to which the basic school science teachers adopt reflective practices?
2. What is the level of reflectivity demonstrated by basic school teachers who teach science in the Ada District of Ghana?
    a. To what extent does the school environment promote reflective practices?
    b. What are the levels of reflection by these basic school science teachers?
3. What factors influence teacher reflection during their science classroom engagements in the Ada East District of Ghana?
    a. How will peer influence be a factor in the teachers' classroom engagement
    b. How frequently do these science teachers use activities that influence reflective practices? How will basic school teachers consider school activities as factors that influence reflective practices?
4. What are the challenges faced by basic school teachers who teach science in the Ada East District of Ghana in adopting reflective practices?
5. What type of model could be developed to enhance reflective practices among basic school science teachers in Ada East District of Ghana?

a. What level of knowledge about reflective practices do these science teachers acquire prior to and after the workshop?
b. To what extent can an intervention change these teachers' beliefs and practice of reflective practices?
c. What aspects of the professional teaching processes on reflective practices were beneficial to the teachers and how they improve?
d. What aspects of the professional teaching processes on reflective practices are beneficial to these teachers and how they improve?

1.6 Significance of the Study

This study sought to create the awareness on the importance of reflective teaching practices. This is not only limited to teachers in Ada East District, but also to inform policy thereby contributing to teacher education plans meant for the professional development of teachers, especially basic school science teachers in Ghana. This particular awareness is necessary because it places teachers in a distinct position to understand the very basics of their practices and why they should engage in such practices. Teachers would at the end of the day, appreciate these positives and consistently ensure there is progress in their practices. Knowing the essence of this act, would encourage everyone to continually engage in reflective practices in themselves thereby bringing out required levels of outcomes (Korthagen & Vasalos, 2005).

The study also sought to highlight the need for the science teachers to actively engage in reflective practices by also stressing the ways through which teachers can actively and frequently include action research in their teaching practices. This would help

enhance their professional development, quality in teaching and also improve students' achievements.

Discovery is key to every research. It creates the space for further research to be conducted. This research will provide an underlying factor that would stimulate basic school science teachers to endeavour to be more productive in their works and duties. Information is key in this era where one is relentlessly pushing to make progress and improvement. This level of insight would ensure teachers are abreast with current ways and approaches to practice reflective teaching effectively.

The study further intended to sensitise all stakeholders about the importance, challenges, and consequences of not engaging in reflective teaching practices. That is, the researcher also sought to provide information that would encourage basic school science teachers to actively engage in the reflective teaching practices to enhance their professional competencies. According to Korthagen and Vasalos (2005) self-professional development is what enables one to strive towards improving on work delivery. It makes professionals more efficient and masters of their trade in a time where we have more knowledgeable people and fewer experts.

1.7 Delimitations of the Study

Delimitations refer to the boundaries of the research study, based on the researcher's decision of what to include and what to exclude. It narrows the study to make it more manageable and relevant to what the researcher was trying to explain from his background as a science teacher. In this research, it was noticed that some basic school science teachers in the Ghanaian schools have one form of challenge or the other including the use of reflective teaching strategies during their classroom engagements to improve teaching.

Though all other educational institutions including the Universities are obliged to employ reflective teaching in their engagements with learners, the researcher concentrated on the basic school science teachers in Ada East District due to his experience as a science tutor in a College of Education within the district, and the frequent interactions with such teachers at the basic level. The basic school teachers in Ada East District were therefore considered for this study even though second cycle and other analogous institutions in the district could equally have been used in the study. Furthermore, only basic schools where pre-service teachers engaged in supported teaching in school (STS) in the catchment areas of Ada College of education were used for the study.

Again, there are several practices which basic and pre-service teachers go through that build their professional competences, but this study was limited only to the status of the reflective practices by basic science teachers in this study.

1.8 Definition of Terms

Clusters: A group of two or more basic schools where respondents work together

Reflective Practitioner: Anyone who goes through introspective exercise without a target, domain or levels of reflection.

Reflective Professional: A teacher who engages in reflection, linking to a target, domains and levels of reflection with (IDEAs) Improved Deductive Educational Assessments.

Reflection-for-action: Reflection prior to classroom engagements

Reflection-in-action: Reflection during classroom engagements

Reflection-of-action: Reflection after classroom engagements

Standard Base Curriculum: Universally accepted Plan of work

Domains: Are learning fields in the new curriculum.

Classroom Engagements: All activities involving pupils and teachers before, during and after instructional periods.

1.9 Chapter Summary

This chapter outlines the challenges that motivated the study to be carried out and also states the significance of the study as well as its purpose. The chapter also outlines the research questions that were addressed.

1.10 Organisation of the Thesis

In the next chapter, the relevant literature on the concepts concerning reflective practices among basic school science teachers has been discussed.

The thesis has been structured such that the first chapter is followed by Chapter Two which reviews the relevant literature on the status of reflective practices in general, from global perspective to the Ghanaian situations among basic school science teachers. In Chapter Three, the methodology used in the study has been outlined. This is followed by Chapter Four in which collected data were analysed. In Chapter Five, very significant and novel findings from the study have been identified, interpreted and discussed. In Chapter Six, key research findings have been outlined including contributions of the research to knowledge. This chapter also outlines some recommendations and suggestions for future research works.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Overview

This chapter reviews relevant literature regarding concepts on reflective practices from philosophical, historical and conceptual perspectives. The review further brings to light some scholarly works on reflective practices through comparative analysis of findings from some previous researches, starting from global perspectives to current Ghanaian situation by other scholars. This is done in order to find out some commonalities or diverse views in practice as far as Ghanaian situations are concerned. The chapter also touches briefly on the historical background of reflective practices to expand the knowledge base of other researchers on the concept. The fundamental processes and activities practitioners engage in during classroom activities to effectively carryout reflective practices have been thoroughly discussed. Challenges that basic school teachers and teacher-trainees often encounter with their pupils during daily classroom engagements on reflective practices are also carefully reviewed. The review is done in line with the five research questions and their corresponding objectives followed by the conceptual framework.

Finally, conceptual framework which formed the basis of the study has been designed and explained based on the main concepts the study identified and clearly outlined to be followed in order to become a successful basic school reflective professional. Reflective practice is an essential aspect of professional development for teachers worldwide, including African basic school teachers. However, literature on this topic from global and an African perspective is relatively limited, especially in the context of basic schools. This review blends some of the existing literature on reflective

practices among other African basic school teachers during classroom engagements with those in Ghana.

2.1 The Concept of Reflective Practices

It is not sufficient simply to have an experience in order to learn or teach. Without reflecting upon this experience, it may quickly be forgotten, or its learning potential lost. It is from the moods and thoughts emerging from this reflection that generalisation or concepts can be generated. More importantly, generalisation also allows new situations to be tackled effectively (Potter & Training, 2015).

In support of this assertion, remarkably, good instructors do not just assess their students only; but they also find ways to assess themselves in order to continuously improve their own practices. The Association (2014) further identified continuing education and lifelong learning, specifically with regard to our role as teachers, as a core competency of our profession. The Association further affirmed that understanding of learning theories, instructional measures, and achievement standards, as well as the principles related to teaching and learning, as core knowledge, acknowledged that these are necessities for continuing professional development of practitioners.

2.2 Types of Reflective Practices

The habit of reflective practice is the universal remedy for effective teaching especially at the basic school level. Reflective teachers always imagine what they are doing and how it might be made even better (Eryaman, 2007). Taking a critical look at types of reflections put in practice by the professionals in the early days, a clear explanation of reflective practice revealed that the concept is a means by which one

can engage in either anticipatory reflection, contemporaneous reflection or retrospective reflection.

The six stages of Gibbs cycle, as shown in Figure 2 constitute significant milestones in addressing reflective issues in the classroom, especially at the basic school level. This pattern helps direct the basic school teacher to always consider what went wrong and finally thinks about what to do differently. Considering Gibbs' reflective practice, the cycle begins with Description stage. During this stage, the teacher has the chance to describe the classroom situation in details. In this situation the teacher is able to state what happened during a particular activity or lesson. This stage also affords the teacher the capability to be able to tell when and where a particular activity happened and who were involved. After this stage, the cycle explains how the teacher expresses his or her feelings about what took place. The teacher's 'Feelings' which constitutes the second stage of the cycle, allows the classroom teachers to develop the ability to explore any feelings or thoughts that they had during the teaching experience, and how they may have impacted the experience.

2.3 The Importance of Reflective Practices in Education

It is possible to trace the concept of reflection back to Dewey (1933), who asserted that reflective thought is first motivated by perplexity and doubt and this assertion was supported by Scott (2020). People are compelled by this misunderstanding to enquire about, identify, and fix issues on reflective practices that are relevant to their educational activities. Reflective practices in science classrooms therefore hold great promises for enhancing the quality of science education and preparing pupils for the challenges of the modern world. The practice does not only hold great promise but enhance teaching and learning by improving teacher self-awareness and

professionalism (National Teaching Council [NTC], 2018). According to report, reflective practice also promotes student self-awareness, confidence, motivation and student self-reflection. It also promotes Ghana's education policy that implements National Teaching Standard (NTS) which ensures best practices including journaling in the classroom. Consequently, reflective practices often make way for the basic school teachers to effectively manage their classroom diversity and inclusivity. The practice though has numerous advantages as outlined, is not without its own inherent challenges which the study sought to address.

2.4 Benefits of the Reflective Practices

There are several advantages to using reflective techniques in the classroom for both students and teachers. Self-awareness, critical thinking, and professional development are encouraged by these methods. The benefits of reflective practice, as discussed by Hatton and Smith (2000) have been widely recognized in the field of education and professional development. Although Hatton and Smith's findings on reflective practice was earlier published in 1995, their ideas continue to be influential, and subsequent research has further explored and expanded upon the benefits of reflective practice.

Hatton and Smith (2000) further indicated that Enhanced Self-Awareness, which is reflective practices, helps students and teachers to develop self-awareness by examining their thoughts, feelings, and actions in the learning process. They indicated that through reflection, individuals gain deeper understanding of their strengths, weaknesses, and learning preferences.

2.5 Reflective Practice from Global Perspective

This review looked at the definition and conceptual framework of reflective practices, highlighted their benefits, explored challenges, and identified effective strategies for intervention. Finlay and Rehabilitation (2009) indicated that the term reflective practices took its ancestry foundation from ancient times in the beginning of the 20th century with personalities like John Dewey, and Donald Schön among other scholars who were first credited with the reflective practice. Although Finlay and Rehabilitation identified the importance of reflective practices, they were of the view that despite the popularity reflective practices received especially in education, there were concerns raised in literature on the lack of conceptual clarity that often surrounded the term 'reflective practice', a gap that has been identified and further clarified in this literature.

Research has shown that reflective practices can have positive impacts on teacher development and student learning outcomes. For example, in a study conducted, by Li and Huang (2019), it was found that reflective practices were positively associated with teacher efficacy, which in turn was associated with learners' achievement. Similarly, a study conducted in Ghana by Hobbs (2007) found out that reflective practices were positively associated with teacher professional growth and development.

On the contrary however, reflective practices are not without challenges. In some cultures, there may be a reluctance on the part of the teacher to engage in self-reflection due to fear of being seen as an incompetent or inadequate teacher. Additionally, reflective practices may be seen as time-consuming and may not be prioritized in busy school environments (Hobbs, 2007).

Notwithstanding the above challenges, elsewhere, a study conducted by Otienoh (2009) found reflective practice as a crucial element in promoting inclusive education in basic schools. They found that, teachers who engaged in reflective practices were more likely to adapt their teaching strategies to meet the diverse needs of their students, including those with disabilities.

Similarly, a study conducted by Matibiri and Chikoko (2019) in Zimbabwe, explored the challenges and opportunities associated with reflective practices among basic school teachers. The study found that while reflective practice was valued by teachers, they faced several challenges in implementing it. These challenges included lack of support from school administrators, inadequate time for reflection, and limited resources for effective implementation. The study recommended that school administrators in Zimbabwe should create a conducive environment for reflective practice by providing support, time, and resources to teachers. In support of the above researches conducted, Githua and Mugenda (2019) in Kenya also identified some understandings of reflective practices by clearly indicating that the practices were critical in helping teachers to identify their strengths and weaknesses, develop strategies for improvement, and enhance their professional development. The study recommended that teacher education programmes should always incorporate reflective practice as a key component to prepare teachers adequately for their roles.

2.6 Effectiveness of Teachers' Reflective Practices in Science Teaching

On the effectiveness of reflective practices in our schools across Africa, Adigun and Akindele (2018) in Nigeria examined the effects of reflective practice on teaching effectiveness and student learning outcomes. Their study found that reflective practice enhanced teachers' pedagogical skills and improved students' learning outcomes. The

study then recommends that teachers in Nigeria should engage in reflective practice regularly to improve their teaching effectiveness and promote students learning.

Other revealing studies available suggest that reflective practices among African basic school teachers are influenced by their cultural backgrounds, beliefs, and experiences (Amoah, 2011). Amoah indicated that some African cultures, clearly support the practice that for example; the classroom teachers are always regarded as the sole authority in the classroom, and therefore, questioning their methods may be seen as disrespectful. This, according to him, can hinder reflective practices among teachers as they may not be receptive to feedback and criticism from their colleagues and students. The study by Amoah also attributed this to lack of professional development opportunities and support from School Management. Despite some cultural interferences from African perspective, Obidike and Olusakin (2020) reported positive views that teachers who engaged in reflective practices reported feeling more confident in their teaching skills and better able to identify areas of improvement.

2.7 Factors Influencing Reflective Practices

In Nigeria, Adeyemi and Adeyinka (2019) conducted a study on reflective practices among basic school teachers. The study found that teachers' reflective practices were influenced by their teaching experiences, personal beliefs, and professional development. The study recommended that teacher education programmes should integrate reflective practice as a key component to enhance teaching quality and improve student outcomes. A similar study conducted by Inusah, Emile and Ahmed (2017) examined reflective practices among basic school teachers in Ghana. The findings from the study are in direct support of Adeyemi and Adeyinka and confirmed that basic school teachers' reflective practices were influenced by their teaching

experiences or personal beliefs. On the contrary, their study also identified contextual factors such as limited resources and high workload as factors influencing reflective practices. The study concluded that reflective practice was critical in enhancing teaching quality and recommended that teachers receive training in reflective practice.

In spite of the critical roles reflective practices play in classroom engagements in other parts of the world, in Ghana, a study by Adutwum and Afenyadu (2019) found that reflective practices among basic school teachers was low, and teachers did not engage in self-reflection during their classroom practices.

Similar studies by Akakpo, Agbesi, Asare and Amoah (2019) conducted in Ghana also explored the experiences of primary school teachers with reflective practice. The study found that reflective practice was not a common practice among Ghanaian teachers, primarily because they lacked adequate knowledge and understanding of the concept. The study recommended that teacher training programmes in Ghana should incorporate reflective practice as part of their curriculum to enhance teacher professionalism and effectiveness.

2.8 The Concept of Reflective Practices

It is not sufficient simply to have an experience in order to learn or teach. Without reflecting upon this experience, it may quickly be forgotten, or its learning potential lost. It is from the 'feelings' and thoughts emerging from this reflection that generalisation or concepts can be generated. More importantly, generalisation also allow new situations to be tackled effectively (Potter & Training, 2015).

In support of this assertion, remarkably, good instructors do not just assess their students only; but they also find ways to assess themselves in order to continuously

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The six stages of Gibbs cycle, as shown in Figure 1, constitute significant milestones in addressing reflective issues in the classroom, especially at the basic school level. This pattern helps direct the basic school teacher to always consider what went wrong and finally thinks about what to do differently. Considering Gibbs' reflective practice, the cycle begins with Description stage. During this stage, the teacher has the chance to describe the classroom situation in details. In this situation the teacher is able to state what happened during a particular activity or lesson. This stage also affords the teacher the capability to be able to tell when and where a particular activity happened and who were involved. After this stage, the cycle explains how the teacher expresses his or her feelings about what took place. The teacher's 'Feelings' which constitutes the second stage of the cycle, allows the classroom teachers to develop the ability to explore any feelings or thoughts that they had during the teaching experience, and how they may have impacted the experience.

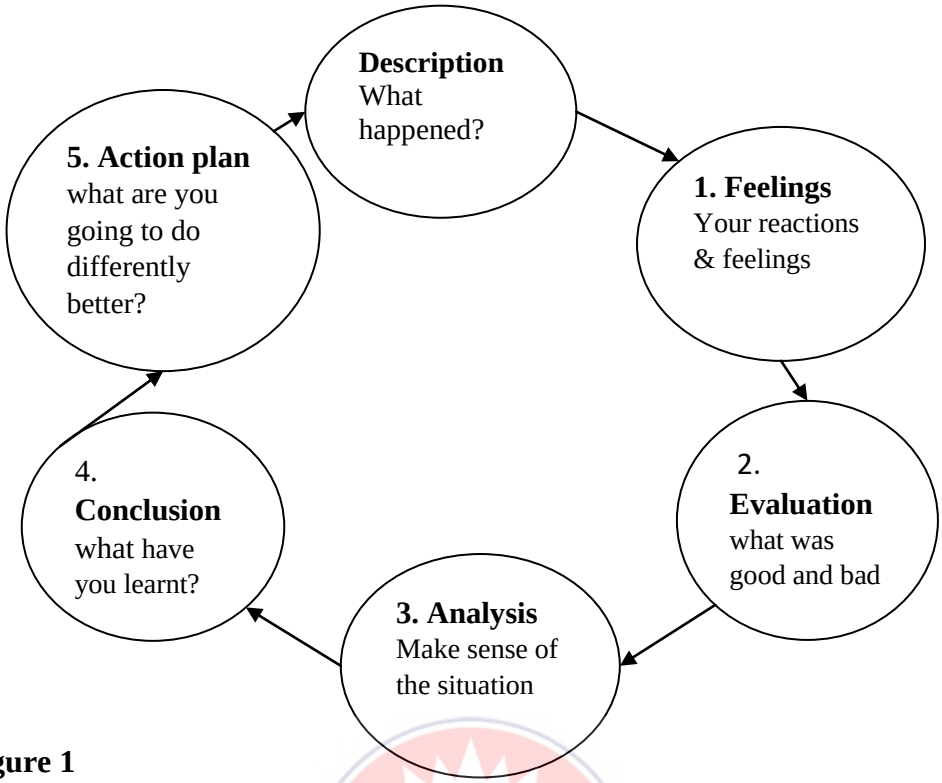


Figure 1

Gibbs' Reflective Cycle Adapted

Note: Reflective cycle adapted from Using GIBBS' reflective cycle in making reflections of literary analysis by Adeani, I. S., Febriani, R. B, & Syafryadin, S. (2020). *Indonesian EFL Journal*, *6*(2), 139-148.

In Figure 1, Gibbs asked some rhetoric questions at various stages of the reflective cycle such as; "what was the teacher's feeling during a particular lesson?" and what does the teacher feel before and after the lesson or an activity during the lesson? After these questions have been supposedly answered, the teacher has the opportunity to evaluate what worked well and what didn't work well in the classroom situation. After going through all the three stages and at the fourth stage, the teacher's objectivity and honesty play very key roles. To get the most out of the reflection situation, the teacher needs to focus on both positive and negative aspects of the situation, even if it was primarily one or the other.

The teacher, after a careful evaluation of the classroom activities, has the chance to do 'Analysis'. At this stage, the teacher has the chance to make sense (carry out self-assessment) out of what happened during a particular classroom activity. This stage further enables the teacher to focus on details around what happened in a particular situation as indicated in Figure 1. The teacher now has the chance to extract meanings from what happened, in order to have an improved deductive assessment of the lesson. For an effective analysis by the teacher during classroom activities, the teacher targets the reflective activities towards different aspects of the teaching process in order to find out what went well or poorly and may ask why.

After making a clear and a distinct analysis of the activities that took place, the teacher has the chance to draw valid conclusions. At this stage of the Gibbs' cycle, the teacher now develops the needed expertise to draw valid and useful conclusions about what happened especially during classroom engagements with learners. This stage also affords the teacher the opportunity to summarise the learning process and also highlight what changes those actions could bring out so as to improve the outcome in future lessons. Finally, the Gibbs' cycle, enables the teacher to initiate an 'Action plan' after a careful analysis of an activity. At this stage, the teacher plans for what could be done differently in a similar or related science classroom situation in future.

2.9 Levels of Reflection

Four stages of reflection are described by Harding and Charlton (2016) as a sort of mental processing. They emphasized the importance of writing down reflections, but this is just one example; reflection can also be verbal or just in the mind. They also said that whenever we communicate learning in writing, it becomes new learning material and we can use it to reinforce or check our understanding of it, acting as a

feedback loop. This shows the value of introspection in the learning process. It was further indicated that there are no rules about how to reflect but reflection usually involves three stages as indicated below.

2.10 Types of Reflective Practices

The habit of reflective practice is the universal remedy for effective teaching especially at the basic school level. Reflective teachers always imagine what they are doing and how it might be made even better (Eryaman, 2007). Taking a critical look at types of reflections put in practice by the professionals in the early days, a clear explanation of reflective practice revealed that the concept is a means by which one can engage in either anticipatory reflection, contemporaneous reflection or retrospective reflection.

2.10.1 Reflection-for-Action

This is a level of reflection which occurs before a problem is addressed (Shandomo, 2010). The authors indicated that the term, reflection–for–action, implies pre-assessing a lesson either independently or in collaboration with another teacher before engaging learners. This is done by diagnosing possible problems and strategies by co-reflecting with another teacher. In support of this arrangement, Shandomo (2010) confirmed that good teachers do not just get on with teaching activities without first assessing their strengths and weaknesses through reflective activities on the lessons to be delivered.

2.10.2 Reflection–in-Action

Schön (1998) as cited in Yanow and Tsoukas (2009) calls the second level of reflective activity of all professionals as ‘reflection-in-action'. Reflective teachers always put up serious efforts to search out better teaching strategies. According to

Jasper (2003) reflective-in-action can be described as the capacity of professionals to consciously think about what they are doing while they are doing it. This concept by Schon becomes the primary and most widespread use of reflective practices among professionals both in training and in practice.

2.10.3 Reflection-of-Action

Schön (2017) and Anderson (2020) indicated that reflection-on-action emphasized the relationship between reflection and experience. It was however argued that there is a difference between reflection-in-action and reflection-on-action, and that teachers must be aware of both and treat them as such. Anderson then clarified that Reflection-in-action refers to teachers becoming aware of their decisions as they work, while reflection-on-action refers to teachers reflecting back and critiquing their own practices even after the teaching process. Both however emphasised the importance of experiences and the application of knowledge gained through reflection in teacher experience.

2.11 Peer and Self-Assessment

This concept aims at questioning teachers' own professional actions, behaviour, practices, and accomplishments either from peers or one's own assessment to acquire professional excellence (Kitsantas & Zimmerman, 2002). They further indicated that developing self and peer assessment skills are valuable investments for a long-term future of our pupils. This implies that peer assessment is key to achieving educational goals since pupils are the target beneficiaries of this practice.

2.12 Cognitive Constructivist Theory

The Constructivist process of reflection influences what a teacher perceives, feels, sees, and learns in the classroom setting (Borges da Costa & Cox, 2017). This

position by Coaster Borges da Costa and Cox, is in support of the popular, Contiguity principle; which indicated that Instructors should also combine pictures and words in designing digital interactive learning materials for effective classroom reflections. The cognitive constructivist theory of multimedia developed by Bull (2009) is one of the commonest theories that support the use of multimedia to boost up reflective practices. This common theory has its own effects to reflective practice that needs to be further highlighted in this write up.

2.12.1 Cognitive Theory Effect to Reflective Practice

It is worth noting that one cannot engage in reflection without the application of the cognitive aspect of the body. According to Hatton and Smith (2000), cognitive, which has to do with the mind plays a vital role in all activities that involve the use of the brains which enables basic school teachers to understand and produce new strategies. Meta-cognitive strategies, also allow them to control their own practices through organising, planning, and evaluating, as well as affective strategies that help them to gain control over their emotions, attitudes, motivations, and values (Borges da Costa & Cox, 2017). In support of this assertion, the cognitive aspect of the teacher further plays very significant role in lesson delivery and for that matter reflective teaching practices. Therefore, in order to maximize teachers' approaches and strategies of reflective teaching so as to help their pupils achieve the best of the lesson, teachers should increase their cognitive awareness of reflective teaching (Hatton & Smith, 2000). It was further indicated that in order for the teachers to achieve the needed results, they should design specific tasks for themselves to make their reflective abilities easier, faster, more enjoyable, more self-directed, and more transferable to new situations to provide the appropriate feedback to pupils.

2.13 The Role of Reflective Practice in Lesson Delivery

Good instructors discover methods to evaluate or assess themselves in order to continuously improve their own professional practices. They do this in addition to teaching or assessing their students. The American Library Association (2013) lists ongoing education and lifetime learning as a key skill of our profession, particularly in relation to our function as classroom teachers. Before beginning to offer lessons, a teacher should effectively participate in reflection-for-action processes. This is known as reflection-for-action procedures. The former asks the instructor to first consider what will be taught, how it will be taught, and what the students are likely to learn from the lesson (Iqbal, Chishti & Akhlaq, 2017). This practice was then finally established that the teacher, who engaged in Reflection-in-Action also known as Active Lesson Delivery (ALD) and smooth progression of lesson plan during practicum, were better achievers of teaching output compared to those who do not engage first in reflection for action. It is therefore imperative for all professionals to first and foremost engage in reflection –for-action before the actual lesson deliveries.

2.14 Constraints on the Use of Reflective Practices

Since the introduction of T-TEL in Ghana, reflective practice as a component of global educational practice has drawn a lot of attention and is now viewed as an alternative paradigm in teacher education. This profession is not without its own unique obstacles and inherent difficulties. However, there is still considerable work to be done to uncover some of its underlying difficulties because the idea is relatively new to Ghanaian teachers. The majority of these issues have been taken into account in the updated curricula to adapt to changing student demands, yet they are likely to induce fear in many teachers. Spalding and Wilson (2002) identified some challenges

that are likely to affect effective implementation of reflective practices, in the sense that not all practitioners may understand the reflective process.

2.15 Frequent Policy Modification and Implementation

Farrell (2001) was of the view that frequent changes in educational policies within a short times after its introduction and implementation reduces its effectiveness at all levels. It was further noticed that specialties that also go with teacher education, by educating teachers at basic levels to colleges of education where professional teachers are trained also diminishes (Knowles, Gilbourne, Cropley & Dugdill, 2014). However, Meaney, Griffin, Bohler & Learning (2009) asserted that mentor education during pre-service teacher education can equally help reverse the negative effects of policy modifications identified in earlier studies.

2.16 Reflective Practice and Rapid Technological Advancements

One major difficulty that commonly affects reflective practice implementation is the proliferation and rapid development of media technology that are most often alien to most basic school teachers in the classroom (Farrell, 2001). More conspicuously among the constraints is the current, rapidly developing Information Technology (IT), use of various methods, such as digital video tools, and web-based and electronic portfolios. Abrams and Middleton (2004) in their findings supported the position of Farrell (2001) but were also of the view that Information Technology (IT) challenges may be short lived provided policy developers provide enough training for the implementers of reflective practices especially at the basic school level.

2.17 Reflective Practices Adopted by Basic School Science Teachers

Reflective practice is a necessary aspect of teaching, as it inspires continuous professional growth and improvement. However, there were only few research conducted on the extent to which reflective practices are adopted by basic school science teachers in Ghana. A study carried out by Opoku-Amankwa, Agbozo and Agbenyega (2018) explored the use of reflective practices among basic school science teachers in Ghana. The study found that reflective practices were not regularly used by teachers, with only a few teachers engaging in reflective activities like the use of reflective journals (RJ), observations of peers as they teach, and feedback sections. The study further suggested that teachers needed more training and support to improve upon their reflective practices. In a similar study conducted by Osei, Addei and Kwarteng (2019) it was found that most teachers in Ghana had limited knowledge of reflective practice and its importance in teaching. The study therefore recommended the need for teacher training institutions to use alternative training programmes that focus on reflective practice and its application in classroom teaching. In agreement to the findings of this study, Asante, Abusah and Appiah (2019) explored the impact of a reflective practice intervention on science teachers' professional growth in Ghana. The study found that the intervention improved teachers' reflective skills and promoted their professional development. The question however remains as to whether teachers continued to engage effectively in the practice.

Contrary to the above findings, the literature suggests that reflective practices are not widely adopted by basic school science teachers in Ghana, but that the outcome of this study would provide an innovative training and support in form of a model to enhance teachers' reflective skills and promote their professional growth. Further

research is therefore needed to explore the barriers to facilitators of reflective practices among Ghanaian teachers.

2.18 Level of Reflectivity Demonstrated by Basic School Science Teachers

Fundamentally, reflective teaching is a process of self-examination and critical evaluation of one's teaching practices. In recent years, there has been growing interest in the level of reflectivity demonstrated by basic school science teachers in Ghana (T-TEL, 2018). This literature review explores the available research on this statement to explain the levels of reflectivity among basic school teachers in Ghana.

A study conducted by Asiedu-Addo and Agyei-Okyere (2018) found out that basic school science teachers in Ghana demonstrated a low level of reflectivity. The study surveyed 50 science teachers from 10 basic schools and found that only a few basic school teachers engaged in reflective practices where they engaged in activities like; reviewing their own lesson plans, assessing student learning, and adjusting their teaching strategies accordingly.

Another study carried out by Asare and Sarfo (2020) in a similar situation examined the factors that influenced the levels of reflectivity as demonstrated by basic school science teachers in Ghana. The study found out the following challenges including; teachers' lack of formal training in reflective teaching practices, limited access to professional development opportunities, and inadequate support from school administrators were among the major factors that hindered teachers' ability to engage in reflective teaching practices among others.

In contrast to the study conducted by Asare and Sarfo (2020), Ampiah and Boakye-Yiadom (2021) found out that basic school science teachers in Ghana who

participated in a professional development programme on reflective teaching practices demonstrated a significant improvement in their level of reflectivity. The programme therefore provided teachers with opportunities to engage in reflective practices such as peer observation, self-evaluation, and feedback. These practices though emphasised by earlier Researcher s is still at its developmental stage.

In conclusion, some research studies opined that basic school science teachers in Ghana exhibit a low level of reflectiveness, which is influenced by a number of variables including lack of formal training, restricted access to professional development, and insufficient support from school administrators. However, as the research suggests, interventions like professional development programmes may greatly enhance teachers' degree of reflection.

2.19 Factors Which Influence Teacher Reflection during Classroom Engagements

Factors which influence reflective practices during classroom engagements include both positive and negative factors. In this study, both factors have been identified and how each of the factors either promotes or hinders classroom engagement processes has been discussed. Reports from earlier researches by Gibbs and Schön showed that teacher reflection is a critical component of effective teaching practices at all levels of education. It was also suggested by Gibbs and Schön that reflective teaching practices enable teachers to examine their classroom practices, identify areas of improvement, and make informed decisions to enhance their own teaching skills as well as students' learning outcomes.

Several studies have explored many factors that occasionally influence teacher reflection among science teachers across basic schools in Ghana. For example, Borko,

Jacobs, Eiteljorg and Pittman (2015) indicated that teacher reflection is influenced by several factors, including teacher beliefs, teaching experience (which may either negatively or positively influence the process), and support structures. In their study, they found that teachers with more experience tend to reflect more on their teaching practices compared to novice teachers. Furthermore, teachers with strong beliefs in the importance of reflection were found to be more likely to engage in reflective practices. This implied that teacher experience also plays a crucial role in effective reflective practices.

