



UNIVERSITY OF GHANA

**JUNIOR HIGH SCHOOL (JHS) SCIENCE TEACHERS' PERCEPTIONS ON
PROFESSIONAL DEVELOPMENT AND INSTRUCTIONAL PRACTICES:**

THE CASE OF LA DADE-KOTOPON MUNICIPALITY IN GHANA

BY

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**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
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IN EDUCATION DEGREE.**

APRIL, 2022

DECLARATION

Candidate Declaration

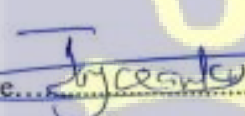
I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in the university or elsewhere.

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Supervisor's Declaration

We hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Ghana.

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DEDICATION

I dedicate my dissertation to my wonderful husband and children, who have been incredibly supportive throughout the process. I appreciate all the support you have given me from the start of my pursuit of the degree till now. I am deeply grateful.



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The completion of this dissertation could not have been possible without the participation and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, I would like to express my deep appreciation and indebtedness particularly to the following:

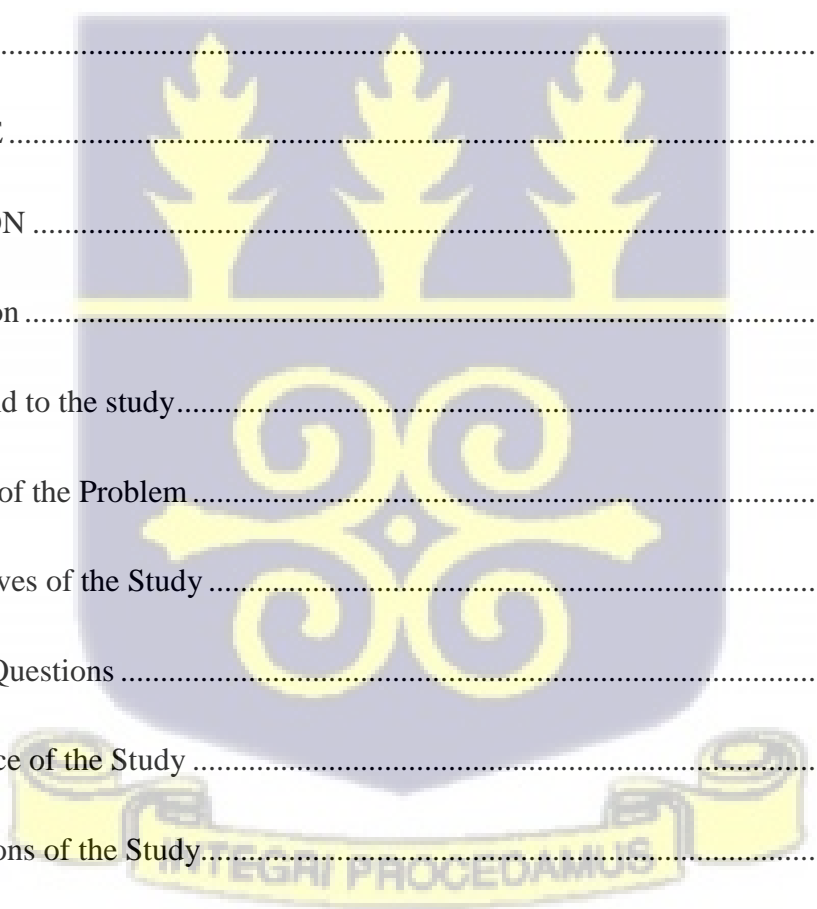
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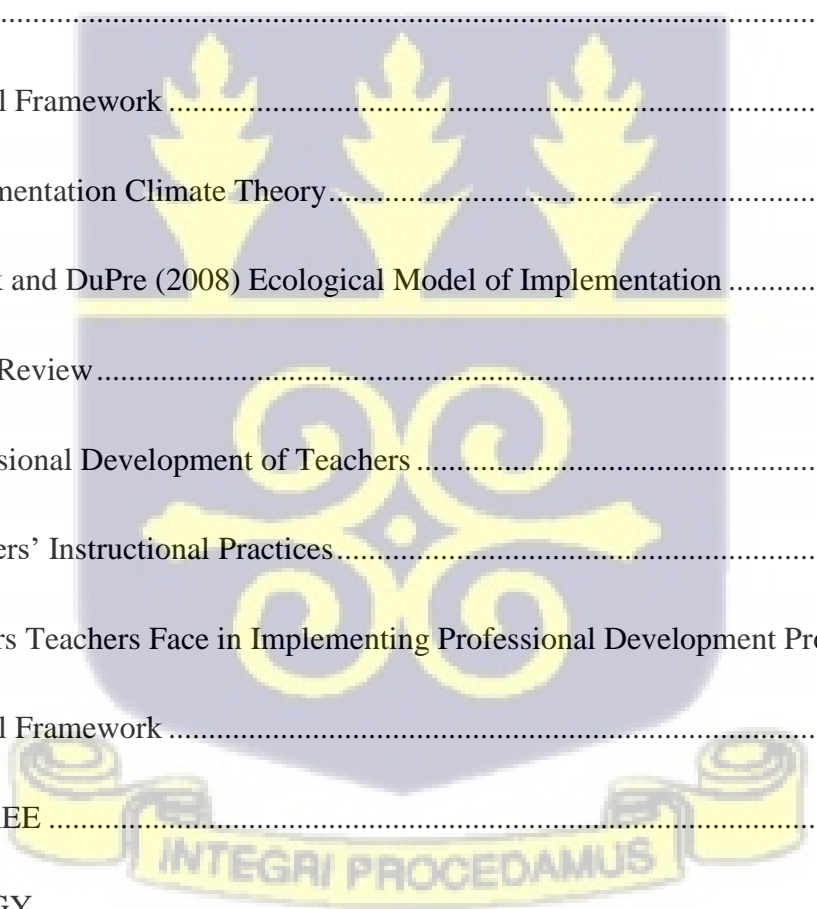


TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	x
LIST OF TABLES	xi
ABSTRACT	xii
CHAPTER ONE	1
INTRODUCTION	1
1.0 Introduction	1
1.1 Background to the study	1
1.2 Statement of the Problem	3
1.3 Objectives of the Study	5
1.4 Research Questions	5
1.5 Significance of the Study	6
1.6 Delimitations of the Study	7
1.7 Organization of the Study	7



CHAPTER TWO	8
LITERATURE REVIEW	8
2.0 Introduction	8
2.1 Conceptual Review	8
2.1.1 Professional Development of Teachers	8
2.1.2 Teachers’ Instructional Practices	11
2.1.3 Barriers to the Successful Application of the Professional Development Programs of Teachers	13
2.3 Theoretical Framework	15
2.3.1 Implementation Climate Theory	15
2.3.2 Durlak and DuPre (2008) Ecological Model of Implementation	17
2.2 Empirical Review	23
2.2.1 Professional Development of Teachers	23
2.2.2 Teachers’ Instructional Practices	29
2.2.3 Barriers Teachers Face in Implementing Professional Development Programs	34
2.4 Conceptual Framework	39
CHAPTER THREE	41
METHODOLOGY	41



3.0 Introduction.....	41
3.1 Research Philosophy.....	41
3.2 Research Design.....	42
3.3 Research Setting.....	43
3.4 Population.....	43
3.5 Sample Size.....	44
3.6 Sampling Technique.....	44
3.7 Instrumentation.....	45
3.7 Procedure.....	45
3.8 Data Analysis.....	46
3.9 Trustworthiness of Data.....	47
3.10 Ethical Issues.....	47
CHAPTER FOUR.....	49
FINDINGS, ANALYSIS AND DISCUSSIONS.....	49
4.0 Introduction.....	49
4.1 Background of Study Participants.....	49
4.2 Teachers of Science’s Perceptions about the Impact of Professional Development Programs on their Content Knowledge.....	51

4.2.1 Improvement of Knowledge of Instruments and Apparatus	53
4.2.2 Improvement of confidence and precision as to what to teach students	55
4.2.3 Motivation to teach content knowledge in class.....	57
4.3 Teachers of Science’s Perceptions about the Impact of Professional Development Programs on their Instructional Practice	58
4.3.1 The Mobilization of Teaching and Learning Materials.....	61
4.3.2 The mobilization of students	63
4.4 Barriers to the effective implementation of professional development programs	65
4.4.1 Lack of adequate teaching and learning materials coupled with huge class size.	66
4.4.2 Period constraints	68
4.4.3 Financial constraints.....	70
4.4.4 Classroom structure	72
4.5 Discussions.....	74
4.5.1 Theory of Implementation Climate	74
4.5.2 The Durlak and DuPre (2008) Ecological Model of Implementation	75
4.5.3 Relation of Findings to Empirical Review	77
4.5.4 Barriers to the implementation of professional development programs.....	78
4.6 Conclusion.....	79

CHAPTER FIVE	80
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	80
5.0 Introduction	80
5.1 Summary of Findings	80
5.2 Recommendations for the Successful Application of Professional Development Programs	81
5.2.1 Exploring Alternative Means of Financing	81
5.2.2 Increasing the Length of Science Periods.....	83
5.2.3 Provision of Essential Facilities by Government.....	84
5.3 Limitations of the Study.....	85
5.4 Recommendations for Future Research	86
5.5 Conclusion.....	86
REFERENCES	88
APPENDICES	101



LIST OF FIGURES

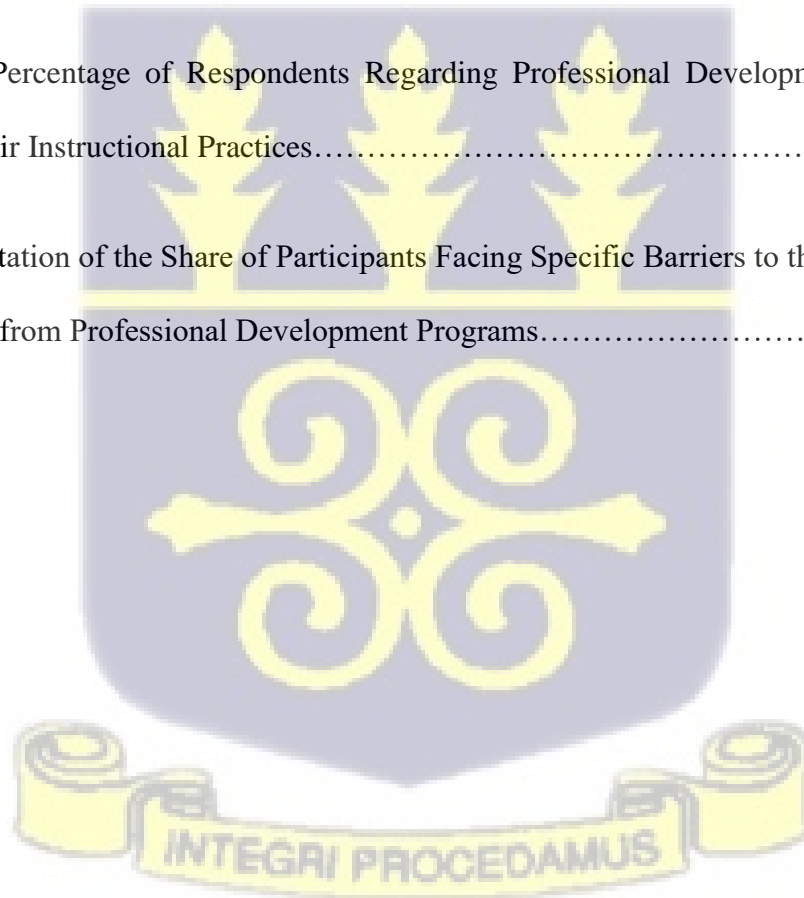
Figure 1. The Five Components of the Durlak and DuPre (2008) Ecological Model of Implementation35

Figure 2. Conceptual Framework of the Study.....36

Figure 3. The Percentage of Respondents who Reported that Professional Development Programs were Impactful on their Content Knowledge.....46

Figure 4. The Percentage of Respondents Regarding Professional Development Programs as Impactful on their Instructional Practices.....52

Figure 5. Presentation of the Share of Participants Facing Specific Barriers to the Implementation of Ideas Gained from Professional Development Programs.....57



LIST OF TABLES

Table 1. Demographics of Respondents.....43



ABSTRACT

In the endeavour to produce students who are nationally and internationally competitive, quality teaching and student accomplishment have been the subject of much controversy on the education front. As a result, most education systems now include the topic of teacher professional development as a necessity. It is therefore imperative to determine how impactful Professional Development (PD) programs are, as well as the barriers that inhibit the successful application of PD programs in the classroom. The study examined the perceptions Junior High School (JHS) Science teachers in six (6) circuits in the La Dade- Kotopon municipality hold about the impact of PD programs on their content knowledge and instructional practices. The study also aimed to identify the barriers the Science teachers face in the application of the PD programs. Employing the purposeful sampling technique, 15 respondents were sampled. Thematic analysis employed in the analysis of data revealed that teachers found PD programs impactful on both their content knowledge and instructional practices. Findings also revealed that the JHS Science teachers faced several barriers in the application of knowledge gained from PD programs. Findings additionally justified the implementation climate theory and an aspect of Durlak and DuPre (2008) ecological model of implementation, upon which the study was based. The study went on to recommend solutions to eliminate such barriers inhibiting the application of PD programs in the classroom to facilitate the effective teaching of science to produce competitive students.

Keywords: Professional Development Programs, Barriers, Teachers' Instructional Practice

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The chapter gives a background to the study and describes the problem which the study seeks to address. The significance, objectives, delimitations, and organisation of the study are also introduced in this chapter.

1.1 Background to the study

In today's world, teachers must be abreast with the latest instructional tools to ensure that students learn. Professional development is deemed sufficient for this purpose because it provides both material and pedagogical knowledge for teachers. Furthermore, professional development equips teachers with an understanding of how to deliver effective education to students, and also facilitates their adaptation to the ever-changing student needs.

Professional development is a continuous process that empowers the individual teacher. According to Saleem (2021), professional development is an ongoing process that gives teachers more power. It enables teachers to diagnose classroom problems and ways to solve these problems. It prepares teachers to meet world-class standards (Gay, 2005). Professional development is necessary for the reformation of the school and to improve upon the performance of teachers in the school.

Due to the professional development of the teacher, student learning outcomes will be improved. It helps teachers to diagnose problems in the classroom and come up with solutions. Student

learning outcomes will increase as a result of the teacher's professional development. Continuous professional development is the trending issue of the present day. This suggests that professional development is a central component in every modern proposal for improving education. Professional development, in a broad sense, refers to the development of a person in his or her professional role more specifically (Abraham, 2019).

Professional development offers teachers the opportunity to improve the quality of teaching and learning by updating their knowledge, sharpening their abilities, and acquiring new teaching strategies (Luneta, 2012). The introduction of the School-Based In-service training (SBI) and the Cluster-Based In-service training (CBI) by the National Teaching Council (NTC) formally called the Teacher Education Division (TED) in Ghana, aims at providing the opportunity for teachers to improve upon their knowledge. And again, the introduction of SBI and the CBI is a result of the Pre-tertiary Teacher Professional Development and Management (PTPDM) policy in Ghana on teacher professional development which states that for all teachers, professional development programs will be used to provide some of the evidence for promotion to enable teachers to advance to the next career level with competencies (Ellis, 2017).

The La-Dade-Kotopon Municipality like any other Municipality or District in Ghana has organized several professional development programs for the teachers and other educators in the municipality including SBI and CBI to empower them to impact students' learning outcomes. Among such programs organized are Jolly Phonics workshop for the Early Childhood teachers, Dyslexia Identification and Management workshop, Experimento workshop training for JHS Science teachers, workshops for the teaching of Mathematics, English, ICT, French and other subjects,

Effective Classroom Management, Cockcrow workshop, among others and yet, the feedback from School Performance Appraisal Meetings (SPAMs) and reports from supervision for the past two years suggest that not much improvement is made on pupils' performance.

Investigating professional development programmes through the perceptions of teachers is crucial for the success of such programmes since such programmes are tailored for teachers. Specifically, discovering the perceptions of teachers on professional development programmes will serve as a feedback with which such programmes can be improved. However, academic research into perceptions teachers hold on professional development programmes are virtually non-existent. (Acheampong & Gyasi, 2019). Considering the necessity of this, it is problematic when researchers ignore the perceptions of teachers on professional development. This research seeks to find out the perception of Junior High School Science teachers on Experimento workshop training on their content knowledge and instructional practices.

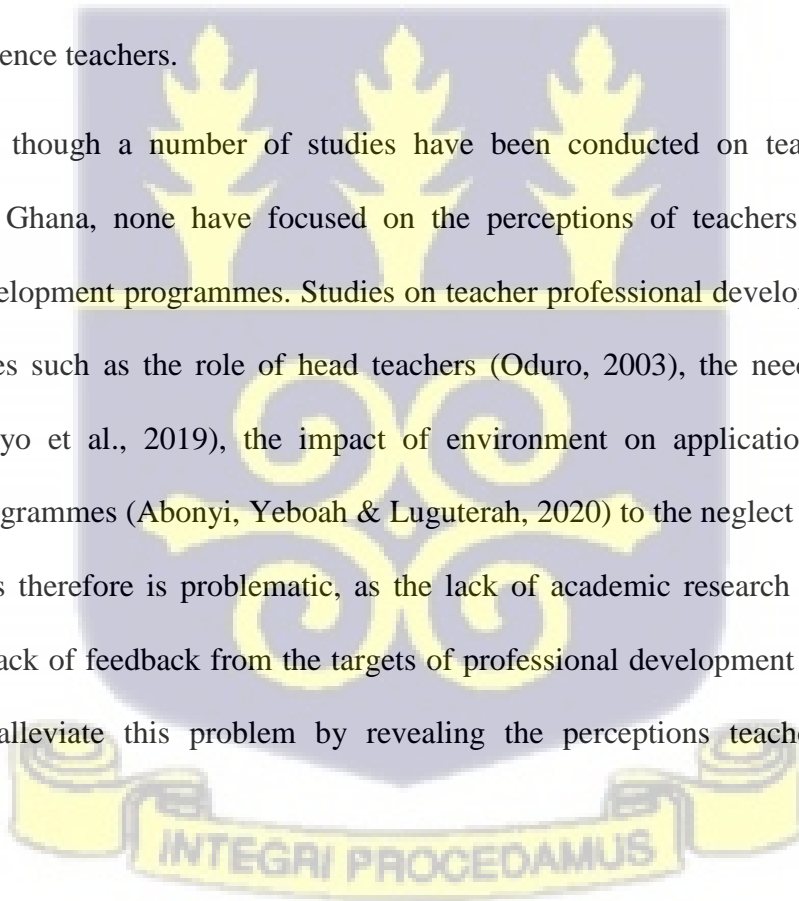
1.2 Statement of the Problem

Recognizing that the teacher is the central figure around whom the success or otherwise of every instructional activity revolves, the Ghana Education Service (GES) has since 2005 developed a framework for the implementation of In-Service Education and In-Service Training (INSET) policy. The National Teaching Council (NTC) whose mandate is to improve teacher's knowledge and their professionalism has established an institutionalized structure for continuous professional development for pre-tertiary school teachers.

To this effect, a number of professional training programmes have been conducted to empower teachers to impact students' learning outcomes. However, there is limited evidence on the

effectiveness of professional development programs for teachers in this district. According to a report by the Directorate on School Performance Appraisal Meetings (SPAMs) for 2017/2018 to 2019/2020 academic years, students' performance in the Basic Education Certificate Examinations (BECE) remains poor. The number of candidates who sat for the examination over the three academic years have slightly increased (from 3,475 in 2018, 3,523 in 2019 to 3,661 in 2020) but the failure rates have significantly worsen from 15.4% ,22.7% to 24.90% respectively (SPAM Report, 2020). This suggests that these interventions are not generating the anticipated outcomes. As a result, the author of this study believes that empirical research is required to assess JHS Science teachers' perceptions of the effectiveness of the municipality's professional development initiatives for science teachers.

Moreover, even though a number of studies have been conducted on teacher professional development in Ghana, none have focused on the perceptions of teachers have concerning professional development programmes. Studies on teacher professional development have rather focused on issues such as the role of head teachers (Oduro, 2003), the need of for inclusive education (Chitiyo et al., 2019), the impact of environment on application of professional development programmes (Abonyi, Yeboah & Luguterah, 2020) to the neglect of the perceptions of teachers. This therefore is problematic, as the lack of academic research on the topic may translate into a lack of feedback from the targets of professional development programmes. The study aims to alleviate this problem by revealing the perceptions teacher have on such programmes.



1.3 Objectives of the Study

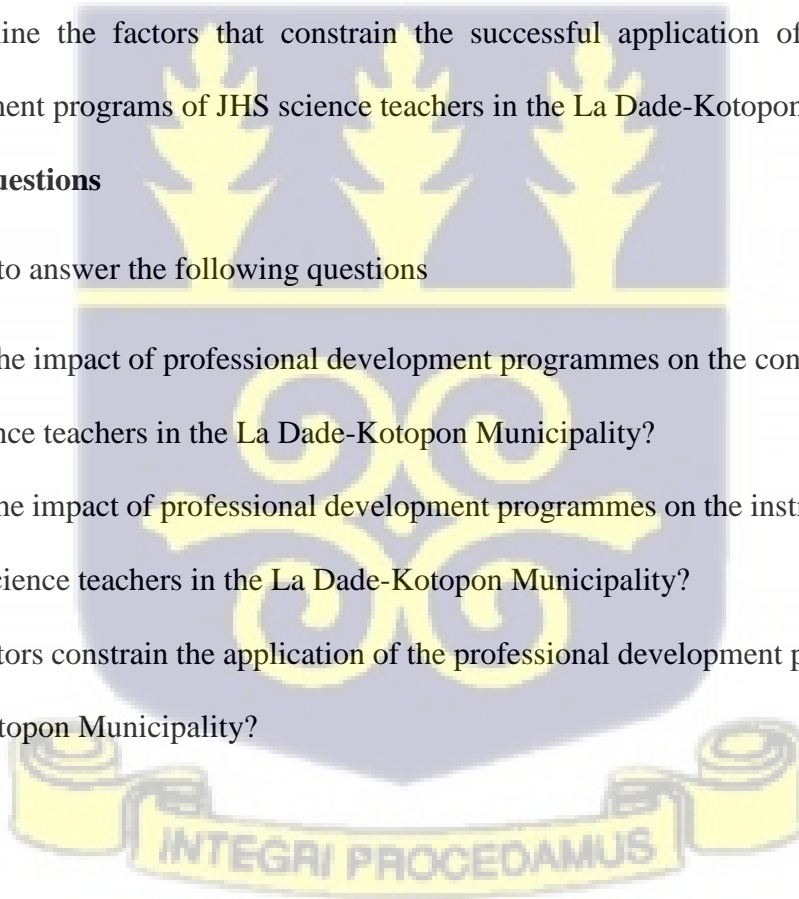
Generally, the study aims to investigate the perceptions JHS science teachers have on professional development programmes with a focus on the La Dade-Kotopon Municipality. The study seeks to achieve these specific objectives.

1. To assess the perceptions of JHS science teachers in the La Dade-Kotopon Municipality on the impact of professional development programmes on their content knowledge.
2. To assess the perceptions of JHS science teachers in the La Dade-Kotopon Municipality on the impact of professional development programmes on their content knowledge.
3. To examine the factors that constrain the successful application of the professional development programs of JHS science teachers in the La Dade-Kotopon Municipality.

1.4 Research Questions

The study seeks to answer the following questions

1. What is the impact of professional development programmes on the content knowledge of JHS science teachers in the La Dade-Kotopon Municipality?
2. What is the impact of professional development programmes on the instructional practices of JHS science teachers in the La Dade-Kotopon Municipality?
3. What factors constrain the application of the professional development programs in the La Dade-Kotopon Municipality?



1.5 Significance of the Study

The significance of the current study cannot be overstated. The significance of the study lies in the importance of professional development of teachers and education in general. The current study aims to diagnose problems with respect to difficulties in applying knowledge gained from professional development programs by teachers. When teachers are unable to apply innovative and effective means of teaching in the classroom, teaching and learning will not improve to achieve learning and educational outcomes in general. It is therefore crucial that barriers in the way of professional development programs are identified and eliminated to achieve the necessary goals of such programs.

Diagnosing the hurdles and the way they impede the application of knowledge and ideas gained in professional development programs will inform policies to effectively address these problems. Also, accurate identification of such barriers, which this research seeks to do, will inform designers and drafters of professional development programs to adjust such programs to make them more implementable in the classroom.

Additionally, the study achieving its goal of pointing out the difficulties teachers face in applying innovative ways of teaching will enable schools in the country to be more competitive in relation to their international peers if the relevant authorities decide to act on the findings of the study. Students in the country will be able to achieve quality education upon which they will build successful careers and lives.

Furthermore, the study makes significant contributions to policy. Knowing the perceptions of teachers on the impact of professional development programmes will inform government on

educational policy on professional development, since such findings will serve as feedback from teachers on such programmes. Moreover, the study makes meaningful contributions to theory. First, findings of the study will add to the body of knowledge concerning the implementation climate theory and the ecological model of implementation. Also, the study contributes much needed literature on the perception of teachers on professional development programmes, thereby aiding in the filling of the literature gap concerning the topic.

1.6 Delimitations of the Study

The current study was confined within the La Dade-Kotopon municipality though there were several other municipalities within which the study could have been conducted. The study was further restricted to primary data gathered from participants. Also, participants were assessed using only the interview guide prepared for the study.

1.7 Organization of the Study

The study was organized in five different chapters. The first chapter, the Introduction gave a general background to the study, presented a statement of the problem and highlighted the significance and objectives of the study. The Literature Review involved discussions about existing literature concerning the study variables. The Methodology, the third chapter, presented information regarding the design of the study, population, sample size and data collection and analysis. The Results Chapter systematically presented the findings of the study while the last chapter rendered an analysis of the findings in relation to the purpose of the study and reviewed literature.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed relevant literature pertaining to the study, covering a conceptual review of the study, the theoretical framework of the study and a review of empirical studies.

2.1 Conceptual Review

This section of the literature review discusses the relevant concepts in the study including the professional development of teachers, teachers' instructional practices, and the barriers to the successful application of professional development programmes.

2.1.1 Professional Development of Teachers

Professional development, in a broad sense, refers to the development of a person in his or her professional role, be it a teacher, lawyer, engineer, or doctor. To be more specific, Quint (2011) defined professional development as the formal in-service training to upgrade the content knowledge and pedagogical skills of teaching. Teacher professional development is defined as the process of improving both the teacher's academic standing and facilitating their acquisition of greater competence and efficiency in discharging their professional obligations in and outside the classroom (Komba & Nkumbi). Put differently, teacher professional development is the process of improving the knowledge and skills of the teacher. It is generally agreed that professional

development refers to any activity, which can effectively increase teachers learning, change their practice, and ultimately improve students' learning out-comes, although research foci vary in terms of evaluating its effects on teachers and students (Shi et al., 2019).

Glatthorn (1995) was of the view that, 'Teacher development is the professional growth a teacher achieves because of gaining increased experience and examining his or her teaching systematically'. Glatthorn (1995) further described it as the growth that occurs as the teacher moves through the professional career cycle and it is broader than staff development which is the provision of organized in-service programs designed to foster the growth of groups of teachers. Teacher professional development programs can therefore be regarded as interventions aimed at improving the instructional practices, skills, and knowledge of teachers.

Teachers develop through the introduction of systemic interventions like professional development. Professional development is crucial to the generation of new information and the continuous acquisition of knowledge in the field of teaching. Professional development of teachers is an important tool for improving teaching and learning. Teacher professional development is a career-long process which lasts throughout the career of the teacher. There is a need for professional teachers to go through professional development programs to improve their teaching skills and knowledge. To maintain a high quality of the teaching-learning process, it is essential to provide continuous professional development opportunities to the teachers.

It has a profound impact on bringing productive change to the teaching-learning process (Gul et al., 2021). The teachers benefit when they are supported by in-service training to develop their pedagogical knowledge and skills (Dufour & Marzano, 2011). Professional development improves

the competencies of the teacher, who is the heart of the classroom (Komba & Nkumbi, 2008). Such programs provide teachers with the opportunities to explore new roles, refine their practice, develop new instructional techniques, and broaden themselves as both individuals and educators.

These professional developments could be either through formal experiences (as attending workshops or professional meetings, or mentoring.) or informal experiences, such as reading professional publications, or watching television documentaries related to any academic discipline (Ganser, 2000). Professional development programs also include organizational mechanisms for continuously monitoring teacher development. Continuous monitoring leads to the identification of gaps in teacher development which can inform the design of professional development programs to sufficiently fill those gaps.

Previously professional development was thought of as a short-term process where teachers gather information on a particular aspect of work. But only in recent years, it has been thought of as a long-term process that includes regular opportunities and experiences planned systematically to promote growth and development in the profession. Two concepts about teacher professional development as seen by Hoyle (1982) were first, as a process in which a teacher continues to develop the knowledge and skills required for effective professional practice as circumstances change and as new responsibilities are accepted'. Second, as 'knowledge acquisition and skills development which should, to a greater degree than in the past, be more directly related to substantive problems faced by teachers.

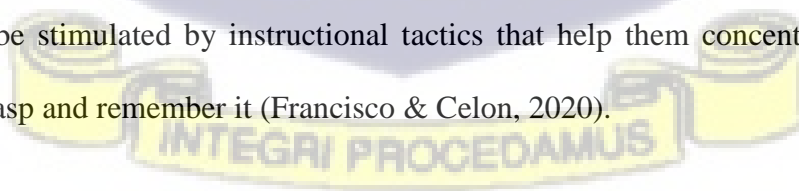


2.1.2 Teachers' Instructional Practices

Instructional practices refers to the skills and behaviours of the teachers in a classroom that are used to teach students how to behave in the classroom. They are the delivery methods teachers adopt to get their lessons across to students. Teachers' behaviours are what guide their classes and are regularly used throughout time as well as the content of the lessons. The instructional practices teachers adopt has a bearing on learning (Webb et al., 2014). In this light, teachers choose to use instructional practices that gives the best chance of realizing set learning objectives. The choice of instructional practice is also largely dependent on the level and type of the students being taught. For instance, a teacher will be required to adjust his teaching style when teaching students with special needs.

Many academics have used the terms teaching approach or teaching style to characterize instructional approaches. Several studies have used the phrases "teaching approach," "teaching methods," and "teaching style" to define instructional practices. Teachers use several teaching strategies that enable students to achieve learning outcomes.

Instructional practices are the instructional tactics employed by teachers to assist students in becoming more self-sufficient and tactical learners. When students handpick the best methods and employ them to complete assignments, these methods become effective learning strategies. Students might be stimulated by instructional tactics that help them concentrate and combine knowledge to grasp and remember it (Francisco & Celon, 2020).



According to the Dancy and Henderson (2007) framework, there are two types of instructional practices, namely, traditional teaching methods and alternative instructional practices. Traditional educational approaches are often known as teacher-centred practices. Traditional teaching procedures are formal and controlled instructional methods in which the instructor plans what, when, and how students learn. In traditional teaching techniques, the teacher assumes the role of repository of knowledge and imparts the students with knowledge. The teacher plays the role of a lecturer and an evaluator whereas the students assume a listening role. The students do not play a participatory role in class and merely listen to what the teacher has to say.

Emiliana (2017) was in consonance with this point of view when he expressed the view that traditional educational approaches include a teacher who talks more, imparts information, and heavily depends on textbooks. According to Zohrabi et al. (2012), the primary focus of the traditional teaching method is on getting children to perform well on state-mandated assessments as opposed considering students' needs which leaves students with little room for personal growth. A student-centred teaching method is a term used to describe alternative instructional practices students are passive recipients of knowledge.

Alternative instructional practices on the other hand put students at the centre of teaching. The approach is also termed as the learner-centred approach because everything that ensues in and outside the classroom revolves around the student. It is an approach that is problem-centred, responsive, collaborative, and democratic whereby both the student and the teacher have a say in deciding how, what, and when to learn (Dancy & Henderson, 2007). The approach revolves around the students' views, pre-existing knowledge, interests, capacities and needs.

Unlike the traditional approach where the teacher dictates everything that happens in class, the alternative approach creates an enabling environment for all students to learn, transfers responsibility to students over their learning and help the make decisions and value judgements about the relevance of what is taught to their own interests and lives (Brown, 2008). Wolk (2010) asserted that in the environment created by alternative learning approaches, the teacher guides learners to achieve their goals. This teaching approach is deemed flexible and is associated with experiential learning and self-directed learning (Acat & Donmez, 2009). Studies have demonstrated that students who undergo alternative teaching practices perform better academically (Walsh & Vandiver, 2007; Hassidov, 2019).

2.1.3 Barriers to the Successful Application of the Professional Development Programs of Teachers

One encounters several challenges during the implementation of new concepts learnt at professional development programs. These challenges are known as “barriers”. A barrier is defined as “any condition that makes it difficult to make progress or to achieve an objective” (Yuen et al., 2003).

Different categories have been used by researchers and educators to classify barriers into two categories: extrinsic and intrinsic barriers (WordNet, 1997, as cited in Yuen et al., 2003,p. 237). However, their definitions of extrinsic and intrinsic were different. In one study, Ertmer (1999) referred to extrinsic barriers as first-order and cited access, time, support, resources and training, and intrinsic barriers as second-order and cited attitudes, beliefs, practices, and resistance;

whereas, Hendren (2000, as cited in Yuen et al., 2003, p. 237) indicated that extrinsic barriers were seen as affecting organizations rather than individuals, while intrinsic barriers were seen as affecting teachers, administrators, and individuals.

Another classification found in the literature is teacher-level barriers versus school-level barriers. Becta (2004) grouped the barriers according to whether they relate to the individual (teacher-level barriers), such as lack of time, lack of confidence, and resistance to change, or to the institution (school-level barriers), such as lack of effective training in solving technical problems and lack of access to resources. Similarly, Blamire et al. (2006) categorised barriers into micro-level barriers, including those related to teachers' attitudes and approach to ICT, and meso level barriers, including those related to the institutional context. The latter added a third category called macro-level (system-level barriers), including those related to the wider educational framework. Another perspective presents the obstacles as about two kinds of conditions: material and non-material (Pelgrum, 2001). The material conditions may be the insufficient number of computers or copies of software. The non-material obstacles include teachers' insufficient ICT knowledge and skills, the difficulty of integrating ICT in instruction, and insufficient teacher time.