In a similar study by Oduro, Anamuah-Mensah and Ampiah (2016), the followings have been identified as some basic factors that often influence reflective practices at basic school levels, such as; teacher workload, lack of support, and inadequate training as barriers to teacher reflection among science teachers in Ghana. The study further indicated that science teachers in basic schools faced significant time constraints due to large class sizes, limited resources, and competing demands on their time, which made it difficult for them to engage in reflective practices. Furthermore, inadequate support from school leaders and lack of opportunities for professional development often slow down teacher engagement in reflection processes.

Similar study conducted by Dzidzornu, Quansah and Tetteh (2020) found that teacher reflection was influenced mostly by the level of teacher autonomy and the quality of supervision in the school. It was found out that teachers who had excellent supervision and had greater freedom in their classes were more likely to use reflective techniques. As a result, a variety of factors, such as teacher views, teaching experience, support systems, workload, assistance, and training, autonomy, and supervision, have an impact on teachers' reflection. This study therefore focuses on

resolving these issues to increase teacher reflection among science instructors in Ghana's primary schools, which could subsequently strengthen instruction and result in better student learning results.

2.20 Challenges Faced by Basic School Science Teachers in Adopting Reflective Practices

Reflective practices are very crucial aspect of teaching that enhance professional growth and continuous development of the teacher. However, in Ghana, some earlier researches indicate that basic school science teachers face several challenges in adopting reflective practices. Example of such study carried out by Oduro, Asabere-Ameyaw and Agbekpornu (2019) showed that the challenges of basic school science teachers in Ghana are quite significant. Major among these challenges include; inadequate training, lack of time, and resources, low self-efficacy, and limited support from colleagues and school administration. The study further noted that teachers did not only lack adequate training on reflective practices but their benefits as well. As a result, teachers did not know how to use reflection as a tool to improve upon their teaching practices.

Another study by Asabere-Ameyaw and Oduro (2018) revealed that basic school science teachers in Ghana were faced with inadequate time and resources to engage in reflective practices. The study also noted that teachers found it challenging to document their reflections on their teaching practices using reflective journals, making it difficult to monitor their growth and development as reflective practitioners.

Furthermore, the study by Oduro et al. (2019) noted that basic school science teachers in Ghana had low self-efficacy in reflective practices. Teachers' low level of confidence in their ability to reflect effectively, and this affected their willingness to

engage in reflective practices. Moreover, limited support from peers and school administration was also noted as a challenge for basic school science teachers in Ghana. The study by Asabere-Ameyaw and Oduro (2018) further revealed that teachers did not have access to mentorship, peer support, or feedback from school administration to enhance their reflective practices.

In conclusion, research shows that basic school science teachers in Ghana face several challenges in adopting reflective practices. These challenges include inadequate training, lack of time and resources, low self-efficacy, and limited support from colleagues and school administration. To promote reflective practices in Ghana and more specifically in Ada East District, there is a need for targeted professional development programmes, mentorship, peer support, and policy changes that support teachers' engagement in reflective practices.

2.21 Types of Models for Reflective Practices for Science Teaching

Reflective practice has been widely recognized as one of the most powerful academic tools for professional development among teachers, including those in basic school science education in Ghana. Literature suggests that reflective practice can improve teachers' knowledge and skills, increase their motivation and self-efficacy, and enhance the quality of their teaching practices. However, despite the potential benefits, reflective practice is not widely adopted among basic school science teachers in Ghana. This highlights the need for an appropriate model to enhance reflective practices among basic school science teachers in Ghana and for that matter Ada East District.

One potential model that could be developed to enhance reflective practices is the Action Research Model. Action research is a systematic and cyclical process of reflection and action, where teachers identify a problem, collect data, analyse the data, develop an action plan, implement the plan, and evaluate the outcomes. This model is highly collaborative, encourages teachers to take ownership of their learning, and provides a framework for ongoing professional development. Studies conducted in other contexts have demonstrated that the action research model can enhance teachers' reflective practices and improve their teaching practices.

The problem, however, is based on issues of effective application of the newly acquired set of skills. Darling-Hammond and Richardson (2009) encouraged the "active learning" community, i.e. a Professional Development (PD) model which is school-based, workable, and collaborative in nature. Such PD activities build sustainability and boosts confidence of teachers' practice in drawing inquiry from local knowledge (Villegas-Reimers, 2003). Reflective teaching practices incorporate most of the promising features of a PD model development where teachers work with colleagues and experts including researchers to increase their chances to prepare and fine-tune their instructional practice models. It is a self-motivated and a powerful approach to professional learning model development where teachers, improve their lessons, learn new and treasured teaching approaches, expand their subject matter knowledge, work collaboratively, and become self-reflective professionals (Lewis, Perry, Friedkin & Roth, 2012). Hence model development with an expert is one of the best ways teachers can collaborate and improve their knowledge by developing a model of their own.

Another model that could be used to enhance reflective practices is the Reflective Practice Cycle. This model involves three phases: self-observation, self-evaluation, and self-reflection. During the self-observation phase, teachers gather data about their teaching practices, including student performance, classroom management, and instructional strategies. In the self-evaluation phase, teachers analyse the data and identify areas for improvement. In the self-reflection phase, teachers consider their own beliefs, attitudes, and values, and how these may be influencing their teaching practices. The Reflective Practice Cycle is a simple and flexible model that can be adapted to different contexts and can be used by individual teachers or groups of teachers. Based on Gibbs style of reflective model development, this study would adopt reflective cycle model to enhance output of basic school teachers in reflective practices. This approach is considered over other models due to its recursive and recursive nature.

2.22 Benefits of the Reflective Practices

There are several advantages to using reflective techniques in the classroom for both students and teachers. Self-awareness, critical thinking, and professional development are encouraged by these methods. The benefits of reflective practice, as discussed by Hatton and Smith (2000) have been widely recognized in the field of education and professional development. Although Hatton and Smith's findings on reflective practice was earlier published in 1995, their ideas continue to be influential, and subsequent research has further explored and expanded upon the benefits of reflective practice.

Hatton and Smith (2000) further indicated that Enhanced Self-Awareness, which is reflective practices, help students and teachers to develop self-awareness by

examining their thoughts, feelings, and actions in the learning process. They indicated that through reflection, individuals gain deeper understanding of their strengths, weaknesses, and learning preferences.

In summary, there is the need for a suitable model to enhance reflective practices among basic school science teachers in Ada East District in Ghana. The Action Research Model and the Reflective Practice Cycle are two potential models that could be developed and implemented. These models have been used to enhance teachers' reflective practices and also improved their teaching practices in other contexts. Further research is needed to evaluate the effectiveness of these models in the Ghanaian context and to identify any necessary modifications.

2.23 The Theoretical Framework

Reflective teaching according to Yanow and Tsoukas (2009) is a concept introduced by Donald Schön, an influential scholar and theorist in the field of education and professional development in the 80s. Schön's work on reflective practices had a significant impact on the way teachers approach their teaching methods and how professionals in various fields engage in continuous learning and improvement.

The theoretical framework in this study was then based on Schön's concepts of three theoretical perspectives. These included; social cognitive theory, constructivism, and transformative learning theory as indicated by (Darling-Hammond, 2006). Social cognitive theory according to Darling-Hammond, emphasizes the importance of self-regulated learning, where individuals actively monitor and control their own learning processes. In this context, reflective practices can be seen as a way of promoting self-regulated learning among teachers.

Constructivism on the other hand also emphasizes the role of prior knowledge and experiences in learning by construction of Knowledge. Korthagen and Vasalos (2005) were of the view that reflective teaching from a constructivists' perspective emphasizes that teachers construct their own knowledge and understanding through critical reflection on their experiences in the classroom. According to them, this involves actively making sense of their teaching practices and the impact they have on students' learning. In the context of reflective practices, teachers can reflect on their prior experiences and knowledge to develop new teaching strategies and improve their teaching practices. Transformative learning theory by Mezirow (1983) and Darling-Hammond (2006), also emphasized the importance of critical reflection in promoting transformative learning experiences. Both authors stressed the value of reflection in fostering transformational learning experiences in adult education while discussing reflective techniques. As a result, science teachers in the basic schools may critically evaluate their own teaching strategies to pinpoint their own strengths and flaws as well as create fresh perspectives and instructional strategies to improve their own teaching strategies.

A further consideration of the theoretical perspective of reflective practices indicates that, not all reflections are very crucial to classroom activities. Leung and Kember (2003) also indicated that reflection may be employed at different levels, and not all reflections are undertaken at the deepest, or critical, level. Kreber and Castleden (2009) also strongly emphasised that shallow level of reflection may be appropriate for certain learning outcomes that require the learner to describe, report or recall a particular learning outcome. Therefore, engaging with deeper and critical reflection can be related to whether the learner takes a deep or surface approach to learning. Moon (2004) also reiterated the views expressed by Kreber and Castleden (2009) that

a deep approach to learning is more closely associated with deep reflection, which can in turn enhance learning outcomes (Nelson, 2014). This influences the level or depth of reflection include learner or teacher capacity and discipline approaches (Kreber & Castleden, 2009).

Reflective practice is an essential component of teaching, which involves teachers examining and analysing their own teaching practices, experiences, and beliefs to improve their professional skills and the learning outcomes of their students. In the context of science classroom engagements, reflective practices can play a crucial role in promoting effective teaching and learning. Constructivism, an educational philosophy that stresses the value of basic school teachers actively building their understanding of the world through their experiences and interactions with their surroundings, is the theoretical foundation of this approach. Additionally, the educational theory known as transformational learning theory complements this paradigm by emphasizing the ways in which teachers' views and presumptions can change as a result of their exposure to and engagement with fresh concepts and viewpoints. The Theory emphasizes the importance of critical reflection in promoting transformative learning experiences. The theory also suggests that learning is most effective when it involves a process of reflection and critical thinking, and hence teachers in this case must be willing to challenge their existing beliefs and expectations in order to grow and develop. Kreber and Castleden (2009) were of the view that while these frameworks may have been developed before the year 2000, their influence and application have continued into the specified time frame. They were also of the opinion that there may be other frameworks and authors within this period, but these according to them, there are some of the notable ones in the field of reflective practice. Finally, in the context of reflective practices in this study, teachers

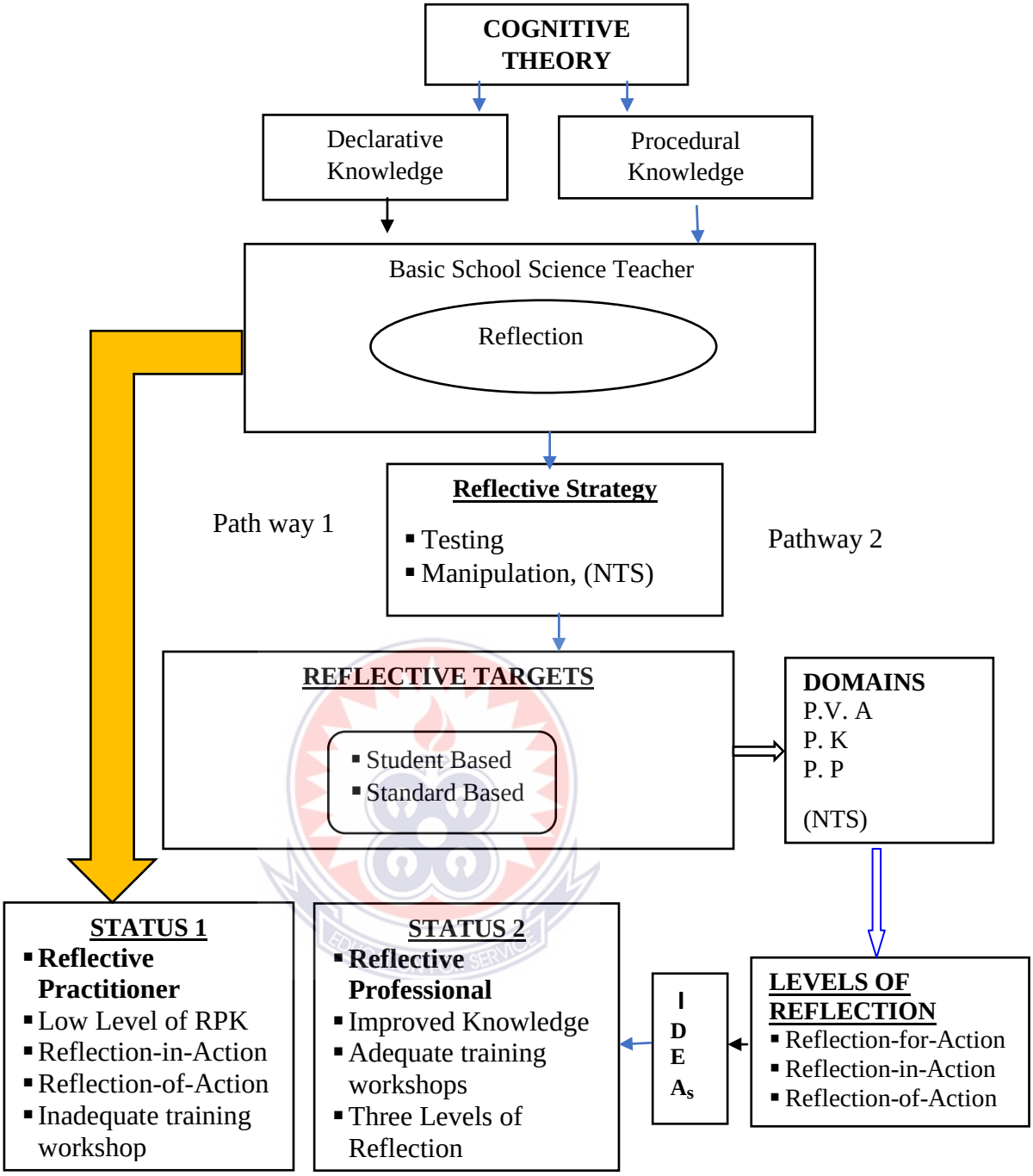
can critically reflect on their teaching practices to identify their strengths and weaknesses and develop new perspectives and approaches to teaching.

2.24 Conceptualisation of Reflective Practices

A conceptual framework provides a structured approach to defining key concepts, relationships between variables, and the theoretical narratives supporting a concept within a study (Vesanen, 2007).

Reflective practices among basic school teachers in science classroom, (Vesanen, 2007) believed strongly that conceptual framework could be developed to identify the key elements of reflective practice and the factors that influence its implementation. It was also stressed that the framework also identified the theoretical perspectives that inform the study and the research questions that will be explored.

In this study also, the concept of reflective practices by the basic school science teachers has been developed into a well explained structure in Figure 2.



Source:Adapted from University of Mississipi, School of Education. White (2019) http://education.olemiss.edu/.download/conceptual_framework.pdf

Figure 2

Conceptual Framework: Becoming a Reflective Professional

The justification for the development of the Conceptual Framework in Figure 2 is that it:

1. serves as a guide for researchers, policymakers, and educators.
2. identifies key areas for intervention and improvement of reflective practices among basic school science teachers in Ada East District and beyond
3. paints the true picture of the current status of reflective practices among the basic school teachers in Ada East District.

The conceptual framework within which this study has been designed for reflective practices among basic school teachers is presented in Figure 2. The Framework summarizes the key elements of the concept and provides a general idea of the reflective practices for an effective professional development. Every teacher should be a well-known teacher for their reflective practices; thus, it is crucial to understand how teachers may engage in these activities in order to develop into reflective professionals. It is necessary to understand the conceptual framework for reflective practices of basic school teachers for this study in order to understand what these practices comprise and their components.

A conceptual framework is a structural depiction of a phenomenon in a study that also describes the phenomenon's natural progression (Camp, 2001; Adom et al., 2018). In addition, conceptual framework provides a logical and systematic approach to understanding the research problems that guides the research and interpreting the findings. In a similar manner, this study presents, the conceptual framework in Figure 2, which presents a mental picture of reflective practices.

2.24.1 Becoming a Reflective Professional

Many teachers who are able to carry out some form of cognitive exercise need to acquire two types of knowledge i.e. declarative and procedural. Cognitive, declarative and procedural knowledge are interconnected components of the knowledge framework, which function together to promote learning, problem solving and decision-making processes by the learner (García-Ceberino, Gamero, Feu & Ibáñez, 2020). For example, declarative knowledge according to García-Ceberino et al. (2020), is a situation where the learner understands a concept and can use it to explain new information and make judgments and behavioural decisions. The Authors further explained that procedural knowledge on the other hand, is demonstrated when the learner can put a concept into action by undergoing some form of introspection that makes the learner a reflective professional.

The formalisation of the cognitive theory is generally attributed to Jean Piaget, who articulated mechanisms by which knowledge is internalized by learners. Cognitive theory according to Kalina and Powell (2009) is a form of psychological theory of knowledge which argues that humans construct knowledge and meaning from their experiences and knowledge acquired (Amakyi & Ampah-Mensah, 2016).

This claim has been carefully explained and outlined in the research framework in Figure 2 (pg 42). In Figure 2, there are two distinct pathways that explain what constitute a reflective practitioner and a reflective professional.

Figure 2 represents a framework of reflective practice which has cognitive and constructivism theories as its fundamental operational elements, based on cognitive theory Hruby and Roegiers (2012). It is argued that connecting theory and reflective practice can be particularly very useful in the development of a reflective disposition

and should begin with stimulating and examining personal beliefs and theories (Smith, 2003). This according to Visser (2010), the relationship between cognitive theory and reflective teaching in education is significant and intertwined. Visser further indicated that cognitive theory is a psychological framework that focuses on how people process, store, and use information. It explores how individuals acquire knowledge, solve problems, and make decisions through mental processes such as perception, memory, attention, and reasoning. On the other hand, reflective teaching according to Kalina and Powell (2009) is an approach in education where teachers engage in critical self-assessment and thoughtful examination of their teaching practices to improve their instructional methods and student learning outcomes. The reason for this was supported by Beattie that "what has to be learned is intimately connected to what is already known" (Beattie, 2000, p. 19). Tracey and Baaki (2014) also in agreement with this submission, opined that cognitive theory and reflective teaching share a symbiotic relationship in education. It was further emphasised that cognitive theories provide valuable insights into how people learn, which in turn informs reflective teaching practices. The reflective teaching process according Tracy and Baaki (2014) allows educators to align their instructional methods with cognitive principles, leading to more effective and student-centered learning experiences.

This theory helps especially basic school teachers teaching science to acquire the relevant skills that make them reflective professionals. In this framework, the reflective practitioners need to acquire the cognitive theory that equips them with Declarative and Procedural Knowledge that would help them to effectively engage in the use of variety of tools that would be applied via three levels of reflection, in order to become effective reflective professionals based on some strategies and targets of interest to learning. Notwithstanding, a reflective practitioner who acquires

declarative knowledge (data or facts about something) and procedural knowledge (abilities or steps on how to do something) carries out reflective practices using various teaching strategies.

There are two pathways shown in the framework to further explain the concept of who is a reflective practitioner as well as a reflective professional. The pathway (I) shows how a basic school science teacher becomes a reflective professional and another pathway (II) shows how another group of basic school science teachers becoming just reflective practitioners. The first pathway (strategy), if well carried out makes classroom for engagements and is pupil-centred, standard-based or knowledge based, which enables the basic school teacher to be able to overcome some possible limitations. The pathway may also enable the teacher to engage in reflective practices at all levels of reflection in order to become a reflective professional. Overcoming these limitations subsequently enables the basic school teacher in general and basic school science teacher in particular to successfully apply the reflective skills across the three domains and levels of reflection in order to become an effective reflective practitioner. But reflective practice in teaching is not just important for teachers and schools. According to research conducted by Hattie (2012), developing excellence in reflective teaching has the single most powerful influence on student achievement as well.

The formalisation of the cognitive theory is generally attributed to Jean Piaget, who articulated mechanisms by which knowledge is internalized by learners. Cognitive theory according to Kalina and Powell (2009) is a form of psychological theory of knowledge which argues that humans construct knowledge and meaning from their experiences (Amakyi & Ampah-Mensah, 2016).

As indicated earlier, the conceptual framework basically has its internal structures made of a two-pathway reflective practice process based on the cognitive reflective theory for acquisition of relevant reflective skills by basic school teachers. The basic school teachers' ability to apply the most appropriate reflective practice skills to improve their reflective skills to become reflective professionals in order to improve quality, hinges on continuous practice (Amakyi, & Ampah-Mensah, 2016).

This practice of becoming a reflective professional and improving quality, must be in line with the National Teachers' Standard (NTS) where the three domains (PVA, PP and PK) are basically considered by the basic school teacher when engaging with the pupils in the classroom (Ananga, 2018).

In order to become an effective reflective professional, the teachers again need to engage the pupils before, during and after lessons and reflect at each stage to improve upon their teaching strategies, making them reflective professionals.

The presentation of these procedures was adapted from The University of Mississippi School of Education Conceptual Framework: Educators as Reflective Professionals by University of Mississippi School of Education, (White, 2019).

From the framework, the various unit labels indicated that reflective practitioners can possess the characteristics of an effective basic school reflective professional, when they display the elements of cognitive theory to acquire some levels of declarative and procedural knowledge by reflecting along targets outlined in the framework. Although some teachers are considered as reflective practitioners, it is also possible when the reflective practitioner is able to overcome certain challenges as indicated in the

Pathway (I) and employ the principles of reflective practices along the three levels to become a reflective professional.

This is a confirmation that teachers as reflective professionals include all the activities teachers engage in throughout their lifetime (Akbas, Ozdemir, 2008). This is to enhance their knowledge based on social, cultural, and economic approaches in defining the individual teacher's responsibilities to improve teaching and learning.

2.25 Chapter Summary

In this chapter, relevant literature on this study has been reviewed on the status of reflective practices from global perspective to the Ghanaian situations among basic school science teachers. This has been done along the five key research questions to explain the concepts related to each research question. The Chapter also discusses the theoretical perspectives of the status of reflective practices and concludes with the conceptual framework which explains the general overview of the reflective practices. The Chapter also gives a mental picture of reflective practices and discusses the information gap that must be bridged.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

In this chapter, different methods (including the design), procedures and processes that were followed in the study for the collection and analyses of the data have been outlined. The chapter further discusses details regarding the research design, the population of the study, the sampling procedures used. It also discusses the research instruments used, data collection procedures employed, professional reflective teaching and learning interventions, as well as ethical considerations and data analysis techniques used.

3.1 Research Design

Research designs are plans or specific procedures and structures put in place towards the investigation of a problem. (Creswell, 2014). This is further explained by Johnson and Christensen (2014) that research design is a form of framework for the collection and analysis of data that will be used to answer research questions or tests in research. In this study therefore, the types of research design or specific procedures used have been indicated and explained.

3.2 Rationale and Assumptions for Quantitative and Qualitative Design

Research design is governed by the notion of 'fitness' for purpose (Cohen, Manion & Morrison, 2007). In this study, both quantitative and qualitative research designs were used. Considering the research problems and the nature of the targets, the qualitative research design was chosen to support the quantitative design. This is because it is the right approach to research in which the Researcher seeks to elicit participants' responses that would help in gaining in-depth understanding of the problem under

investigation. In this study, qualitative and quantitative designs were used to fully reveal the true status of reflective practices among basic school teachers in Ada East District. Moreover, the rationale for adopting this approach was to ensure that the Researcher understands the situation in question from the direct perspective of the respondents through descriptive mean and exploratory methods. Creswell (2009) indicated that mixed method research provides a more useful pathway to harness strengths that offset the weaknesses of both quantitative and qualitative research. More specifically, the study employed the concurrent parallel design i.e., qualitative and quantitative (Quan-Qual) design to develop a complete understanding of the research problem by obtaining different but complementary data. This design is considered the most appropriate as the Researcher sought to triangulate methods by directly comparing quantitative results with qualitative findings for verification and validation purposes.

3.3 Type of Research Design

The study explored the current status of reflective practices among basic school teachers who teach science. The study then investigated the extent to which the teachers engaged in reflective practices and the factors that contributed to or hindered their use of reflective practices in teaching science. Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell, 2009). A research design according to Creswell, encompasses the entire process from formulating research questions to selecting methods and analysing data.

Generally, in research study, there are about forty mixed-methods research designs reported in literature (Tashakkori & Teddlie, 2003). Creswell (2003) identified the six

most commonly used designs, which include three concurrent and three sequential designs. One of those designs, the mixed-methods sequential explanatory design, is highly popular among researchers and implies collecting and analysing first quantitative and then qualitative data in two consecutive phases within one study.

This study therefore adopted this highly recognised design to arrive at its intended purpose based on its characteristics in research. Its characteristics are well described in literature (Tashakkori & Creswell, 2007) and the design according to them has found application in both social and behavioural sciences researches. In agreement with Tashakkori and Creswell, the researcher in this study strongly believed that the experiences and the audiences indicated by earlier researchers form the basis for this research, hence used, a Mixed-Methods Sequential Explanatory Design for the study. The Mixed-Methods Sequential Explanatory Design consists of two distinct phases: quantitative phase followed by qualitative phase (Creswell, 2003). In this design, the Researcher first collects and analyses the quantitative (numeric) data. The qualitative (text) data are collected and analysed in sequence and help explain, or elaborate on, the quantitative results obtained in the first phase.

The second, qualitative phase builds on the first, quantitative phase, and the two phases are connected in the intermediate stage in the study. The rationale for this approach is that the quantitative data and their subsequent analyses provide a general understanding of the research problem. The qualitative data on the other hand and their analyses refine and explain those statistical results by exploring participants' views in more depths, (Creswell, 2003). This design is not without its own inherent challenges, i.e. the strengths and weaknesses of this mixed-methods design have been widely discussed in the literature (Creswell, 2004). Its advantages as outlined in

Figure 3 by (Creswell, 2004) include straightforwardness and opportunities for the exploration of the quantitative results in more detail. The limitations of this design are lengthy time and feasibility of resources to collect and analyse both types of data. In this study, a survey was used as the major data collection method within the research design. It involved gathering of information from a sample of individuals at the basic school level in the district through questionnaires, interviews and observations. The surveys in this study were used to collect quantitative data, such as opinions, attitudes, preferences, as well as demographic information on the basic school teachers. The phase of the data collection method included open-ended questions to gather qualitative data to support the quantitative data.

The second phase involved an in-depth interview section which was used to collect qualitative data with a subset of teachers who earlier completed the survey. The interviews explored the factors that mostly contribute to or hinder the use of reflective practices among basic school teachers in science classrooms. The interviews were conducted using a semi-structured format to allow for open-ended responses from the participants.

3.4 Rationale and Assumptions for Quantitative and Qualitative Design

Research design is governed by the notion of 'fitness' for purpose (Cohen, Manion & Morrison, 2007). In this study, both quantitative and qualitative research designs were used. Considering the research problems and the nature of the targets, the qualitative research design was chosen to support the quantitative design. This is because it is the right approach to research in which the researcher seeks to elicit participants' responses that would help in gaining in-depth understanding of the problem under investigation. In this study, qualitative and quantitative designs were used to fully

reveal the true status of reflective practices among basic school teachers in Ada East District. Moreover, the rationale for adopting this approach was to ensure that the researcher understands the situation in question from the direct perspective of the respondents through descriptive mean and exploratory methods. Creswell (2009) indicated that mixed method research provides a more useful pathway to harness strengths that offset the weaknesses of both quantitative and qualitative research. More specifically, the study employed the concurrent parallel design i.e., qualitative and quantitative (Quan-Qual) design to develop a complete understanding of the research problem by obtaining different but complementary data. This design is considered the most appropriate as the Researcher sought to triangulate methods by directly comparing quantitative results with qualitative findings for verification and validation purposes.

3.5 Population

Population forms one of the vital aspects in research. Population specification is a necessity in the documentation of both qualitative and quantitative studies. It refers to the entire group of individuals or entities that are interested in a particular study. It encompasses every member that fits and could be identified with a particular type of criteria (Faryadi, 2019). According to the author, it is vital to identify a target population and the size of your sample which means that you take an appropriate sample of your accessible population that can represent your population without bias.

Asiamah, Mensah and Oteng-Abayie (2017) specified that, a good sampling indicates the selection of an adequate number that is representative of the target population statistically such that a researcher can use it to make informed conclusions about the results based on the collected data. It is sometimes thought that the larger the sample, the better the results and more accurate the outcome.

3.5.1 Target Population

A target population which is sometimes referred to as the study population, helps the researcher to narrow down the focus of the research to a more manageable and relevant groups. According to Felsen et al. (2010), target population is crucial during the selection of participants for the study. It also refers to a specific group of individuals or entities that a research study investigation aims to either describe or predict. The group according to the author, shares common characteristics, traits or experiences. Out of this group, a sample that is representative could be taken for the study. In this study however, the target population was the basic school science teachers in Ghana.

3.5.2 Accessible Population

The accessible population, according to Asiamah, Mensah and Oteng-Abayie (2017), also known as sampling frame or study population, refers to the group of individuals or entities that are easily accessible and willing to participate in research. Bartlett et al. (2001) also affirmed that accessible population is a part of the population reached after taking out all individuals of the target population who will or may not participate or who cannot be accessed at the study period. According to them, it is the final group of participants from which data is collected by surveying either all its members or a sample drawn from it. They added that it represents the sampling frame if the intention is to draw a sample from it. In this study therefore, the accessible population comprised all basic school science teachers in the Ada East District.

3.5.3 Sample

A sample is a sub-set of individuals or groups or cases selected from a larger population preferably the accessible population for a study (Felsen et al, 2010). According to them, a sample represents the target population that allows researchers to make inferences about the population and also generalise findings.

In this research, the target population to benefit from the study include the basic school teachers (339,124) across Ghana (Ghana Statistical Service, 2018). These teachers are widely dispersed across the country. This would prove to be a difficult hurdle to overcome and subsequently, impossible to be accessed due to limited resources. The researcher focused on teachers in the Ada East District. Out of this number, a total of 420 basic school science teachers from Ada East District (of the Greater Accra region of Ghana) were selected as the accessible population for the study. This number represents the characteristics of the entire basic school teacher-population in at the basic school in Ghana, including the Ada East District with its demographic characteristics. Out of this number, a representative sample was selected for the study.

3.6 Sampling Procedure

A total of 420 teachers represents the accessible population of basic school teachers who engaged in classroom science activities. Out of the 420 basic school science teachers, a total of 165 basic school science teachers who engaged in classroom science reflective teaching practices were sampled. This was done by lottery method under simple random sampling method from the accessible population for the quantitative phase of the study. In this method, names of the 420 teachers were assigned with numbers and placed in a box. The numbers were well mixed up in the box. The researcher then called some officers present at random to pick any of the

numbers in the box without looking into it. The numbers were picked with same procedure until all the 165 respondents were selected. Convenience sampling method was also used to select 12 cluster of schools for the study. Purposive sampling method was then employed to select between 12-20 participants (science teachers) who took part in the quantitative phase and were available and willing to participate in the qualitative phase. As indicated, these numbers comprised, teachers who were ready and willing to participate in the study and could be reached by the researcher. The recommended sample size for a survey study of this nature depends on several factors such as the desired level of precision, confidence level, variability in the population, and the margin of error.

The sample size was therefore determined using the Cochran formula (1977) as modified by (Charan et al. (2021) given that $n = \frac{Z^2 \times PQ}{e^2}$ where; -

n=sample size

z= standard error associated with the confidence level (usually 1.96)

p=variability or standard deviation for studies

e=acceptable sample error

In this study, the sample size was determined using the recommended values such as;

Z= 1.96, P =0.5, Q = 0.5 and e = 0.05 therefore

- $n_o = \frac{(1.96)^2 \times (0.5 \times 0.5)}{(0.05)^2}$ = 420 teachers

- Science teachers: 39.2% of 420 = 165 teachers, hence the recommended sample size for the study is 165 basic school science teachers form the population size of 420 teachers at 90% confidence level with 5% margin of error (http://www.raosoft.com/samplesize.html).

  Based on these calculations, a sample size of 165 out of the 420 basic school science teachers is very much a reliable ratio to draw a valid conclusion based on the findings of the study. Withing the target population, it becomes necessary to further zoom to ensure efficiency and effectiveness of the tools to be used in the research.