Some of these studies look at hurdles at the level of the instructor, the institution, or the system. However, because one of the goals of this work is to identify the current and prospective difficulties that Science instructors encounter in their classrooms, this analysis will only look at the teacher and school-level barriers.



2.3 Theoretical Framework

The theoretical framework of the study was based on two theories. The implementation climate theory developed by Klein and Sorra (1996) and the Durlak and DuPre (2008) implementation model.

2.3.1 Implementation Climate Theory

The implementation climate theory was developed by Klein and Sorra (1996) based on an extensive review of determinants for the effective implementation of technology. The theory basically suggests that the effective implementation of new ideas is dependent on the implementation climate created or present at the organization. In other words, the theory proposes that the implementation climate in an organisation determines the effective implementation of innovation.

Applied to the current research setting, the theory suggests that the effective implementation of knowledge and skills gained by JHS Science teachers within the La Dade-Kotopon municipality from professional development programs is dependent on the implementation climate in schools within the municipality. Klein and Sorra (1996) noted that organizations use different policies to facilitate the implementation of new ideas including technical support, training, workload changes, implementation monitoring, and enforcement procedures among other measures. According to them, organizations vary in their adoption of such measures based on the type and level of innovation. They assert that, an organisation's implementation climate arises from its adoption of combinations of such policies and practices.

Implementation climate is defined by Klein and Sorra (1996) as the common perception among intended users of new ideas that the usage of implementation is expected, supported, and rewarded. It is the feeling or perception among innovation users that the usage of innovation is feasible and rewarding owing to the environment created by the combination of policies and practices. The theory proposes that the stronger the implementation climate, the more consistently new ideas will be used in the organisation and vice versa.

Making meaning of the theory, the theory proposes that the implementation climate in schools within the La Dade-Kotopon municipality will be heightened if the schools introduced appropriate policies and practices to facilitate the application of new ideas such as alternative teaching approaches and skills acquired in professional development programs. The provision of technical support, in the form of teaching and learning materials will increase the implementation climate at schools. The introduction of other policies such as training and enforcement procedures will enable Science teachers implement teaching ideas gained from professional development programs.

The implementation climate theory has been justified by several studies (Pullman et al., 2018; Turner et al., 2018; Williams et al., 2018). Turner et al. (2018) tested the implementation climate theory in a community pharmacy medication management program. They observed that implementation climate was positively and significantly linked with implementation against non-implementation. Williams et al. (2018) hypothesized that organizational climate and implementation climate have joint, cross-level effects on the implementation of evidence-based practices by clinicians in behavioural health organisations. The researchers' hypothesis was confirmed when they found that in organisations with more positive organisational climates at

baseline, higher levels of implementation climate influences increased evidence-based practices among clinicians. Pullman et al. (2018) also confirmed the hypothesis in their study that implementation climate is linked with the intensity of workplace-based clinical supervision for evidence-based treatment delivery for children.

It can therefore be concluded that the implementation climate theory explains the phenomenon being studied in this research and is evidenced based. Science teachers will apply knowledge gained from professional development programs more consistently if schools adopt the right policies and practices to improve the implementation climate.

2.3.2 Durlak and DuPre (2008) Ecological Model of Implementation

Durlak and DuPre (2008) developed an ecological model of implementation to explain the factors affecting the successful implementation of innovation. The model was developed based on the review of 500 quantitative empirical studies on implementation, and 81 implementation reports. The review led to the development of a five-thronged model which describes the factors that affect implementation. The Durlak and DuPre (2008) ecological model suggests that, implementation is affected by five categories of factors based on the characteristics of such factors. The five factors include

1. Characteristics of the community
2. Characteristics of the providers of the innovation
3. Characteristics of the innovation
4. Aspects of the prevention delivery system; that is, the characteristics relating to organisational functioning

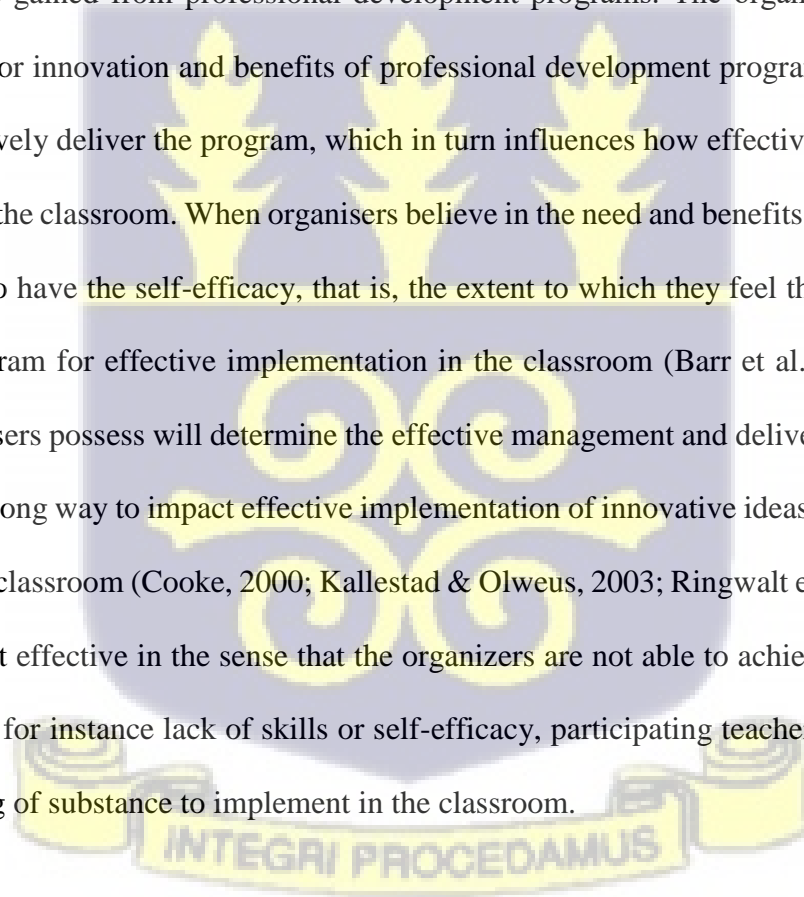
5. Aspects of the prevention support system; that is, the characteristics relating to training and technical support

Applying the model generally to the implementation of ideas gained from professional development programs by teachers, the model suggests that, firstly, the characteristics of the teacher community undergoing professional development influences the effective implementation of ideas gained from professional development programs. The characteristics of the organisation organizing the professional development program as well as the features of the idea being implemented are equally influential. Also, the characteristics and the climate at school in which teachers apply innovative ideas impact the effective implementation of innovative ideas gained from professional development program. Conclusively, the nature of training and technical support given to teachers, according to the model, affect the implementation of innovative ideas in the classroom. These five factors that affect the implementation of innovative ideas are discussed below;

According to the model, the community context in which a program will be conducted affect the effectiveness or success of the program. Factors within the community context such as funding, politics and policy. Politics within the community can either facilitate or hinder the effective implementation of innovative ideas gained from professional development programs. For instance, a group of teachers who have been coerced to attend a professional development program by the superiors are less likely to implement ideas gained from such programs in the classroom, due to the possibility that they may not be committed in the first place to the program (Berman & McLaughlin, 1976). Policy within the community of teachers of have a similar effect on

implementation of innovative ideas from such programs. When teacher associations have policies that require their members to undergo some form of professional development activities for instance, teachers will be more committed and willing to implement proceeds of such programs in the classroom (Durlak & DuPre, 2008). Durlak and DuPre (2008) asserted that though funding may not be enough to guarantee the effective implementation of such ideas, they play an enhancing role in the implementation of innovation gained from professional development programs.

The characteristics of the provider of innovation, in the case of this study, the organizers of professional development programs are key determinants of the effective implementation of innovative ideas gained from professional development programs. The organizer's perceptions about the need for innovation and benefits of professional development programs improves their ability to effectively deliver the program, which in turn influences how effective the ideas will be implemented in the classroom. When organisers believe in the need and benefits of such programs, they are likely to have the self-efficacy, that is, the extent to which they feel they will be able to deliver the program for effective implementation in the classroom (Barr et al., 2002). Also, the skills the organisers possess will determine the effective management and delivery of the program which will go a long way to impact effective implementation of innovative ideas gained from such programs in the classroom (Cooke, 2000; Kallestad & Olweus, 2003; Ringwalt et al., 2003). When programs are not effective in the sense that the organizers are not able to achieve the aims of the program, due to for instance lack of skills or self-efficacy, participating teachers will not be able to learn anything of substance to implement in the classroom.



Also, the characteristics of the innovation itself, according to the model, plays an important role in its implementation. The nature of the innovative idea can either facilitate or hurt its implementation. The compatibility of the innovation with the goals and mission of the organisation, in this case the schools, determines the degree of success of its implementation (Berman & McLaughlin, 1976; Gottfredson & Gottfredson, 2002). For example, when a teacher attempts to implement an idea foreign to the goals and mission of the school, it is likely that the teacher will be stopped by his or her superior officers, or the structures inherent in the school, being a function of the mission of the school will inhibit such implementation. In other words, the innovative idea must be appropriate for the organization. The adaptability or flexibility of an innovative idea also affect the success of its implementation (Mihalic et al., 2004; Richard et al., 2004; Riley et al., 2001; Rogers, 2003). When the innovation is more adaptable and flexible, there is a more likelihood that its implementation will be successful than otherwise. Rigid innovative ideas require strict and exact circumstances to thrive while flexible ideas do not. In this regard, in a situation where the strict and exact circumstances for effective implementation do not exist, flexible ideas are more likely to thrive than rigid ideas.

The model describes factors relevant to the prevention of delivery system as the factors that relate to the general organisational setting or capacity that affect the effective implementation of innovation. The model identifies three umbrella factors relating to the organisational capacity to impact the implementation of innovation. They are the general organisational features, specific organisational practices and processes, and specific staffing considerations. The general organisation context in schools determine the effectiveness of implementation of innovative ideas gained from professional development programs. The general organisation features include the

work climate in an organisation, which can be assessed by sampling employees' perceptions about trust, morale, conflict resolution procedures and collegiality (Mihalic et al., 2004). It also includes the organisational norms with respect to change, regarding the organisations' openness to innovativeness, change and risk-taking, or the extent to which an organisation is committed to maintaining the status-quo. The extent to which an organisation can incorporate change, as well as its shared vision, also count as a general organisational feature in determining the success or otherwise of implementation. The specific practices and processes in an organisation including its decision-making processes, coordination with other agencies, communication processes and patterns, formalisation of tasks, centralisation among other practices and processes in an organisation also affect the effectiveness of implementation of innovative ideas (Rogers, 2003). According to the model, specific staffing considerations including its' leadership, and managerial and administrative support also affect innovation implementation.

The last major component of the model is the prevention delivery system, which concerns training and technical assistance given to innovation providers, who in the case of this study, are the organizers of professional development programs. When organizers of professional development programs have the necessary training and technical support, they will be able to deliver effective programs which will influence the effective implementation of innovative ideas gained from professional development programs, in the positive sense. Technical assistance may include some combination of re-training of initial providers, training of new staff, provision of emotional support among others. For instance, the early monitoring of implementation of professional development programs, quickly followed by retraining to fill knowledge gaps is regarded as highly effective (DuFrene et al., 2005; Greenwood et al., 2003). Technical support to staff of professional

development organizers leads to staff retention, which positively impacts effective implementation.

Durlak and DuPre (2008) ecological model of implementation is explained in the figure below:

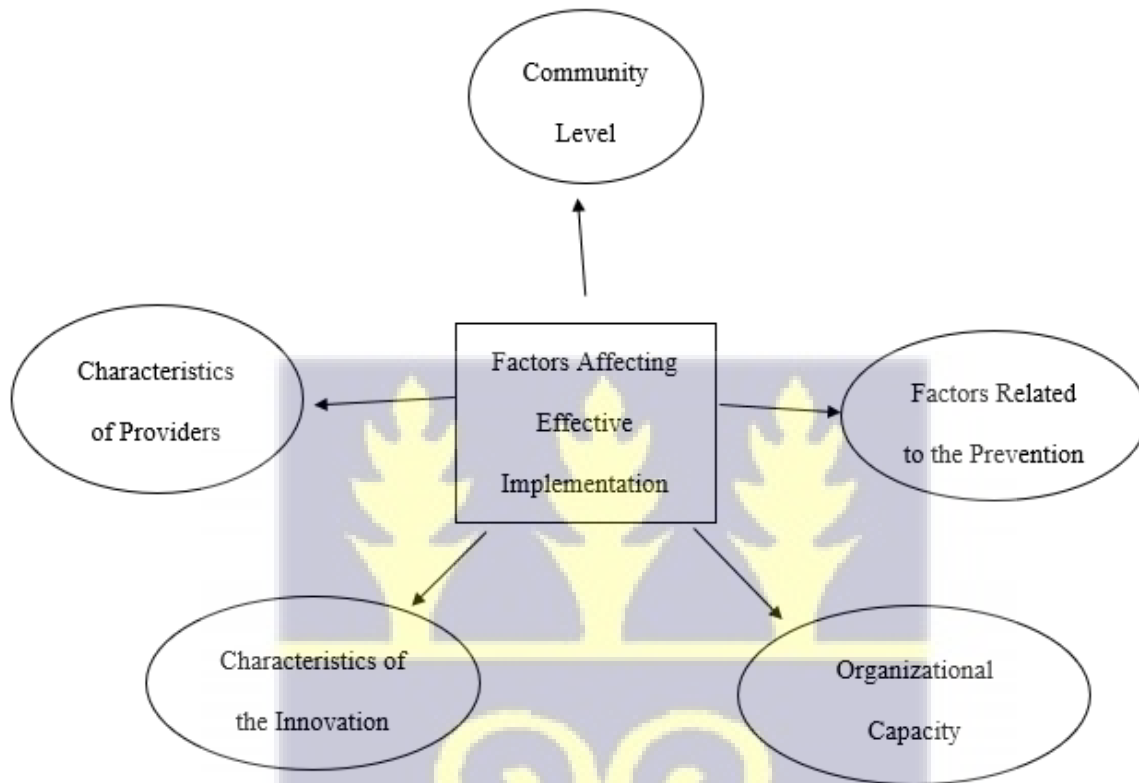


Figure 1: The Five Components of the Durlak and DuPre (2008) Ecological Model of Implementation

In conclusion, it can be said that the two theories adopted by study duly explain the phenomenon of the application of professional development programmes in schools. First, the implementation climate theory essentially emphasises that the environment in schools affect the application of professional development programmes. The environment can also aggregately influence their

perceptions of such programmes since the environment generally affect the success of these programmes to the extent that the environment of application ultimately decides the success of the programmes. The ecological model of implementation is basically similar to the implementation climate theory, as it also underscores some factors that affect the success of the application of professional development programmes.

2.2 Empirical Review

The empirical review of the study is conducted along three lines. Empirical studies relating to teachers' professional development, teachers' instructional practices and barriers teachers face in implementing ideas gained from professional development programs are reviewed.

2.2.1 Professional Development of Teachers

Buczynski and Hansen (2010) did research to examine the effectiveness of a professional development programs conducted purposefully to enhance the application of the inquiry-based method in the teaching of Science. Surveys and focused group discussions revealed that Science teachers who enrolled in the program have improved their content knowledge in Science. However, they faced some challenges in the application of the inquiry-based method in the classroom including limited resources, language learning, classroom management issues, mandated curriculum pacing and time constraints.

Another research conducted by Komba and Nkumbi (2008) investigated the perceptions and practices of professional development programs in Tanzania. In the study, 186 head teachers,

primary school teachers, school inspectors, district education officers among other education officials were purposively sampled and assessed using interviews, questionnaires and observational checklists. Findings showed that professional development programs were poorly coordinated and underfunded. Findings further revealed that professional development practices in the country focused both on the academic improvement and professional development of teachers. The major advantage of this study was that it broadened its scope of respondents to include other education officials aside teachers who may share divergent perceptions and views.

A similar study was conducted by Tantawy (2020) to probe the perceptions teachers have about the influence of professional development programs on teachers' performance career progression and commitment in Dubai. Using a semi-structured interview, all three participants admitted to the positive influence of professional development programs on their performance, career progression, personal qualities, students' outcomes, and commitment to the teaching profession. However, this study could be criticised for its small sample size of three, which may make finding unrepresentative of the population.

Research done in the United States by McCray (2018) to determine the perceptions teachers had about professional development programs found out that although teachers perceived professional development programs to be impactful as a tool for learning and teacher leadership, effective collaboration is needed to realize its full potential.

Swan (2007) investigated the utilization of generic collaborative Mathematics tasks in promoting teacher professional development in Dortmund, Germany. The author described the theoretical basis for the design of the tasks, the tasks themselves in the study. The researcher also examined

teachers drawn from 44 colleges of education after they had undergone a professional development program where generic collaborative Mathematics tasks were used. Student reports and classroom observations revealed that, there were profound changes to teachers' instructional practices. The researcher also found that, teachers' beliefs about Mathematics, teaching and learning both influenced the way they implemented generic collaborative Mathematics tasks in the classroom and were challenged by the cognitive and affective outcomes. The author ultimately concluded that the tasks were effective in improving teachers' instructional practices in teaching Mathematics.

Reeves (2013) set out to examine the effectiveness of online professional development programs, while identifying the factors that account for the effectiveness or otherwise of the online programs. The premise of the study as stated by the author was that, though online professional development programs are increasingly popular and pervasive, there was limited research into the antecedents of the effectiveness or otherwise of such programs. Using a survey of large-scale online development program initiative involving 1,231 participants, the causes or antecedents of self-reported changes in teacher knowledge, classroom practices, and student achievement as a result of online professional development programs were probed. Among the antecedents of improvement in teacher knowledge, prior knowledge, state certification, computer proficiency, school support, coherence, session readings and transferability of content were identified. School support and teacher knowledge were identified as antecedents of improvement in classroom practice while classroom practice predicted student achievement. Ultimately, it was concluded that online professional development programs were effective.

Similarly, Garet et al. (2001) took a systematic look at the antecedents of effective teacher professional development. Specifically, the study examined the impact of professional development on Mathematics and Science teachers' learning. Using probability sampling, 1,027 Science and Mathematics teachers were sampled to undergo a survey. According to the authors, the study presented the first empirical comparison of effects of different characteristics of professional development on teachers' learning. Data analysed using ordinary least squares regression revealed three main characteristics of professional development courses that impact the knowledge levels and instructional practices of teachers. They were, the focus on content knowledge, coherence with other learning activities and opportunities for active learning. The researchers concluded that it is through these core characteristics that the form of the activity, collective participation of teachers from the same school, subject or grade, and the duration of the activity, professional development programmes impact teachers' knowledge and instructional practices.

Chen, et al. (2009) also researched on online professional development programs where the researchers aimed to identify the perceptions teachers held about online professional development programs with a focus on online synchronous discussions. To achieve this aim, transcripts of six online synchronous discussions, containing 3,600 messages from an online professional development program were analysed. Additionally, the researchers conducted 10 interviews with participating teachers in online professional development programs to gain a deeper understanding of the perceptions they held about the programs. Findings indicated that, teachers did not only regard online professional development programs to be a useful learning tool, but it was also a platform for teachers to socialize, request and provide information and support each other.

Analyses also showed that teachers sent more social at the beginning and end of online professional development programs which did not involve any cognitive or metacognitive skills. However, findings indicated that the information exchange during synchronous discussions were not effective for some participating teachers. According to respondents interviewed, synchronous discussions did not have much advantage over face-to-face discussions. The researchers speculated that this may be due to the lack of self-regulated skills by the participants or the moderator.

Another online teachers' professional development study was conducted by Yang and Liu (2004). In the study, the researchers investigated the effectiveness and value of online workshops as a professional learning community creation tool. The research aimed to examine the pattern of interaction, mentoring quality, and teachers' attitudes toward participation in online teacher's professional development programs. To obtain the aims of the study, 128 teachers were co-mentored by senior elementary school teachers to meet a professional development standard. Surveys and content analysis were used to collect data. Participants' online message posts were also analysed. Findings indicated that most participants benefited intellectually and emotionally from online workshops. Additionally, the study found that though online workshops had satisfactory positive learning effects on participants, participants' participation in online workshops were not interactive and flexible enough.

Bayar (2014) investigated teachers' perceptions about the components of effective professional development activities in Turkey. Basing the study on the premise that there is a lack of clarity as to what components make professional development programs effective, the author sought to define what effective professional development programs are, and to list the key components of

professional development programs. Sixteen elementary school teachers were interviewed after they had undergone a one-year professional development program, about their experiences in the program. The 12 participants were asked to generate a list of what they considered as key components of an effective professional development program. The researcher additionally analysed training results reports from the Turkish Ministry of National Education. Findings revealed six key components of effective professional development activities, including a match to existing school needs, a match to existing teacher needs, teacher involvement in the designing and planning of the programs, long-term engagements, high quality instructors, and active participation opportunities.

The effects of an engineering-focused professional development program on how teachers choose to implement engineering in the classroom were examined by Guzey et al. (2014). These authors premised their study on the fact that the increasing emphasis on incorporating engineering into K-12 classrooms creates the need to satisfy the needs of a complex and multidisciplinary society. The study involved 198 grade 3 to grade 6 teachers from 43 schools in 17 districts, who participated in a year-long professional development program designed to aid the integration of a new engineering-focused state Science standards. Posters including lesson plans and student artefacts were used to the engineering practices of teachers and their implementation in the classroom. Findings mainly indicated that teachers who had undergone the program were able to effectively design and implement engineering lessons, which suggests that teachers' effective implementation of engineering lessons in the classroom was linked with the structure of professional development programs.

2.2.2 Teachers' Instructional Practices

Huffman et al. (2003) conducted a study to examine the relationship between different types of professional development, teachers' instructional practices and students' achievements in Mathematics and Science. The types of professional development studied included curriculum implementation, immersion, collaborative work, and examining practice. Data pertaining to teachers' instructional practices and the amount of professional development undergone by teachers was collected through a survey. The sample of the study included 94 middle school Science teachers and 104 middle school Mathematics teachers. Eight grade state Science and Mathematics test data were used to assess student achievement in Science and Mathematics. Regression analyses conducted showed that for both Science and Mathematics teachers, curriculum development and examining practice were significantly related to the use of standards-based instructional practices. With respect to student achievement, only curriculum development had a significant relationship with student achievement.

Firmender et al. (2014) also sought to investigate the relationship between teachers' instructional practices and students' achievement in mathematics. The researchers specifically sought to determine whether there was a relationship between two specific discourse-related instructional practices and students' mathematics achievement in geometry and measurement as part of a research study on the effectiveness of advanced mathematics curriculum for kindergarten and grades one and two. Engaging students in verbal communication in mathematics and encouraging the use of appropriate mathematics vocabulary were the two instructional practices incorporated in the mathematics units. Students' achievement in mathematics was assessed using Open-

Response Assessments. Hierarchical linear method was used to determine the relationship between the instructional practices and students' achievement in mathematics. Findings demonstrated that there was a significant positive relationship between the two instructional practices and mathematics achievement.

McNeill and Krajcik (2008) examined the instructional practices middle school science teachers employed in the introduction of scientific explanations and whether these practices influenced students' ability to construct scientific explanations during a middle school Chemistry unit. To achieve the aims of the study, 13 teachers created a project-based Chemistry unit, where they explained how to "make new stuff from old stuff" with 1,197 seventh grade students. Each teacher's enactment of the focal lesson on scientific explanation was videotaped and coded for four different instructional practices namely, defining scientific explanation, modelling scientific explanation, connecting scientific explanation to everyday explanation, and making the rationale of scientific explanation explicit. Findings demonstrated that teachers vary in the activities they engage in, and in quality during the introduction of scientific explanations. It was also found that teacher's use of instructional practices influenced students' understanding and learning of scientific explanations, and the effect of these instructional practices depended on the context in relation to other instructional practices teachers used.

O'Dwyer et al. (2015) explored the relationship between the instructional practices teachers employed and student achievement. The authors premised the study on the continued emphasis on linking instructional practices to learning outcomes and what policy tweaks in instructional practices could engender better learning outcomes. Using data from the Trends in International

Mathematics and Science Study (TIMSS) from four countries, U.S, Japan, Korea and Singapore, the study examined eighth grade teachers' use of instructional practices that enhance the conceptual understanding of students and examined the relationship between those practices and Mathematics test scores. Descriptive statistics and a series of multilevel regression models revealed that teachers in the U.S. used similar practices with the Koreans in the frequency and types of instructional practices. Teachers in the U.S and Korea were also found to use some practices more frequently than teachers from Singapore and Japan. Findings also indicated that a subset of instructional practices were related to Mathematics achievement in Singapore and the U.S. but not in Japan and Korea. Teachers' practices accounted for very little in the variability in test scores even in cases where instructional practices had significant positive relationships with Mathematics achievement.

Yilmaz et al. (2017) investigated the instructional practices adopted by science teachers for the argumentation-based teaching based on the premise that argumentation is a prominent concern in the research of Science education with policymakers encouraging Science teachers to adopt the method. The study took place during a graduate course seeking to develop Science teachers' theory and pedagogy of argumentation. Seven participants partook in the study including one elementary Science teacher, two Chemistry teachers and four graduate students with background in Science education. Data was collected through video and audio recordings, post-interviews, and written materials of participants. Findings revealed three types of argumentation-based instructional practices including meta-level instructional strategies for argumentation, basic instructional strategies for argumentation, and meta-strategic instructional strategy for argumentation. It was

concluded in the study that the research provided a coding framework for classifying argumentation-based Science teaching.

The relationship between teachers' instructional practices and student absenteeism was examined by Gottfried and Ansari (2019) at the elementary school level. The study was anchored in the premise that prior studies only focused on the effect of absenteeism on students but not the effect it has on teachers' instructional practices. The study aimed to investigate whether kindergarten teachers with more frequent student-absenteeism taught any different than teachers with less student absenteeism. It was found that student absenteeism impacted the instructional practice teachers adopted based on a nationally representative dataset used. However, there was no difference in the rigor and dosage of academic instruction between instructional practices. There was no evidence of heterogeneity among the sample of teachers used, meaning the findings of the study are more generalizable.

Barak and Shakhman (2008) conducted research aiming to explore the practices and beliefs Physics teachers in Israel possessed about introducing reform-based instruction in the Physics class. The study was based on the presupposition that though Physics was an established subject in schools, extensive differences had been identified among teachers in relation to issues like using rich instructional strategies in class, their beliefs about students' abilities to develop higher-order thinking, and their self-confidence in the utilization of progressive instruction. Data was gathered through semi-structured interviews with eleven experienced physics teachers. Findings indicated that Physics teachers regarded reform-based instruction rather as an idealistic, impractical view of teaching Physics. It was shown that teachers occasionally introduced enhanced instructional

strategies explicitly required by the formal school curriculum such as presenting, analysing and generalizing results in a variety of forms. However, the revelation was made in the study that Physics teachers utilized fewer extra-curriculum strategies aimed at engendering higher-order thinking such as demanding students to formulate their own questions or introducing them to problem-solving strategies in class.

The effect of high-stakes tests on teachers' instructional practices was explored by Vogler (2005). Adopting the survey approach, data was collected from a stratified sample of social studies teachers in Mississippi, who teach the same content that is tested in the state's high school graduation examination. Data analysis indicated that teachers who spent long hours preparing their students for the examination are likely to adopt traditional, teacher centred approaches such as multiple-choice questions, textbooks, textbook-based assignments, and lecturing. Also, teachers' adoption of instructional practices was mostly influenced by factors regarding sanctions attached to the examination rather than the teachers' desire or their beliefs about using the best practices.

A Shirrell et al. (2019) study explored the circumstances under which elementary school teachers' professional learning opportunities predicted changes in their instructional practices and beliefs in relation to Mathematics. The study was premised on the notion that more advanced instructional practices are being introduced in schools in the United States due to the introduction of more ambitious content in school curricula. Adopting the survey method, 1,238 elementary school teachers were assessed on items such as their background, day-to-day experiences and their work interactions. Teachers' Maths practices, beliefs, formal professional learning opportunities, on-the-job professional learning opportunities were also assessed in the survey. It was found in the

study that teachers' on-the-job interactions during the first year of reform predicted changes in their instructional practices. Findings also indicated that these changes had a link with the infrastructure that local school systems created to support Mathematics learning. Findings further revealed that teachers' participation in formal professional development programs informed their beliefs with regards to instructional practices but not their practices.

Lastly, Ozdemir (2019) ran a study to probe the impact of school principals' leadership behaviours on students' achievement in Mathematics through professional community and teachers' instructional practices in lower secondary education in economically disadvantaged communities. The study was conducted in thirty-six lower secondary public schools in Mamak and Altindag boroughs in Ankara, Turkey. A two-level quantitative research design was adopted to achieve the objectives of the study. Data was analysed in relation to teachers' instructional practices and school level factors. The finding of the study indicated that the leadership behaviours of principals had an indirect effect on the Mathematics achievement of students through the instructional practices of teachers.

2.2.3 Barriers Teachers Face in Implementing Professional Development Programs

Penuel et al. (2007) conducted a study to examine the effects of different characteristics of professional development programs on Science teachers' knowledge and the barriers they face in implementing ideas gained from such programs. The research analysed data from a survey of 454 teachers served by 28 different professional development providers in a hierarchical linear modelling framework. Findings demonstrated that professional development programs increased teachers' knowledge. It was also revealed that such programs cause teachers to adopt more Science

friendly approaches to teaching. It was further demonstrated in the study that teachers' perceptions regarding the success of the programs impact their successful implementation in the classroom.

Johnson (2006) set out to investigate the barriers Science teachers face in the implantation of reforms learnt in professional development programs. The author focused on Science teachers from two middle schools in the United States who were in their second year of professional development. It was found that even though professional development programs were well coordinated and funded, teachers encounter technical, political, and cultural barriers to implementation. This research sheds light on the fact that barriers faced in the implementation of professional development programs are not limited to poor countries.

Mendenhall et al. (2013) explored stakeholders' perceptions of barriers and facilitators relating to the effective adoption and implementation of a comprehensive school improvement model. Forty stakeholders including teachers, students and school social workers were assessed in the study. Lack of buy-in and understanding of the improvement efforts and limited time were found to be the barriers to school improvement efforts. Professional development, on-site consultation, and leadership were revealed to be crucial facilitators for success.

Sobolewski et al. (2021) conducted research to investigate the barriers hampering the effective implementation of movement integration, a method to increase physical activity with numerous learning outcomes. Findings revealed that barriers included lack of space in classroom, time constraints, fear of losing control and lack of confidence and competence. Movement integration, which is an alternative learning approach cannot be implemented to a full extent, as findings of the study revealed, due to the barriers discovered in the study.

Another study was staged along similar lines by Martell (2020), where the barriers hampering the successful implementation of the inquiry-based learning approach were investigated. The study also sought to determine how professional development programs influence teacher development over time. The researcher employed the longitudinal approach to assess the teaching tools and practices of three history teachers. Findings revealed that professional development programs influenced the development of teachers, which was evident as they developed inquiry-aligned beliefs and inquiry-related conceptual tools. However, teachers faced obstacles in the implementation of the inquiry approach as they lacked the practical tools and support.

Goktas et al. (2009) sought to identify the main barriers and possible enablers for integrating information and communication technologies in pre-service teacher education programs in Turkey. Data was collected through questionnaires and interviews. Specifically, data was collected by means of questionnaire from 53 deans in schools of teacher education, 1,330 prospective teachers, 111 teacher educators, and from interviews from six prospective teachers and six teacher educators. Findings indicated that most respondents believed that the lack of in-service training, lack of the right software and materials, and the lack of hardware were the main problems facing the integration of ICT into pre-service teacher education programs in the country. Participants mainly agreed that the only enabler for the integration is the appropriate strategy they believed they had.

Ghavifekr et al. (2016) conducted a study where the researchers investigated the challenges encountered in the use of information communication technology (ICT) in the teaching and learning process based on the premise that the use of ICT in classrooms enable students to acquire

the relevant skills to thrive in the 21st century. Using a quantitative approach, data was collected through questionnaires from randomly sampled 100 secondary school teachers from the Malaysian state of Melaka. Respondents identified the limited accessibility and stability of network connections, lack of effective training, lack of technical support, limited time and lack of teacher competency to be the majors facing the adoption of ICT in the classroom.

Kilinger et al. (2003) looked at the barriers and facilitators of scaling up or increasing the use of research-based teaching practices in elementary schools in the United States of America. Twenty-nine elementary school teachers from six schools were made to undergo professional development programs and afterwards observed throughout the school year through classroom interviews, observations, and teacher logs. Teachers mostly lamented limited instructional time, too many competing demands on time, frequent interruptions, and limited teaching, and learning materials. Findings also revealed that adequate preparations, effective strategies and the voluntary cooperation of students were the major facilitators of the use of research-based methods in elementary school teaching.

A study by Watson and Yang (2016) probed impeding factors encountered by teachers in the United States in using games for instruction, and how their perceptions of these problems is influenced by gender, teaching level and experience with using games to teach. The study started with an initial interview of 15 teachers who had prior experience using games to teach in the K-12 classroom. Based on the interview, two web-based surveys were generated and sent to two groups of teachers; one group had experience using games to teach and the other group did not have experience. There was a total of 109 respondents. Four challenges were identified, including

challenges of implementing games effectively, challenges with using technology, challenges with the current educational system, and challenges with obtaining games. With respect to gender, males found challenges of the effective implementation of games to be more troubling while females found technological challenges and challenges of acquiring games to be more challenging. Middle and high school teachers found challenges of implementing games to be troubling than middle and primary school teachers, who found challenges with obtaining games to be more troubling. Teachers with prior experience of using games to teach found implementation challenges and the current educational system more inhibiting.

Soysal and Radmard (2017) investigated the challenges teachers in Turkey faced regarding their implementation of learner-centred teaching, which is a major requirement of educational reform-based initiations in Turkey. To obtain the aims of the study, a naturalistic inquiry was conducted where 31 teachers were observed as they applied the learner-centred approach in classrooms. The respondents identified 12 teaching barriers they faced and made a few attributions to the challenges they faced. Challenges identified included a lack of student participation in class activities, low learning motivation of students, ineffective negotiation of meaning, low confidence of students, obligation of close repetition of course content, problems with class management, limited instructional resources, limited time, among other factors. Teachers attributed the causes of some these problems to rote learning on the part of students, students' dispositions and personalities, classroom size, overloaded curriculum among others.