3.7 Researcher's Role

The researcher in conducting quantitative or qualitative research becomes responsible for maintaining the rigor and credibility of various aspects of the research. The first step is to display a high level of competence and skills in the various areas of the study (Dodgson, 2017). In a way, this is analogous to the role that statistics, validated and reliable instruments, and standardized measures and methods play especially in quantitative research. One of the significant roles played by the researcher in this research therefore included; monitoring and reducing bias, developing competence in the methods used, collecting and coding the data, and presenting the findings as realised from the study. The researcher also conducted the interviews properly, according to the design and made appropriate field observations. Finally, data collected were presented in a systematic manner after which data were interpreted per the design shown in a flow chart in Figure 3.

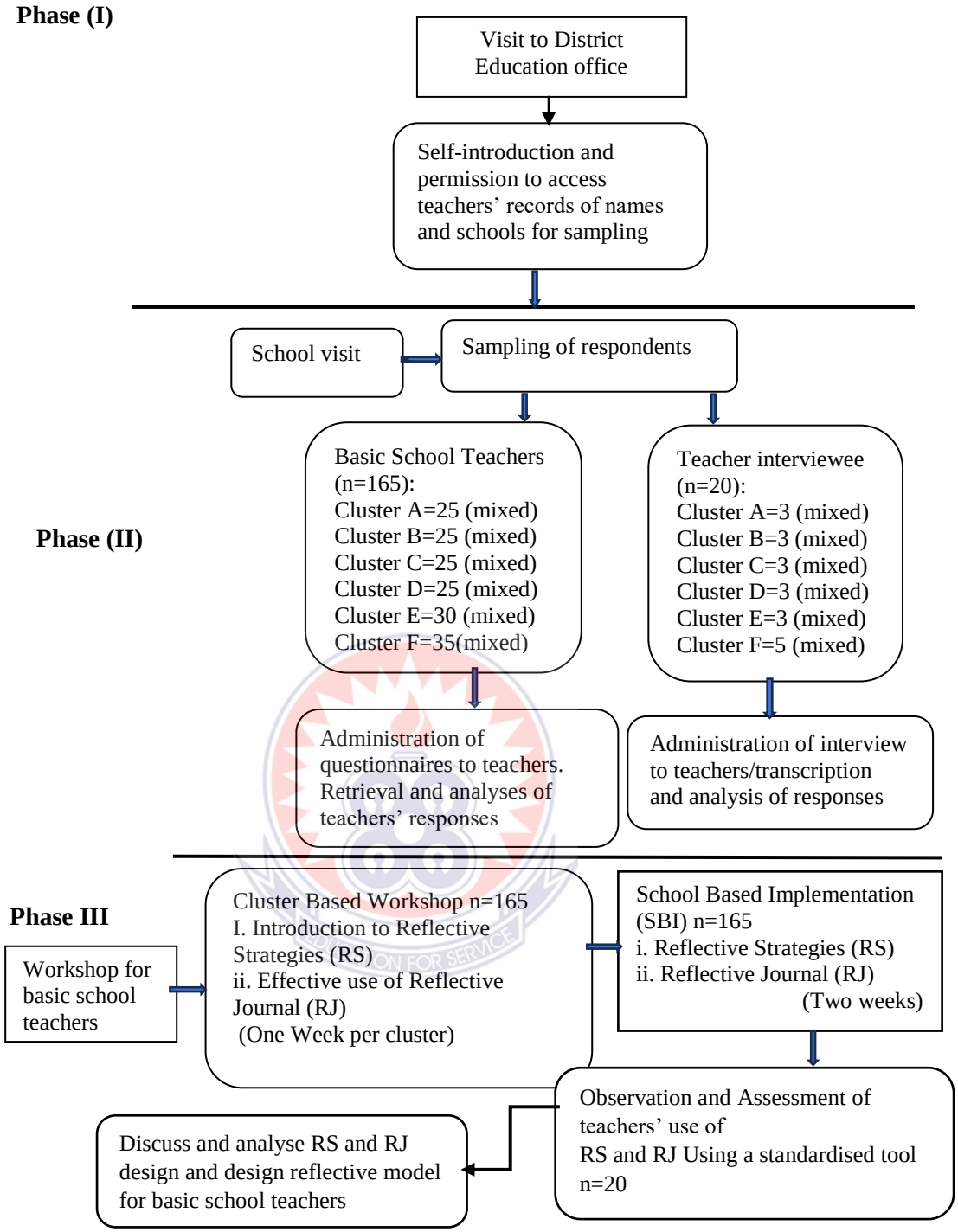


Figure 3

Data Collection Procedure

3.8 Data Collection Technique

As indicated in the design, in Figure 3, data were collected in three phases. The first phase was to engage with the education authorities who submitted the details of the respondents. In the second phase, teachers' questionnaires were administered followed by interview section for 20 other teachers. Research questions were answered through separate questionnaires for the science teachers (Appendix A and B). Each questionnaire had items on the following sub-headings; Biographic data, classroom activities, reflective activities practised by teacher, feedbacks from pupils and constraints in carrying out reflective practices. Soon after the workshop for the teachers on cluster basis, the researcher carried out observation for 20 selected teachers on their classroom reflective practices while teachers engaged in science classroom practices. Feedbacks on the observations were generated using the observation guide (Appendix F).

The recovery rate was 100% in all cases of questionnaires, interviews and observation sections. This was because the questionnaires were handed over personally by the researcher and collected after the teachers had finished responding to them at their convenience within two weeks. Other 20 teachers were also given similar treatment but on different dates scheduled at their convenience and that of the researcher. Workshops were latter organised for the participants including reflective journal writing, followed by observation schedules. Observation sections were also planned based on the teaching schedules of the teachers in their various schools at their convenience.

3.8.1 Phase (I)

In phase (I) of the data collection procedure, the researcher visited the District Education Office for self-introduction and obtained permission letter to conduct the research in the district (See Appendix E) for the sample letter.

3.8.2 Phase (II)

This phase involved the collection of data through the use of the questionnaires and interview guide for teachers. The questionnaires were administered and retrieved from the teachers after one week. This was followed by the administration of the interview for some selected teachers. Both data were collected by the researcher and analysed separately.

The baseline survey was designed to gather information on the status of reflective practices among basic school teachers in the Ada East District. As it is often used to describe and explore human behaviour, surveys are therefore frequently used in social and psychological research (Singleton & Straits, 2009).

The Researcher visited six various clusters (schools in the circuits) to have a first-hand interaction with the respondents. The Researcher met with the headteachers and formally carried out self-introduction to the teachers in each school. In all, three clusters were visited in a day for two days. Respondents were given the questionnaires with ample time to answer the questions in seven days. The cycle of visits continued on the third day after a visit to the first cluster to collate the responses. This went on until the last set of cluster of schools was visited and data collated successfully. This was followed by engaging 20 other teachers who expressed willingness to take part in the interview schedule. The two sets of data collected were analysed and based on

the outcome, a workshop was later organised (in Phase III) to intervene in the reflective strategies as well as the effective use of reflective journals.

3.8.3 Phase III: The professional reflective practice intervention

The purpose of this research went beyond a mere documentation and interpretation of data on the status of reflective practices in the basic schools. In view of this, the study also provided a well-structured intervention measures to enhance the reflective practices of basic school teachers especially during their science classroom engagements due to the practical based approach of the subject at the basic levels. Some authors, Cohen et al. (2000) suggested that this could be achieved through action research which is one of the effective tools for making interventions more effective especially where changes and improvements are most needed.

The major advantage of action research is that it contributes to knowledge as well as good practices. It is hoped that through the use of key features of action research, this study would add to teachers' reflective practice strategies during classroom engagements.

In order to ensure achievement in this phase, the researcher earlier organised self-assessment section for the basic school science teachers where teachers gave true assessment of themselves through pre-workshop questionnaires administered to each participant as far as reflective practices are concerned. This was followed by one-day workshop in each of the six clusters within the premises of the schools which were central to each of the selected clusters. Participants were taken through some common Reflective Strategies (RS) using Gibbs' audio-visual reflective model and how to use a typical Reflective Journal (RJ) to the benefit of the teacher and the pupils. The teachers were also tasked to practice the outcome of the workshop activities for two

weeks in their various schools under the supervision of the headteachers and occasional visits by the researcher. This was done by the researcher within the first week of the two weeks practice period by the teachers, as emphasised by (Hiebert, 1999, as cited in Amedeker, 2016) that in professional learning, follow-up visits to help teachers to practice reforms, are very necessary for the successful implementation of a curriculum innovation. Within a period of two weeks after the full implementation of the workshop outcome on the use of the RS and RJ, the researcher formally went round the schools where the selected teachers were practicing to consolidate their new skills learnt during the workshop. During this second visits to the schools, the researcher sat through the lessons organised by the 20 selected teachers on individual basis to further observe and also lend technical supports, where necessary, to those facing unusual challenges. The researcher later engaged teachers in self-assessment processes using self-administered open-ended questions to find out their levels of improvement after the workshop and classroom practices for the two weeks period. The results were analysed and discussed, out of which a reflective model was developed to facilitate and improve upon the reflective practices. With the permission from the teachers, the researcher later observed lessons using an observation guide based on the best practices outlined and confirmed by the teachers.

3.9 Data Collection

Good data collection procedures are essential for the success and integrity of research studies and often help to contribute to the advancement of study as a whole. Collection and recording of data in research are crucial aspect of any scientific investigation (Rice, 2009). Proper data collection procedures also ensure that research findings are accurate, reliable, and reproducible by the researcher or other researchers.

It also helps researchers to organize research works more efficiently, and also collaborate effectively, and comply with ethical and legal standards. All sorts of data produced during research from observation, analysis, equipment use, and scientific testing are included in the research data category. It is often gathered, noted, or produced with the intention of analyzing in order to develop novel research works.

In this study, both quantitative and qualitative data were gathered for this study and provided in both print and electronic form. The term research data was described by Rice (2009) as data which is collected and observed or generated for the purposes of analysing that data to produce new research outcomes. This research therefore included data in form of print data, records, digital datasets and physical items created or collected for the purpose of, or during the research process including observations. According to Rice (2009), research data collation is the concerned with planning, organising, storing, sharing, and reusing data for future research. The primary aim of research data collation is to develop tools to store and organise data to make efficient research process with existing research data. In agreement with this, ideas from Rice, the researcher developed tools store and organise data for more efficient and effective research process. This was achieved by conducting regular data audits to verify data accuracy and integrity by choosing appropriate data collection methods and tools for the five stated research objectives. The data collected were recorded in a timely and consistent manner to prevent loss or misplacement of information. There was also a secured and reliable system put in place to record data, including electronic databases or cloud-based platforms.

3.10 Methods for Verification and Trustworthiness

One method of promoting trustworthiness is through the various processes of triangulation. Roughly stated, triangulation in research means using several sources of information or procedures from the field to repeatedly establish identifiable patterns (Norman & James, 2020). In this study, the researcher used triangulation of instruments to ensure proper verification of finding and trust worthiness. According to Norman, and James (2020), recognizing similar outcomes repeatedly through various data sources is a different phenomenon than replicability in a priori empirical study. They further explained that methodological triangulation is also very crucial in ensuring trustworthiness where the researcher uses, more than one method of collecting or analysing data. The methods for verification employed in this study make the outcome very trustworthy and reliable.

3.11 Instruments

Three instruments were used to gather data for the study; in-depth opened ended interview guide, a set of closed-ended questionnaires and observation guides were prepared in a way to capture relevant information for the study. The purpose was to enhance reliability, as suggested by McIntyre (2000) that several research instruments be used so that their findings could be triangulated. In view of this, the three data gathering instruments were employed in this study and results were compared.

3.11.1 Questionnaire for Teachers

Questionnaire is a widely used and useful instrument for collecting survey information, providing structured, often numerical data, being able to be administered without the presence of the researcher, and often being comparatively straightforward to analyse (Cohen, Manion & Morrison, 2007). The study adopted a self-administered

questionnaire with a pre-validated 5-points Likert-scale questions made up 84 items which were adapted from Faghihi and Anani (2016) for the quantitative phase of the study. For example; 1=Strongly Disagree (SD) 2=Disagree (DA) 3=Don't Know (DK) 4= Agree (A) 5= Strongly Agree (SA). Questionnaires were used to collect biographical data like age, gender, qualifications and views of teachers on reflective practice in teaching.

3.11.2 Interview guide for Teachers

The second instrument used in the study was interview Guide for teachers (see Appendix C). A semi-structured interview guide was used for the study, centred broadly on the science classroom engagements by basic school teachers and how they engage in reflective practices before, during and after each lesson. The instrument also delved into teachers' own ways of handling a particular lesson if given the second chance. The semi-structured interview guide for individual teachers at different locations and at the teachers own leisure was used purposely to gather more intangible aspects of the classroom engagements on reflective practices in the various schools by the teachers involved. The interview items were developed to elicit the required responses with open-ended questions.

As a follow up activity on the interview on individual basis, cluster interview sections were also employed as supplementary to the individual interviews conducted. The groupings were school-based where respondents share some basic professional values as teachers with the researcher in the same school, by either observing each other's lessons or also sharing experiences among themselves as members of staff over the period. This informal interaction with teachers added more values to the responses

offered by the respondents who were free to say what the teachers usually practice in their various classrooms without fear or being subjected to any form of intimidation.

3.11.3 Structured Observation Guide for Teachers

The third instrument used in this study was observation (Appendix G). Cohen, Manion and Morrison (2007) described observation data as sensitive to contexts by demonstrating strong ecological validity (Moyles, 2002). According to Cohen et al. (2007) a structured observation is very systematic and enables the Researcher to generate numerical data from the observations. Numerical data in turn facilitate the making of comparism between settings and situations and frequencies patterns and trends to be noted, or calculated. Passive non-intrusive approach where the Researcher merely noted down the observed situation. This enabled the researcher to understand the context of programmes, to be open-ended and inductive. It also helped the Researcher to see things that might otherwise be unconsciously missing. Finally, it afforded the Researcher the opportunity to further discover some important issues which the participants were not ready to freely talk about during the workshop or the interview sections. This helped the researcher to move beyond gathering of a mere perception-based data, hence was able to look directly at what was taking place *in situ* rather than relying on second-hand accounts.

According to Cohen et al. (2007) there are two major types of observation, in research, these are; participant observation and non-participant observation. They advised that observation studies are more advantageous to experiments and surveys when data are being collected especially on non-verbal behaviours. They further indicated that during observation, the researchers are able to discern on-going behaviours as they occur. This helps the investigator to make appropriate notes about

its salient features. The researcher in this study therefore employed a non-participant observation approach with structured observation guide for teachers to collect final data after the intervention process. This was to help the Researcher get a first-hand information of the reflective skills the teachers actually acquired and transferred.

3.12 Piloting the Instruments

Pre-piloting and piloting the instruments, are both very crucial in determining the authenticity of the instruments and the data collected. A pilot testing of instruments has several functions, principally to increase the reliability, validity and practicability especially of the instrument (Cohen, Manion & Morrison, 2007).

It was also strongly emphasised that pilot testing which results in identifying weaknesses and re-wording of instruments is of paramount importance and that pretesting, is crucial to their success. In this study, the researcher pilot tested the instruments in Ada West District basic schools with 46 participants in order to; check the clarity of the questionnaire items and interview guide, their instructions and layout to gain feedback on the validity of the questionnaire and the interview items used in this study. The rationale for using Ada West District was that schools in the district have same characteristics in terms of teacher qualifications, subjects, teaching and learning facilities as well as common curriculum.

The researcher also strongly believed that the pilot testing of the instruments improved the constructs and the purposes of the research specially in checking the clarity of the instruments. It was also employed to ensure that the instrumentation, sampling, and data types were appropriate to yield answers to the research questions which would guarantee a high level of complexity of data analysis.

The researcher also noted that there is a strong belief in such a study in science, that though the pilot testing may take some time out of the research period of work, it was mandatory to carry it out since the exercise has the tendency to gain feedback on the validity of the two major instruments used. This was to ensure the operationalization of the constructs and the purposes of the research to eliminate ambiguities or difficulties especially in wording, (Cohen, Manion & Morrison, 2007). It was also done to check readability levels for the target audience and to gain feedback on the type of question and its format used. Again, the pilot testing was also to identify omissions, redundant and irrelevant items featuring in each of the instruments. Finally, the researcher carried out the pilot testing in order to check the duration, workability or feasibility of the instruments to find out if they were too unclear to generate the needed responses.

3.13 Validity and Reliability

The quality of a research instrument or a scientific measurement is determined by both its validity and reliability (Aikenhead, 2005). Validity seeks to determine whether the instrument actually measures what it is intended to measure, and reliability on the other hand, refers to the consistency of outcome of the data when multiple measurements are gathered (Gott, Duggan & Roberts, 2003). Validity is one of the key requirements for both quantitative and qualitative research (Cohen, Manion & Morrison, 2007). It demonstrates how a particular instrument measures what it purports to measure. In this study, three forms of validity were employed to substantiate the accuracy of the instruments used in this research; internal and external validity, content validity and construct validity. Generally, the two supervisors of the researcher and other senior lectures in the Faculty of Science, offered their professional advice in helping to validate the instruments. This was done through

constant fine-tuning of both content and construct validities of each statement in the instruments before they were finally administered.

3.13.1 Internal and External Validities

Internal validity refers to the extent to which design of a research study and methods ensure that the results precisely reflect the basic causal relationships between variables (Findley, Kikuta & Denly, 2021). The authors also indicated that internal validity also assesses whether the conclusions of the study are based on genuine effects rather than alternative explanation. The study therefore sought to demonstrate the explanation of reflective practices, which the research provides and can actually be sustained by the data gathered. This was done to ensure accuracy, which could be applied to both quantitative and qualitative research. It also gave the findings a more accurate description of the situation being addressed. The study was also able to track and store the information clearly, in order to eliminate rival explanations of the situation under study.

The external validity on the other hand according to Findley, Kikuta and Denly (2021) shows the extent to which the results of a study can apply to real world setting or other groups outside the experiment or the study. From their perspective, it also produces same results if other researchers administer same instruments to different people, at different times and places.

Finally, both internal and external validities enable the researcher to determine whether the conclusions drawn from the results of the study conducted could be applied to a broader population making the research more valuable.

3.13.2 Content Validity

This form of validity ensures that the instruments used in a study show a high level of fair and comprehensive coverage of the domains or items they purported to cover (Cohen, Manion & Morrison 2007). In order to ensure high level of fairness and comprehensive coverage of the status of reflective practices among basic school teachers, the researcher ensured that the elements of the main issues on reflective practices were fully covered in the research by showing a fair representation of the wider issues under investigation. This eventually ensured that the elements chosen for the research sample were themselves addressed in depth and breadth.

3.13.3 Construct Validity

Construct validity in view of Straub, Boudreau and Gefen (2004) refers to how well a researcher translates or transforms a concept, idea, or behaviour that is a construct into a functioning and operating reality. The authors further explained that construct validity has two components including both convergent and discriminant validity, where convergent validity evaluates the effectiveness of a measurement tool and divergent validity on the other hand evaluates measures of different constructs that are distinct and uncorrelated showing that they measure unique concepts.

Guided by these provisions of the authors, the study touched on the abstract aspect of the research, balancing it with the previous forms of validity that dealt with the actualities i.e., to find out the degree to which the two instruments in this study are able to measure the level of reflective practices among basic school teachers. In this context also, the Researcher's understanding of the constructs was similar to that which is generally earlier accepted to how well a researcher translates or transforms a concept, idea that is a construct into a functioning and operating reality. This was

done in agreement with other constructs of the same underlying issues elsewhere. In this study, each of the items under the various questions were designed without any form of ambiguity to the respondents. This was done after the questionnaires and the interview guides were piloted twice in each case with basic school teachers in Ada West District that shares common geographical boundaries. The two districts also share similar characteristics in terms of teacher qualifications and common curriculum with Ada East District, showing the effectiveness of the measurement tools.

3.14 Reliability Calculations

Reliability according to Alreck and Settle (1995) is the ability of an instrument to get the same value from numerous measurements that has been made in the same manner. Since reliability forms an integral part of a research process, its role cannot be compromised. Huck (2007) describes reliability as the degree of consistency among the components of a measuring device, hence testing for it is crucial. Further indications are that if a scale's components accurately measure the same concept, it is considered to have good internal consistency and reliability (Huck, 2007, Robinson, 2009). The Cronbach Alpha coefficient is the most widely and commonly used indicator for determining internal consistency. It is most convenient when using Likert scales and it is thought to be the most suitable reliability metric (Whitley, 2002, Robinson, 2009). Other researchers are of the opinion that although there are no hard-and-fast procedures for internal consistency, most people think that a minimum internal consistency coefficient of 0.70 is appropriate to determine the reliability of a measuring device (Whitley, 2002, Robinson, 2009). The current most used techniques in reliability calculations are Cronbach alpha and KR-20, which, however, may give pretty disparate results of 0.98 and 0.55 respectively, (Erkuş, 2007). In this study

however, the reliability was calculated using SPSS and the results are recorded in Table 1.

Table 1

Reliability Statistics of Instrument (n=84 Items)

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.965	.969	84

Table 1 shows, Cronbach alpha values given as 0.995 and 0.996 based on 84 standardised items computed using version 20.0 of the SPSS of the research instruments. Bonett & Wright (2015) developed formulas in relation to required sample sizes necessary to calculate the Cronbach alpha coefficient at a given power level or predicting it at a certain sensitivity level. In this study, the values were obtained using similar techniques.

3.14.1 Triangulation

Triangulation is described as the use of two or more methods of data collection in the study of some aspect of human behaviour (Cohen, Manion & Morrison, 2007). They further explained that triangulation in its original form is a technique of physical measurement thus, by studying it from more than one standpoint and, in so doing, by making use of both quantitative and qualitative data. Triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research. In this study therefore, the researcher employed more than one method in arriving at the outcome thus methodological triangulation. In this study, beside the use of the Quan-Qual approach in analysing data, the data collection procedures were also varied for each

research question through the use of observation guide, questionnaires and interview guide. The details of these are found in the Appendix I.

3.15 Ethical Consideration

The study followed ethical guidelines for research involving human subjects. Informed consent was obtained from all participants including the participating schools, and their privacy and confidentiality were ensured throughout the study. Although one can identify three main areas of ethical issues here – informed consent, confidentiality, and the consequences of the interviews – these need to be unpacked a little, as each is not unproblematic (Cohen, Manion & Morrison, 2007).

Participants who took part in this research did so on voluntary basis. In turn, withdrawal was also accepted at a point of the research process. This was to ensure that participants elicit the expected behaviour and did not in any way act to alter the outcome of the results of the research negatively. Participation was not made obligatory to the respondents in the research process so as to feel caged. Hence, the opportunity to discontinue taking part in the research at any point in time was permitted. This was also to ensure that participants were not subjected to any form inconvenience in any way possible. Participants were duly informed of the research processes. Their consents were also sought before being allowed to take part in the research. This was done to ensure that they became fully aware of the aims and objectives of the research. Most importantly, the respondents were updated from time to time about the ongoing study and served with the outcome of the research.

Personal details of participants such as house numbers, names and contact information were not collected. This was also done to ensure the anonymity of the respondents. That made it highly impossible for anyone to trace who stated what or who selected

what. The responses were (for all intended purpose) not in any way traceable to any participant. As such, all confidential information such as gender and age were used for the intended purposes only. They were therefore not given out for other reasons aside the intended ones.

3.16 Data Analysis Procedures

The quantitative data from the survey was analysed using descriptive statistics, such as mean, percentages and frequencies. The qualitative data from the interviews conducted by the researcher was also analysed using a thematic analysis approach. The themes that emerged from the interviews were coded and analysed to identify patterns and relationships among the data. The quantitative data was analysed with the use of the version 20 of Statistical Package for the Social Sciences (SPSS) software.

The study first reported the quantitative statistical results using SPSS followed by qualitative in themes generated and coded by the researcher. This was done from the interview transcripts and reflective activities. In terms of qualitative analysis, data was analysed using the inductive or content analysis approach. First, descriptive open coding was employed to categorise data followed by careful examination of consistency of the data. The frequently mentioned words, sentences and paragraphs were labelled with codes. This was done to identify recurring themes and patterns related to reflective teaching practices.

Finally, the respondents in question, were contacted for the face-to-face interview section. The interview was recorded with the permission of the participants. This was done through audio recording and hand written notes from the interviewer.

The recorded tapes were played back in addition to the field notes and transcribed. Themes were generated and summaries of the responses were recorded under these themes and analysed. The responses were either used to support the quantitative results or refute them.

3.17 Intervention Processes

This part of the study discusses some intervention processes used to improve basic school teachers' performance in reflective practices during classroom engagements. The processes include introduction of teachers to the writing of reflective journal and illustration of best approaches to reflective practices through workshops which constituted the most effective means for intervention. Intervention usually helps the researcher to identify cause-and-effects in research activities. It directs the researcher to better understand what works well and what doesn't in order to provide solution.

3.18 Reflection and Reflective Journals

Reflective journals are one of the key documents teachers often use to engage in reflective practice (Draissi, BaoHui & ZhanYong, 2021). Reflective journals are formal or informal written records of learning experiences that are used by teachers as a metacognitive tool for improving practice. Metacognition is putting intentional thought into the learning process. Reflective journals may contain reflections about lesson delivery, student achievements, classroom management, content questions, or notes about remediating or enriching the curriculum for specific students. Reflective journaling can take time, but it has been proven to be an effective professional material that places the teacher in a better position to improve. The study therefore exposed basic school teachers to Journal entries as the first step in reflective practices in the process of observations, questions, conjecture, evaluations, or analysis.

Reflective or learning journals are considered to be one of the most common strategies employed because of the practical utilization. They have mainly been utilized in different study fields such as literature, healthcare and mathematics. The structure and format of reflective journals could include free stream-of-consciousness writing or a structured recording of critical events. The essential goal is to develop self-awareness and have a better concept comprehension.

3.19 Professional Learning Intervention Process (PLIP)

In all, the Professional Learning Intervention Process covered six cluster of basic schools made up of an average of 30 teachers each, were visited by the researcher. Each cluster was presented with the same PL intervention procedures during a workshop. This workshop was a professional development (PD) workshop, targeted at basic school teachers who have challenges engaging in reflective practices during science classroom engagements.

3.19.1 Pre-Workshop Activities

It also aimed at developing an effective journal management to facilitate the reflective process. Participants were self-assessed to ascertain their levels of skills in reflective practices. The aim of using cluster-based learning processes was to promote Reflective Learning Community (RLC) in order to make reflective practices self-directed and to make the teachers become definitely empowered. This type of Reflective Learning Community approach according to Göker (2016), helps to create a strong behavioural change in reflective practices that would ultimately promote professional development and experience among basic school teachers. Professional Development mostly occurs when participants are willing to develop new theories of action ideas and willingness to change and shape new behaviours.

Two separate sections were organised for the basic school teachers during the Professional Reflective Learning (PRL) procedures and Reflective Journal Development (RJD) activities. Prior to these sections, the researcher met with all the basic school teachers sampled for the study in each cluster of schools and thoughtfully discussed their common professional challenges with them.

3.19.2 Post – Workshop Activities

After the workshop, participants were again taken through self-assessment processes to ensure that they readily acquired the new skills and actively participated in forming reflective groups. In effect, Reflective Learning Communities (RLC) were established based on mutual trust and respect among all participants including the headteachers to help them make receptive communication excluding the concepts of sarcasm and put-downs. This approach made the participants quite sensitive to issues devoid of being judgemental when they come together to share their own experiences, behaviours and practices of teaching.

In a professional reflective model similar to Gibbs' reflective model, and Göker (2016) model, sample reflective journals were used to complement the cycle. This was done to improve the level of understanding of reflective practices and use of reflective journals during classroom engagements by basic school teachers. See (Appendices C and D).

3.19.3 Post-workshop Observation

The distinctive feature of observation as a research process is that it offers an investigator the opportunity to gather 'live' data from naturally occurring social situations. In this way, the researcher can look directly at what is taking place *in real times* rather than relying on second-hand accounts (Cohen et al., 2000). Moyles

(2002) also supported this view and indicated that observational data are sensitive to contexts, hence demonstrate strong ecological validity. This according to Moyles, enables researchers to understand the context of programmes, to be open-ended and inductive, to see things that might otherwise be unconsciously missed, and to discover things that participants might not freely talk about in interview situations. This is because observed incidents are less predictable, there is a certain freshness to this form of data collection that is often denied in other forms like questionnaire or a test. Based on these positions held by earlier researchers, the researcher in this study used structured observation guide specifically to gather further data on the interactional settings in the classrooms to elicit the needed results. Feedbacks from the workshop activities, supported by the observation processes, a model was developed to guide reflective practices in the classroom setting. According to Boud's Model of reflection, Boud, Keogh and Walker (2013) proposed a structured model of reflection that consists of three phases: returning to an experience, attending to feelings and reactions, and re-evaluating and learning from the experience. Learning from Boud et al. (2013), this new model emphasises the importance of critical analysis and action planning. This study therefore developed a model that provides the needed basis for good reflective practices.

3.20 Limitations of the Study

Limitations are constraints that are greatly beyond the control of the researcher but could have an effect on the outcome of the study (Simon & Goes, 2013). Reflective practices are inherently subjective, as they usually rely on researchers' personal experiences, interpretations, and perspectives. This subjectivity is likely to introduce biases and limit the objectivity of the research process. In this study, the researcher considered the suggestions from Simon and Goes, and identified some constraints that

emerged in relation to the determination of the status of reflective practices in the basic schools. It is worth noting that classroom reflective practices are quite novel concepts in Ghanaian educational sector especially at the basic school levels. This study being an ethnographic one involving basic school science teachers of various backgrounds, considered any form of interactions with respondents as a sort of examination, hence bound to meet the problem of participants most of whom expressed their reluctance to provide frank responses. Moreover, there was no unanimity of the extent to which activities may be carried out. Although the researcher exercised some level of extra caution to elicit feedbacks by creating a relatively friendlier environment for the respondents to exhibit the true state of what pertains, some respondents still exhibited their unwillingness to boldly express their views on the state of reflective practices in their schools. These acts by the teachers though checked to some extent, may cast doubt on the generalisability of the outcome of the study. Against this background, the researcher took the advice from Wallen and Frankel (2001) that the effects of the phenomenon of respondents' unwillingness to express their views should not be ignored in explaining unexpected results of the study.

Considering the current state of Covid-19 and its anomalous effects on the globe, including Ghana at the time of this research, the MOE and other academic authorities found it difficult to follow the usual planned academic calendar. This was severally interrupted due to the unforeseen behaviours of the virus. This problem placed the researcher in an unclear position which could not guarantee him any specified moment to meet the respondents at a given school time to elicit accurate responses. This remained a predicament as Ghana, for that matter MOE continued to battle with the pandemic. Subsequently the researcher also tried to overcome some of these

limitations by explaining to the respondents the need to supply genuine responses as the research aimed at improving teaching and learning at the basic school level especially in the Ada East District of Ghana.

3.21 Chapter Summary

In this Chapter of the study, the status of reflective practices among basic school teachers during science classroom engagements was discussed. The chapter also identified the major design used in the study, thus mixed-methods approach comprising quantitative and qualitative (Quan-Qual) methods. The study went through three major phases. The first phase involved permission from the District Education directorate that allowed research to be conducted in the district by the researcher. The permission enabled the researcher to access the target population and the schools earmarked for the study. The second phase involved school visits, sampling of respondents and administration of instruments to respondents. The types of instruments used as well as data analysis procedures used were identified as questionnaire and interview guide for teachers. In the third phase, the intervention workshops and its related activities that were organised for all participants were discussed in this chapter. Data presentation and analysis based on these discussions are reported in Chapter four.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.0. Overview

This chapter presents the outcome of the findings from the analysis of data collected from the field. This is based on the activities of phases II and III of the study as outlined in Figure 3. In this chapter, data is presented in tables using frequencies, simple percentages and mean, according to the research questions. This is preceded by the demographic information of the respondents followed by analysis of data as presented in the Tables. The chapter also reports on the intervention processes including development of a reflective model (PRPM). The major findings from each research question have been presented and labelled as such. A brief summary of the major findings is made at the end of the chapter.