Burden and Hopkins (2017) also delved into the perceptions, attitudes and beliefs of pre-service teachers using the iPad for their professional learning purpose and for teaching during school

placements. Using a sample of 117 pre-service teachers undergoing a one-year postgraduate qualification in Britain to achieve qualified teaching status, a mixed approach consisting of a questionnaire survey and focus groups was adopted. It was found that the lack of infrastructure, lack of technical know-how and the absence of training were acting as barriers for the effective adoption of technology by pre-service teachers.

Reviewed empirical studies largely point to the fact that professional development programs influenced the teacher development positively (Buczynski & Hansen, 2010; Komba & Nkumbi, 2008; Martell, 2020; McCray, 2018; Penuel et al., 2007; Tantawy, 2020). The effectiveness of professional development programs however did not mean that they were not without obstacles as several studies reviewed indicated that teachers mostly encounter obstacles in the implementation of such programs (Buczynski & Hansen, 2010; Johnson, 2006; Martell, 2020; Sobolewski et al., 2021).

2.4 Conceptual Framework

The conceptual framework of the study, as based on reviewed literature is that teachers undergo professional development programs to improve their content knowledge and instructional practices. However, after gaining these improvements, they face barriers in the implementation such improved knowledge and instructional practices in the classroom. Figure 2 below explains the framework of the study



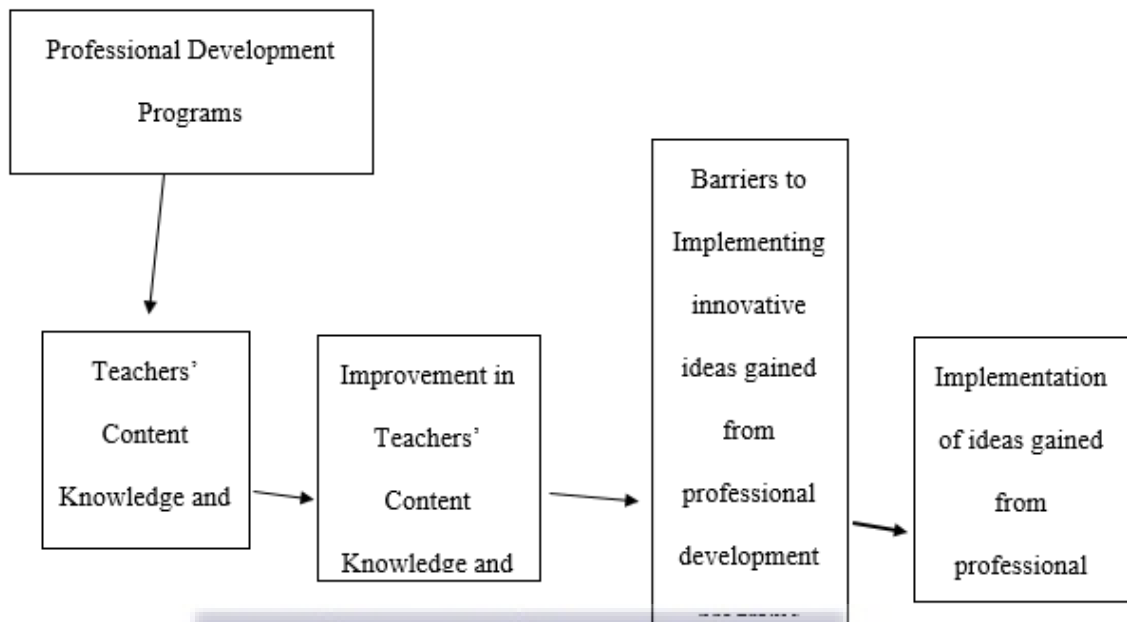


Figure 2: Conceptual Framework of the Study



CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the study's methodology which includes the research settings, research design, target population, sampling and sample size, instrument, procedure data collection, data analysis, and ethical consideration.

3.1 Research Philosophy

A research philosophy is a viewpoint on how information about a phenomenon should be obtained, examined, and applied. The diverse philosophies of study approach are referred to under the name epistemology, which contrasts with doxology, which refers to what is considered to be true. In the Western tradition of science, positivist (also known as scientific) and interpretivist (sometimes known as antipositivist) are two important research ideologies (Galliers, 1991).

The foundation of the study is based on the positivist philosophy. According to positivists, reality is stable and can be viewed and described objectively, that is, without interfering with the phenomena being researched (Levin, 1991). They argue that observations should be repeatable and that phenomena should be separated. In order to find patterns in and establish connections between some of the components of the social environment, this frequently entails manipulating reality with variations in just one independent variable. This philosophy was adopted because the researcher aimed to objectively assess the perception of teachers concerning the impact of

professional development programmes, believing that the phenomenon is stable and objectively observable.

3.2 Research Design

Research design is an approach that is aimed at assessing the opinions, attitudes, and behaviours of people on a particular subject (Jatoo, 2002). The qualitative approach was adopted by this study. The qualitative approach means going into the field into the real world of program, organization, neighbourhood, street and getting close enough to the people and circumstances there to capture what is happening. It makes possible description and understanding of both externally and internally observed behaviour and opinion (Chandra & Shang, 2017). The qualitative design was adopted because the study aimed to get a detailed sense of the perception of teachers on the impact of professional development programmes to get a deep and full understanding of the phenomenon, since the approach is adopted to collect in-depth information, as opposed to the quantitative approach which is used to collect shallow, numerical data.

The study adopted a case study design. Case study research is said to allow for an in-depth review of new or unclear phenomena whilst 'retaining the holistic and meaningful characteristics of real-life events (Phelan, 2011). This design was used to find out science teacher' general views about their professional development activities for the development of teacher competencies. These views were triangulated to corroborate and validate the overall findings for a more complete and comprehensive understanding of the study. The case study method was adopted because the researcher intended to focus on only science teachers in the La Dade-Kotopon municipality.

3.3 Research Setting

Research setting is the physical, social, or experimental context within which research is conducted (Davies, 2021). The La Dade-Kotopon municipality which is within the Greater Accra Region was chosen because it is imperative to choose a setting that is made up of JHS Science teachers from all parts of the country to ensure that the sample taken is a representation of the entire Science teacher population in Ghana. Accra is considered the capital of Ghana and as such houses the seat of government, making it a hub for both international and local commerce (Ghana Statistical Service, 2012). The region harbours people from a multi-ethnic society with representations from all parts of Ghana in terms of religion, political party affiliation, and ethnic identities, thereby making it a suitable setting to be considered for the study setting.

The study is limited to La Dade-Kotopon Municipality with a particular focus on all JHS Science teachers in all the six (6) clusters of schools who took part in the Experimento Science training workshops. The researcher chose La Dade-Kotopon Municipality, since it is the only municipality that has organized Experimento training for the Science teachers in Ghana.

3.4 Population

Population refers generally to the subject or group from which a sample is selected. It is a group of much interest to the researcher whose views finally determine the findings of a study. Research “population is a unit being sampled; it can be a geographical setting, person, organization, a written document or social action (Neuman, 2006)”.

The researcher focused on Science teachers because of failure in students in the subject. This is because a report from Ghana Education Service (2020) which indicates that a significant number

of students still fail Science in their West African Senior School certificate. It is therefore imperative that the present study focuses its population on Science teachers to understand the kind of professional development training these have acquired and their instructional practices in the classroom.

3.5 Sample Size

The sample size is the number of items that have been selected from the population (Kothari, 2004). According to Kothari (2004) the choice of sample size may be influenced greatly by budgetary constraints as well as the approach being adopted in the study. However, efforts should be made to ensure that the parameters of interest of the population are not overlooked. The study employed a sample size of 15 JHS Science teachers comprising 8 males and 7 females from the La Dade-Kotopon municipality.

The sample size of 15 is justified because qualitative studies do not require huge sample sizes due to the usually in-depth information collected during qualitative studies as asserted by Fugard and Potts (2015).

3.6 Sampling Technique

The study adopted the purposive sampling to select the sample for the study. Purposive sampling which is a non-probability sampling technique is a sampling method where respondents are selected based on certain features which are of interest and relevant to the study (Gyapomaa, 2019). The purposive sampling was used to select junior high schools Integrated Science teachers in the La-Dade-Kotopon Municipality. Purposively, only Integrated Science teachers who have received

professional development in Experimento training were sampled for the study. Integrated Science teachers in the approached in person to take part in the study.

The purposive sampling technique was utilised because the researcher needed to target a particular group of people with a certain characteristic, which in the context of this study were Integrated Science teachers who have undergone Experimento training.

3.7 Instrumentation

An interview guide was used as the main instrument for this qualitative study. An interview guide is a flexible tool suitable for questions that require probing to obtain adequate information (Jatoo, 2002). The semi-structured interview guide was used in this study. The interview tool is useful for collecting in-depth information and questions can be explained. The questions on the guide were structured based on the objectives of the study. This was to engender responses from respondents that aligned with the objectives and ultimately enable the researcher achieve the aims of the study. Sample of questions on the interview guide included “What do you understand by professional development program?”, “Have you ever been part of any professional development program?”, and “What are some of the professional development programs you have attended?”, “Which of them do you think was/were impactful?” “Which was/were not impactful?”, “What are your reasons for saying so?” among other questions.

3.7 Procedure

Data was collected via face-to-face or one-on-one semi structured interview with respondents. Before interviews were conducted, initial contact was made with the respondents for their consent.

Participants were reached through personal contacts. The researcher called the heads of the schools to confirm the date and time for the interviews. The researcher sought and was granted permission to interview respondents in the staff common rooms of their respective schools. Interviews lasted from between 15 minutes to 20 minutes. A tape recorder and notepad and pen were used in the data collection process to record interviews and take notes respectively. Recorded interviews were then transcribed in detail, where all the utterances made by both the interviewer and the interviewee were written down. The researcher observed all the COVID 19 protocols below to protect the respondents and herself:

- Social distancing; at least 1 meter from the researcher and the participants during the interactions.
- Adequate hand sanitizers were provided and applied by both the researcher and participants before and after every interview sessions.
- Nose marks were also provided and worn throughout the interview by both the researcher and the participants.

3.8 Data Analysis

The study employed thematic analysis to unravel some level of patterned meaning within the qualitative dataset (Braun & Clarke, 2006). This approach to data analysis encompasses identifying and describing both explicit and implicit ideas rather than just word and phrase counting (Guest et al., 2012). The use of thematic analysis enabled the researcher to identify, classify as well as delineate patterns within the data to help interpret the various aspects of the research topic (Braun & Clarke, 2006). It is worth stating that data analysis began just after the

interviews were completed. All recorded interviews were transcribed and transcripts were read over and over to identify themes and link patterns of the transcripts.

Statements and quotes which reinforced specific emerging themes were documented and associated with the development of the various themes which allowed the narratives to naturally flow from the viewpoints of the respondents (Smith & Osborn, 2003). These narratives were further explored through the interpretation of the researcher (Smith & Osborn, 2003). When emerging themes from the data analysed were assembled, coherent links between them were established which reflected a more theoretical ordering and interpretation of the data (Smith & Osborn, 2003).

3.9 Trustworthiness of Data

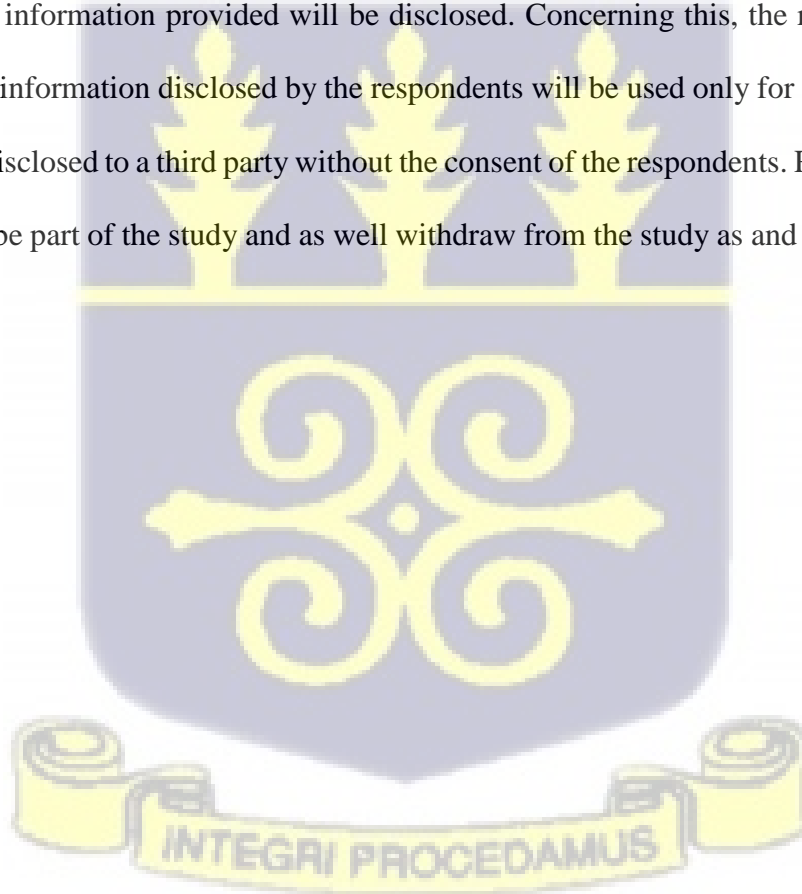
The trustworthiness of the qualitative data set was ensured by conducting a precise, consistent and thorough analysis of the qualitative data set. Trustworthiness of the data was also ensured by the researcher categorically stating the data analysis technique and the detailed process by which the analysis was conducted (please check previous section). According to Nowell, Norris, White and Moules (2017), a researcher engaging in these stated activities ensures the trustworthiness of a qualitative dataset.

3.10 Ethical Issues

Participants were informed of the research after which they gave their consent before participating in the study. Honesty and sensitivity to any locally established institutional policies or guidelines

for conducting the research were observed. The researcher was sensitive to culture, religion, gender, disability, and any other significant differences about the participants during planning, conduct, and reporting of the research.

In addition, the principles of confidentiality and anonymity of participants were adhered to. On the principle of anonymity, the researcher assured respondents that their identities will not be disclosed, and hence, no personal information such as the name of the respondent, the social security number, and address of the respondent will be included in the data collection process. On the other hand, the principle of confidentiality was also held such that respondents were assured that no personal information provided will be disclosed. Concerning this, the researcher assured participants that information disclosed by the respondents will be used only for academic exercise and will not be disclosed to a third party without the consent of the respondents. Respondents could decide or not to be part of the study and as well withdraw from the study as and when they wished to.



CHAPTER FOUR

FINDINGS, ANALYSIS AND DISCUSSIONS

4.0 Introduction

The findings of the study are presented based on the research's objectives and questions. Findings pertaining to the perceptions of JHS Science teachers about the impact of professional development on their content knowledge and instructional practices are presented. In addition, as per the research objectives, the barriers Science teachers face in the implementation of professional development programs will also be discussed in relation to reviewed literature.

4.1 Background of Study Participants

A total of 15 respondents participated in the study, of which 8, representing 53.33% of the sample were males and 7, making up 46.67% of the total sample were females. All respondents interviewed in the study taught Science at public schools. All participants interviewed participated in the Experimento workshop. Respondents had years of experience ranging from 2 years to 13 years, with respondents averaging just over years of experience in teaching. The demographics of the respondents are outlined in the table below:



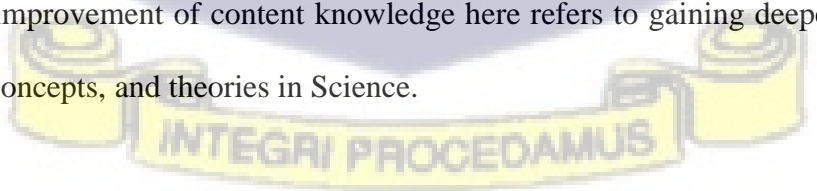
Table 1: Demographics of Respondents

RESPONDENT (R)	GENDER	YEARS OF TEACHING EXPERIENCE	TYPE OF SCHOOL
Respondent 1	Female	6 years	Public
Respondent 2	Male	13 years	Public
Respondent 3	Male	2 years	Public
Respondent 4	Female	5 years	Public
Respondent 5	Male	12 years	Public
Respondent 6	Female	12 years	Public
Respondent 7	Male	4 years	Public
Respondent 8	Male	6 years	Public

Respondent 9	Male	9 years	Public
Respondent 10	Male	3 years	Public
Respondent 11	Female	3 years	Public
Respondent 12	Female	2 years	Public
Respondent 13	Male	11 years	Public
Respondent 14	Female	4 years	Public
Respondent 15	Female	6 years	Public

4.2 Teachers of Science’s Perceptions about the Impact of Professional Development Programs on their Content Knowledge.

In this section, findings relating to Science teachers’ perceptions regarding the impact of professional development programs on their content knowledge are presented. Professional development programs are designed to improve the knowledge or academic standing and skills of the teacher. An improvement of content knowledge here refers to gaining deeper understanding about the facts, concepts, and theories in Science.



Though a few respondents were of the view that professional development programs did not necessarily improve their content knowledge, some respondents perceived professional development programs as impactful on their content knowledge. Rather, when asked the question how impactful professional development programs have been, respondents focused on how impactful professional development programs have been on their delivery methods.

Respondents who considered professional development programs as impactful on their content knowledge believed so because they considered the programs to improve their knowledge of instruments and apparatus as Science teachers improved their confidence to deliver their knowledge to students and also motivated them to teach content knowledge in class.

Out of the 15 participants, 8, representing 53.33% of the total respondents believed professional development programs were impactful on their content knowledge. Seven out of the 8 respondents who believed so, representing 46.67% of the total sample, did so because they believed professional development programs improved their knowledge of scientific instruments and apparatus. Four respondents, representing 26.67% of the total sample, believed their content knowledge is impacted through the building of their confidence in their content knowledge by professional development programs. Only two respondents, representing only 13.33% of the total populated cited motivation as the avenue through which their content knowledge are impacted by professional development programs. Figure 3 below presents the information below:

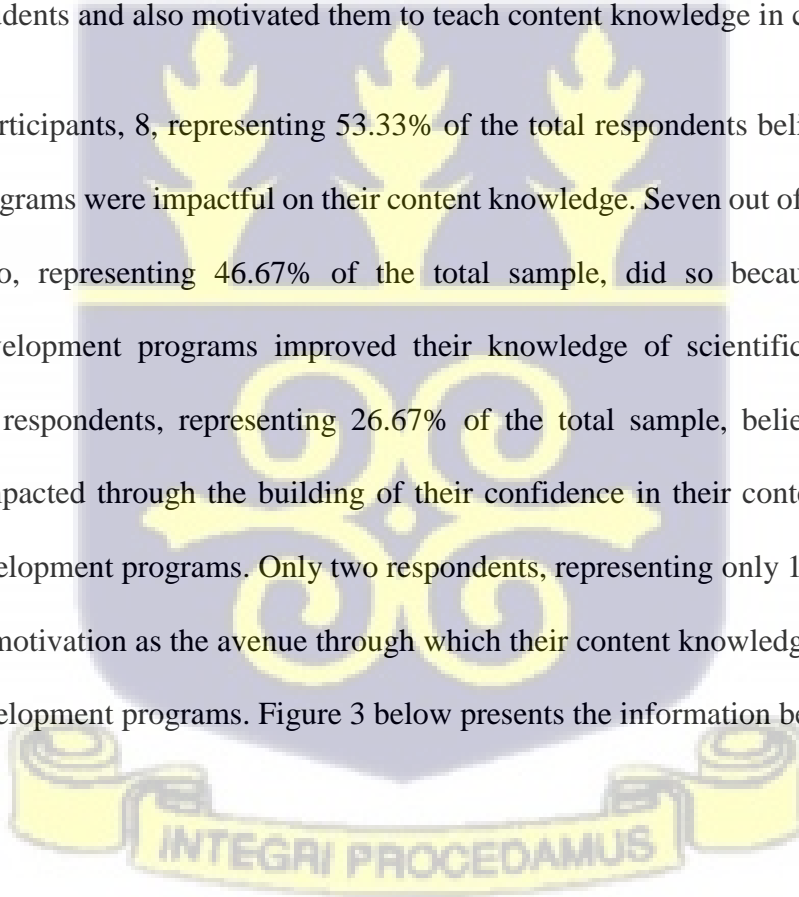
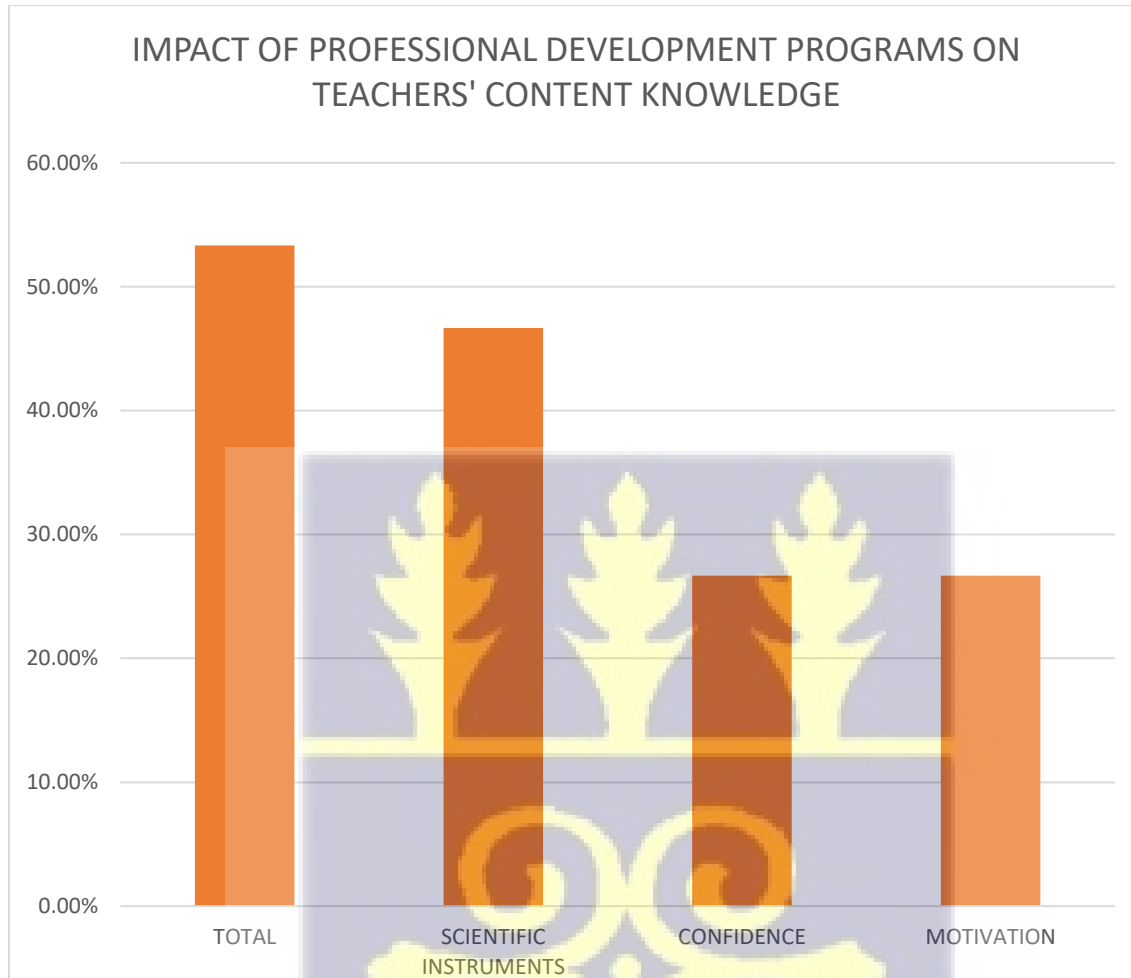


Figure 3: The Percentage of Respondents who Believed Professional Development Programs were Impactful on their Content Knowledge.



4.2.1 Improvement of Knowledge of Instruments and Apparatus

Some respondents were of the perception that professional development programs improved their content knowledge owing to the fact that such programs improve their knowledge and operation

of Science apparatus. Generally, content knowledge refers to the concepts, facts, theories, and principles that are taught and learnt in a specific academic discipline as opposed to the skills in the discipline. In this regard, Science teachers' knowledge and operation of instruments, which professional development programs make possible, enable them to appreciate and fully understand such concepts, theories, facts and principles. Scientific instruments and apparatus are used in Science experiments to demonstrate scientific phenomena to make such phenomena more vivid and understandable.

According to the respondents, during professional development programs, especially on a program dubbed "Experimento", they were made privy to scientific instruments which they had not come into contact with before. They reported that they were taught how to operate the apparatus and also allowed to operate such instruments. Respondents underscored how impactful the experience was in improving their content knowledge. Teachers of Science, by being able to understand scientific phenomena will be able to elucidate such phenomena to their students to enable them to fully grasp such occurrences.

Some of the respondents had this to say:

Respondent 3 (male): *"it's the same Experimento Ghana that I attended... it was very impactful because we learnt how to use some of the instruments which we were not used to as in how we were able to use them by ourselves and also get to see some of them for the first time."* [28/02/22 at 9:50 am].

Respondent 5 (male): *“I preferred Experimento to the rest because they later on provided us with some of the teaching materials to use in teaching in class”* [28/02/22 at 11:53 am].

Respondent 8 (male): *“I could easily talk about the Science Experimento errm program that we have been part of. They took us through series of errm modules and then they gave us the needed apparatus that we can use hands on for our students to enhance the teaching and learning of anything”* [01/03/22 at 9:18 am].

Respondent 6 (female): *“In reality, Science Experimento was the best because errm it involved a lot of practical, series of practicals, is a whole lot, is a package and I believe if we are able to continue, our children will be able to do something better”* [28/02/22 at 12:14 pm].

4.2.2 Improvement of confidence and precision as to what to teach students

Respondents were also of the perception that teacher development programs give them confidence and assurance in the content they teach their students. According to them, such programs reinforce the facts, concepts, theories and principles they teach by repeating them to teachers who attend the programs. They were of the view that the confidence and assurance gained from such programs improve the delivery of their content knowledge in class.

Responses given by participants were to the effect that experts who facilitate such programs are able to stimulate their thought processes about such facts and principles which lead to further appreciation and understanding of the subject matter. It is also customary, according to

respondents, for experts in the field of Science to update teachers of Science on the new trends and discoveries in the discipline, which to a large extent improves their knowledge and gives them confidence in what they already know.

With regards to gaining confidence in new content learnt by teachers of Science in such programs, they usually engage in their own research, which is usually done online, to verify them. Therefore, in effect, professional development programs stimulate research on the part of teachers to improve their content knowledge and further give them confidence and assurance.

Some respondents had this to say:

Respondent 2 (male): *“Sometimes, these programs give you confidence in what you already know. Because when you attend them, they repeat what you already know there.”* [28/02/22 at 9:16 am].

Respondent 3 (male): *“...whenever we enrol in such programs, we learn something new. You know the field of Science is full of new discoveries and trends and all these new things we learn prove what we already know in the field.”* [28/02/22 at 9:50 am].

Respondent 11 (female): *“I think we improve our content knowledge by doing research on the new things we learn in the professional development programs.”* [01/03/22 at 11:07 am].



4.2.3 Motivation to teach content knowledge in class

Respondents reported that professional development programs improve their content knowledge by motivating them as teachers of Science. Participants consider these programs as motivational because, according to them, they serve as a platform where Science teachers can gather and fraternise with each other. Motivation is also gained from the fact that professional development programs make their job much easier by helping them fully appreciate and understand the subject matter they teach.

Some respondents were of the opinion that, generally, some teachers tend to lose focus or lack motivation when there are no courses to guide them in their activities. Therefore professional development programs serve as occasional guides that fuel them with knowledge and encouragement. It was also found that teachers of Science were more motivated to go to the classroom and teach once they have come into contact with scientific instruments and improved their knowledge about a subject matter. The motivation to teach entrenches the knowledge the teacher has and also enables him to read more and improve their knowledge.

Some of respondents had this to say:

Respondent 12 (female): “...*you know you can present and teach whatever you have with confidence. Is a big motivation because you know the children will basically understand and it also makes it easier for you to present your concepts...*” [01/03/22 at 11:46 am].

Respondent 13 (male): *“After attending these programs you are always motivated to teach. Because it somehow refreshes your will to teach and know more from students in class...”*
[01/03/22 at 12:10 pm].

Respondent 6 (female): *“When you learn something from the programs, you become willing to explore more. And I believe this adds to our existing knowledge”* [28/02/22 at 12:14 pm].

Concerning the impact of professional development programmes on the content knowledge of science teachers in the La Dade-Kotopon municipality, in summary, it was found that the content knowledge of teachers are enhanced by professional development programmes by improving their knowledge and operation of scientific apparatus, improving their confidence in their content knowledge and motivating them to teach content knowledge.

4.3 Teachers of Science’s Perceptions about the Impact of Professional Development Programs on their Instructional Practice

In this section, findings pertaining to teachers’ perceptions regarding the impact of professional development on their instructional practices are presented. This refers to the impact of professional development programs on the teaching approaches they use in class.

With respect to how Science teachers perceive the impact of professional development programs on their instructional practice, all participants found the programs influential and helpful in their choosing of a teaching methodology. They considered the programs to have affected how they

teach in the classroom in different but presumably positive ways. Respondents were of the perception that professional development programs have revolutionized the teaching methodology for the better.

Some respondents had this say:

Respondent 15 (female): *“Well as I said earlier on, in every program you learn something new so basically it is going to influence your approaches and methodologies which you use in your teaching and learning process. So yes, it has impacted in different, diverse ways of presenting your lessons”* [01/03/22 at 1:17 pm].

Respondent 14 (female): *“I said earlier on that it has been impactful, err with almost all errr the trainings that I attended we were given some materials and our thinking of Science in this part of the world have been errrm abstract teaching, we just imagine how the things are. But we were given some materials which is aiding in our teaching and learning so it has been impactful”* [01/03/22 at 12:42 pm].

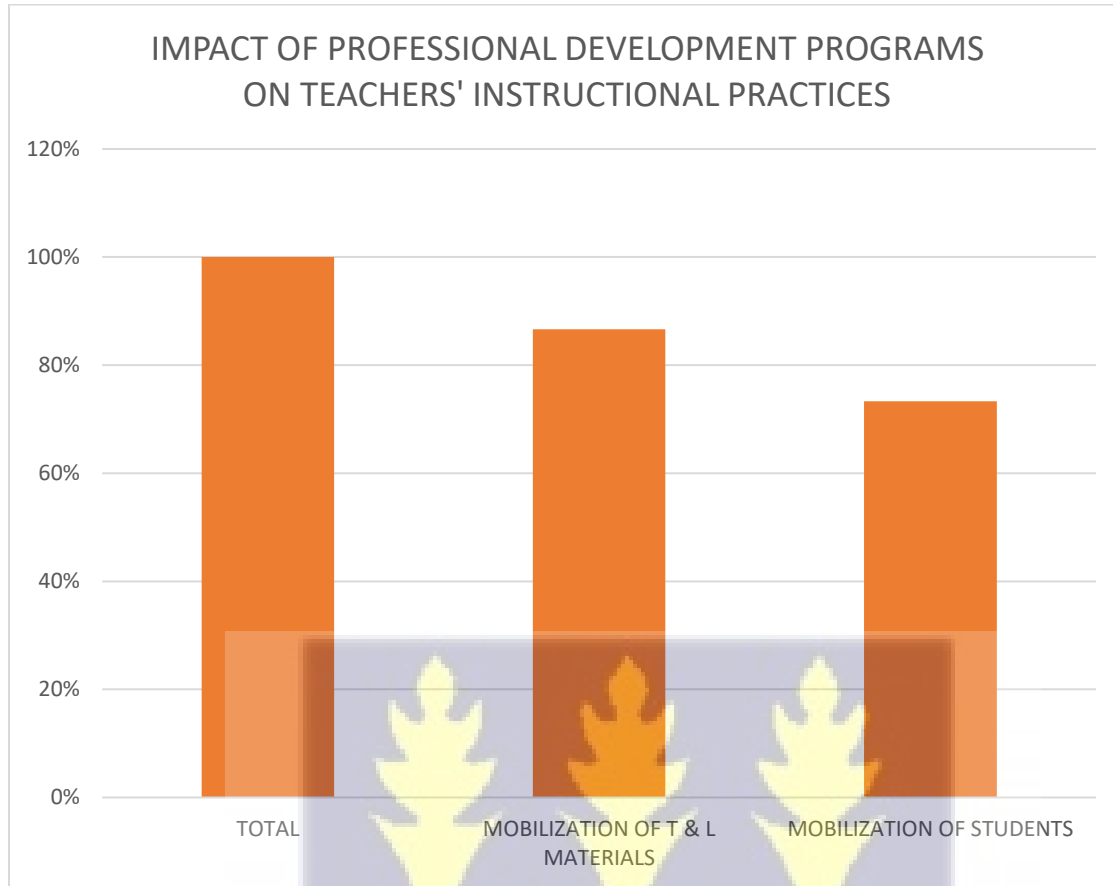
Further analysis of participants’ responses revealed that teachers of Science perceive professional development programs to have revolutionized their instructional practices in two major ways: the mobilization of teaching and learning materials and the mobilization of students to adequately teach a subject matter.

All 15 respondents regarded professional development programs as impactful on their instructional practices. However, 13 respondents, representing a majority of 86.67% of the participants reported

that professional development programs impacted how they mobilize teaching and learning materials, while 11 out of the 15, representing 73.33% of the total respondents believed professional development programs have impacted their instructional practices with respect to the mobilization of students during teaching. The figure below represents the percentage of respondents who believed professional development programs to be impactful on their instructional practices and the share of them who believed professional development programs impacted their mobilization of teaching and learning materials, and students.

Figure 4: The Percentage of Respondents Regarding Professional Development Programs as Impactful on their Instructional Practices





4.3.1 The Mobilization of Teaching and Learning Materials

Respondents expressed the view that professional development programs have opened their eyes to new ways of teaching, with one being the effective and adequate mobilization of teaching and learning materials to teach lessons. Participants were of the view that employing teaching and learning materials in teaching is an improvement on the traditional model of teaching where the teacher literally imparts knowledge into students by lecturing. They confessed that using the teaching and learning materials approach greatly assists students in learning and it easily facilitates

comprehension. They further expressed that the model also assists teachers in getting their lessons across.