4.1 Data Presentation

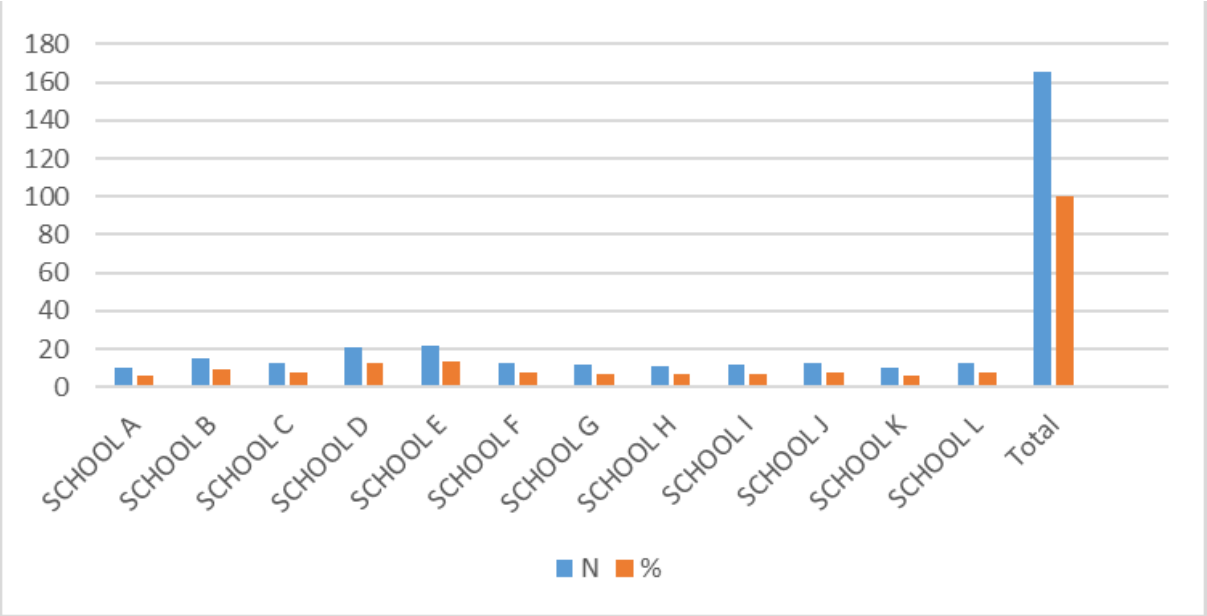
A coding manual was developed for coding the teachers' questionnaires (Appendix A-C). Closed ended scale items were coded into spread sheets for entry into the computer software (SPSS Spreadsheet). Responses to open ended questions were also organised and reviewed into categorised themes, after which codes were generated for each category and entered into a computer software (SPSS spreadsheet) version 20 for analysis. Analyses of mean, frequencies and percentages of respondents and other inferences were recorded and are presented in Tables and Figures. These presentations in Tables and Figures are in line with version seven (7) of the American Psychological Association (APA) style. The recorded tapes from the various interviews were played back as well as contributions from the various clusters during workshops were also transcribed and used to identify themes. The summaries of the

responses were recorded under these themes with the aid of the coding manual developed.

Presentation of results was based on the stated objectives of the study with their corresponding research questions and in-depth interviews with the basic school science teachers. The Researcher in many instances did not combine or collapse data in making a general assumption of the outcome. According to Cohen, Manion and Morrison (2007) "combining categories can be beneficial though but it is not without its own intrinsic challenges" p.510-511.They then suggested that it is more prudent to keep with data in the box within the original Figures or Tables and explain the figures rather than collapsing them into smaller categories. This according to them would help the researcher to carefully scrutinise data to see how evenly or widely the data are distributed. The researcher in this study agreed with Cohen et al hence presented data and explained them in their expanded forms.

4.2 Demographic Information of Teachers and Their Respective Schools

The study was conducted in twelve basic schools with relatively common characteristics in terms of teacher-qualifications and environmental conditions. It was projected that teachers selected across the twelve cluster of schools across the district teach science and any other related subject of choice. A total of 165 basic school science teachers who responded to the issues raised in this study were selected from twelve (12) cluster of schools by ratio based on the population in each cluster. The outcome of their demographic information has been presented in Figure 4.



Note: a. Each colour in the bar chat represents the basic schools used in the study

b. Figures in each bar present the number of respondents in each basic school with their corresponding percentages.

Figure 4

Distribution of Teachers by School in Ada East District

In Figure 4, twenty-two science teachers 22 (13%) were sampled from the biggest cluster while 10 science teachers (6%) were sampled from a cluster with the least number. These numbers constitute a homogeneous representation of the teachers within the clusters based on experience, academic and professional qualifications.

Table 2 highlights the classification of the respondents by their gender identities. The number of basic school science teachers with their percentage representations are recorded in Table 2.

Table 2

Classification of Teachers by Gender (N=165)

		Sex of teachers	
		Number of teachers	**Per cent of teachers**
Ada East District	Male	123	74.5
	Female	42	25.5
	Total	**165**	**100**

In Table 2, one hundred and twenty-three (123) male teachers (74%) were part of the respondents who took part in the study while 42 females representing (26%) took part. A total number of 165 basic school science teachers responded to the items in this study.

In Table 3, all the basic school science teachers who took part in the study were classified according their various ages groups. The outcome is recorded in Table 3.

Table 3

Age Range of Teachers (n=165)

Age (years)	**Number of teachers**	**Per cent of teachers**
21 – 30	34	20.6
31 – 40	34	20.6
41 – 50	52	31.5
51 – 59	44	26.7
60+	01	0.6
Total	**165**	**100**

In Table 3, majority of the teachers (52) were identified with the age range of 40-50 years, followed by the age range of 50-59 years. The rest were below 40 years. This may imply that probably the turn-over rate of the teachers in the district was low. Thus teachers who completed their further studies probably continued to stay in the

district with their rich experiences probably till their retirement age at 60. (key finding deleted)

4.3 Teachers' Classification by Subject Area and Gender

Teachers were also asked to state their subject areas in respect to their classroom engagements at the basic school level. The responses given by the teachers have been summarized in Table 4 by gender.

Table 4

Classification of Science Teachers by Gender and Subject Area (N=165)

	Subject Classification		
Sex of Respondents	**Science Only**	**Science And Other Subjects**	**Total**
Males	52 (42.3)	71 (57.7)	123 (100)
Females	4 (9.5)	38 (90.5)	42 (100)
Total	56 (33.9)	109 (66.1)	165 (100)

Note. Numbers in brackets are in percentages

In Table 4, majority of teachers (66.1%) taught science and other subjects at the primary school and 33.9% also taught only science at the JHS level. This shows that majority of the science teachers also taught other subjects especially at the primary level. Out of these numbers, only four of the female teachers (9.5%) taught science as elective subject at the JHS. This implied that the teaching of science was a male dominated subject in the district.

The basic school teachers were also asked to indicate their highest academic qualifications. This was done in line with their subject areas of specialization. The results are summarized in Table 5.

Table 5

Classification of Teachers by Highest Academic Qualification and Teaching Areas

N=165

Highest Educational Qualifications	**Science classification by teaching**		
	Science Only	**Science And Others**	**Total**
Technical and vocation	8 (4.8)	0 (0.00)	8 (4.8)
Diploma	37 (22.4)	4 (2.4)	41 (24.8)
First Degree	0 (0.00)	103 (62.5)	103 (62.5)
Masters	7 (4.3)	6 (3.6)	13 (7.9)
Total	**52 (31.5)**	**113 (68.5)**	**165 (100)**

Note. Numbers in brackets are in percentages

Table 5 shows that, more than 68% of basic school science teachers in Ada District who hold a minimum of Diploma teach science and other related subjects. On the contrary, none of the teachers who holds first degree specialised in science. Moreover, less than 27.2% of the teachers who teach in the district hold Technical and Vocational as well as diploma as their maximum qualifications to teach science only. It can further be noted that more than 95.2% of the teachers who teach in the district hold a minimum of diploma to teach science and any other subject. This may imply that the teaching of science in the district could be in the hands of highly qualified teachers who might be experienced in their professional fields as well.

4.4 General Knowledge of Science Teachers on Reflective Practices

The reflective practices adopted by science teachers in Ada District have been summarised in the Tables 6. The Table identifies teachers who received some form of training within the previous 24 months on reflective teaching practices. The responses given by the teachers are recorded in Table 6.

Table 6

Teachers who Received Training on Reflective Practice in the Last 24 Months N=165

	Number of teachers	Per cent of teachers
Yes	36	21.8
No	129	78.2
Total	**165**	**100.0**

Table 6 shows that majority of science teachers (78%) did not attend any kind training workshop on reflective teaching practices. However, 36 teachers (21.8%) indicated that they received such trainings.eg. "We had one programme at the college of education before these badges of trainees came for observation" (TJ22). "Yes, those in the junior high school and the upper primary"TP5.

Interview conducted for some of the teachers also revealed that they had ideas about reflective practice, for example "reflective practice is just a way of rethinking about my lesson, how am able to deliver it, or how am about to deliver it" (TP13).When quizzed further on the teacher's knowledge about reflective teaching: "Well, it's a thing that I have been hearing long time but of late when the new curriculum came with the new curriculum, we started seeing it as part of the curriculum" (TP13).

From the responses given by the teachers, only few of them indicated that they received some form of training within the previous 24 months hence had some level of ideas about reflective practice in the schools.

Key Finding 1

Majority 78% of teachers did not receive any form of training on reflective practices. However, 36 teachers (21.8%) received such trainings in the past two years.

The basic school teachers were asked to state the various reasons why they did not attend any training workshop within the previous 24 months. The responses given by the teachers are recorded in Table 7.

Table 7

Teachers' Reasons for not Attending Workshop in the Last 24months

Reasons for not receiving any training	**Number responses**	**Percent of teachers**
Our District did not organise one	133	80.6
The government promised but did not organise	32	19.4
Total	**165**	**100.0**

Note. Two different responses emerged out of the data

In Table 7, responses from the teachers (133) indicated that more than (80%) of the science teachers in the district did not attend any workshop because the district could not organise workshop on reflective teaching practices within the last two years. Thirty-two (32) of the teachers (19.4%), revealed that the government promised to organise workshop on reflective teaching but could not fulfil the promise.

The basic school science teachers who received training in reflective practices were asked to indicate the various mean by which they received such trainings over the previous 24 months. The responses given by the teachers are recorded in Table 8.

Table 8

Means by Which Teachers Received Training in the Past Two Years?

Organisation that gave the training	Number of teachers	Per cent of teachers
N G O	32	91.7
Self-initiated training	4	8.3
Total	**36**	**100.0**

Note. Most of the teachers did not respond to this statement

In Table 8, majority of the teachers did not respond to this statement because data from Table 6 showed that only 36 teachers (22%) received training in reflective practices within the last two years. eg. "Let me say a year ago" "I recently we went for a refresher course" (TJ2). However, majority (91%) of the teachers who received the training did so through the help of NGOs while very few of the teachers (8%) also took the initiative to train themselves in reflective teaching practices.

Key Finding 2

Over 78% of teachers in Ada Eat District did not receive training in reflective teaching within the previous two years. Although majority of teachers in the district were aware of the reflective teaching concept, only 8% had the chance to gain some amount of knowledge on the practices. Among those who received this training, over 90% were trained by NGOs while the rest took self-initiative.

4.5 Knowledge of Basic School Teachers about Reflective Practice

The basic school science teachers were asked to indicate the extent to which they agreed or disagreed with their positions as reflective practitioners in relation to their classroom engagements. The teachers' responses on the extent to which they either agree or disagree with their positions as reflective professionals have been summarized in Table 9.

Table 9

Teachers' Response to their Position as Reflective Practitioners. (N=165)

As reflective practitioners, I	Number of teachers SD	D	D K	A	SA	Sample (n)
Reflect on my own teaching	46(27.9)	56 (33.9)	45 (27.3)	18 (10.9)	(0.00)	165
Have knowledge about reflective teaching	78(47.3)	46 (27.9)	36 (21.8)	(0.00)	5 (3.0)	165
Learnt about reflective teaching under training	30 (18.2)	126 (76.4)	4 (2.4)	(0.00)	5 (3.0)	165
Know the purpose of reflective teaching	(0.00)	6 (3.6)	18 (10.9)	73(44.2)	68(41.2)	165
Know how to write a reflective journal	24 (14.5)	128(77.6)	3(1.8)	2 (1.2)	8(4.8)	165
Know how to write a reflective journal on daily basis	56 (33.9)	68 (41.2)	5(3.0)	(0.00)	36 (21.8)	165

Note. Numbers in brackets are in percentages Strongly Disagree=SD Disagree=D Don't know=DK Agree=A Strongly Agree=SA

In Table 9, over 60% of the basic school science teachers dis*agreed and strongly disagreed* that as reflective practitioners, they reflect on their own teachings during classroom engagements. e.g. "*ability to work with the minds*'' (TJ 55).

Notwithstanding these positions by the teachers, a little over 24% of them *agree* or don't know that as reflective practitioners, they have knowledge about reflection and reflective practices. In support of this claim by the teachers 156 teachers (94.6%) disagreed and also *strongly disagreed* that they learnt about reflective teaching while in training as professional teachers. In spite of these positions indicated by the teachers, more than 141(85.4%) of the teachers however indicated that they knew the purpose of reflective practices eg. "It is just to improve our teaching process (PT 112) and then also ''improve the learning process of the pupils'' (TJ 55). On the knowledge of writing reflective journal, 152(92.1%) of the teachers *disagreed* and

also *strongly disagreed* that they know how to write reflective journal especially on daily basis. By implication, the basic school teachers have low level of knowledge on how to write reflective journal.

Key Finding 3

Over 60% of the basic school science teachers dis*agreed and strongly disagreed* that, they reflect on their own teachings during classroom engagements. Over 156 teachers (94.6%) teachers also *disagreed* and also *strongly disagreed* that they learnt about reflective teaching while in training as professional teachers, however the teachers 141(85.4%) indicated that they know the importance of reflective practices. Over 152(92.1%) also indicated that they do not knowledge of writing reflective journal.

In order to ascertain whether or not the basic school science teachers had really adopted reflective teaching in their schools, teachers were asked to state how often this was done. The teachers' responses to the question have been summarized in Table 10.

Table 10

Frequency at Which Teachers Adopt Reflective Practices as Reflective Professional in the Schools (N=165)

	Number of teachers					
	Never	**Seldom**	**Sometimes**	**Often**	**Always**	**Mean**
I do reflection on my lessons prior to my teaching	25(15.20)	103(62.40)	37(22.40)	(0.00)	(0.00)	2.67
I reflect on my lessons during the teaching process	25(15.20)	37(22.40)	103(62.40)	(0.00)	(0.00)	3.52
I use reflective practices in all my lesson delivery	37(22.40)	19(11.50)	109(66.90)	(0.00)	(0.00)	3.56
I do reflection on my lessons with pupils after teaching	14(8.50)	37 (22.40)	57(34.50)	57(34.50)	(0.00)	3.04
I consider reflective most important activity to me	(0.00)	37(22.40)	28(17.00)	100(60.60)	(0.00)	2.45
I adopt reflective teaching to improve upon my next lessons	4(2.40)	58(35.20)	83(50.30)	20(12.10)	(0.00)	3.52
Average mean						3.13

Note. Numbers in brackets are in percentages

Table 10 shows that, the mean scores of all 6 items were close to 3.0 indicating that generally the teachers *sometimes* adopted reflective practices. For example, “To some extent I can say yes but I don't see it in daily occurrence” (TP4). Out of this figure, items with the mean scores of 3.5 and 3.56 were the highest mean scores of adoptions of reflective practices by the basic school teachers in the schools. This implies that the basic school science teachers believed that they *seldom* adopted reflective practices to improve upon their next lessons. For example, “before lesson begins, I sit for about three minutes to five minutes to go through my lesson” (TP33) and “then check my notes and then check the materials I'm going to use (TJ 11). Considering the least

mean score of (2.50), I *consider reflective practices for teaching as most important activity to me.* It implies that although the teachers may consider reflective practice as most important to them, they did not have in-depth knowledge in its application. The highest mean score of (3.56), *I use reflective practices in all my lesson delivery*. For example: “Oh me even before the Introduction koraa I've been doing it” (TP20. This gave the highest indication of the teachers, which implies that the basic school science teachers generally adopted reflective teaching to improve their lessons.

Key finding 3b

From the study, the mean scores of all 6 items were close to 3.0, indicating that generally, the teachers in the district *sometimes* adopted reflective practices. Out of this figure, items with the mean scores of between 3.5 and 3.56 were the highest mean scores on the adoption of reflective practices by the basic school teachers in the schools. By implication, the basic school science teachers in the district indicated that they *seldomly* adopted reflective practices to improve upon their next lessons. Hence the teachers did not *always* adopt reflective practice.

4.6 Level of Reflectivity Demonstrated by Basic School Science Teachers

The basic school science teachers were asked if their school environments also contributed to promoting the level of reflective practices demonstrated in their schools. The responses given by the teachers are recorded in Table 11.

Table 11

The Extent to Which the School Environment Influences Reflective Practices (N=165)

How often does your school influence you?	Never	Seldom	Sometimes	Often	Always	Mean
My school keeps good records	86(52.4)	20(12.2)	9(5.5)	49(29.9)	(0.00)	4.2
My school consents to my use of electronic equipment	5(34.8)	36(22.0)	71(43.3)	(0.00)	(0.00)	3.8
My school has support systems in place	(0.00)	(0.00)	107(65.2)	37(22.6)	20(12.2)	3.4
I am influenced by my school's environment	(0.00)	19(11.6)	31(18.9)	114(69.5)	(0.00)	2.4
My school has reward systems	(0.00)	12(7.3)	28(17.1)	118(72.0)	6(3.7)	2.2
Average Mean						3.25

Note. Numbers in brackets are percentages

Table 11 shows, how often the school environment influences teachers' reflective practices. For example, '*my school keeps good records to help me adopt reflective practices'* had the highest mean score of 4.2 and '*my school has reward systems for me whenever I engage in reflective practice'* had the lowest mean score of 2.2. This implies that the school *often* keeps good record to help teachers adopt reflective practices but the school only *seldom* has reward system in place for teachers whenever they engaged in reflective practices for example E.g. 'So even the headmaster has made it clear to us that he is ready to give us free materials any time we are ready to engage in reflective practice, we're also free to come and consult him' (T112).

However, considering the overall average mean of 3.3, it could be concluded that the school environment *sometimes* enabled good records keeping to help teachers adopt reflective practice and also sometimes has reward system in place for teachers

whenever they engaged in reflective practices. For example, 'I think the headmaster is supportive' (T11). This may generally imply that the school environment sometimes supports the teachers whenever they engaged reflective practices.

Given that a great majority of the teachers (114) indicated that their school environment influences them to engage in reflective practice and also rewards them whenever they engage in reflective practices and these were *often* done in the schools.

Key Finding 4

The school environment *sometimes* helps teachers (114) to keep good records to help the science teachers engage in reflective practices. Also, the school environment *seldom* has reward system in place for teachers who engage in

4.6 The School Environment and Reflective Practices

The basic school science teachers were asked to indicate the frequency at which their schools influenced their reflective practices. The responses of the teachers have been recorded in Table 12.

Table 12

The Frequency at Which the School Influences Teachers in Reflective Practices (N=165)

Statement;	Never	Seldom	Sometimes	Often	Always
My school has regular in-service training	84(51.2)	58(35.4)	22(13.4)	(0.00)	84(51.2)
My school promotes reflective practices through journals	27(16.5)	58(35.4)	50(30.5)	29(17.7)	(0.00)
My school has equipment and TLMs in place to enhance my reflective practices	27(16.5)	58(35.4)	79(48.2)	(0.00)	(0.00)
Other teachers are ready to give support	27(16.5)	9(5.5)	61(37.2)	67(40.9)	(0.00)
My school has social amenities	66(40.2)	86(52.4)	12(7.3)	(0.00)	(0.00)

Note. Figures in brackets are in percentages

Table 12 shows that, majority (50%) of the teachers indicated that their schools *never* had regular in-service training for them in reflective practices: example, 'there's no conscious effort for the support per day' (TP112). But over 65.9% of the teachers also indicated that their various schools *sometimes* promoted reflective practices through regular supply of reflective journals to record their activities. Over 40% the teachers indicated that other teachers in their schools are *often* ever ready to give various forms of support to enable them to carry out their reflective practices. For example, '*because the curriculum is new now, what we do is that if you don't understand something and you can see the headmaster'* (TP112). On the other hand, 52% of the basic school teachers also indicated that their schools *sometimes* have electricity to help them use electronic devises to carry out reflective practices. On the use of TLMs, 48% of the teachers indicated that their schools have TLSs in place to enhance their reflective practices.

Key Finding 5

On the frequency at which the schools influence teachers' reflective practices, teachers 51% indicated that their schools *never* had regular in-service training for them in reflective practices. However, over 40% of the teachers also indicated that other teachers *often* are ever ready to assist them to give various forms of support in reflective practices. Again, other teachers 40% also indicated that their schools have TLMs in place to support their reflective practices

Given that more that 50% of the teachers indicating that their schools *never* had any in-service training for them in reflective practices implies that the teachers often engaged in reflective practices by the help of other colleague teachers. Hence it could be concluded that the teachers engaged in reflective practices by through the assistance of their colleagues with little or no influence by their schools.

4.7 The Extent of Reflective Practices by Teachers in the Basic Schools

4.7.1 Reflection–for-Teaching

The basic school teachers were asked to indicate the frequency at which they reflected prior to lesson deliveries. The responses given by the teachers are recorded in Table 13 in terms of frequencies and percentage of each item.

Table 13

Frequency at Which Teachers carry out Reflection Prior to Lesson Delivery N=165

	Reflection-for-Teaching)			
During pre-lesson delivery stage;	Seldom	Sometimes	Often	Always
I do reflective practice using the curriculum materials	15(9.1)	53(32.3)	60(36.6)	36(22.0)
I function as a teacher, based on a pre-set standard	15(9.1)	53(32.3)	41(25.0)	55(33.5)
I question every detail of my lessons prior to each lesson delivery	15(9.1)	18(11.0)	126(76.8)	5(3.0)
I engage my students in my lesson preparation prior to its delivery	12(7.3)	14(8.5)	68(41.2)	70(42.4)
I consider differing needs of learners in my lesson preparation	12(7.3)	14(8.5)	57(34.8)	81(49.4)

Note. Figures in brackets are percentages; one person did not respond to the set of items.

Table 13 shows that, over (36%) of the teachers indicated that during pre-lesson delivery stage, they *often* engaged in reflective practices using the curriculum. For example, 'I think about what I'm going to teach' (TP5), 'have I taught that to a particular class before? "How did it go when I was there on the student?" (TJ5). Other teachers, (76%) also indicated that during pre-lesson delivery stage, they *often* question every detail of their lesson prior to lesson deliveries. For example, "would the pupils be able to understand what I am going to teach?" (TP111), while over 42% of the teachers also indicated that during pre-lesson deliveries, they *always* engaged pupils in lesson preparation prior to its deliveries. Over 49% of the teachers indicated that during pre-lesson deliveries, they *always* consider differing needs of their pupils during their lesson preparations. The responses in this category indicate that teachers question every detail of their lessons before they are delivered.

Key Finding 6

Over 36% of the teachers indicated that during pre-lesson deliveries, they *often* use the curriculum in their reflections. More than 75% of the teachers also indicated that they *often* question every detail of their lessons prior to lesson delivery during reflection. Some of the teachers, (42%) also indicated that during pre-lesson deliveries they *always* engage their pupils during their lesson preparations.

Given that the teachers often use the curriculum in their pre-lesson for reflection and also *often* question every detail of their lesson suggests that the teachers were mindful of carrying out reflection prior to lesson deliveries but not done *always* as demanded of them.

The respondents were asked to indicate how often they carry out certain classroom activities on reflective practices in their schools. The responses given by the teachers on each activity are indicated in Table 14.

Table 14

Frequency at Which Teachers Carry out Reflective Activities during Lesson Deliveries (N=165)

	Teachers' response: Reflection –in-teaching			
As part of my class activities, I;	**Never**	**Sometimes**	**Always**	**Mean**
limit my reflective teaching strategies only to teaching techniques	(0.00)	27 (16.4)	138 (83.6)	2.83
limit my reflective teaching strategies only to team-based learning	(0.00)	35 (21.3)	130 (78.7)	2.78
connect a learner-centred method of teaching to the underlying theories of reflection	(0.00)	69 (41.9)	96 (58.1)	2.55
pay attention to student's different learning styles	(0.00)	75 (45.5	90 (54.5)	2.54
encourage my students to reflect in groups	(0.00)	78 (47.3)	87 (52.7	2.52
modify my teaching strategies to meet the current challenges	(0.00)	79 (47.9)	86 (52.1)	2.52
make adjustments to lessons based on my past experiences	(0.00)	88 (53.3)	77 (46.3)	2.45
tend to reflect on my lesson delivery in order to be innovative	4 (2.5)	134 (81.2)	27 (16.3)	2.13
reflect on the effectiveness based on best practices	4 (2.6)	145 (87.8)	16 (9.6)	2.07
react to each student's responses as I teach	71 (43.0)	20 (12.2)	74 (44.8)	2.01
reflect because my school requires me to do so	10 (6.0)	146 (88.4)	9 (5.6)	1.99
adjust my teaching practices to ensure effective reflection	70 (42.4)	27 (16.3)	68 (41.3)	1.98
answer students' problems in lesson delivery	65 (39)	100 (61.0)	(0.00)	1.60
guide my students to reflects on lesson activities	108 (65.4)	57 (34.6)	(0.00)	1.34
consciously pause with students in my lesson delivery to reflect	117 (70.9)	43 (26.0)	5 (3.1)	1.32
connect new concepts to students' prior knowledge during the lesson	148 (89.7)	17 (10.3)	(0.00)	1.10
Overall mean score				**2.60**

Note. Figures in the brackets are percentages

4.7.2 Reflection-as-Teaching

In Table 14, the basic school teachers were asked to indicate the frequency at which they carried out some activities outlined during lesson deliveries. The responses were recorded in mean, frequencies and percentages on the activities teachers frequently used for reflection during lesson deliveries and are recorded in Table 14.

The mean scores were arranged numerically from lowest to the highest with the average mean score of 2.60, implying that generally teachers *always* carried out the activities indicated in the table during lesson deliveries in order of preference. The items with the mean scores of 2.8 and 2.7 equally implied that teachers *always* 'limit their reflective teaching strategies only to teaching techniques" and also *always* "limit their reflective teaching strategies only to team-based learning" during lesson deliveries. For example, 'I normally give group work in class so that those who don't follow the lesson can do so' (TJ 55). Considering the mean scores of 2.5, the teachers indicated that they *sometimes* and *always* reflect during lesson deliveries where they encourage their students to reflect in groups and also modify their teaching strategies to meet the current challenges of teaching and learning.

The lowest reflecting rate (1.10) during lesson deliveries as teachers indicated, showed that teachers *never* 'connect new concepts to students' prior knowledge during the lesson'. The next three lowest mean scores on teachers' reflection during lesson deliveries were given on teachers *never consciously pause with students in lesson delivery to reflect on planed lessons* (1.32), *guide students to reflect on lesson activities and its core competencies* (1.34) and *answer students' problems in lesson delivery based on their own reflections* (1.60). It may be that these were activities that teachers placed less emphasis or importance on when reflecting during lesson

deliveries, as compared with *limit reflective teaching strategies only to teaching techniques* (2.8).

Considering the fact that teachers never consciously paused with students to reflect during lesson or guide students to reflect on core competencies or answer students' problems based on their own reflection during lesson deliveries indicated that they had no much knowledge of reflective practices during lessons. It could be concluded that most of the basic school science teachers do not have much training on how to carry out reflection during lesson deliveries as indicated in Tables 6 &7.

Key Finding 7

The teachers' reflective mean sores on 16 items during lesson deliveries were between (1.1) and (2.8) indicating reflection-as-teaching with *connect new concepts to students' prior knowledge during the lesson* and *limit my reflective teaching strategies only to teaching techniques*, as minimum and maximum responses respectively.

Additionally, the teachers rated themselves to have been *always* carrying out reflection during lesson deliveries on *limiting reflective teaching strategies only to teaching techniques* and also on *limiting teaching strategies only to team-based learning* as highest. On the other hand, the teachers also indicated that they had *never* connected new concepts to students' prior knowledge during the lesson and also *never* consciously paused with students in their lesson deliveries to reflect on planed lessons.

Given that generally, the teachers rated themselves to have been carrying out reflective practices *always* and specifically, *never* connected new concepts to students' prior knowledge and also *never* consciously paused with students to reflect during lessons implied that the science teachers have difficulty carrying out reflective processes during lessons.

Table 15

Frequency at Which Teachers Carry out Reflective Activities at the End of Lesson Deliveries (N=165)

Teacher's activity after lesson delivery:	Teachers' responses in reflection-of-Teaching					
	Never	Seldom	Sometimes	Often	Always	Mean
I evaluate my students at the end of each lesson	9(5.5)	(0.0)	82(53.3)	(0.0)	73(44.8)	3.7
I record my teaching experiences into the reflective journal	22(13.4)	(0.0)	69(41.8)	(0.0)	73(44.8)	3.6
I identify alternative ways of presenting my ideas to students	17(10.4)	(0.0)	78(47.2)	(0.0)	70(42.4)	3.6
I am committed to maintaining supportive learning environments for reflective teaching	36(33.4)	(0.0)	110(66.6)	(0.0)	(0.00)	3.5
I am committed to applying National Teachers' Standard	(0.0)	(0.0)	81(49.1)	(0.0)	84(50.9)	3.5
I recognize the complexity of classroom dynamics	(0.0)	(0.0)	113(68.4)	(0.0)	97(58.7)	3.5
I see reflective practices as a tool to engage all students	(0.0)	(0.0)	144(87.2)	(0.0)	21(12.8)	3.4
I am curious about the effectiveness	(0.0)	(0.0)	94(56.9)	(0.0)	71(43.1)	3.4
I reflect on my teaching based on the feedback I receive	40(24.2)	(0.0)	93(56.3)	(0.0)	27(16.5)	3.4
I recognize the learning outcomes of my pupils	33(20.1)	(0.0)	111(67.2)	(0.0)	21(12.7)	3.4
I consider reflection very important in making decisions	8(4.9)	(0.0)	120(72.7)	(0.0)	37(22.4)	3.2
Overall average mean score						3.5

Note. Figures in brackets are in percentages

4.7.3 Reflection-of-Learning

In Table 15, the basic school science teachers were asked to indicate how often they carried out certain activities after lesson deliveries. The responses have been presented in mean scores and frequencies with their corresponding percentages.