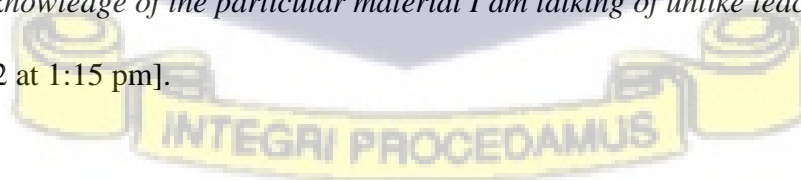
The Science teachers interviewed were of this stance because in using teaching and learning materials to teach, the subject matter becomes more vivid and closer to students than it otherwise would have been. They reported that with the model, learning new ideas becomes simpler, as one can easily relate to the subject matter by accessing the teaching and learning materials. Respondents claimed that the model makes learning more compelling for students since children or students are drawn to objects of various tones and measures and are likely to show interest and curiosity in controlling and observing the effect their manipulation have on such objects.

According to respondents, by utilizing teaching and learning materials, teaching, and learning becomes more amicable while a cordial environment is constructed which aids both teaching and learning. Participants believed they owe this approach to the various professional development programs they attended.

Some of the respondents had this to say:

Respondent 7 (male): *“Very well because most of my teaching now, with the materials we have available, I use them to teach and those that are few I try to demonstrate so the student gets the knowledge of the particular material I am talking of unlike teaching in abstract.”*

[28/02/22 at 1:15 pm].



Respondent 1 (female): “...oh well with that of *Experimento*, it has to do with using relevant materials around the people in our environment. Those common materials, basic materials to teach or to present that will enhance, so that the children can relate to their environment whatever they are being taught” [28/02/22 at 8:45 am].

Respondent 4 (female): “As a result of that we have given them that something like indicator you can use onion or red cabbage in your teaching career as an indicator as are gone are the days that we only know what we call methyl orange and phenolphthalein and the rest. If you don't have it, it means that you are just teaching in abstract. But now we can just fall on the natural indicators to use it in our teaching career, so it has become very beneficial to us.” [28/02/22 at 10:51 am].

Respondent 9 (male): “...using teaching and learning materials in your lessons.” [01/03/22 at 9:55 am].

4.3.2 The mobilization of students

Another way professional development programs have impacted the instructional practices of Science teachers, according to respondents, is the mobilization of students in teaching and learning activities. According to them, professional development programs have enlightened them to involve students more in what goes on in the classroom. Respondents described this methodology as participatory, where students get to play active roles in teaching and learning activities. They were of the view that this method is more effective than the traditional model of teaching where only the teacher plays an active role in teaching and learning activities.

Participants preferred this model to the traditional model because the model is learner-centred. That is, everything that goes on in the classroom revolves around the learner. Here, respondents reported that they use various techniques which seek to make students the centre of teaching and learning including the inquiry technique where the facilitator or the teacher seeks to bring to the fore the students' pre-existing knowledge, ideas, and past experiences so as to build lessons around them to make lessons more relatable to students. Some also employ techniques where the student is required to engage in an activity upon which the lesson will be based.

The idea behind this approach is that, by involving students in the teaching and learning activities, learning and comprehension will be easier. Respondents claimed to have learnt in professional development programs to let students engage in practical activities which will open their minds and ease their grasping of the subject matter.

Some of the respondents had this to say:

Respondent 10 (male): *"...mostly it should be pupil-centered, the teaching should be pupil-centered, they should be involved and then you should just direct."* [01/03/22 at 10:33 am].

Respondent 1 (female): *"Yeah it has taught me a lot of, it has given me idea of errrm soo many methodologies. How to involve the pupil into the center of the learning errrm which is different from the abstract teaching."* [28/02/22 at 8:45 am].

Respondent 6 (female): *"Involving the pupils, carrying out experiments, yeah involving the pupils and then the use of materials, demonstration of the lessons for the pupils to have*

knowledge. It should not be teacher-centered but it should be teacher-pupil or pupil-centered.” [28/02/22 at 12:14 pm].

Respondent 10 (male): *“What I can say is that when they are made part of process they tend to enjoy themselves more”* [01/03/22 at 10:33 am].

In summary, with respect to the impact of professional development programmes on the instructional practices of teachers, it was revealed that the instructional practices of teachers in the La Dade-Kotopon municipality are refined by the programmes through enlightening them to mobilize teaching and learning materials and learners.

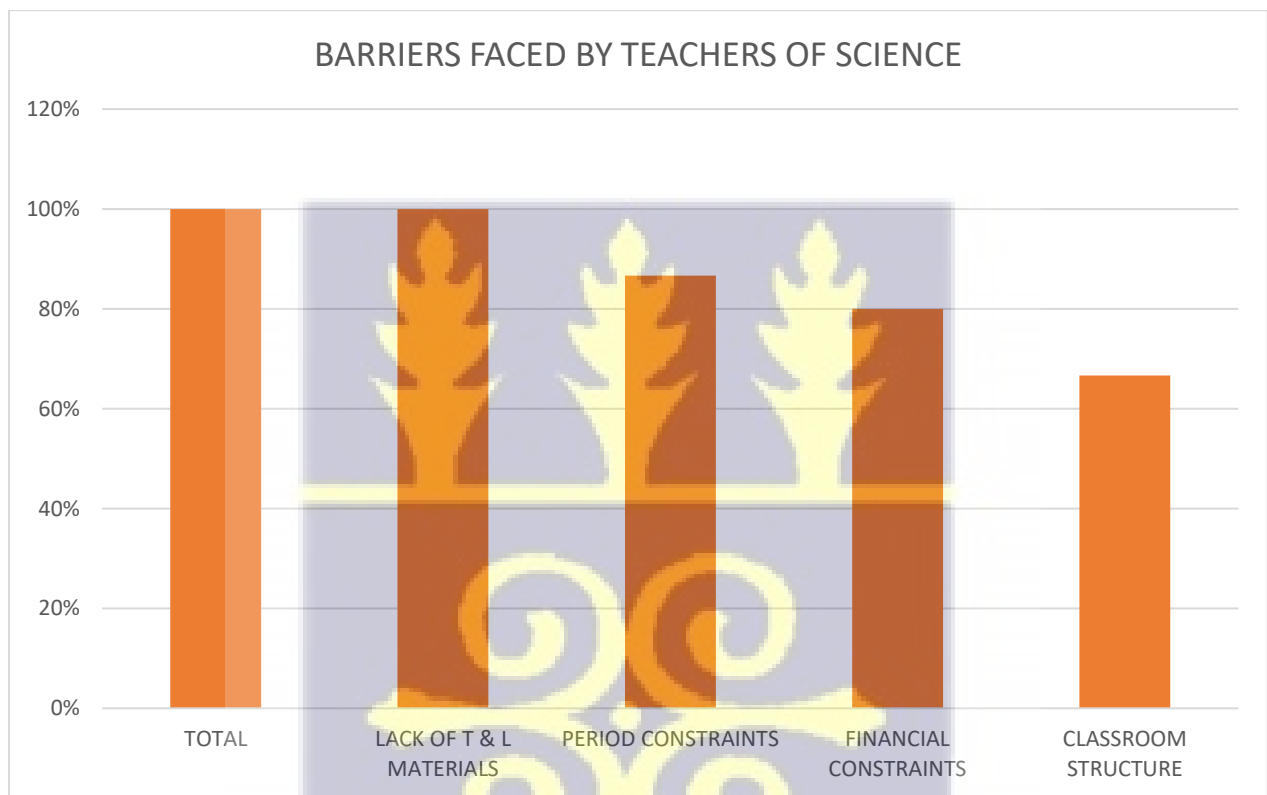
4.4 Barriers to the effective implementation of professional development programs

Findings revealed JHS teachers of Science face a number of challenges in the application of knowledge gained from professional development programs. Barriers were in the form of the lack of adequate teaching and learning materials coupled with large class sizes, financial constraints on the part of schools, period constraints, and classroom structure and layout. The challenges are discussed below.

All 15 respondents reported that they faced barriers in implementing ideas gained from professional development programs. Fifteen out of fifteen respondents reported the lack of adequate teaching and learning materials for the implementation of such ideas in the classroom. Thirteen respondents, representing 86.67% of the total respondents reported period constraints. Twelve respondents, making up 80% of the total respondents lamented about financial constraints,

while ten of the respondents, representing 66.67% of the total respondents reported the structure of the classrooms as a barrier to the effective implementation of ideas gained from professional development programs. The figure below presents the stated information:

Figure 5: Presentation of the Share of Participants Facing Specific Barriers to the Implementation of Ideas Gained from Professional Development Programs



4.4.1 Lack of adequate teaching and learning materials coupled with huge class size.

Respondents, recounting the barriers they face in implementing knowledge gained from professional development programs, bemoaned the insufficient teaching and learning materials

available for their usage. They expressed concerns that there are not enough teaching and learning materials (TLM) to implement the content and the methodology they acquire during professional development programs. Given the nature of Science content in the curriculum which requires experimentation and observation, the availability of the teaching and learning materials like scientific instruments and apparatus is essential. As a result, respondents lamented the inadequacy of these materials.

According to them, the problem exists from the municipal level to the school level. The inadequacy of such material sometimes render them only teaching the theoretical aspect of topics and not the practical aspect. Some recounted cases where they needed apparatus to teach their students but because of the inadequacy of the materials, could not get them because they were being used by another class.

Large class sizes worsen the case, according to respondents. They reported that the few apparatus available were not enough for large classes to utilize. They again recounted that in some situations, they have to divide the classes into small groups just for the utilization of the apparatus, which according to them is an ineffective way of teaching because they are convinced that the whole class utilizing the apparatus in unison creates a cordial and perfect environment for learning and comprehension.

Some respondents had this to say:

Respondent 7 (male): *"...because we don't have all the items in our but it is situated somewhere that if you need it, you have to follow up the SISO before you can have access*

to it to use it your school. If you happen to have your period clashing with another school and they also want to use the same thing, then it means you will forgo it at that time, which is not helping.” [28/02/22 at 1:15 pm].

Respondent 2 (male): *“In my school, access to materials, teaching learning materials is one of my challenges and then the large size of the class is also one of the factors or challenge that I face a lot.” [28/02/22 at 9:16 am].*

Respondent 15 (female): *“In our school, we have various class sizes. For instance, the class that came out from now, they are about 54 so if you have any that goes beyond erm 5 box or apparatus that you have only 5, then you only need 5 groups and that 5 groups you have as many as 10 or 11 per group.” [01/03/22 at 1:17 pm].*

4.4.2 Period constraints

One issue JHS Science teachers in the La Dade-Kotopon municipality face in the application of knowledge gained in professional development programs is period constraints. In that, the time apportioned for the teaching of Science is not enough to apply methods and techniques acquired in professional development programs. As established earlier, Science is taught through experimentation and observation and therefore requires the effective application of the teaching and learning materials method (TLM). However, according to respondents, the subject is apportioned the same time like other subjects.

In explaining this challenge, respondents reported that the setting up of the apparatus takes time due to the delicate nature of most of the instruments. They explained further that the time used in the setting up and dismantling of the apparatus eats into the time that is supposed to be used for the actual practical work. This, according to them, affects the delivery of the course and also sometimes diminishes the impact the teaching and learning is expected to offer.

Also, some respondents expressed concerns about the number of hours dedicated to the teaching of Science throughout the terms. They were of the view that the topics to cover in the subject are broad and many and therefore require more time than they are given. This, coupled with the time shortages occasioned by the setting up and dismantling of scientific apparatus, causes acute time or period constraints for teachers of Science in the municipality.

Some further registered misgivings about the time of the day Science is taught. Some respondents were concerned that Science periods were in the afternoons, a time of the day, according to them, when the mind is dull and concentration is low for complex experiments and observations. Consequently, they recommended that Science periods should be fixed in the mornings where the mind is bright to enable concentration and comprehension on the part of students.

Some of the respondents had this to say:

Respondent 14 (female): *“...you see with the allocation of the period, you know the subject is very broad. So if you really want to go by the practical demonstration, it really takes time as compared to the number of topics you are to teach at this level. So more or less, the topics are more than the allocation of time in the time-table.”* [01/03/22 at 12:42 pm].

Respondent 2 (male): “...most of the schools we don't have what we call Science lab because most of these activities are supposed to be performed in the lab and our classroom and things is not favourable for such because if I have 70 minutes and I have to go, it means within 70 minutes I have to set up my apparatus, present my lesson within that period and pack out for the next teacher to also his or her time successfully.” [28/02/22 at 9:16 am].

Respondent 3 (male): “Another one is the period allocation, some of them have it in the afternoon, 2-3 in or 1-2 continuously when it happens after that period, after morning sessions, concentration is very low and you find it difficult to get their attention. So the timetable should be such that we will have some morning sessions for Science...” [28/02/22 at 9:50 am].

4.4.3 Financial constraints

Financial difficulties negatively affect the application of knowledge gained in professional development programs by Science teachers in the La Dade-Kotopon municipality. Respondents reported that their schools do not have enough funds to acquire the teaching and learning materials needed for the effective application of knowledge gained in such programs. This usually findings in an acute inadequacy of scientific apparatus which are essential in the teaching of the subject. Financial constraints are caused by poor funding from the government and school districts.

Lack of funds do not only affect the acquisition of teaching and learning materials, but also affect the larger school environment which makes it difficult for teachers and students to practice effective teaching and learning methods like the TLM and learner-centred teaching. Lack of

adequate funding render schools within the municipality without Science laboratories where scientific experiments and demonstration are ideal to take place.

Respondents recounted instances where the lack of adequate facilities, occasioned by financial constraints have made it impossible to acquire scientific apparatus to be used in classrooms. One respondent recounted that the school does not have a car to pick up scientific instruments from the school districts to be used in his school. Another also gave an instance where he could not secure transportation fare to pick up teaching and learning materials from the municipal education office.

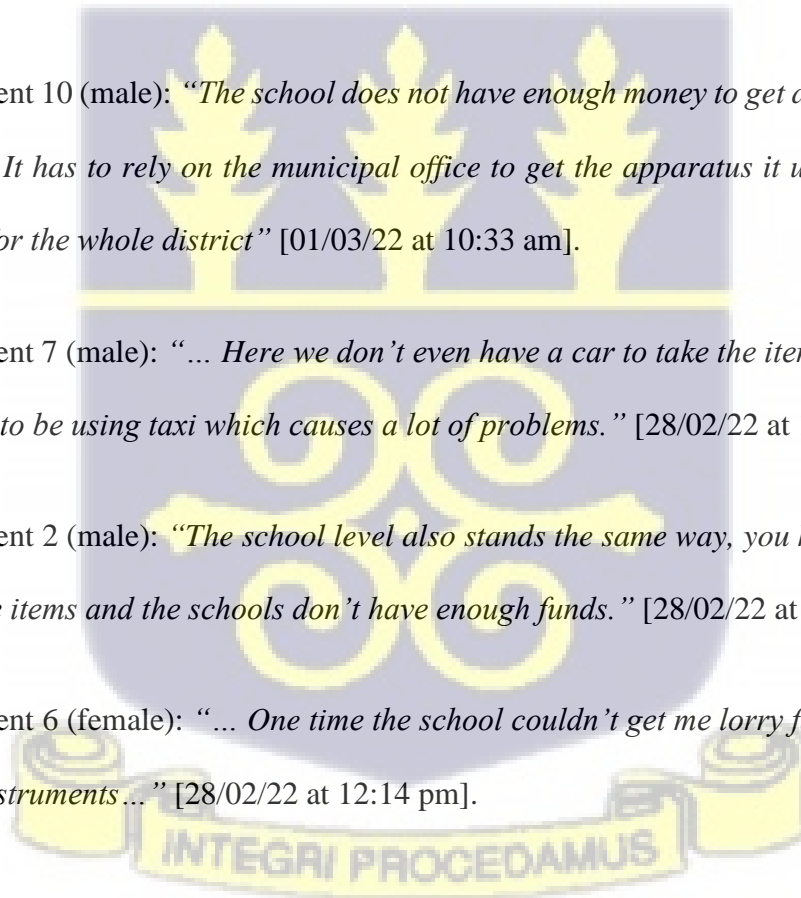
Some of the respondents had this to say:

Respondent 10 (male): *“The school does not have enough money to get all these apparatus by itself. It has to rely on the municipal office to get the apparatus it uses which are not enough for the whole district”* [01/03/22 at 10:33 am].

Respondent 7 (male): *“... Here we don't even have a car to take the items from the office. We have to be using taxi which causes a lot of problems.”* [28/02/22 at 1:15 pm].

Respondent 2 (male): *“The school level also stands the same way, you know we still have to get the items and the schools don't have enough funds.”* [28/02/22 at 9:16 am].

Respondent 6 (female): *“... One time the school couldn't get me lorry fare to go and pick up the instruments...”* [28/02/22 at 12:14 pm].



4.4.4 Classroom structure

Classroom structure and layout were bemoaned by respondents to be unfavourable to instructional practices learnt in professional development programs. Respondents were of the view that current classroom structures and sitting arrangements were designed for only the traditional method of teaching where the teachers stand in front of the class and lecture. However, when it comes to other methods of teaching, sitting arrangements, furniture and the general classroom structure and layout are unfavourable. The nature of classrooms make practical work where students have to engage in activities to learn difficult. Also, classroom furniture are not ideal for the introduction of some teaching and learning materials into the classroom.