The mean scores were arranged from highest to the lowest in Table 15 with the average mean score of (3.50), implying that teachers *often* carry out the activities indicated in the Table after lesson deliveries in order of preference. The items with the highest mean scores of 3.7 and 3.6 imply that teachers *seldom* 'evaluate students at the end of each lesson' and also 'record teaching experiences into the reflective journal immediately after my lesson'

The lowest mean scores of (3.2) as recorded in the Table indicated that teachers *sometimes* consider reflection very important in making decisions. For example, 'I normally think over what I have to do with the children before I give them work to do' (TP 66). The statements with the mean score of 3.4 show that teachers *sometimes* recognised learning outcome of their pupils, and reflect on their teachings, based on the feedbacks they received. The teachers also indicated that that they were *sometimes* curious about the effectiveness of their reflective practice activities and also see reflective practice as a tool to engage all students. For example, for example *before I end my lesson, I tell them to remember what they learnt, this gives me ideas of all that went into the lesson* (TP2)'. Considering the fact that some number of the science teachers *sometimes* considered reflection very important in making decisions, and also *sometimes* see reflection as a tool to engage students after lesson, the teachers did not consider it as high as compared with 'I evaluate my students at the end of each lesson' and 'I record my teaching experiences into the reflective journal

immediately after my lesson'. For example: "office should make conscious effort to provide journals for us to write our reflections inside, so it becomes permanent for me always I think over it" (TP112). It could probably be concluded therefore that majority of the teachers still have some form of challenges reflecting more effectively with their students after lesson, where they see evaluation of students and recording of lesson into reflective journal as the most important of reflection after lesson. For Example: "then also after the lesson I go back to see whether I have done something better or something not well done" (TP112). It could generally be concluded that teachers *often* considered reflecting over activities performed either during lessons and also after the lessons were over.

Key Finding 8

The overall average mean scores on the 11 items in the table indicate that the basic school teachers *sometimes* carry out all the reflective activities after lesson deliveries, and consider reflection very important in making decisions about my students.

Additionally, teachers considered *often* evaluating their students at the end of the lesson and also recording their teaching experiences into reflective journal after lesson deliveries as their top priorities.

4.8 Factors that Influence Teacher Reflection among Basic School Science Teachers

The basic school science teachers were asked to indicate the factors that influence their reflective practices during classroom engagements. The factors such as; the extent to which the teachers' own peers influence their reflective practices and, how often they engaged in reflective practices, and other factors, are recorded in Tables 16.

4.8.1 To What Extent does Peer Influence Promote Reflective Practices among the Teachers?

The basic school teachers were asked to indicate the extent to which their peers influence their reflective practices in the schools. The responses to this question have been recorded in Table 16.

Table 16

The Extent to Which Teachers' Peers Influence Reflective Practices (N=165)

	Teachers' responses					
Peer influence on reflection	**Strongly Disagree**	**Disagree**	**Don't know**	**Agree**	**Strongly Agree**	**Mean**
My head teacher encourages me	(0.0)	(0.0)	(0.0)	122(74.4)	42(25.6)	4.2
My head teacher acknowledges me	(0.00)	(0.0)	(0.0)	122(74.4)	42(25.6)	4.2
I reflect with my colleagues	(0.0)	26(15.9)	(0.0)	68(41.5)	70(42.7)	4.0
My colleague teachers do praise me	(0.0)	35(21.3)	(0.0)	61(37.2)	68(41.5)	3.9
My use of reflective teaching is influenced by my colleagues	(0.00)	(0.0)	(0.0)	96(58.5)	68(41.5)	3.2
Overall average mean score						3.9

Note. Figures in brackets are percentages; one respondent did not respond to the items in the Table.

Table 16 shows peer influence on reflection, such that, *my head teacher encourages me to use reflective practices* as well as *my head teacher acknowledges me anytime I engage in reflective teaching practices* had the highest mean score of 4.2 with m*y use of reflective teaching is influenced by my colleagues* had a mean score of 3.2. For example, a teacher indicated that 'my headmaster is always available to answer you whenever you go to him with teaching problems' (TJ 11).

This by implication, the science teachers *agreed* that their headteachers influenced them by encouraging them and also acknowledging them anytime they engaged in reflective practices as the highest among the activities. On the other hand, '*my use of reflective teaching is influenced by my colleagues* had the lowest mean score of 3.2. For example, "I think if my colleague teachers help me, I can reflect far better in my lessons" (TP 3). This implies that the peer influence for engaging in reflective practices is much done with the Headteachers than their colleague teachers. The mean scores were all quite close to 4.0. Which indicated that the teachers *agreed* that their peers influenced them on reflection during their lessons. This is corroborated by interview with the teachers after the first phase of the questions: for example, a teacher's response indicated that "I think if my colleague teachers help me, I can reflect far better in my lessons" (TP 3). It is obvious to note that the teachers could engage in reflective practices with the help of their peers rather than their headteachers.

Key Finding 9

Among the issues of how peers influence on reflection, majority of the teachers with mean scores on the 5 items were between 3.2 and 3.9 lying between *don't know* to *agree, indicated* that they were mostly influenced by their headteachers rather than their colleague teachers.

Given that teachers were generally influenced by their peers on lesson deliveries, they did so in collaboration with their peers, especially when their headmasters asked them to do so.

4.8.2 What is the Frequency of Activities that Influence Reflective Practices?

Teachers were asked to indicate how often they carried out some activities within a given period. The responses given by the teachers are recorded in table 17, using frequency of activities and percentages.

Table 17

Frequency at Which Teachers Carry out Certain Activities in Reflective Practices (N=165)

As a reflective practitioner, I	Teachers' responses			
	Daily	Weekly	Termly	Yearly
Write my reflective journal after each lesson	154(93.9)	10(6.1)	(0.00)	(0.00)
Reflection to adjust my teaching	125(76.2)	39(23.8)	(0.00)	(0.00)
Reflection on my next lesson	56(34.1)	108(65.9)	(0.00)	(0.00)
Reflection on my past practices	(0.00)	71(43.3)	38(23.2)	55(33.5)
Reflection alone	54(32.9)	61(37.2)	35(21.3)	14(8.5)
Reflection while developing my lesson plan to teach	(0.00)	125(76.2)	39(23.8)	(0.00)
Reflection on diverse students' needs	37(22.6)	45(27.4)	51(31.1)	31(18.9)
Reflection about other teachers' teaching	(0.00)	85(51.8)	51(31.1)	28(17.1)
Reflection with other teachers when about to start my teaching	(0.00)	85(51.8)	48(29.3)	31 (18.9)
Reflection with other experienced teachers	(0.00)	37 (22.6)	96 (58.5)	31 (18.9)

Note. Figures in brackets are percentages. One teacher did not respond to some items

In Table 17, the results show that majority (94%) of teachers indicated that they write their reflective journals on *daily* basis while 76% of the teachers also indicated that they carry out reflection on *daily* basis to adjust their teaching during lessons. For example, "before I start my teaching, I sit for some few minutes to think of the whole lesson" (TP3). Other teachers (66%) also indicated that they carry out reflection on

their next lesson on *weekly* basis while over 76% also indicated that they carry out their reflection on weekly basis while drawing their lesson plan to teach. The least activity carried out by the teachers was given as I *Reflection with other experienced teachers on weekly basis* (22%) for example 'as for me I don't normally depend on the senior teachers before teaching

(TP 5). This implies that the science teachers carry out most of their key activities on *daily* basis while quite a great number also do so on *weekly* basis. Although the teachers carry out reflection with other experience teachers, they do so only on *weekly* basis. This might probably be due to insufficient time for the experience teachers to meet with the less experienced ones.

Key Finding 10

The majority of the teachers 94% write their journals on *daily* basis and 76% of them also carry out their reflection on *daily* basis so as to adjust their teaching during lesson deliveries. On the other hand, quite a great number 76% of the teachers also carry out their reflection *weekly* when drawing lesson plans.

4.9 What Are the Challenges Faced by Basic School Science Teachers Who Teach Science in Adopting Reflective Practices?

The basic school science teachers were asked to indicate the challenges they usually face when they engaged in reflective practices. The responses given by the teachers are recorded in Table 18.

Table 18

Challenges Faced by Teachers in adopting Reflective Practices (N=165)

	Teachers' responses					
Teacher's Challenges	**SD**	**D**	**DK**	**A**	**SA**	**Mean**
I lack training on reflection	(0.0)	(0.0)	(0.0)	22(13.4)	142(86.6)	4.8
I lack proper time management for reflective teaching	(0.0)	(0.0)	(0.0)	42(25.6)	122(74.4)	4.7
My colleagues and I are not conversant with reflective practices	(0.0)	(0.0)	(0.0)	70(42.7)	94(57.3)	4.5
I have inadequate refresher courses	(0.0)	15(9.0)	(0.0)	42(25.6)	107(65.2)	4.4
I lack regular supervision	(0.0)	26(15.7)	(0.0)	101(61.6)	37(22.6)	3.8
There are no trained teachers in my school to help	(0.0)	85(51.5)	(0.0)	42(25.6)	37(22.6)	3.4

Note. Figures in brackets are percentages. Strongly Disagree=SD Disagree=DA Don't Know=DK Agree=A Strongly Agree=SA

From Table 18, one of the challenges indicated by the teachers was lack of training on reflective teaching which had a mean score of 4.8, followed by "lack of proper time management for reflective teaching" had the second highest mean score 4.8. In both cases the teachers *strongly agreed* that they lack training on reflective teaching practices and proper time management. For example, "since I completed school, I never gone for such training so I see it as wasting my time" (TP 12). Other teacher also indicated that "my colleagues and I are not conversant with reflective practices" had mean score of (4.5) while "I have inadequate refresher courses to attend" had a mean score of (4.4). From the data, the teachers *agreed* that they were not conversant with reflective teaching and moreover had inadequate refresher courses. "I lack regular supervision by my school head" and "There are no trained teachers in my school to help with my reflective teaching" had the lowest mean scores of (3.8) and (3.4) respectively for example "in this school most of us are new so we don't have

teachers who practice it, so it's difficult to do it" (TJ 42). From the data, teachers *agreed* that *lack of regular supervision by their Headteachers* as well as *trained teachers in reflective teaching* were among the lowest challenges indicated.

Given that that the teachers strongly agree that they lack training on reflection and time management couple with proper supervision, it could be concluded that reflective teaching practices is a serious challenge to basic school science teachers.

Key Finding 11

The mean score (4.8) of teachers' responses showed that they *strongly agreed* that lack of training on reflective teaching and lack of proper time management for reflective teaching were their major challenges faced in the schools. On the other hand, the mean score (3.8) of teachers' responses showed that teachers *agreed* that lack of supervision and trained teachers to guide them in reflective teaching was identified as among the less serious challenges in the schools.

4.10 Summary of Findings

The teachers' demographic information in Table 4 of this study showed that majority of the Science teachers 113 (68.5%) teach science and other subjects and 52 (31.5%) teach science only in the Ada East District. It was also indicated that none of those teachers 52 (31.5%) who hold first degree to teach science only but rather those with Diploma, HND and Masters Degrees. It was further indicated that majority of the teachers 129 (78.2%) did not receive training in reflective teaching practices. Considering the age and experience of the teachers, over 131 of them were above 30 years representing 79.4% of the respondents. Majority of the teachers (126) representing 76% in the district *disagree* that they had knowledge in the reflective practices. A large number of the teachers also indicated that their school environments did not *sometimes* support their reflective activities while others 20(12.2%) indicated that the school environment *never* supported them in reflective practices. A few

challenges confronting the use of reflective practices include *lack of training* and *time management.* Although some teachers 4 (8.3%) engaged in self-training as indicated in Table 8, they could not influence the rest of the teachers to carry out effective reflective teaching.

In view of these shot comings identified in this study concerning the basic school teachers, an intervention process was put in place to help teachers carry out effective reflective practices in their science classrooms engagements. This was done in line with the design at phase III in Figure 3 of this study. This phase provided a comprehensive intervention and implementation processes with a follow up observation plan to substantiate the effects of the intervention. This was preceded by pre-Professional Learning Intervention Processes.

4.11 What Type of Model could be developed to Enhance Reflective Practices?

4.11.1 Implementation and Evaluation of Reflective Intervention Processes

Based on the summary of the findings in this chapter, intervention processes were put in place to improve the reflective skills of the basic school teachers in the district. In view of this, the researcher organised workshop for the teachers on cluster basis by assessing the levels of the teachers 'knowledge before the workshop and after the workshop.

4.11.2 Pre- Professional Learning Intervention Processes

This phase according to the design in Figure 3 of the study, highlights on the implementation and evaluation of the Professional Reflective Intervention Processes. The intervention processes were put in place to improve upon reflective practices in science classrooms in the Ada East District. In the process, the science teachers were again asked to confirm their knowledge in reflective practices and its impact by

providing answers to self-assessment questions which guided the researcher in the intervention processes. The questionnaire and interview data collated and analysed in the previous phases of this study showed that the basic school science teachers' knowledge on reflective teacher was low. The workshop was therefore designed and organised, based on the outcome of the findings from the data analysed. In order to further confirm the previous findings, a pre-workshop assessment was conducted for all the basic school science teachers who took part in the previous phase of the study. The outcome of the questions answered are recorded in Tables 19 and 20.

4.11.3 Teachers' Knowledge of Workshops Attended on Reflective Practices

As part of the follow up activities in this study on the basic school teachers' previous knowledge, including their reflective practices as indicated in Table 6, and also concerning their knowledge and training workshops attended previously, a total of 36 (21.8%) teachers indicated that they took part in a workshop while majority of the teachers 129 (78.2%) indicated that they did not receive any such trainings. In this section, the teachers were asked further to indicate the type of skills acquired during their previous training workshops attended if they did so. The responses by the teachers regarding their levels of various skills acquired during their previous training workshops are recorded in Table 19.

Table 19

Assessment of Basic School Science Teachers' Knowledge on Previous Workshops Attended on Reflective Practices (N=165)

Teachers' Knowledge during any previous workshops attended	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean
The workshops gave me insight into model development	78(2.4)	41 (24.8)	15(9.1)	31(18.8)	2.8
I have acquired enough skills	73(44.2)	40(24.2)	52(31.5)	(0.00)	2.4
My knowledge has improved	53(32.1)	53(32.1)	52(31.5)	7 (4.2)	2.0
I can effectively apply my reflective skills	23(13.9)	126(76.4)	11(6.7)	5 (3.0)	1.9
Overall Average mean					2.3

Note: Numbers in bracket are in percentages

Table 19 shows an average mean score of the responses to be 2.3, indicating that generally the teachers disagree with the statements in the table. For example, '*The workshops I attended earlier have given me insight into models development'* had the highest mean score of (2.8) indicating that teachers *agreed* that the workshop they attended gave them insight into model development. However, a greater majority with a mean score of (2.4) disagreed that their knowledge improved in reflective practice skills and can effectively apply them. This showed that majority 126 (76.4%) of the teachers could not apply their reflective skills hence need to receive training in this regard.

Key Finding 12

The mean scores of teachers on four items were from 1.9 to 2.8 lying between *strongly disagree* and *agree*, indicating the true position of the teachers. With the mean score of 2.8, a small number of teachers (45) *agreed* that they attended a workshop earlier and had acquired enough skills that enabled them gain insight into model development. However, a greater majority (139) of teachers *disagreed* and *strongly disagreed* of acquiring enough of such skills to develop models. This is an indication that the teachers needed to receive further training to be able to acquire enough skills in reflective practices and model development. In addition, over 103 teachers *disagreed* and *strongly disagreed* that they acquired enough skills in reflective practice skills and model development.

Given that some small number of teachers attended workshop prior to the training section, while a larger majority did not acquire such skills, is an indication that the teachers needed to receive further training to improve their various skills outlined in the Table 19.

4.12 Professional Learning Intervention Process (PLIP)

This section reports on Professional Development Workshop by the researcher on school cluster basis. The reason for this intervention process was based on the results of the baseline data analysis done in this Chapter 4 of the study as shown in Tables 6, 18 &19 on the basic school teachers' inability to receive adequate training on reflective practices. It was found out that the basic school science teachers in the Ada East District had inadequate knowledge on reflective practices and model development. The purpose of the workshop therefore was to improve the reflective skills of the teachers. In view of this, the Researcher first provided a well-structured intervention measures to enhance and change the reflective practices skills of basic school science teachers. Secondly, the section reports on data about the impact of the intervention on the teachers' reflective practices towards an improved classroom engagement. Some authors, Cohen et al. (2000) and Kemmis and McTaggart (2003) suggested that this could be achieved through action research which is an effective tool for making interventions more effective in human endeavours where changes and improvements are most needed.

4.13 School Visit (I)

Due to the locations of the selected schools for the study, the researcher categorised the schools into bigger clusters (indicated by letter C) for the purpose of workshop, i.e. C1-C4, C5-C8 and C9-C12 as arranged in a flow diagram in Figure 5. Thus, activities of the workshop comprised the determination of what constitute a formal reflective procedure as proposed by Gibbs, a famous searcher on reflective practices. Determination of what makes a basic school teacher a reflective professional was carried out during the workshop sections. For efficient data collection procedures, the clusters were sub-divided into groups for easy accessibility during the workshop and also for data collection. Questionnaires were collected and coded by teachers in Groups of Cluster (GC1). This enabled the researcher to identify feedbacks from each group and clusters. The workshop activities were carried out in three locations in the district. At each location, similar procedures were employed to impact knowledge and also receive feedbacks from the teachers. At each cluster, teachers were given few questions to answer to test their knowledge on reflective practices. Same was done two weeks after the workshop. The intervention processes were as follows:

Prior to the workshops, the Cluster-leads of the teachers were given the soft copies of the audio-visual tutorial outlines by Gibbs as well as the slides (Appendices D and E) on the following areas;

- Exploring the principles and theory of academic and professional reflective practices
- Exploring the reflective writing skills
- Describing the Gibbs' reflective cycle

These were accompanied by video presentation to further explain the concept of reflective teaching practices.

4.14 Gibbs' Conclusions on Reflective Cycle

Gibbs actually proposed two conclusions: a general one, which could be transferable and a specific one, focused on teachers' personal situations. These are now normally merged but the idea helped focus the teachers' conclusion on the following questions that;

- What have you learnt? Generally, and specifically
- What can I now do better?
- Could/should you have done anything differently?
- What skills would I need to handle this better next time?

The teachers were also exposed to what constitute an academic writing and reflective journal writing. In effect, the teachers were made to understand that in academic writing, the subject matter, is not likely to be personal, but in reflective writing the subject matter is likely to be personal (Gibbs, 1998; & Hunt, 2005). In concluding the workshop, the participants (basic school science teachers) were made to reflect over the Gibbs' model on reflection after which they were made to outline a summary of the workshop materials into six-item rubrics for practice.

1. Be Bold and Remain Focused During Reflection (Using 'I' or 'Me')
2. Practise Reflection Before, During and at the End of all Lessons
3. Place Yourself at the Centre of the Reflection
4. Be Sincere to Yourself about What You Reflect On
5. Make Reflection Useful to Your Learners
6. Identify New Ways of Handling the Same Lesson Next Time

In small groups, teachers in each cluster were assigned tasks to develop a simple reflective plan towards lesson deliveries. After a model development and presentation of the outline, participants were asked to discuss the 'strengths' and 'weaknesses' identified in the various presentations carried out. Teachers were then asked to practice the new reflective skills acquired for a minimum of two weeks after the workshop activities. Reflective models were produced and finally developed into a single model, as agreed upon through feedbacks received from participants with the help of the researcher as shown in Figure 5. Feedbacks are very significant in reflective practice. Considering the feedback processes outlined in the Figure, the researcher believed strongly that the process helped him to improve on the work by building on the positive comments from the clusters and using the critical ones to develop the model and also address future challenges on the workshop. Feedbacks therefore play very critical roles in teaching and learning by helping the teacher to improve each piece of work in the classroom. It is therefore very important to develop the reflective model based on the feedbacks of the participants.

4.15 Schools Visit (II) on Feedback after Practice

Two weeks after the workshop activities, the researcher visited the schools and administered a second set of questionnaires for feedbacks from participants. In order to substantiate the claims from the various feedbacks received from participants, the researcher carried out a scheduled, structured observation section on 20 teachers out of the 165 who participated in the workshop and who were willing and ready to be observed. The first part of each visit involved the administration of the questionnaires followed by a structured observation section. Cohen, Manion and Morrison (2007) describe observation data as sensitive to contexts by demonstrating strong ecological validity and this statement by Cohen et al. (2007) was supported by (Moyles, 2002).

According to Cohen, Manion and Morrison (2007), a structured observation is very systematic and enables the researcher to generate numerical data from the observations. This observation exercise did not interfere with the classroom activities of the teachers since the observation was purely a non-participant one. According to Cohen et al. (2007), observation studies are more advantageous to experiments and surveys when data are being collected especially on non-verbal behaviours. They further indicated that during observation, the researchers are able to discern on-going behaviours as they occur. This helps the investigator to make appropriate notes about its relevant features.

To ensure an effective and efficient processes in collating feedbacks from the 12 clusters through small groups have been outlined. All the 12 clusters have been sub-divided into three main groups of 4, that have also been divided into a smaller group of 2 clusters each as indicated in Figure 5.

4.16 Feedback Processes and Procedures on the Skills Acquired by Teachers on Cluster Basis

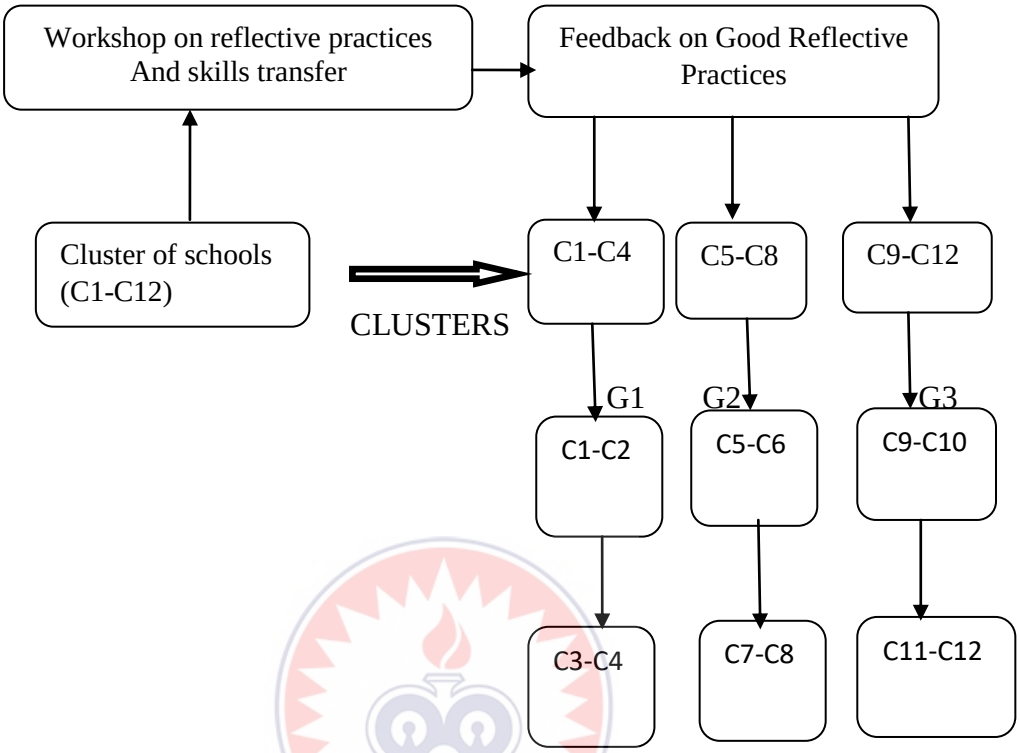


Figure 5

Data Collection Procedures for Intervention and Skills Transfer

In Figure 5, the researcher reclassified the three major clusters into three groups of two clusters per group for a systematic collation of feedback, as follows; i.e. G1=(C1-C2), G2=(C3-C4) and G3=(C5-C6) for the first set of schools. The researcher repeated the visits for the next batches of clusters as follows; G1=(C3-C4), G2=C7-C8), G3=(C11-C12). Inn all, each group was visited twice resulting in six visits to all the 12 schools selected for the intervention processes. The feedbacks received from the 12 schools were collated in the group's clusters with the help of the cluster leads as outlined in Figure 5. The feedbacks as collated are recorded by the researcher and classified into themes and recorded in Table 20 to Table 25.

4.17 Post-Workshop Feedback on Reflective Teaching Practices of Teachers.

The feedbacks were collated from the teachers as indicated in Figure 5 on their levels of knowledge gained the workshop. These feedbacks were received after a minimum of two weeks of classroom practices on reflective practice activities by the teacher and the results are recorded in Table 20.

Table 20

Teachers' Responses to Self-Assessment on Impact of Professional Learning Intervention Workshop (N=165)

After the workshop;	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean
I have acquired enough skills in reflective practice	(0.00)	52(31.5)	40(24.2)	73(44.2)	3.1
My knowledge has improved	(0.00)	52(31.5)	60(36.4)	53(32.1)	3.0
I can effectively apply my reflective skills	11(6.7)	27(16.4)	73(44.2)	54(32.7)	3.0
My insight into model development has improved	3(1.8)	15(9.1)	95(57.6)	52(31.5)	3.1
Average mean score					3.05

Table 20 shows an average mean score of 3.05 indicating that the basic school science teachers generally *agreed* that *they have acquired enough skills in reflective practices to teach their lessons* and have also improved their knowledge. They further indicated that they could also apply their reflective skills *acquired at various stages of their lesson deliveries* with reference to the mean scores of (3.0). All the mean scores were close to 3.0 which indicated that the basic school science teachers were of the opinion and have *agreed* that the workshop improved their skills in the various activities. Given that the teachers have agreed to have acquired the skills indicated, could be an indication that they have improved their teaching skills as a result of their participation in the workshop and also practicing it over the given period of time.

Finding 13

From the findings after the workshop, the mean score of teachers on four items were between 3.0 and 3.1 lying between *strongly disagree* and *strongly agree*. from the findings the teachers generally agreed that they have acquired enough skills in reflective practices to teach their lessons. They also *agreed* that their knowledge in the application of reflective skills during lesson deliveries has also improved, and can apply their reflective skills at every stage of their lessons.

4.18 General Model Development Processes

The basic school teachers were asked to respond to self-assessment questions on their levels of knowledge of an ideal reflective practice of a good teacher. The nine common responses from teachers in the twelve cluster of schools are recorded in Table 21.

Table 21

Knowledge of Teachers on Ideal Reflective Practices in Science Classrooms by Cluster N= (165)

	C1-C12	
Good reflective practices	**Frequency of responses**	**Percent (Frequency)**
Reflect before lesson	45	18.1
Reflect during lesson	40	16.1
Reflect after lesson	38	15.3
Be at centre of reflection	32	12.9
Remain focused	31	12.4
Improve ways to teach next lesson	22	8.8
Receive feedback from pupils	20	8.0
Be pupil centred	14	5.6
Be sincere of what you reflect on	7	2.8
Total responses	**249**	**100**

Note. a. Nine main responses emerged from multiple responses of feedbacks from teachers who participated in the workshop

b. Only the highest number of responses were recorded from each cluster

Results in Table 21 show that nine different categories of responses emerged out of the data comprising 249 responses. The most common responses were categorised as *reflect before lesson* and these were given by over 18.1% of the teachers. Some examples of responses of teachers in this category were "every teacher must reflect before a lesson" (GC2), "reflection must always precede the lesson" (GC9).

The category with second highest responses was coded as *Reflect during lesson* and these were given by 16% of the teachers who responded. Some common examples of responses of teachers in this category were "it is important to reflect even if lesson is on-going" (GC2), "if I reflect during lesson, it improves my teaching" (GC4), "it is always good to think of what you are teaching in class before going on" (GC12).

The category with the third highest responses was given as *Reflect after lesson* and were given by 15.3% of the teachers. Some of the responses given by the teachers in this category were "I need to think of the lesson after the class" (GC5), "it is always important for the teacher to reflect after teaching" (GC6). "I think if I reflect after lesson, I'll do better next time" (GC3). The fourth highest category of responses was coded as *be at centre of reflection* and given by 12.9% of the teachers. Some of the responses given by teachers in this category were "I must always be aware of what am doing" (GC1), "it is important to be in charge of the reflection process" (GC11).

The least category of responses was coded as *be sincere of what you reflect on* and were given by 2.8% of the teachers.

Key Finding 14

The most common responses from the teachers indicated that good reflection practices occur *before, during* and *after* a lesson and that the teacher needs to be at the *centre of the reflection*. In addition, the teacher also needs to be *sincere* during engagement in reflective practices, were the common feedbacks that constitute the most frequent responses.

Examples of the responses given by teachers in this category were "I need to be familiar with what I reflect on" (GC3) and "I must always be honest with what I think about in my lessons" (GC11).

Given that majority of the teachers identified good reflective practices to occur before during and after the lesson, with the teacher being sincere, it may be concluded that the science teachers have gained much knowledge on good reflective practices.

4.19 Model Developed Processes to Enhance Reflective Practices

The science teachers were asked in their clusters to suggest activities that would promote effective reflective practices. In all nine categories of statements emerged and represented as grouped in Table 22.

All the teachers were asked to respond to some suggested activities that would promote effective reflective practices in their science classrooms. Three major themes emerged on reflection *before*, *during* and *after* lessons. The frequency of detailed responses from three sets of Clusters are recorded in Table 23 based on the general items recorded in Table 22.

Table 22

Feedbacks from Basic School Science Teachers' Intervention Procedures for Model Development (I)

Contribution of teachers on good reflective practices	Frequency of Teachers' responses C1-C4	C5-C8	C9-C12	TOTAL
A teacher must Reflect before lessons	12 (4.8)	18 (7.2)	15 (6.0)	45 (18.0)
Teachers should Reflect during lesson	11 (4.4)	12 (4.8)	17 (6.8)	40 (16.0)
Teachers must Reflect after lesson	10 (4.0)	10 (4.0)	18 (7.2)	38 (15.3)
Total	33 (13.2)	40 (16.0)	50 (20.0)	123 (49.3)

Note. a. Three teachers did not respond to the issues

b. Items in brackets are in percentages

Table 22 shows that three sets of categories of responses emerged from all the three sets of clusters, for a good reflective practices. In all, 45(18%) of the teachers indicated that a teacher must reflect before lesson, while 40(16%) also indicated that teachers should reflect during lesson. Other teachers, over 38 (15%) also indicated that as part of good reflective practices teachers must reflect after each lesson.

Key finding 15

Feedback results from majority 123(49.3%) of the teachers in all the 12 clusters on model development indicated that the teacher needs to reflect *before*, *during* and *after* lessons. The teachers indicated these items as the key issues to model development.

In this section of the study, the teachers were asked to respond to some suggested activities that would promote effective reflective practices during classroom engagements with pupils. Three different themes emerged on the contribution of teachers to good reflective practices as part of their science classroom engagements. The responses were recorded in Table 23 as received per the clusters.

Table 23

Feedbacks from Basic School Science Teachers' Intervention Procedures for Model Development (II)

Contribution of teachers on good reflective practices	Frequency of Teachers' responses			
	C1-C4	C5-C8	C9-C12	TOTAL
The teacher must be focused as a teacher throughout lesson	10 (4.0)	9 (3.6)	13 (5.2)	32 (12.8)
Teachers should Receive feedback from students	10 (4.0)	10 (4.0)	11 (4.4)	31 (12.4)
The teacher must be at the centre of reflection	8 (3.2)	9 (3.6)	5 (2.0)	22 (8.8)
Total	**28 (11.2)**	**28 (11.2)**	**29 (11.6)**	**85 (34.0)**

Note. Items in brackets are in percentages

Results in Table 23 show that other sets of categories emerged from all the three clusters. Thirty-two (12.8%) of the teachers indicated that for a good reflective practice the teacher must be focused throughout lesson, while 31(12.4%) also indicated that teachers should receive feedback from students. Other group of teachers, 22(8.8%) also indicated that as part of good reflective practices, teachers must be at the centre of reflection. In all, 85(34%) of responses emerged from the three clusters confirming three sets of responses.

Key finding 16

Feedback results from 85(34%) teachers in the 12 clusters showed three sets of responses to be used to develop a professional model. These statements are *teacher must remain focus* 32(12.8), *teacher should receive feedback from students* 31(12.4) *and teacher must be at centre of reflection* 22(8.8).

In this section, the teachers were asked to respond to some suggested contributions of science teachers that would promote effective reflective practices during classroom engagements. Three different themes emerged on the contribution of teachers to good

reflective practices during classroom engagements. The responses were recorded in Table 25 as received from each cluster of schools.

Table 24

Feedback from Basic School Science Teachers' Intervention Procedures for Model Development (III)

	Teachers' responses			
Contribution of teachers on good reflective practices	**C1-C4**	**C5-C8**	**C9-C12**	**TOTAL**
The teacher must be sincere of what you reflect on	6 (2.4)	8(3.2)	6 (2.4)	20 (8.0)
Teacher should always be learner centred in lesson deliveries	3(1.2)	1(0.4)	10 (4.0)	14 (5.6)
Teacher should try to find improved ways to teach next lessons	4(1.6)	0(0.0)	3 (1.2)	7 (2.8)
Total	**13(5.2)**	**9(3.6)**	**19 (7.6)**	**41(16.4)**

Note. a. Seven teachers did not respond to the issues

b. items in brackets are in percentages

In Table 25, the results show that three sets of responses emerged from the three sets of clusters of the schools. Twenty (20) of the teachers' responses representing (8%) indicated that regarding good reflective practices, teachers must be sincere of what they reflect on, while 14(5.6%) also indicated that teachers should always be leaner-centred during reflective practices. Other response, 7(2.8%) from clusters (C5-C8) indicated that teachers should try and find improved ways to teach next lessons. Categories of comments from teachers across the three cluster of schools constitute the ideal professional practices out of which a well summed-up and structured format was used to develop a model in Figure 6. The model has all the professional ideas harnessed from the teachers to guide professional teachers during lesson deliveries.

Key finding 17

Another set of three feedback results emerged from 41(16.4%) of the teachers' contributions on the responses that *the teacher must be sincere of what is reflected upon, be learner centred* and *find ways to improve next lesson.* The least among the responses 7(2.8) is a compelling statement on teachers to improve reflective practices

The contributions of teachers on ideal reflective practices from the twelve cluster of schools have been carefully collated and arranged from three levels (L1-L3) into a functional model as displayed in Figure 6.

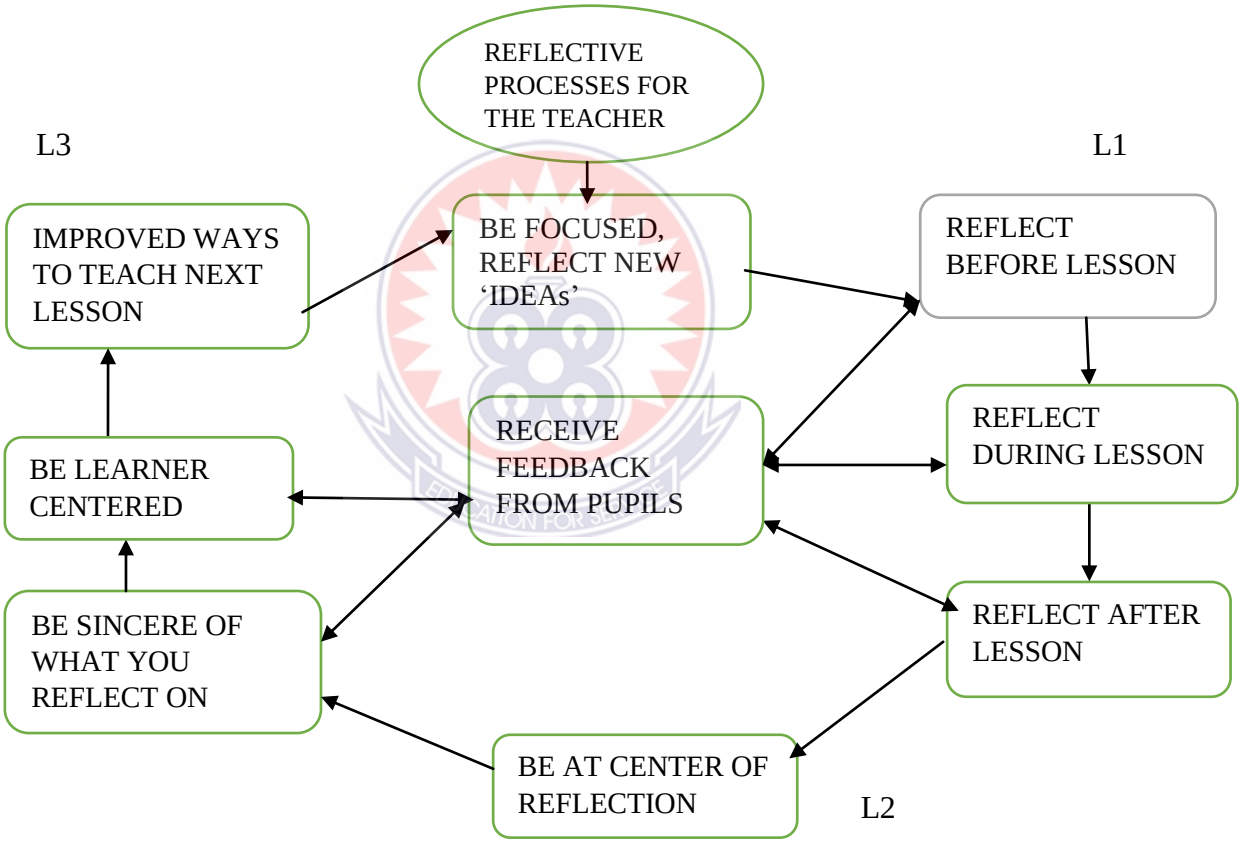


Figure 6

Professional Reflective Practice Model (PRPM)

Figure 6 is a, Professional Reflective Practice Model, (PRPM), developed from all the ideas harnessed from the responses and inputs from teachers as indicated in Tables

22-25 from all the twelve cluster of schools showing participants who took part in the workshop.

4.20 The model is guided and justified by three major principles that

1. good reflective practices occur *before, during* and *after* a lesson.
2. the teacher needs to be at the *centre of the reflection*, with feedbacks.
3. the teacher always needs to be *sincere* and learner cantered during engagement in reflective practices.

The Model has three component parts at each of the three levels (L1-L3) indicating definite professional procedures for professional teachers to follow. One key potential of a good model according to Darling-Hammond (2013) is that a good model has the features to develop and to enhance reflective practices. The PRP Model is an Action Research Model that has the potential to enhance the abilities for preparing the basic school science teachers towards an improved teaching skills required within the new curriculum. This action research Model went through a systematic and cyclical processes based on the Levels indicated in the PRPM of reflection on any given action, where teachers identify a problem, collect data, analyse the data, develop an action plan, implement the plan, and evaluate the outcomes. This model which is recursive and iterative in its operation, agrees with Darling-Hammond (2013) who indicated that reflective models have the potential for preparing teachers for the changing world. Learning from earlier researchers like Darling-Hammond, the processes in the PRP Model has the features to guide the teacher to remain focus when engaging in reflective practices. Smith et al. (2012) also expressed similar position by Darling-Hammond by emphasising that in order to enhance teaching

strategies, teaching models play pivotal role. The teacher therefore in this Model is centrally bound to always receive feedbacks at every stage of the reflective processes.

4.20.1Key Operational Features of PRPM

The first stage of the PRP Model constitutes reflection *before, during* and *after* lessons where feedbacks play a key role. At level 2, the PRP Model also directs the teacher to be at the *Centre of the reflective process* where the teacher remains sincere of what is reflected on. The third level of the PRP Model guides the teacher to be *sincere* of what to reflect on, and at the same time be leaner centred which finally guides the teacher to develop novel IDEAs (Improved Deductive Educational Assessments) to teach next lessons. At this stage, self-Assessment plays very vital role in the reflective processes because one cannot reflect without assessment of the situation but likely to assess without necessarily reflecting. Therefore, at each stage of the model, the teacher is compelled to receive feedbacks from the pupils for reflection towards an effective deductive reasoning of the teacher to improve pupils' output during classroom engagements.

Key Finding 18

From the PRPM model, three levels were identified. The reflection *before* lesson *during* lesson and *after* lesson constitute the first stage of the model in each case the teacher receives feedbacks from pupils. The second level places the teacher at the centre of the reflection process. The last stage also guides the teacher to be *sincere*, *learner cantered* and should develop some improved ways to teach next lesson. This is made possible by the IDEAs component of the model.

4.21 Post-Workshop Observation

After the cluster-based workshops for teachers on reflective teaching practices, the researcher gave two weeks to all participants to use the PRP Model in their teaching. The researcher visited schools and observed a total of 20 teachers who took part in the

workshop and willing to be observed. The researcher used a pre-prepared and validated observation guide as recommended by Walker, and Adelman (1971) to assess each teacher during science classroom engagements. In all, the researcher observed one science lesson for the selected teachers (a maximum of two science lessons for those who could not exhibit certain basic skills) from each of the six cluster of schools within the three major groups as shown in Figure 5. The observable skills identified were assessed based on the guide and these are recorded in Table 26. These observable skills were changes that occurred among the teachers after the intervention process with the use of the PRP Model. The teachers were seen freely practising the skills acquired at the workshop during their science lessons. Other good practices identified and applied by the teachers from the training workshop were also recorded in Table 25.

The selected teachers were observed by the researcher on the use of the model to exhibit the various skills used by the basic school teachers during their classroom deliveries after the workshop training activities. The observation process covered activities before, during and after lessons as spelt out in the PRP Model. The outcome of this real time observations on individual teachers, and the teachers' records from their reflective journals, are recorded in Table 25.

Table 25

Descriptive Statistics on Observation and Assessment of Teachers' Post-Workshop Lesson Deliveries (N=20)

	Observed skills exhibited by teacher	Poor	Average	Excellent	Mean
1.Skill	Teacher has a well-prepared reflective journal	(0.00)	4 (20)	16 (80)	2.8
2.Skill	Teacher recognises feedbacks from pupils	(0.00)	5 (15)	15 (75)	2.8
3.Skill	Teacher often consciously pause	(0.00)	5 (25)	15 (75)	2.8
4.Skill	Teacher reflects alone	(0.00)	7 (35)	13 (65)	2.7
5.Skill	Teacher is able to identify challenges	(0.00)	7 (35)	13 (65)	2.7
6.Skill	Teacher identifies new ways of handling similar challenges	(0.00)	7 (35)	13 (65)	2.7
7.Skill	Teacher reflects during lesson	1 (5.0)	4 (20)	15 (25)	2.7
8.Skill	Teacher records lesson outcomes	(0.00)	7 (35)	13 (65)	2.7
9.Skill	Teacher's teaching note has a portion for reflection	(0.00)	8 (40)	12 (60)	2.6
10.Skill	Teacher reflects before the lesson	(0.00)	8(40)	12 (60)	2.6
11.Skill	Teacher carries out reflection with other colleagues	(0.00)	9 (45)	11 (55)	2.6
12.Skill	Teacher reflects after lesson	(0.00)	10 (50)	10 (50)	2.5
13.Skill	Teacher's lessons follow the curriculum	1(5.0)	11 (55)	8 (40)	2.4
	Overall average mean				2.7

Note: Figures in brackets are in percentages

In Table 25, thirteen (13) skills exhibited by the teachers were observed and assessed by the researcher for twenty (20) teachers. The results show that the overall average mean score was 2.7. This implies that the basic school teachers generally exhibited the skills with *excellence*. However, a few observations with the mean scores of 2.4 showed that some teachers were able to perform the skills on the *average* but not so poor. Although performance was from *average* to *excellent*, two of the teachers showed poor performance in reflecting during class and another one not able to follow the curriculum as required. Given that majority of the teachers showed between

average and *excellent* output in their reflective practice, is an indication of an improved skills acquired by the teachers over their previous knowledge.

Key Finding 19

The results from the skills observed show that majority (80%) of the teachers' performances were rated as *excellent* observable skills where they were able to develop a well-prepared reflective journal for recording during lessons and also consciously pause to allow pupils to reflect and give feedback during lesson. This is an indication that the teachers gained considerable level of knowledge after the workshop.

Given that the teachers' observed skills were rated largely as *average* and *excellent* is an indication that the workshop was very successful in achieving its stated objectives by improving the reflective practice skills of the basic school science teachers in the district.

4.22 Benefits of Professional Teaching Processes in Reflective Practices and Its Impact on Teachers.

The teachers outlined some basic professional 'open questions' they would ask themselves during reflective activities to signify their improved knowledge and positions in reflective activities. Some of the common self-assessment questions posed by the teachers were collated and are recorded in Table 26.

Table 26

Professional and Pedagogical Self-Assessment Questions by Teachers on their Improved Classroom Activities (N=165)

Basic professional questions and procedures on reflective practices	**Frequency of teachers' responses**	**Percent (Frequency)**
Have I prepared well for this lesson?	63	36.2
Do I have the appropriate and functional TLMs to deliver the lesson?	38	21.8
Are my teaching strategies appropriate to the level of pupils?	26	15.0
Am I following the instructional plan?	15	8.6
Do I receive the right feedback from pupils?	15	8.6
Am I allowing pupils time to reflect over the lesson	9	5.2
Do I identify some challenges during lesson delivery?	5	2.9
Do I have other ways of handling similar challenges better in future?	3	1.7
Total	**174**	**100**

Note. Eight items emerged. Some teachers gave multiple responses

Table 26 shows that eight pedagogical questions for reflective practices emerged out of the 174 responses from the teachers. The categories were developed through various forms of groupings and re-groupings of various responses to the questions by considering some key words and phrases that showed some form of commonalities across the responses given by the teachers. Most of the teachers gave responses covering reflective procedures *before, during* and *after* lesson deliveries. The teachers have since developed the ability to question their own classroom practices as a means of self-appraisal,

The most common category of responses (36.2% of teachers) in Table 26 was, about whether the teachers prepared well for any given lesson. The second most populous professional question (21.8) asked by the teachers was whether they have the requisite functional TLMs to deliver lesson. Surprisingly, teachers' professional questions on

the identification of challenges (2.9%) and ways to handle similar challenges better in future (1.8%) were the least professional questions asked by the basic school teachers among the eight questions asked. In effect, it could be noted that at least each of the basic professional questions that a classroom teacher needs to ask at every stage of a lesson were identified by the teachers. The feedbacks from the teachers is a manifestation that the teachers were conscious of using professional teaching strategies that would help their pupils to understand their lessons.

Given that majority of the teachers were conscious of the need to question their own readiness ahead of lesson deliveries, and also ensure functional TLMs, it may be concluded that the teachers' professional pedagogical knowledge in reflective practices have improved significantly.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Overview

In this chapter, significant and innovative findings have been identified, interpreted and discussed based on the findings from the data analysed. The discissions also highlight the major findings of the research and made inferences from them with reference to other findings from related previous studies. Triangulation of data according to Creswell (2006); Patton (2002) are sources comprising official documents, questionnaires, interviews cluster group meetings, observations, as well as visits to the schools. Discussion was based on the major findings from the research questions used in the study.

The research design in Figure 3, allowed for baseline data collection to be done in phases to enable the researcher to effectively account for each activity carried out in the study. The Phase (I) shows how the researcher was granted permission by District Education Directorate to visit the schools. This was followed by visits to the schools for the administration of questionnaires and the interview guide to the respondents. The third phase, was carried out based on the outcome from the two previous phases. Based on the conceptual framework for this study in Figure 2, it was envisaged that the intervention processes suggested in phase three of Figure 3, would improve the knowledge base of the basic school science teacher in reflective teaching practices.

Five research questions and their sub-questions were addressed by the key findings from the data analysed. In this section, the discussions of the major findings with their respective implications are presented on academic information of respondents and the five research questions, ending with a summary of the findings.

5.1 Research Question 1: What Reflective Practices are Adopted by Basic School Science Teachers?

This research question one (RQ1) is sub-divided into two parts (a) and (b) as follows:

RQ1 (a): ***What Is the Basic School Science Teachers' Knowledge in Reflective Practice?***

Key findings 1, 2, and 3 answered the first and second parts of this research question. Considering the knowledge base of the teachers in reflective practices, it was found that majority (78%) of teachers did not receive any form of training on reflective practices hence had very low knowledge of reflective practices. Out of the few teachers, (8%) who received some form of training did so through the assistance of an NGO, including some who took self-initiatives. The study further indicated that over 60% of the basic school science teachers in other responses indicated that they did not reflect on their own teachings during classroom engagements. Similarly, over 156 teachers (94.6%) in other responses also *indicated that they did not* learn about reflective teaching while in training as professional teachers, however, 85.4% of the basic school teachers in response to another item indicated that they knew the importance of reflective practices. On the writing of reflective journal, over 92.1% of the basic school teachers indicated that they did not have adequate knowledge of writing reflective journal. It is therefore very clear to note that the knowledge level of the basic school science teachers in Ada East District is very low and is very likely to affect output of pupils. These findings are in agreement with Osei, Addei and Kwarteng (2019) who indicated that most teachers in Ghana had limited knowledge of reflective practice and its importance in teaching. It is therefore imperative for teachers to make the necessary efforts to improve their knowledge in reflective practices at the basic level to improve teaching and learning in Ghana.

RQ1 (b): ***To What Extent do Basic School Science Teachers Adopt Reflective Practice?***

Although majority of the teachers (78%) indicated that they did not have any knowledge of reflective practices. In addition, 22% of the teachers agreed that they did reflect on their own teaching to some extent. Considering the teachers' knowledge of reflective teaching during training college period, more than 76% of the teachers indicated in another response that they did not learn about reflective teaching while in training. These findings are contrary to the position of Githua and Mugenda (2019) in Kenya who identified that majority of basic school teachers showed understandings of reflective practices and could clearly identify their strengths and weaknesses. The results from this study therefore imply that teachers in the Ada East District may find it difficult to identify their strengths and weakness to improve in reflective practices.

Finally, although the teachers do not have much knowledge of the concept, majority (50%) the basic school science teachers considered themselves as teachers who *sometimes* adopted reflective practices in their teaching without any professional guidance. This implied that the teachers were only doing things on their own and not regularised as far as reflective practice guidelines are concerned. The findings are in agreement with Opoku-Amankwa, Agbozo and Agbenyega (2018) who explored the use of reflective practices among basic school science teachers in Ghana. The study found out that reflective practices were not regularly used by teachers especially at basic school level in the district. It was further found out that only few teachers engaged in reflective activities including the use of reflective journals. This finding is quite similar to a finding by Githua and Mugenda (2019 which in view of the researcher, might not promote good academic performance among pupils in the East Ada District, hence, needed an urgent intervention. The researcher therefore supports

Githua and Mugenda (2019) who recommended that teacher education programmes should always incorporate reflective practices as a key component to prepare teachers adequately for their roles.

Summary of Key findings to Research question 1

> It was found out that the teachers in the district did not adopt any form of reflective practices as a District, largely because the teachers had little or no knowledge on the concept and without much self-training and also because the district did not organise any of such training in the previous years.

5.2 Research Question 2: What is the Level of Reflectivity Demonstrated by Basic School Science Teachers in the Ada East District of Ghana?

This research question two (RQ2) is sub-divided into research questions RQ2a and RQ2b. Under this research question, key findings 4 and 5 of this study answered the first part (RQ2a), and key findings 6, 7 and 8 of this study answered the second part of the research question (RQ2b).

RQ2a: To *What Extent Does the School Environment Promote Reflective Practices?*

Key findings 4 and 5 answered this part of the research question. According to the findings, although the schools did not have any regularized form of reflective practices, the school environment *sometimes* helped teachers to keep good records to help them engage in reflective practices. It was also found out that the school environment *sometimes* had reward system in place for teachers who engage in reflective practices. This is in agreement with Asare and Sarfo (2020) who indicated that the school environment sometimes allows limited access to the teachers to engage in professional development opportunities, and considerable support from school

administrators were among the major factors that hindered teachers' ability to engage in reflective teaching practices among others. On the frequency at which the schools influence teachers' reflective practices, the teachers 51% of the teachers indicated that their schools *never* had regular in-service training for them in reflective practices. This implies that the school environment itself was not compliant to the training of the teachers to practice reflective teaching. It is therefore imperative that the schools in the district make it a priority to organise regular training programmes on reflective practices for teachers to improve their skills.

RQ2b: ***What Are the Levels of Reflection by The Basic School Science Teacher?***

On the issue of the level of reflectivity shown by the teachers, Key Findings 6, 7 and of this study answered this part. The findings showed that the teachers though did not engage in an active or regularized reflective practices, they *sometimes* did so at three levels, i.e., Reflection–for-Teaching, Reflection–in-teaching and reflection-of-Teaching. The three levels are described as reflection *before*, *during* and *after* lessons. These three levels are therefore considered as very key elements for effective reflective practices at the basic school level.

The findings showed that over 36% of the teachers engaged in reflection during pre-lesson deliveries, they *often* used the curriculum in their reflections. More than 75% of the teachers also indicated that they *often* questioned every detail of their lessons prior to lesson delivery during reflection. Some of the teachers, (42%) also indicated that during pre-lesson deliveries they *always* engaged their pupils during their lesson preparations. It appears the teachers though did not engage in active reflective practices were very mindful of their pre-lesson reflections where they even engage their pupils. This is a level of reflection engaged by the teachers according to

Shandomo (2010) is a type of reflection which occurs before a problem is addressed. The authors indicated that the term, reflection–for–action, implies pre-assessing a lesson either independently or in collaboration with another teacher before engaging learners. The teachers action though not a formal activity needs to be commended and given an enhanced and better approach.

The next level practiced by the teachers was reflection-as-lesson. In the finding, the teachers rated themselves to have been *always* carrying out reflection during lesson deliveries on *limiting reflective teaching strategies only to teaching techniques* and also on *limiting teaching strategies only to team-based learning* as the highest. On the other hand, the teachers also indicated that though they always reflected during lessons, they had *never* connected new concepts to students' prior knowledge during the lesson and also *never* consciously paused with students in their lesson deliveries to reflect on planed lessons. This implied that the teachers probably lacked the professional reflective practices skills by not pausing to reflect in their lesson deliveries. This is because according to Jasper, (2003) reflective-in-action can be described as the capacity of professionals to consciously think about what they are doing while they are doing it. This aspect of the professional practice is missing among the teachers. This implied that the basic school science teachers were not be able to improve their reflective practice skills during lessons.

The third level of reflective practice reported by the teachers is reflection-of-action. The findings showed that the basic school science teachers *sometimes* carried out all the reflective activities after lesson deliveries, and consider reflection very important in making decisions about their students. Additionally, teachers rated themselves high on *often* carrying out reflection by evaluating their students and recording their

teaching experiences into reflective journal after lesson deliveries. From the findings, it was noted that teachers carried out these practices *sometimes* but they still needed to regularly carry out the reflective activities after lessons to further improve their skills. Kitsantas and Zimmerman (2002) hence advised strongly that developing self and peer assessment skills after lesson delivery are valuable investments for a long-term future development of our pupils. It is therefore very necessary for the teachers to improve upon the reflective practices after lessons. This was in agreement with (Schön, 1998); Anderson, 2020) who indicated that reflection-of-action emphasized the relationship between reflection and experience. They emphasised the importance of teachers taking their decisions as they work, while reflection-of-action refers to teachers reflecting back and critiquing their own practices after lesson. It is therefore very necessary for the basic school teacher to carry out reflective practices at all levels.

Summary of the Major Findings from Research Question 2

The first part of the findings tried to give a clearer understanding of how the school environment helped in promoting the level of reflectivity is that though the schools have no regularized form of reflective practices, the school environment *sometimes* helped teachers to keep good records to help the science teachers engage in reflective practices. It was also found out that the school environment *sometimes* had reward system in place for teachers who engaged in reflective practices.

Moreover, three levels of reflections were identified as; reflection-for-action, ie reflection before lesson was the most practiced where more than 75% of the teachers indicated that they *often* questioned every detail of their lessons ahead of lesson. On the other hand, the teachers (75%) also indicated that though they *always* reflected during lessons, they had *never* connected new concepts to students' prior knowledge during the lesson and also *never* consciously paused with students in their lesson deliveries to reflect on planed lessons. The third level of reflection is Reflection-of - Action. The teachers indicated that the third level of reflective practice as reported by the teachers is carried out after lesson. The findings showed that the basic school science teachers *sometimes* carried out all the reflective activities after lesson deliveries, and also consider reflection very important in making decisions about their students.

5.3 Research Question 3: What Factors Influence Teacher Reflection during Their Science Classroom Engagements in the Ada East District?

This research question three (RQ3) is sub-divided into research questions RQ3a and RQ3b. Under this research question, key finding 9 of this study answered the first part (RQ3a), and key finding and 10 answered the second part of the research question (RQ3b).

RQ3a: To What Extent does Peer Influence Promote Reflective Practices?

Key finding 9 answered this question. In the finding a teacher indicated that he was *r* encouraged by the headteacher to use reflective practices. Again, the teacher indicated that the Headteacher acknowledged him or her anytime he or she engaged in reflective teaching practices. Among the issues of how peers influence on reflection, majority of the teachers with mean scores of teachers' responses on the 5 items were between 3.2 and 3.9, lying between *don't know* to *agree*, that they are mostly influenced by their Headteachers rather than their colleague teachers. This implies that though reflective practice was not popular in the district, headteachers realized the need to influence their teachers to engage in the practice. This was done to acknowledge teachers and also to encourage them. Hence it could be said that peer influence 3.2 which indicated teachers *didn't know* of peer influence was one of the most obvious factors that positively influenced their reflective practices. This was however not limited to their colleagues only extended to include their headteachers. Headteachers in these findings are encouraged to consider their influence on basic school teachers as very key contribution in promoting effective reflective practices in the schools.

RQ3b: How Frequently Do the Teachers Use Activities That Influence Reflective Practices?

This aspect of the research question three (RQ3) was answered by Key finding 10. Among the issues of how often activities influence on reflection, although majority of the teachers *agree* that they were mostly influenced by their headteachers rather than their colleague teachers, majority of the teachers (94%) indicated that the activity such as writing their journals on daily basis while 76% of them also carried out their reflection on daily basis as one of the activities to adjust their teaching during lesson deliveries. On the other hand, quite a great number (76%) of the teachers also carry out their reflection *weekly* when drawing lesson plans. Their action was in agreement with (Borko, Jacobs, Eiteljorg & Pittman, 2015). In their study, they found that teachers who are more experienced tend to reflect more on their teaching practices on *daily* and *weekly* basis compared to novice teachers. Furthermore, teachers with strong beliefs in the importance of reflection were found to be more likely to engage in reflective practices in not less than once in a week. In effect, teachers should consider their headteachers and writing of reflective journal as some of the major elements in the reflective practice activities.

Summary of the Major Findings from Research Question 3

From the findings, in was discovered that the Headteachers displayed more peer influence on reflection, where majority (74.4%) of the teachers *agreed* that they were mostly influenced by their Headteachers rather than their colleague teachers. This was done in the form of acknowledgement of staff and encouragements. It was also confirmed from earlier findings that teachers with much experience turn to practice reflection more than the less experienced teachers, and was confirmed in this study. This influence by the Headteacher showed that majority (94%) of teachers also usually write their reflective journals on *daily* basis while 76% of the teachers also indicated that they carried out reflection on *weekly* basis to adjust their teaching during lessons.

5.4 Research Question 4: What are the Challenges Faced by Basic School Science Teachers in Adopting Reflective Practices?

Major finding 11, constitutes the responses on research question four. In the finding, the teachers indicated that they were confronted by two main challenges. There was *lack of training* on reflective teaching and *poor time management* for reflective teaching. The mean scores of teachers on five items were between 3.4 and 4.8 lying between *agree* and *strongly agree* and stressing that, lack of training on reflective teaching and poor time management for reflective teaching were their major challenges faced in their schools. These findings are in agreement with research carried out by Oduro, Asabere-Ameyaw and Agbekpornu (2019), which showed that the challenges of basic school science teachers in Ghana are quite significant. They indicated; inadequate training, lack of time, and resources, low self-efficacy, and limited support from peers among others as the common challenges faced by teachers. Quite unfamiliar to the results from the two findings, the teachers also *agreed* that *lack of supervision* and *non-availability of trained teachers* to guide them in reflective teaching were though among the challenges, they were considered as one of the less serious challenges in the schools. Based on the challenges and other related professional lacuna in the implementation of reflective practices in the schools, the researcher put intervention measures in place by organising a workshop for all the teachers who participated in the research to reduce the stated challenges in this study.

Summary of Key Findings from Research Question 4

The teachers (86.6%) strongly *agreed* that lack of training on reflective teaching and lack of proper time management for reflective teaching were their major challenges faced in the schools. The teachers (61.6%) *agreed* that lack of regular supervision was among the challenges. On the other hand, lack of supervision and trained teachers to guide them in reflective teaching was identified as among the less serious challenges in the schools

5.5 Research Question 5: What Type of Model Could be developed to Enhance Reflective Practices among Basic School Science Teachers?

The basic school teachers were asked to develop a model that can enhance their reflective practices. Research questions 5a, 5b and 5c answered this question with key findings 12 to 20 of this study.

RQ 5. Teachers' Knowledge in Model Development and Workshops Attended

Key finding 12 provided common responses to this question. In the study, the teachers indicated that their levels of knowledge on reflective practices improved. Although a small number of the teachers indicated earlier *agreed* that the workshops they attended earlier made them gain insight into model development with the highest mean score of 2.8, majority strongly disagreed at the same mean score of 2.8. Contrary to this claim earlier in this study, majority of the teachers (139) *disagreed* and *strongly disagreed* of acquiring enough of such skills to develop models. In addition, over 103 teachers *disagreed* and *strongly disagreed* that they acquired enough skills in reflective practice skills and model development.

Based on these findings and other related ones in this study, the researcher and the respondents (teachers) engaged in a formal professional development training section that improved teachers' knowledge in reflective practices. Following various intervention processes, the teachers were able to develop a Professional Reflective Practice Model (PRPM) with the parameters indicated in Figure 5, being the common guide that improved their skills in reflective practices. The outcome of the use of the model is evident in Figure 7, where teachers were able indicate some of the useful skills acquired after the intervention process.

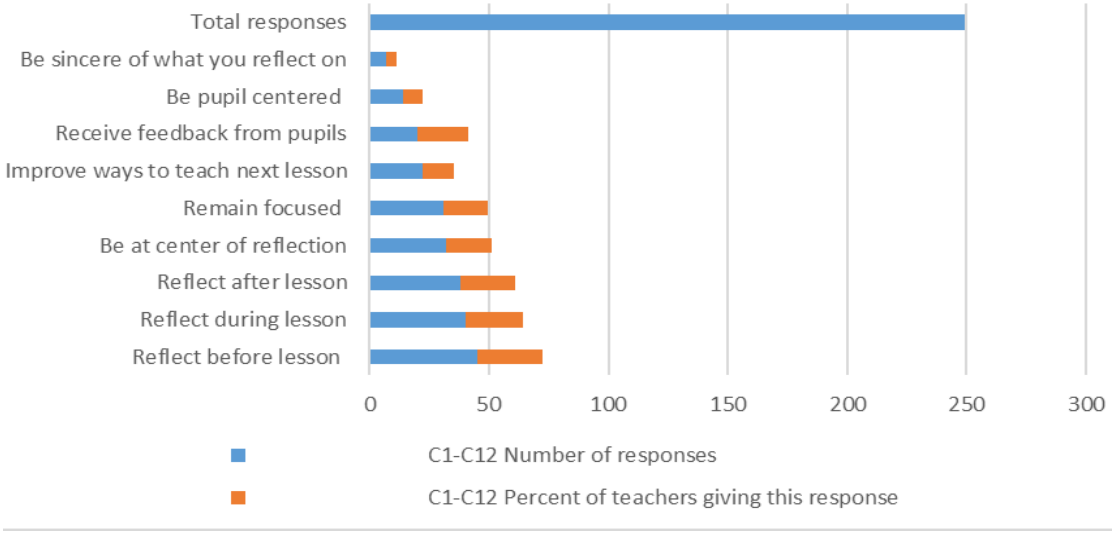


Figure 7

Responses of Teachers on the Good Practices on Reflective Processes and Model Development

From Figure 7, the data on the responses from the teachers show that they recognised reflection *before*, *during* and *after* lessons as the most common practices in lesson deliveries. According to Boud's Model of Reflection (2001), Boud proposed a structured model of reflection that consists of three phases including; returning to an experience, attending to feelings and reactions, and re-evaluating and learning from self-experience. From the findings, the PRP Model has its evaluation stage labelled as IDEAs which is similar to Bould's model with the three levels clearly identified. The reflection before lesson during lesson and after lesson constitute the first stage of the model. In each case, the teacher receives feedback from pupils. The second level placed the teacher at the centre of the reflection process. The last stage also makes the teacher to be sincere, learner cantered and develop some improved ways to teach next lesson. This is made possible by the IDEAs component of the model that begins the reflective prosses for a lesson and 'ends' it, though the Model is recursive in its

operations. The use of the PRPM with the Conceptual Framework has all the embedded skills that teachers can adopt to improve their reflective strategies in classrooms.

5.6 To What Extent can Reflective Practice Model Change Basic School Science Teachers' Reflective Practice Abilities?

Key finding 19 and Figure 6 provided detailed responses to this question. The teachers were assessed by observation and were identified to have gained knowledge ranging from *average* to *excellent* during their classroom engagements. From the findings, it was observed that a teacher has a well-prepared reflective journal for recording key events during lesson. Another teacher also recognised *feedbacks* from students and teachers often consciously *paused* to allow pupils reflect and gives feedbacks were among the common changes observed among the basic school science teachers. It is indicated that generally the teachers were assessed to have gained *excellent* knowledge in the skills outlined in Table 26.

The PRP Model in Figure 6 was used to improve the reflective practice skills of the teachers. The results showed that within the PRP Model, three levels of classroom reflections were identified. The reflection *before* lesson *during* lesson and *after* lesson constitute the first stage of the model. In each case, the teacher receives feedbacks from pupils. The second level places the teacher at the centre of the reflection process. The last stage also guides the teacher to be *sincere*, *learner cantered* and should develop some improved ways to teach next lesson. This is made possible by the IDEAs component of the model that makes it recursive and iterative in nature.

5.7 What Aspects of the Professional Teaching Processes on Reflective Practices Were Beneficial

Key finding 20 and Figures 8 provided the responses to this question. In the findings, over 38% of the teachers were of the opinion that as a professional reflective teacher, one needs to ask if he or she is ready for the lesson and also if functional TLMs are put in place for effective lesson delivery. Considering the least question asked by 1.8% of the teachers, *do I have other ways of handling similar challenges better in future*? Were among the professional pedagogical questions asked by the teachers. From these self-assessment questions, it could be concluded that the teachers have gained a considerable professional knowledge in reflective practices by effectively asking questions that would benefit them in their lesson deliveries. According to Hatton & Smith (2000), there are several advantages to using reflective techniques in the classroom for both students and instructors. Some include: Self-awareness, critical thinking, and professional development. In this study the findings exposed teachers to a better self-awareness where the teachers asked self-probing questions as indicated in Figure 8 of this study.

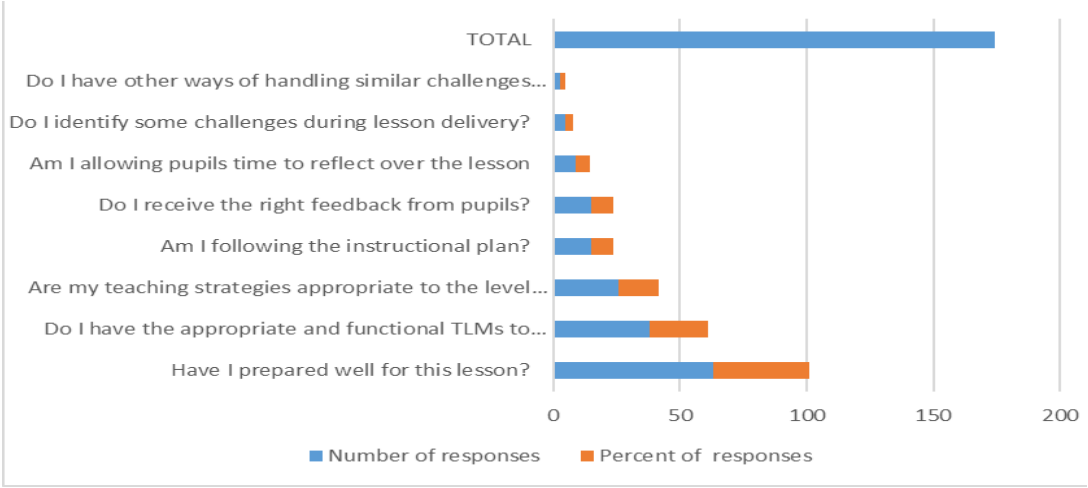


Figure 8

Teachers' Responses to Self-Assessment Questions as Benefits to Reflective Teaching (N=165)

From Figure 8, it could be noted that the study helped teachers to enhance the basic school teachers' critical thinking skills to gain professional experience. To conclude, the teachers gained considerable experience by asking some basic self-assessment (reflective) questions before engaging in classroom activities. This was confirmed by Schön (1983:2009) who indicated that as reflective practitioners, there are basic questions that are fundamental to be asked before engaging in reflective practices. With these skills acquired by the basic school teachers, the teachers could not be considered as reflective practitioners but rather reflective professionals.

Summary of Key Findings from Research Question 5

After the workshop, the findings show that, the mean score of teachers on five items were between 3.0 and 3.1 lying between agree and *strongly agree* that they had acquired enough skills in reflective practices to teach their lessons. They also *agreed* that their knowledge in the application of reflective skills during lesson deliveries had also improved, and can apply their reflective skills at every stage of their lessons. Over 50% of teachers further indicated that they were able to carry out reflection *before during* and *after* lessons as the major outcome indicated in Figure 6.

Post-workshop assessment of the teachers in Table 27 also revealed an improvement from *average* to *excellent* during their classroom engagements. More than 50% of the teachers also indicated their preparedness for reflective teaching by asking series of self-assessment questions in Table 27 like; *have I prepared well for this lesson, do I have the appropriate and functional TLM for this lesson?* With the knowledge acquired, the teachers were guided to develop the PRP model to guide them in their lesson deliveries.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.0 Overview of the Study

This chapter captures the summary of findings from the study, based on the research objectives and the intervention processes. The chapter also highlights the contributions of the study to the filling of the knowledge gaps in reflective practices in the Ghana Education Service. This includes the suggested solutions to the challenges identified. The general conclusions on the outcome of the study have also been stated, followed by recommendations of the researcher. The chapter ends with suggestions for future research works.

6.1 Summary of Findings

This section summarises the findings from the study along the research questions used in the study. The presentation involves triangulation of data from the various research instruments used in the study, such as questionnaires, interviews and observation. Five major questions are presented, and in some cases with their sub-questions for a better and clearer outcome of the study.

6.2. Objective 1: Types of Reflective Practices Adopted by Basic School Science Teachers in the Ada East District of Ghana

Outcome of the study first revealed that a great majority (78%) of the teachers did not receive any form of training over the previous two years, and for that matter have no knowledge in reflective practices as indicated in the Key findings (KF) for example, in (KF1-KF3a&b). Although quite a number of the teachers (21%) indicated that they received some form of training within the previous two years, they still considered adoption of the reflective practices as novel concept to them. Despite this position by

the teachers, 60% of them indicated that they did reflect on their own teaching to some extent. However, since the teachers did not have much knowledge of the reflective practice concept, majority of them, more than 50%, considered themselves as teachers who *sometimes* adopted reflective practices in their teaching (KF3a and KF3b). It was however found out that the teachers in the district did not *always* adopt reflective teaching practices as may be assumed, instead did so *seldomly*. Out of this figure, 6 items with the mean scores of between 3.5 and 3.56 were the highest mean scores on the adoption of reflective practices by the basic school teachers in the schools within the district. By implication, the basic school science teachers in the district indicated that they adopted reflective practices at *seldom* to improve upon their next lessons. Hence the teachers did not *always* adopt reflective practice to improve their lessons as may be envisaged.

6.3. Objective 2: The Extent to Which the School Environment Influences Reflective Practices for Basic School Science Teachers in the Ada East District.

Considering this objective of the study, key findings (KF4-K8) provided clear outcome to this objective. For example, the data collated from the questionnaire for teachers revealed that the school environment *sometime* influenced teachers' reflective practices. One of the statements from the data e.g., *my school keeps good records to help me adopt reflective practices* had the highest mean score of 4.2. this is an indication that the teachers were at *seldom*, influenced by the school environment. Three levels of teacher reflections were also identified. Over 36% of the teachers indicated that during the first level of reflection i.e. Pre-lesson deliveries (reflection-for-action), they *often* used the curriculum in their reflections (KF6, 7 & 8). More than 75% of the teachers also indicated that they *often* questioned every detail of their lessons prior to lesson deliveries during reflection. During the second level of

reflection, the teachers' reflective mean sores on 16 items during lesson deliveries (2.8) indicating that during 'reflection-as-teaching', teachers *always* limited reflective teaching strategies only to teaching techniques. The third level of reflection is 'reflection-of-action'. The overall average mean scores from data on the 11 items indicated that the basic school teachers *sometimes* carried out all the reflective activities after lesson deliveries, and considered reflection very important in making decisions about their students (KF 8). Finally, teachers rated themselves high on *often* carrying out reflection by evaluating their students and recording their teaching experiences into reflective journal after lesson deliveries.

6.4. Objective 3: Factors that Influence Reflections among Basic School Science Teachers During Classroom Engagements in Ada East District.

The third objective in this study highlights the factors that influenced reflective practices of the basic school teachers during classroom engagements. The key findings from (K9 &K10) on the outcome from data obtained showed that the basic school teachers (96) agreed that their own peers influenced them on reflection. However, majority of the teachers (122) with mean scores 4.2 on 5 items showed that the basic school teachers *agreed* that they were mostly influenced by their headteachers rather than their colleague teachers. In addition, majority of the teachers (94%) indicated that they were influenced by wring their journals on daily basis and 76% of them also indicated that they were influenced daily by development of their lesson plans and how to adjust it to teach their lessons.

6.5. Objective 4: Determine The Type of Challenges Faced by Basic School Science Teachers in Ada East District of Ghana in Adopting Reflective Practices.

The fourth objective revealed some of the challenges teachers faced in adopting reflective practices during their classroom engagements with pupils in the district. Key finding 11 revealed some of these challenges as follows; The mean score (4.8) of teachers' responses showed that the teachers, (142) strongly *agreed* that lack of training on reflective teaching. Similarly, about time management, the teachers' responses (122) with a mean score of 4.7 suggested that teachers again *strongly agreed* that poor time management was also one of their major challenges in engaging reflective practices. These challenges including inadequate refresher courses also with a mean score of 4.4 is a confirmation that the teachers also *agreed* that their inability to attend refresher courses also constituted part of the major challenges confronting them to engage in reflective practices. Finally, a mean score of (3.8) of the teachers' responses showed that teachers also *agreed* that lack of supervision and trained teachers to guide them in reflective teaching was identified as some of the less serious challenges in the schools.

6.6. Objective 5: Develop A Model to Enhance the Status of Reflective Teaching Practices Among Basic School Teachers in Ada East District of Ghana

The objective five describes the processes in key function (KF) twelve leading to the development of a functional model to enhance reflective practices among basic school teachers. the outcome of the preliminary data collated from the teachers revealed that the teachers 103 in the district *disagreed* and also *strongly disagreed* that they acquired enough skills and knowledge to improve their reflective practice skills and model development. Based on these findings professional learning interventions were put in place to develop model to help improve the skills of the teachers.

6.7 Professional Learning Intervention Process (PLIP)

The teachers' post-workshop questionnaire data revealed that majority of the teachers acquired enough skills in reflective practices to teach their lessons. The teachers further indicated that their insight into models developed by earlier authorities like Gibbs on reflective teaching has improved. The teachers further indicated that their knowledge in the application of reflective skills during lesson deliveries had improved such that they could effectively apply their reflective skills acquired at various stages of their lesson deliveries.

6.8 Model Development

The science teachers, were guided through the intervention activities using Gibbs' reflective model during the training section to, gain knowledge of the reflective processes. The teachers presented feedbacks to questionnaires by their clusters which was organised and the results processed and developed into a PRP model. This model served as a guide to basic school science teachers in the district. This was developed with nine component parts that identified feedbacks between the teacher and the students as its core component at every stage of its full implementation.

6.8.1 The Extent to Which Reflective Practice Model Changed Basic School Science Teachers' Reflective Practice Abilities

Teachers' questionnaire data after the workshop and model development from majority of the teachers revealed that reflective practices occurred *before, during* and *after* a lesson and that the basic school teacher needs to be at the centre of the reflection (KF14). In addition, the teachers also indicated that they needed always to be sincere during engagement in reflective practices. This helped the teachers to arrive at a more convincing conclusion of their reflective activities.

6.8.2 Aspects of the Professional Teaching Processes on Reflective Practices that were Beneficial to the Teachers and how they Improved

An observation data gathered by the researcher on 20 basic school science teachers after the workshop, revealed that, majority of the teachers' performances in 11 skills were rated as *excellent* over their previous knowledge and skills in reflective practices. The teachers were also observed to be able to develop a well-prepared reflective journal for recording activities related to lessons. In addition, it was revealed that the teachers consciously paused to allow pupils to reflect and give feedbacks during lesson deliveries. These observations linked to the teachers is an indication that the teachers gained considerable level of knowledge after the workshop, (KF19). The teachers (20) from the data revealed that over 38% of them were of the opinion that professional reflective teachers are teachers who always ask themselves if they are ready for a particular lesson. The teachers also asked themselves if functional TLMs were put in place for effective lesson deliveries. Considering the least question asked by of the teachers1.8%, was on *whether teachers had any other ways of handling similar challenges better in future*, were among the professional pedagogical questions asked by the teachers. The teachers' self-assessment feedbacks to these questions basically showed how teachers benefitted from the workshop and how they improved in their reflective skills developments.

6.9 Conclusions

On the contribution of the school environment to reflective practices, more that 50% of the teachers indicated that their schools never had any form of regular in-service training for them in reflective practices. The practices of reflective teaching during science classroom engagements had greatly improved the reflective status of teachers in Ada East District as indicated in key findings 19 and 20 of this study.

The application of the concepts from the PRP Model also added more values to the knowledge reflective skills of the science teachers. This dismissed the earlier misconception of the teachers that any teacher who reflects over a lesson is a reflective professional. The study concluded that the concept of becoming a reflective professional goes beyond a mere introspective activity thereby considering the curriculum and the learners as main targets, strategies, and levels of reflection to be employed for an improved outcome.

6.10 Implications

The results of this study indicated that many teachers had very low knowledge in reflective practices in the district. It is therefore necessary that innovative ways are put in place to add value to classroom engagements.

The integration and use of the reflective practice and its associated processes especially using the PRP model as a guide was proven to be an improved means of diversely addressing reflective challenges in science classrooms. More so, with the introduction of the reflective practices using the PRP model in all basic school science classrooms, teaching by the participants and other education workers, learning of science will become more professional and attractive to learners who benefit most. The use of the PRP Model as a guide in reflective practices will also improve effectiveness of teaching among basic school teachers during science classroom engagements. The integration of the reflective processes as outlined in Figure 6 of this study would equally help the basic school teachers to critically analyse their own teaching methods which had also been explained in Gibbs cycle in Figure 1, with the learners at the centre of the process. The teachers would also be able to identify areas for improvement in their lessons and also make necessary adjustments. The final

implication of this study is the promotion of reflective practices resulting in a more dynamic and successful educational practices in Ghana which will prepare learners for brighter and more prosperous future.

6.11 Contribution of the Study to Knowledge

The study has contributed to painting an accurate and true picture of the current status of reflective teaching practices among basic school science teachers during science classroom engagements in Ada East District of Ghana. The study also contributed to knowledge by fostering continuous learning and personal growth among the teachers.

In the global world, similar studies were carried out in teacher professional growth by Oduro et al. (2016). Although these earlier researchers also covered very wide areas in reflective practices, at local and international levels, very little works were done at the basic school levels and more specifically among basic school science teachers in the Ada district of Ghana. Ultimately, and to the best of knowledge of the researcher, no attempt has ever been made to develop a reflective model for use in this direction. This is the first time a Reflective Practice Model (PRP-M) has been developed to effectively improve both individual and collective knowledge base of teachers who engaged in reflective practices in Ada East District of Ghana.

In effect, the study has been able to transform the basic school science teachers (165) in Ada East District who participated in the study from a status of '*reflective practitioners*' to '*reflective professionals*' as indicated in Figure 2 of this study. By this illustration, the study also brought to light, the true picture of the level of knowledge of basic school science teachers' reflective practices in the district. According to Yidana and Lawal (2015), reflective practice is a professional requirement for teachers hence very important to note. Therefore, the outcome of the

study which revealed the true status of reflective practices in the district is very crucial and worth noting.

Furthermore, although lack of training on reflective teaching was identified by some earlier researchers, there was no form of new intervention to the issues identified on reflective practices where basic school teachers were guided to develop their own model in line with earlier researchers like Gibbs. Some authors like Cohen et al, (2000) and Kemmis and McTaggart (2003) suggested that this could be achieved through action research which is an effective tool for making interventions more effective in human endeavours where changes and improvements are most needed. The development of the PRPM as a functional model to enhance reflective practices among basic school science teachers was a novel intervention and first of its kind that served as a great source of inspiration to participants during the training workshop.

Finally, the teachers were able to acquire more reflective practice skills, worked as a team, and were guided by past theories, and later contributed to the development of their own learning model with the help of the researcher.

6.12 Recommendations

This study showed the true status of reflective practices in Ada East District of Ghana among the basic school teachers who exhibited low level of knowledge in carrying out reflective practices. Based on the findings from this study, a number of interventions and recommendations have been made by the researcher to all stakeholders in the district and in education sector in general.

1. The Researcher in collaboration with GES Directorate in the district should help formalise and adopt reflective practices by always making it a priority

during science classroom engagements to improve the knowledge of teachers in reflective practices.

2. On the levels of reflectivity by teachers, it is recommended that the basic school science teachers in the Ada East District should always endeavour to go through the three levels in their lesson presentations, i.e. teachers should be able to reflect *before*, *during* and *after* each lesson in collaboration of the headteachers and district directorate of education.
3. On the factors that influence reflective practices, it is recommended that the science teachers in the Ada East District receive training in reflective practices in order to effectively assist one another in their various schools to improve their skills during classroom engagements. It is further recommended that headteachers who also influence teachers should equally be trained together with the teachers to aid the process.
4. Considering lack of training and poor time management as some of the key challenges facing the use of reflective practice, it is recommended that the District Directorate of Education in collaboration with other stakeholders should organise frequent training workshops for all basic school science teachers to update their skills.
5. Frequent use and application of the PRP Model developed from this study should be encouraged by the District Directorate and the teachers who received the training during the study. It is further recommended that the researcher should carry out a follow-up study to include other subject teachers rather than science.

6.13 Suggestions for Future Research Work.

Based on the findings from this study, the following suggestions have been made to guide stakeholders and other future Researchers on reflective practices.

1. Any future studies should be carried out across additional subject areas to reach out to more basic school science teachers with more female teachers in focus.
2. Ministry of Education and the Ghana Education Service should encourage NTC to include issues of reflection as part of its professional assessment plans.
3. Tutors in Colleges of Education and other teacher training institutions should also incorporate reflective practices as part of their pre-service professional assessment plans.
4. The applicability of this study in other subject areas is yet to be tested, therefore any further study should go beyond basic schools and science classrooms.
5. It is finally suggested that other study be conducted using computer animations to depict the reflective practices for teachers to follow quickly.

It is hoped that continuous training of basic school science teachers to become reflective teaching professionals would help improve teaching and learning in a more logical manner for the academic development of basic school pupils in Ghana. From the study, it was revealed that many teachers can be Reflective Practitioners, but it takes only few teachers with strategic approach to become Reflective Professionals.

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APPENDICES

APPENDIX A

Research Question Matrix: Relationships Between Research Questions, Data Sources And Data Collection Techniques

	Research Questions	Data Source	Data Collection Techniques	Data Analysis Techniques
1	What reflective practices are adopted by basic school teachers in the Ada District of Ghana?			
a)	What is the basic school teacher's knowledge of the reflective practices?	Basic school Teachers/ training certificates	Questionnaire/Interview guide /checklist	Freq. analysis, search for themes/checklist
b)	To what extent do basic school teachers adopt reflective practice?	Basic school Teachers	Questionnaire/Interview guide/checklist	Freq. analysis, search for themes
2	What is the level of reflectivity demonstrated by basic school teachers in the Ada District of Ghana?			
a)	To what extent does the school environment promote reflective practices?	Basic school Teachers School record books	Questionnaire/Interview guide/checklist	Freq. analysis, search for themes& checklist
b)	What are the stages of reflection used by the basic school teachers?	Basic school Teachers	Questionnaire/Interview guide/checklist	Freq. analysis, search for themes& checklist
3	What factors influence teacher reflection among basic school teachers during their classroom engagements in the Ada District of Ghana?			
a)	To what extent does peer influence promote reflective practices among teachers in the schools?	Basic school Teachers	Questionnaire/Interview guide	Freq. analysis, search for themes
b)	What is the frequency of activities that influence reflective practices?	Basic school Teachers	Questionnaire/Interview guide/checklist	Freq. analysis, search for themes& checklist

4	What are the challenges faced by basic school teachers in adopting reflective practices?	Basic school Teachers	Questionnaire/Interview guide/checklist	Freq. analysis, search for themes& checklist
5	What type of model could be developed to enhance reflective practices among basic school teachers in Ada East District of Ghana?			
a)	To what extent can reflective practice model change basic school teachers' reflective practice abilities?	Feedback from Basic school Teachers	Observation guide	Freq. analysis
b)	What aspects of the professional teaching (pedagogy) processes on reflective practices were beneficial to the teacher and how they improved?	Feedback from Basic school Teachers	Observation guide	Freq. analysis
c)	What knowledge about reflective practices do teachers acquire prior to and after the workshop?	Feedback from Basic school Teachers	Observation guide	Freq. analysis

APPENDIX B

QUESTIONNAIRE FOR TEACHERS

University of Education, Winneba

SCHOOL OF GRADUATE STUDIES

Dear Sir/Madam,

I am a PhD candidate at the University of Education, Winneba. I am conducting a research on the status of reflective practice experiences among teachers in Ada East District. This questionnaire is designed to elicit information from teachers regarding the practices and challenges on reflective teaching.

Please note that all information provided will be **strictly confidential** and will be used for academic purposes only.

By completing the survey, you indicate that you voluntarily wish to participate in this research.

For any questions, please contact me or my supervisors.

Our details are provided below:

Researcher ’s Name: Amevor Asiwome

Email: asiwomevo@yahoo.com

Phone: 0204079012

Name of Supervisor: Prof. M. K Amedeker -Ph.D. (CPhys MInstP)

Email: mawuden@yahoo.com

Thank you for taking a few minutes to answer this questionnaire.

Consent Forms

Study Title**:**

STATUS OF REFLECTIVE TEACHING PRACTICES AMONG BASIC SCHOOL TEACHERS IN SCIENCE CLASSROOM ENGAGEMENTS IN ADA EAST DISTRICT

Introduction

I am a PhD candidate at the University of Education, Winneba. I am conducting a research on Reflective practices Experience among teachers in the District. This questionnaire is designed to elicit information from teachers regarding the practices and challenges on reflective teaching practices.

Potential Benefits

There are no immediate and direct benefits to you as a person for your participation in the study. However, the information you give will help the Ghana Education Service team to evaluate and improve the education in Ghana. The findings of the study would help the GES and related organisations to improve the reflective practices among teachers.

Potential Risks

There is no direct risk involved in participating in this study.

Confidentiality

Any information given will remain **confidential** and will be used for the purpose of this study only. Your name would not be mentioned in any report. The information you give would be cumulated with others and stored on a password protected computer. Access to the data would be only limited to the Researcher and the assistants. The recorded tapes would be kept for one year after which it would be discarded.

Compensation

Compensation will not be provided.

Voluntary Participation and Right to Leave the Research:

You are free to choose whether to take part in this study or not, and you are free to withdraw at any time at your own discretion. Feel free to ask any questions before or after the interview.

Contacts for Additional Information

If you have any further question, please contact Amevor Hubert on number 0246 222 788, email asiwomevo@yahoo.com and Prof. M.K Amedeker mawuaden@yahoo.com

Voluntary Agreement Form

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any question I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand that I have the right to withdraw from the study at any time without in any way it affecting my further medical care**.** I have also agreed to allow the interview to be audio recorded.

I hereby agree to participate as a volunteer in this study.

Name and Signature of the Researcher

……..

Please, kindly provide suitable responses to the following items by ticking the appropriate option.

Section A: Background Information- [*Individual Characteristic Factors*

1. Sex of respondents 1) Male 2) Female

4. Highest Educational Qualification (completed)

1) Technical and vocation Qualification
2) Diploma
3) HND
4) First Degree (B.Ed, BSc etc)
5) Masters

6) PhD

7) Professional Qualification (ACCA, CIMA etc.)

8) Other…….

5. Number of years in teaching

Number [ ] Years

6. Which subject(s) do you normally teach during (2020-2021) School year?

…….

7. What grade level(s) did you teach during the 2020-2021 School year?

Class ……

6. What is your current Rank in the Education Service?

1. Deputy Director
2. Assistant Director I
3. Assistant Director II
4.Principal Superintendent
5.Senior Superintendent I
6.Senior Superintendent II
7.Superintendent
8.Pupil Teacher

Section B: Knowledge about Reflective practices – [Individual characteristic factors]

To what extent do you agree or disagree with the statements below

As a reflective Professional teacher, I	*SD= Strongly* Disagree	*D= Disagree*	*DK=* Don't Know	*A= Agree*	*SA= Strongly Agree*
1. reflect on my own teaching.					
3. have knowledge about reflection and reflective teaching					
3. learnt about reflective teaching under training					
4.know the purpose of reflective teaching					
5. know how to write a reflective journal					
6. know how to write reflective journal on daily basis.					

8. Did you receive any training on reflective practices in the last 12 months?

1) Yes
2) No

If yes, please proceed to item 9

If no, please state reason(s) and proceed to items in section C.

……

……

……

9. Which organisation provided training for you in reflective teaching, if any?

1) Government
2) Private Organization
3) NGO
4) Self-initiated training
5) Any other organisation ……

Section C: **Adoption of Reflective practices**

How often do you adopt reflective practices in your school?	Always	*Often*	*Sometimes*	*seldom*	*Never*
10. I do reflection on my lessons prior to my teaching.					
11. I reflect on my lessons during the teaching process					
12. I use reflective practices in all my lesson delivery.					
13. I do reflection on my lessons with pupils after teaching.					
14. I consider reflective practices for teaching as most important activity to me.					
15. I adopt reflective teaching to improve upon my next lessons					

Section D: Extent to which school environment influences reflective practices

How often does your school influence you?	Always	*Often*	*Sometimes*	*seldom*	*Never*
16. My school has reward systems for me whenever I engage in reflective practice.					
17. I am influenced by my school's position to adopt and promote reflective practices.					
18. My school keeps good records to help me adopt reflective practices.					
19. My school has support systems in place to enable me carry out my reflective practices					
20. My school consents to my use of electronic equipment in carrying out reflective practices					

School Environmental Factors

How often does your school influence you?	Always	*Often*	*Sometimes*	*seldom*	*Never*
21. My school has regular in-service training in reflective practices for staff					
22. My school promotes reflective practices through regular supply of reflective journals					
23. My school has equipment and TLMs in place to enhance my reflective practices					
24. Other teachers in my school are ever ready to give various forms of support to enable me carry out my reflective practices					
25. My school has social amenities like electricity supply to help me use electronic equipment in carrying out reflective practices					

Section E: Stages of reflections used by basic school t

Stage 1: How often do you carry out the following activities?

During pre-lesson delivery stage; (Reflection-For-Teaching)	Always	*Often*	*Sometimes*	*seldom*	*Never*
26. I carry out reflective practice using the curriculum materials					
27. a. I function as a teacher, based on a pre-set standard of knowing my students and how they learn.					
27.b. I function as a teacher, based on a pre-set standard of knowing the content and how to teach it					
28. I question every detail of my lessons prior to each lesson delivery.					
29. I pay attention to details of my teaching skills before embarking on my lesson delivery.					
30. I do reflection on my students based on their individual needs before embarking on daily lessons.					
31. I consider students' perspectives prior to lessons with due consideration for their personal interests.					
32. I see the need for thoughtfully connecting my actions in teaching with students' learning.					

33. I discuss problems with my peers before lessons begin.					
34. I see beyond immediate demands of learners before a lesson episode.					
35. I engage my students in my lesson preparation prior to its delivery					
36. I consider differing needs of learners in my lesson preparation (physical, intellectual, gender).					

STAGE 2: How often do you carry out the following activities?					
During lesson-delivery stage; (Reflection-As-Teaching)	Always	*Often*	*Sometimes*	*seldom*	*Never*
37. I carry out my reflective teaching strategies to include team-based learning					
38. a. I carry out my reflective teaching strategies to include teaching technique that uses technology					
38b. I carry out my reflective teachings to include techniques like, making students as autonomous learners					
39. I modify my teaching strategies to meet the current challenges of teaching and learning.					
40. I connect a learner-centred method of teaching to the underlying theories of reflection.					
41. I encourage my students to reflect in groups.					
42.I guide my students to reflect on lesson activities and its core competencies of critical thinking and problem solving					
42b. I guide my students to reflect on					

lesson activities and its core competencies of imagination and creativity					
43. I pay attention to students' different learning styles such as verbal and aural learners.					
44. I connect new concepts to students' prior knowledge during the lesson.					
45. I take my time to react to each student's responses as I teach.					
46. I adjust my teaching practices to ensure effective reflection on students' activities					
47. I answer students' problems in lesson delivery based on my own reflections.					
48. I make adjustments to lessons based on my past experiences.					
49. I reflect on the effectiveness of my specific teaching practices based on best practices.					
50. I reflect over the available TLMs to address students' individual differences.					
51. I reflect because my school requires me to do so.					
52. I tend to reflect on my lesson delivery in order to be innovative					
53. I consciously pause in my lesson delivery to reflect on my planed lessons					

STAGE 3: How often do you carry out the following activities?

After lesson delivery; (Reflection-Of-Learning)	Always	*Often*	*Sometimes*	*seldom*	*Never*
54. I record my teaching experiences into the reflective journal immediately after my lesson.					
55. I evaluate my students at the end of each lesson					
I am curious about the effectiveness of my own reflective teaching practices.					
I reflect on my teaching based on the feedback I receive from my students					
56. I am committed to creating and maintaining supportive learning environments for reflective teaching					
57. I am committed to applying National Teachers' Standard in order to improve reflective practices.					
58. In the preparation of my next lessons, I identify alternative ways of presenting my ideas to students					
59. I recognize the complexity of classroom dynamics through self-reflection.					
60. I recognise the learning outcomes of my pupils as part of my reflective practice strategies.					
61. I consider reflection very important in making decisions about my students.					
62. I see reflective practices as a tool to be employed to engage all students in my classroom management.					

Section F: The extent to which peers influence reflective practices

To what extent do your peers influence your reflection?	*SD= Strongly* Disagree	*D= Disagree*	*DK=* Don't Know	*A= Agree*	*SA= Strongly Agree*
63. My colleague teachers do praise me in my reflective teaching practices					
64. My use of reflective teaching is influenced by my colleagues					
65. My head teacher encourages me to use reflective practices					
66. My head teacher acknowledges me anytime I engage in reflective teaching practices					
67. I reflect with my colleagues after my lessons					

Section G: Frequency of activities on Reflective Practices

How often do you carry out the following activities?	Never	Yearly	Termly	Weekly	Daily
68. Reflection alone					
69. Reflection on diverse students' needs					
70. Reflection with other experienced teachers					
71. Reflection with other teachers when about to start my teaching					
72. Reflection about other teachers' teaching					

	Never	Yearly	Quarterly	Weekly	Daily
73. Reflection on my past practices before teaching					
74. Reflection while drawing my lesson plan to teach					
75. Reflection to adjust my teaching during lessons					
76. Reflection on my next lesson					
77. Writing my reflective journal after each lesson					

SECTION H: Challenges of Reflective Practices

To what extent do you agree or disagree with the statements below	*SD= Strongly* Disagree	*D= Disagree*	*DK=* Don't Know	*A= Agree*	*SA= Strongly Agree*
78. Teachers lack training on reflective teaching.					
79. Improper time management for reflective teaching					
80. My colleagues not conversant with reflective practices					
81. Inadequate refresher courses for teachers in reflective teaching					
82. There are no trained teachers in my school to help with my reflective teaching					
83. Inadequate supervision by school heads on reflective teaching					
84. Lack of regular supervision by school heads on reflective teaching.					

Thank you for your time and contribution

APPENDIX C

INTERVIEW GUIDE

Interview Guide for Basic School Teachers

Study Title**: STATUS OF REFLECTIVE PRACTICES AMONG BASIC SCHOOL TEACHERS DURING CLASSROOM ENGAGEMENTS IN ADA EAST DISTRICT OF GHANA**

Introduction

I am a PhD candidate at the University of Education, Winneba. I am conducting research on Reflective practices Experience among teachers in Ada East District. This questionnaire is designed to elicit information from teachers regarding the practices and challenges on reflective teaching.

Duration/procedure

I will be carrying out in-depth interviews in which our conversations will be audio-recorded. This will take about 30 to 40mins of your time. You have the right to agree or disagree with the audio recording. You can disagree to participate in this study if you are not comfortable with the audio recording of the interview. Your age and other personal information will be required; however, a code will be used for easy identification and sorting. These questions would be asked at your pace.

Potential Benefits

There are no immediate and direct benefits to you as a person for your participation in the study. However, the information you give will help the Ghana Education Service team to evaluate and improve the education in Ghana. The findings of the study would help the GES and related organisation to improve the reflective practices among teachers.

Potential Risks

There is no direct risk involved in participating in this study.

Confidentiality

Any information given will remain confidential and will be used for the purpose of this study only. Your name would not be mentioned in any report. The information you give would be cumulated with others and stored on a password protected computer. Access to the data would be only limited to the Researcher and the assistants. The recorded tapes would be kept for one year after which it would be discarded.

dd/mm/yyyy

Date [ ]

School of Interviewee [……]

Place of Interview [……..]

Participant ID [ ]

Start Time:

Good day, Madam/Sir.

With your permission, can we begin?

1. Sex of respondents 1) Male 2) Female

Main Questions

1. Generally describe to me briefly how your everyday life looks like in the classroom?

What do you do just before you start your lessons each day?

i. Have you ever heard of reflective teaching?

ii. Please briefly describe to me what you know about reflective teaching

Let's now start the discussion by talking about how you understand the **term Reflective Teaching**? (Prompt with the definition or explanation of reflective learning if does not know)

Probe

Definition

Let me give you this definition

"A reflective teacher is one who observes and reflects on his or her own teaching and uses observations as well as the reflections as a way of bringing about change in their teaching and their students' learning''

iii. what's your view about this definition?

2. What do you do during the lesson? What do you also do after the lesson?

i. How is reflection used in your daily teaching activities?

ii. Do you think reflective teaching is useful to you? - What do you think are the benefits of Reflective teaching? / How would you rate yourself in terms of your level and expertise in reflection?

iii. In what way does your school support you to implement reflective practices in your teaching?

how often does your school support you to implement reflective teaching?

iv. Please tell me at what stages of the teaching process do you do reflection?

v. Do you think there is the need to pause at each point in the lesson to reflect?

(if yes , why?)

3.Probes

i. what roles do your peers play during your reflective practices?

(What ways do they help you to carry it out?)

ii. how often do your peers help you carry out reflective practices as a teacher?

How do you do that?

i.e. do you do it alone, or with someone else?

iii. how often does your school contribute to your reflective teaching?

4.i. What do you think are some challenges associated with Reflective teaching in your school?

Why are they challenges?

4. What do you think could be done to make Reflective teaching more effective in your school and the District?

Thank you for your time, ***End of Interview***

COMMENTS ABOUT RESPONDENT

……..……

……

COMMENTS ON THE INTERVIEW / SPECIFIC QUESTIONS

……

……

……

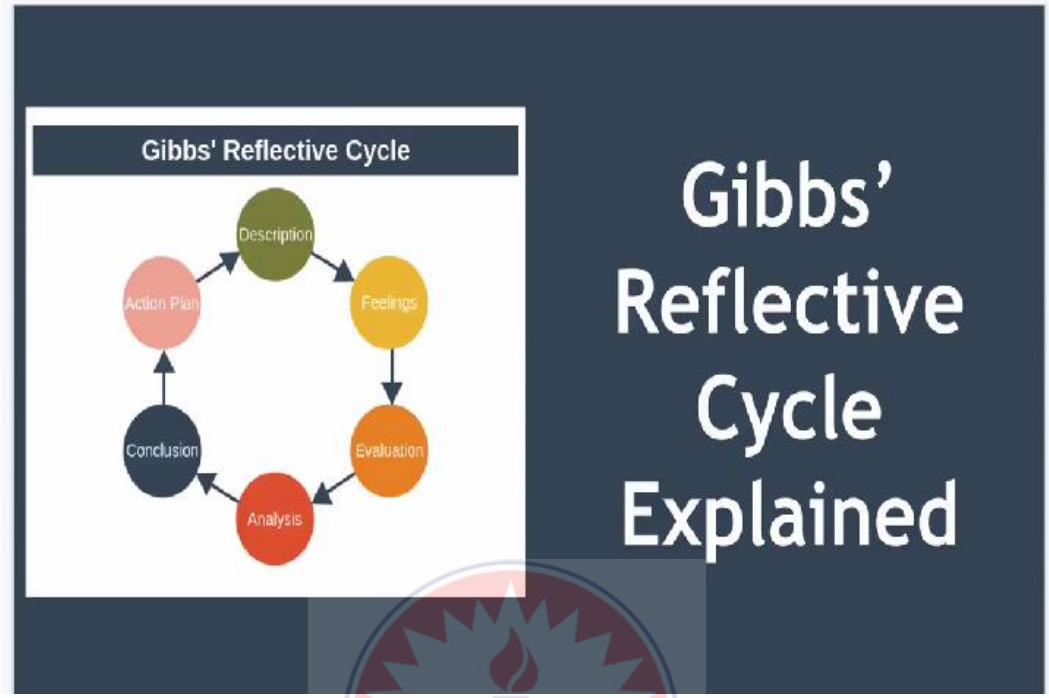
……

……

APPENDIX D

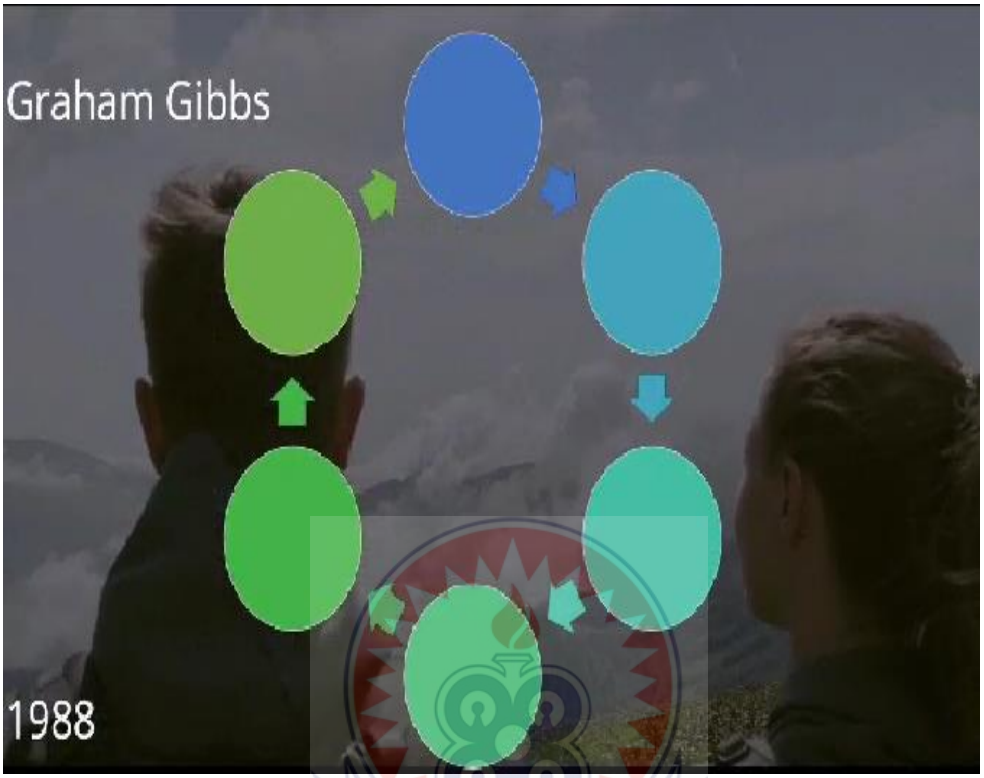
AUDIO VISUALS ON GIBBS' REFLECTIVE CYCLE EXPLAINED

Video source..\edited video 1.mp4



APPENDIX E

GIBBS REFLECTIVE CYCLE



APPENDIX F1

POST-WORKSHOP SELF-ASSESSMENT FOR SCIENCE TEACHERS ON GOOD PRACTICES DURING REFLECTIVE TEACHING PRACTICES

i. What are some good practices would you carry out before lesson?

……

……

……

ii. What are some good practices would you carry out during lesson?

……

……

……

……

iii. What are some good practices would you carry out after lesson?

……

……

……

……

iv. Suggest some other measures you would put in place to ensure a successful reflective practices during classroom engagements.

v. What Professional Pedagogical Questions would You Ask Yourself in Order To Ensure Effective Reflective Practices During Classroom Engagements?

……

……

……

……

……

APPENDIX F2

QUESTIONNAIRE ON IMPACT OF PROFESSIONAL LEARNING INTERVENTION WORKSHOP

After the workshop;	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean
I have acquired enough skills in reflective practices to teach my lessons					
My knowledge in the application of reflective skills during lesson deliveries has improved					
I can effectively apply my reflective skills acquired at various stages of my lesson deliveries					
My insight into models developed by earlier authorities on reflective teaching has improved					

APPENDIX G

POST-WORKSHOP OBSERVATION / ASSESSMENT CHECKLIST

SCHOOL……TEACHER……. SEX…..

S/N	OBSERVABLE FEATURES	Rating scale			
		Excellent	**Average**	**Poor**	
		3	2	1	
	SCIENCE LESSON				
1	Teacher's lessons follow the requirements from the curriculum				
2	Teacher has a well-prepared reflective journal for recording key events during lesson				
3	Teacher's teaching note has a portion for reflection				
4	Teacher reflects before the lesson				
5	Teacher often consciously paused to allow pupils reflect and gives feedbacks				
6	Teacher reflects during lesson				
7	Teacher recognises feedbacks from pupils				
8	Teacher records lesson outcomes in the reflective journal				
9	Teacher reflects after lesson delivery				
10	Teacher reflects alone				
11	Teacher carries out reflection with other colleagues				
12	Teacher is able to identify challenges in the lesson and provide solutions				
13	Teacher identifies new ways of handling similar challenges next time				

APPENDIX H

TABLE FOR DETERMINING SAMPLE SIZE FOR A FINITE POPULATION

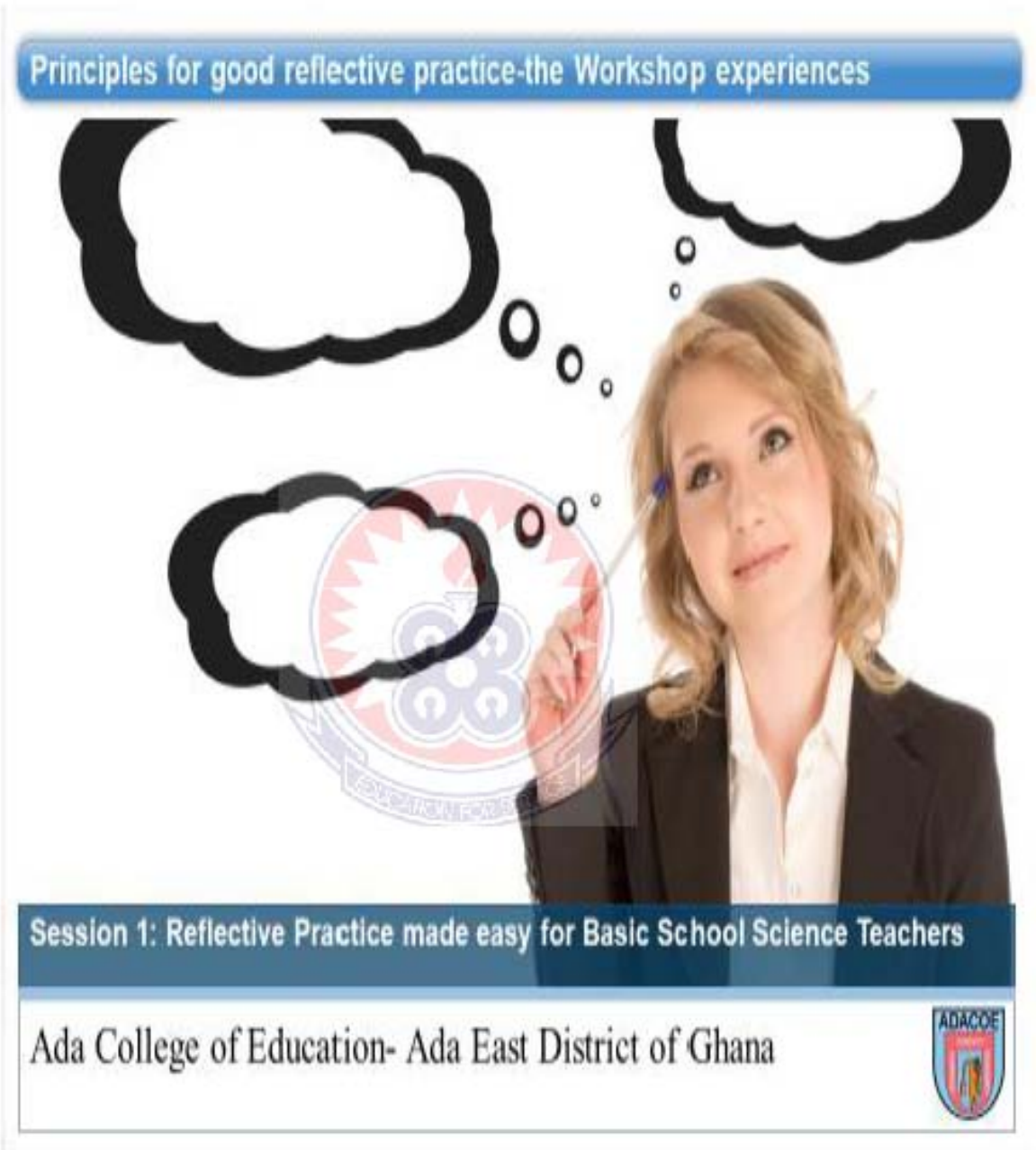
N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70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

Note.—*N* is population size. *S* is sample size.

Source: Krejcie, R.V. & Morgan, D.W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607-610.

APPENDIX I

WORKSHOP PRESENTATION GUIDE ON REFLECTIVE PRACTICES



Principles for good reflective practice-the Workshop experiences

REFLECTIVE PRACTICES FOR BASIC SCHOOL TEACHERS

-We do not learn from experience. We learn from reflecting on experience."

John Dewey, *(1938, p. 78)*

OBJECTIVES of the Session

- Explore the principles and theory of academic and professional reflective practice
- Explore reflective writing
- Describe the Gibbs reflective cycle

Reflective Practice- Definition

We reflect on something to consider it in more detail. Examples include:

- If we have a purpose or a goal to achieve
- If it is relatively complicated
- If we just want to think about an experience in the past.

Generally reflection is working on what we know already to generate new knowledge- to learn

- **'Reflection is a form of mental processing – like a form of thinking – that we use to fulfil a purpose or to achieve some anticipated outcome.**
- **It is applied to relatively complicated or unstructured ideas for which there is not an obvious solution and is largely based on the further processing of knowledge and understanding and possibly emotions that we already possess'**

(Moon 2005:2)

'A conscious act with the intention of finding out more about our learning process and how they effect our professional practice and working relationships' (Hunt 2005:234)

Why do we need to reflect?

If we don't examine our experiences and reflect on them in a constructive way, how will we learn from our successes and our mistakes?

Wallace (2007)

As you will remember from previous sessions, the Kolb Learning Cycle (1984) suggests that for learning to take place an experience needs to be followed by reflection as part of the experiential learning cycle.

It is not sufficient simply to have an experience in order to learn and without reflecting upon this experience it may quickly be forgotten, or its learning potential lost.

It is from the feelings and thoughts emerging from this reflection that generalisations or concepts can be generated. From undertaking this process it allows new concepts to be generated In order to tackle future experiences effectively. Gibbs (1988)

Why should we reflect?

There are many reasons why you should reflect on experiences, for this subject ,throughout your degree and professional life:

- To improve skills and competences
- To inform personal development planning
- For continual professional development
- To support the learning process
- To put value into your experiences
- To gain a better understanding
- To become an independent learner and use your own judgement

The Reflective Cycle (Gibbs, 1988)

Cycle Explained

Description:

- What happened,
- When it occurred,
- Who was there,
- What did they do,
- What was the outcome.

It's important to remember to keep the information provided relevant and to-the-point. Don't waffle on about details that aren't required –if you do this, you're just using up valuable words that you'll get minimal marks for

Feelings:

Discuss your feelings and thoughts about the experience. Consider questions such as:

- How did you feel at the time?
- What did you think at the time?
- What impact did your emotions, beliefs and values have?
- What do you think other people were feeling?
- What did you think about the incident afterwards

Cycle Continued

Evaluation:

How did things go? Focus on the positive and negative even if it was primarily one or the other.

- What was good and what was bad about the experience?
- What went well? What didn't?
- Were your contributions positive or negative.
- If you are writing about a difficult incident, did you feel that the situation was resolved afterwards?

Cycle contd

Analysis:

This is where you make sense of what happened, using the theory and wider context to develop understanding.

- Why did things go well? Or Badly?
- How can the theory explain what happened?
- How does my experience compare to the literature?
- What research/theories/models can help me make sense of this?
- Could I have responded in a different way

Cycle Continued

Conclusion:

Gibbs actually proposed two conclusions: a general one, which could be transferable and a specific one, focused your personal situation. These are now normally merged but the idea may help focus your conclusion.

- What have you learnt? Generally, and specifically
- What can I now do better?
- Could/should you have done anything differently?
- What skills would I need to handle this better next time?

Action plan:

Action plans sum up anything you need to know and do to improve for next time.

- How /where can I use my new knowledge and experience?
- How will I adapt my actions or improve my skills next time?
- If the same thing happened again, what would I do differently?

Using a Journal to Reflect

- In order to both reflect and in turn learn effectively whilst also being able to submit a high quality reflective blog, you rely on having sufficient data and being able to draw relevant observations from it.

- It is best to keep a note of everything as you go along so you have the option of which data to use for your blog: the information you note down at the time may not all be submitted as part of your assessment blog, however, could still enable valuable learning to take place.

Using journal reflection cntd

journal

Academic Writing versus Reflective Writing

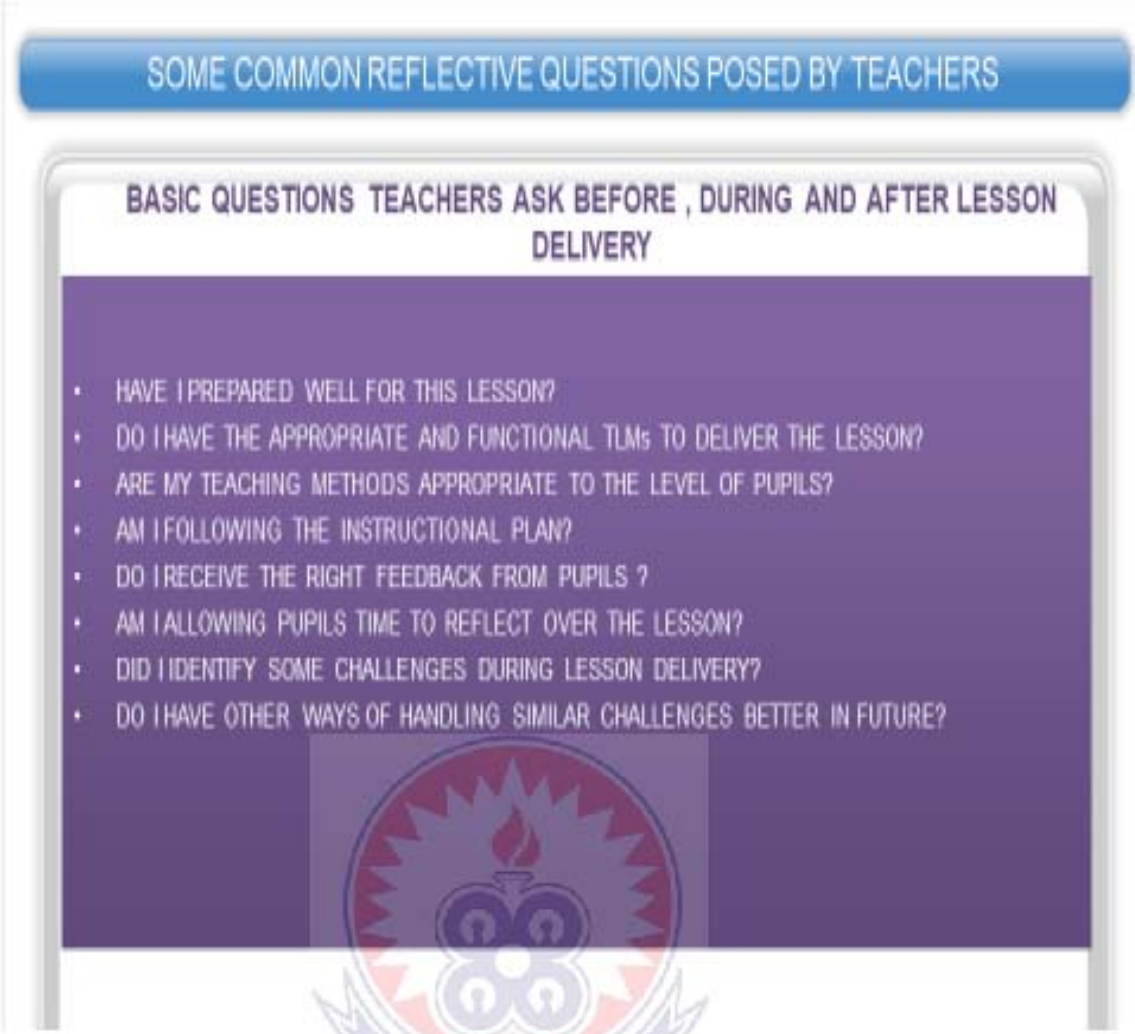
Academic Writing	Reflective Writing
The subject matter is likely to be clearly defined	The subject matter may be diffused and unstructured
The subject matter is not likely to be personal	The subject matter is likely to be personal
The subject matter is likely to be given	The subject matter is determined by the writer
The purpose of the writing is set in advance usually in a title/topic	There may be a purpose but it is more of a direction (rather than a title) that predicts the outcome
There will be a conclusion	There may be a conclusion in that something has been learnt
Usually 'one-off' and 'handed in'	Part of a process that takes place over time
Writing style is usually objective	Writing style likely to be subjective with use of the first person 'I'
A result of a thinking process – tidily ordered.	Usually involves the process of thinking and therefore not always tidily ordered

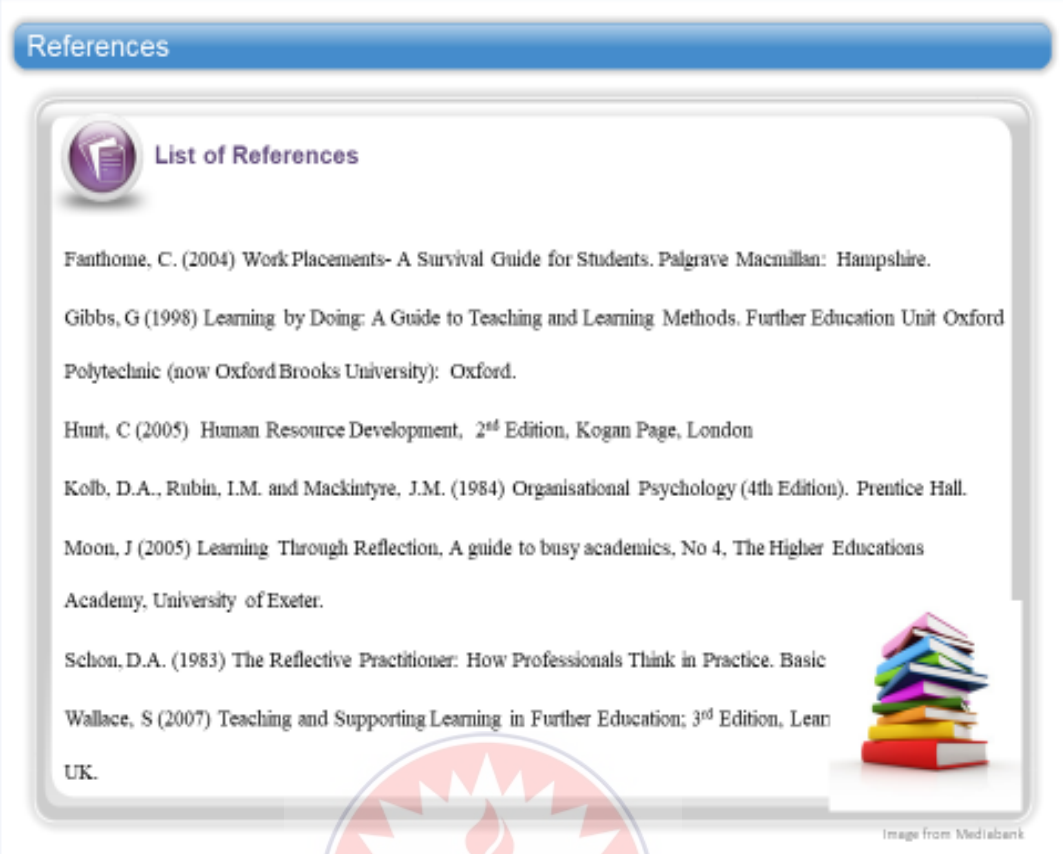
Challenges contd

- Although you are writing about your own experiences and feelings, be as rigorous and thorough as you would be for any other assignment. You cannot write about absolutely everything that happened during your placement.
- placement reflection should also make reference to how the placement has shaped your thoughts and ideas with regards your future career path, even if these thoughts are negative as it is just as useful to discover how you do not want to spend your time

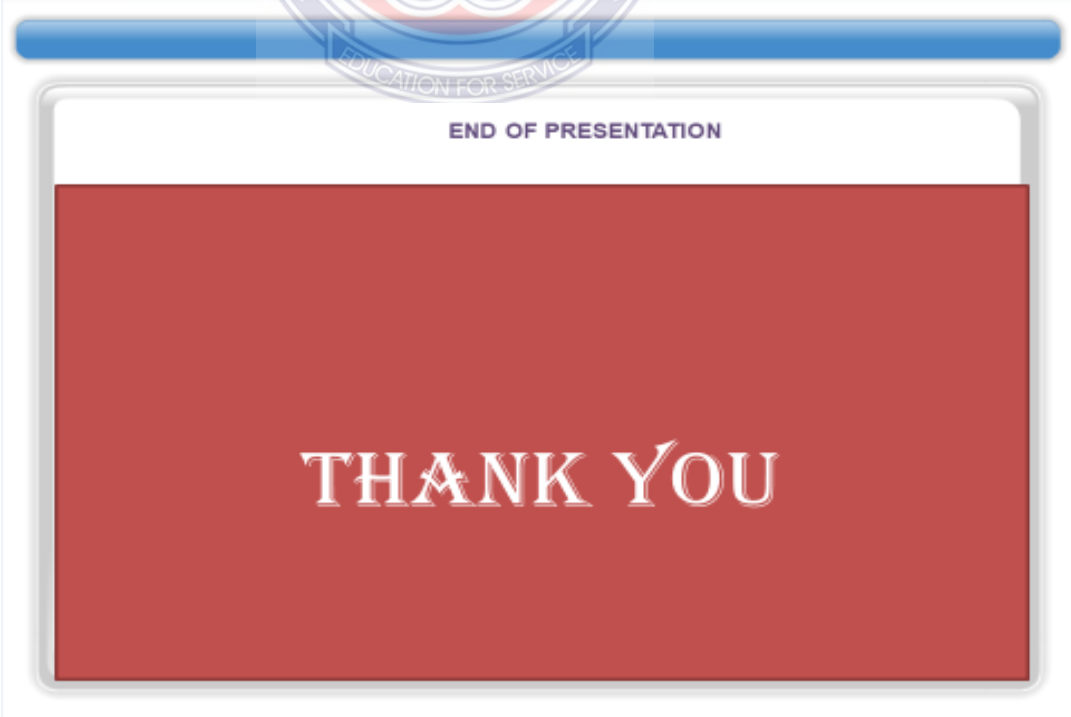
ummary

- **This session has reviewed the reflective practice principles and theories which can be applied throughout your placement and assessments**
- **Reflective writing is very different to academic writing as you can use 'I' and 'me'**
- **Describing an event simply details what happened, by reflecting, something useful can be learnt which will help to develop and enhance your experience**
- **Reflective practice and the use of the reflective cycle will support your learning and development**





NOTE: **All teachers can be called reflective practioners, but not all teachers who can become reflective professionals.**



APPENDIX J

TEACHERS DISCUSS REFLECTIVE PRACTICES AT CLUSTER MEETING

APPENDIX K

INTRODUCTORY LETTER

GHANA EDUCATION SERVICE

REPUBLIC OF GHANA

3rd August, 2022.

MR. AMEVOR, KWADZO ASIWOME
ADA COLLEGE OF EDUCATION
ADA EAST

INTRODUCTORY LETTER

I write to introduce to your outfit the bearer of this letter (MR. AMEVOR, KWADZO ASIWOME) a postgraduate student of the Department of science Education, University of Education, Winneba (UEW) who is to conduct field survey in your school for his research.

Research title: **Status of reflective practices during classroom Engagements among Basic School Teachers in Ada East district.**

Kindly give him the needed assistance to conduct the survey.

Counting on your cooperation.

Thank you.

GHANA EDUCATION SERVICE
ADA EAST DISTRICT
EDUCATION FOR SERVICE

NII OKAI SAMUEL
DEPUTY DIRECTOR – HRMD

FOR:
MOSES TETTEH PORNORTEY
DIRECTOR OF EDUCATION
ADA - EAST

DISTRIBUTION:
SELECTED BASIC SCHOOL HEADTEACHERS, ADA EAST

CC: ALL MSOs, GES – ADA EAST