Participants lamented that due to the lack of Science laboratories, they utilize classrooms in the staging experiments and demonstrations, which is not ideal. Respondents pointed to the fact that classroom furniture are not designed for such activities, which creates problems including sometimes the breaking of apparatus. Due to the unfriendly nature of classrooms to such activities, ample time have to be spent to set up apparatus to stage experiments and also to dismantle, which limits the time utilized for the actual lesson.

Respondents bemoaned the fact that classroom furniture are not favourable for a change of sitting arrangement that will favour other methods of teaching. Desks are designed to face a certain direction and any change of arrangement causes great inconveniences. This limits the effectiveness of activity based methods which use the learner-centred approaches of teaching since classroom layout was made for students to only sit and listen to their teachers.

Some of the respondents had this to say:

Respondent 15 (female): *“...we don’t have something like a Science lab where some of these things can be done there. So assuming children are having Social Studies or English language, and there is a change lesson, so you have to go in for Science, organizing them at that particular time so that we don’t catch up with time was a bit challenging but in all we were able to do our best.”* [01/03/22 at 1:17 pm].

Respondent 2 (male): *“...because we don’t have a lab when we want to set up experiments or anything in the classroom, some apparatus end up breaking. You see our classrooms were not designed of those kind of things...”* [28/02/22 at 9:16 am].

Respondent 4 (female): *“In the classroom we struggle to create the enabling environment to undertake experiments. Sometimes we have to move tables from other classrooms to the classroom to be able to do anything.”* [28/02/22 at 10:51 am].

Findings relating to the challenges faced in the application of professional development programmes can be summarised that science teachers in the municipality have to battle with lack of adequate teaching and learning materials, lack of funds, period constraints and unfriendly classroom structure and layout in the application of knowledge gained in professional development programs



4.5 Discussions

In this section, findings will be compared with reviewed literature including the theoretical, conceptual and empirical reviews.

4.5.1 Theory of Implementation Climate

The implementation climate theory (Klein & Sorra, 1996) was justified by the findings of this study. In respondents' responses, it was evident that the conducive climate has not been created by schools within the municipality to facilitate the implementation of professional development programs. The implementation climate at schools within the La Dade-Kotopon municipality was not strong enough to support and reward Science teachers who sought to implement new ideas gained from professional development programs.

As a result of the absence of appropriate policies such as the provision of technical support, training, implementation monitoring and enforcement procedures, a weak implementation climate has been created as Science teachers have the perception that the conducive climate has not been created to aid their efforts to implement new ideas in the classroom. Consequently, the consistency with which ideas gained from professional development programs was reduced.

The barriers respondents reported to the researcher were evidence of the poor implementation climate at schools within the municipality. The lack of technical support, in the form of lack of adequate teaching and learning materials owing to the poor financing of the schools was evident in the research findings. Also, though participants did not report that there were not any

implementation monitoring and enforcement procedures at schools, they created the impression that these were absent at the schools.

In this light, the study was in alignment with other studies (Pullman et al., 2018; Turner et al., 2018; Williams et al., 2018) which also justified the implementation climate theory. In this light, the study was in alignment with other studies (Pullman et al., 2018; Turner et al., 2018; Williams et al., 2018) which also justified the implementation climate theory. In a nutshell, it can be asserted that the findings of the study confirmed the implementation climate theory. This owes to the fact the climate of schools within the La Dade-Kotopon municipality was not positive to engender effective application of professional development programmes, in line with the explanations of Weiner et al. (2011).

4.5.2 The Durlak and DuPre (2008) Ecological Model of Implementation

Relating the findings of the study to the ecological model of implementation, as developed by Durlak and DuPre (2008), it can be deduced that only one, the organisational capacity component, out of the five components of the model was justified by the findings. With regards to the community level factors which involves the politics and policies within the teacher community, respondents did not report any barriers which were related to power play or the policies within the teacher community. Also, the findings of the study also did not give credence to “characteristics of providers” component of the model, as respondents did not attribute the problems, they faced to the organizers of professional development programs.

In a similar fashion, it was clear that the characteristics of the innovative ideas teachers intended to implement inherently impeded their implementation. It was obvious that factors that are external to the innovative ideas affected the implementation of such ideas. This led to the non-justification of the “characteristics of the innovation” component of the model. It is in the same vein that the “factors related to the prevention support system” component, which borders on matters relating to the training and technical support given to organizers of professional development programs, was not explained by the findings of the study. This is due to the fact that respondents did not attribute the challenges to the skill-set of the organizers of such programs or the effectiveness of professional development programs.

The component of the model relating to organisational capacity was however justified by the findings of the study. Barriers reported by teachers were to the effect that schools within the La Dade-Kotopon municipality did not have the capacity to support the implementation of innovative ideas gained from professional development programs. Schools lacked the requisite teaching and learning materials to aid the implementation of more advanced instructional practices by teachers. They also lacked the funding to adequately support such implementation. The unfavourable classroom structure coupled with large class sizes, and limited teaching periods both account for the capacity of schools to support teachers to implement innovative teaching methods.

In another study reviewed on applying the ecological model to formative research for a WIC training program, three out of the five ecological model of implementation were justified. It indicated that, to take the full advantage of the Ecological of implementation, one needs to use it

not only as a model for interpreting behaviour pattern but also as a framework for collecting data (Newes et al., 2000).

4.5.3 Relation of Findings to Empirical Review

The findings of this study were largely in agreement with findings of reviewed empirical studies. This study found that professional development programs have a positive impact on the content knowledge of Science teachers just like Buczynski and Hansen (2010), and Yang and Liu (2004) found in their studies. This finding also attests to the fact one of the focus of professional development programs within the municipality was the improvement of content knowledge of teachers, a finding similar to that of Komba and Nkumbi (2008).

The finding of this study, that professional development programs improves the instructional practices of teachers is in consonance with the findings of Martell (2020), who found that professional development programs seeking to improve inquiry-based learning significantly improved inquiry-based teaching and learning. This finding is also in agreement with Penuel et al. (2007) and McCray (2018) who found that professional development programs improves Science-friendly teaching approaches and teacher leadership respectively. This finding is further in alignment with the findings of Huffman et al. (2003), and Shirrell et al. (2019).

Lastly, findings pertaining to the barriers were in harmony with a number of reviewed empirical studies (Buczynski & Hanson, 2010; Burden & Hopkins, 2017; Goktas et al., 2009; Johnson, 2006; Komba & Nkumbi, 2008; Martell, 2020 Sobolewski et al., 2021; Soysal & Radmard, 2017). The finding of absence of technical support in the form of lack of adequate teaching materials are in

alignment with Buczynski and Hanson (2010) and Martell (2020). Though the lack of technical support is mostly a consequence of financial constraints, only Komba and Nkumbi (2008) made that particular finding in Tanzania which is similar to the findings in this study.

4.5.4 Barriers to the implementation of professional development programs

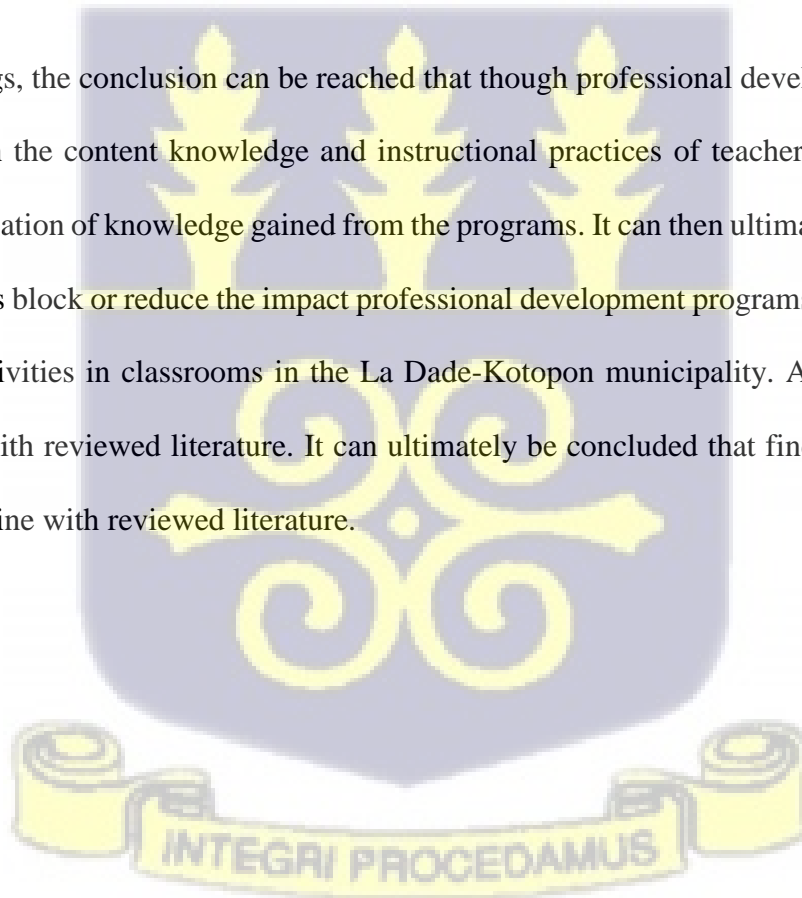
The classification of barriers into extrinsic and intrinsic barriers was also demonstrative in the findings though all barriers identified in the study were all extrinsic. This is due to the fact that none of the challenges described by respondents were inherent or internal to the teaching approaches. Barriers were rather imposed by the external environment in which teachers found themselves. For instance, had respondents found themselves in an environment where there were enough funds and teaching and learning materials, enough time allocated for the teaching of Science and favourable classroom structures and layouts, they would not have faced any problems applying knowledge gained from professional development programmes.

The criteria on which Ertmer (1999) classified extrinsic and intrinsic barriers was verified by the findings of this study. Ertmer (1999) suggested that extrinsic barriers are imposed by time, support and resource. Upon critical look at the barriers faced by JHS Science teachers within the La Dade-Kotopon municipality, all four are in alignment with the criteria. The lack of funds and sufficient teaching and learning materials are rooted in the lack of resources. The time Ertmer (1999) cited was evident in the lack of sufficient teaching periods for the teaching of Science, pointed out by respondents in the study. The absence of a favourable classroom environment, occasioned by unsuitable furniture and layouts could also be classified as the absence of support.

Hendren (2000) as cited by Yuen et al. (2003) was also justified by the findings of this study by referring to extrinsic barriers as those that affect organizations rather than individuals. Per the findings of the study, it is evident that all problems identified by respondents were those that afflicted their schools. The lack of funds and the inadequacy of teaching and learning materials are both school problems. It is in the same vein that the unsuitability of classroom structure and layout and the insufficiency of apportioned teaching periods afflict the school and not by the individual teachers and students.

4.6 Conclusion

From the findings, the conclusion can be reached that though professional development programs are impactful on the content knowledge and instructional practices of teachers, several barriers inhibit the application of knowledge gained from the programs. It can then ultimately be concluded that such barriers block or reduce the impact professional development programs have on teaching and learning activities in classrooms in the La Dade-Kotopon municipality. Also findings were largely in line with reviewed literature. It can ultimately be concluded that findings of the study were largely in line with reviewed literature.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the findings of the study and conclusions based on the key findings. Also in this chapter, recommendations are made to alleviate barriers regarding the implementation of professional development programs. The chapter further presents the challenges of the study while making recommendations for future research.

5.1 Summary of Findings

The study aimed to reveal the perceptions JHS teachers of Science in the La Dade-Kotopon municipality have on the impact of professional development programs on their content knowledge and instructional practices while identifying the barriers they face in the application of the programs in the classroom. The following were found:

1. Professional development programs impact the participants' content knowledge by improving their knowledge and operation of scientific apparatus, improving their confidence in their content knowledge and motivating them to teach content knowledge.
2. Professional development programs have impacted participants' instructional practices by enlightening them to mobilize teaching and learning materials and learners

3. JHS teachers of Science have to battle with lack of adequate teaching and learning materials, lack of funds, period constraints and unfriendly classroom structure and layout in the application of knowledge gained in professional development programs.

5.2 Recommendations for the Successful Application of Professional Development Programs

The study recommends three broad solutions to eliminate barriers faced by JHS Science teachers in the implantation of knowledge gained from professional development programs. They include exploring alternative means to gain adequate financing, allotting sufficient time for the teaching of Science and the provision of the essential facilities by government. The recommendations are detailed below.

5.2.1 Exploring Alternative Means of Financing

Most of the barriers identified to impede the successful application of professional development programs in the classroom come down to financing, including the lack of funds, the inadequacy of teaching and learning materials and the unfavourable classroom structure and layout. Considering that Ghana is a poor country and most schools within the country face the same issue with regard to financing, it behoves on schools within the municipality to explore alternative means to getting funds, instead of relying on meagre government funds to run (Jakarta, 2010).

Looking for money in diverse ways will open opportunities for schools within the municipality to be able to afford teaching and learning materials necessary for the teaching of practical subjects like Science. With the prospect of adequate financing, schools can independently engage in

renovations of school premises to create the enabling environment for teaching and learning activities (Johnson, 2006).

Schools within the municipality can appeal to the private sector for funding. According to Jakarta (2010), the contribution of the private sector to national education is a resource that remains largely untapped. The fact that private companies within the country have corporate social responsibilities creates an avenue where deprived schools can solicit for funds to improve teaching and learning. The provision of funds to deprived schools is one area where the private sector can fulfil their social responsibilities and given the fact that education is one of the core values of society there is a great chance that deprived schools can capitalize on.

Alexander et al. (2014) made the recommendation that, schools can also sell students' handicraft and art to generate income to optimise teaching and learning activities. One of the means of assessing students is the development of handicraft and arts. With the introduction of courses like Creative Arts into the school curriculum, students develop artefacts and arts like baskets, pots, paintings among others which can be put up for sale to generate funds (Alexander et al., 2014). Schools can partner with manufacturing and advertising companies who can readily sell handicraft developed by students and teachers. This will supplement the school finances.

Another alternative mechanism for generating income is by appealing to alumni (Bray, 1986). Past students of schools form associations where they mostly provide financial assistance to schools. Though old students associations may take initiatives to better schools, it behoves on those currently in the school to diagnose problems within the schools and make such associations aware.

Alumni groups are therefore avenues where deprived schools can solicit funds to supplement inadequate school finances. If schools are able to garner resources from diverse sources, teachers can adequately implement teaching and learning approaches learnt in professional development programs.

5.2.2 Increasing the Length of Science Periods

The study makes the recommendation for increased Science periods on the timetable to make room for experiments and other advanced teaching and learning methodologies. This recommendation is backed by Sobolewski et al. (2021), when they made they made the same recommendation upon making the finding in their study that teachers' of Science have limited time to teach the subject. Science is a practical subject and it is not solely theoretical. Consequently, the Oxford Dictionary define Science as the “intellectual and practical activity encompassing the systemic study of the structure and behaviour of the physical and natural world through observation and experiment”. The use of key words such as “practical”, “observation” and “experiment” in the definition underscores the fact that the subject cannot be taught and learnt only through the traditional method of teaching.

Teachers and learners of Science have to stage experiments, which require the appropriate and adequate scientific apparatus, to fully appreciate and understand the subject (Hackling et al., 2007). This requires more time than other subjects that are relatively based on more theory than practicals. This calls for schools within the municipality to apportion adequate time for the teaching of the subject. Considering that schools within the municipality do not have adequate facilities for the

teaching and learning of the subject, which makes the handling of the course more cumbersome, more time should be allocated to the teaching of the subject to enable teachers and students alike navigate their way around such encumbrances. Schools providing teachers of Science with extended periods to teach the subject will enable teachers implement both the TLM method and the learner centred approaches in the classroom.

5.2.3 Provision of Essential Facilities by Government.

The study's recommendation that schools find alternative means of financing themselves does not mean that the researcher intends to let the government off the hook. The provision of facilities for public schools, which all respondents are from, is ultimately the responsibility of the government (Lawanson et al., 2011). The government, through the Ministry of Education and the Ghana Education Service should provide schools within the municipality with the appropriate and adequate teaching and learning materials in the form of scientific apparatus that facilitate the teaching and learning of Science.

The government should also provide schools with Science laboratories, where teachers and students can stage scientific experiments to facilitate learning and comprehension (Audu et al., 2013). The absence of laboratories creates problems for the teaching and learning of Science since schools within the municipality have unfavourable classrooms to teach the subject. Concerning classrooms and their inappropriateness for the teaching and learning of Science, government should consider overhauling the kind of furniture it provides for schools. Government should

furnish classrooms with easily-adjustable furniture so as to make the classrooms flexible enough to accommodate other forms of teaching and learning (Ojeje & Adodo, 2018).

Finally, being cognizant of the fact that schools within the municipality do not have their own scientific apparatus, and have to regularly contact the municipal office to get such instruments to teach, the government should ease the process and not make it an ordeal for Science teachers. The government should provide schools in the municipality with the necessary facilities to pick up items from the office when needed, including cars (Ojeje & Adodo, 2018). The government, by doing this, will pave the way for the effective application of knowledge gained in professional development programs.

5.3 Limitations of the Study

The study was not without shortcomings. The following are some of the shortcomings of the study:

1. The wholly qualitative approach of the study might be a concern for some. Qualitative studies, though are rich in details, may fail to be representative since they usually involve less respondents compared to quantitative studies.
2. The sample size of fifteen could have been larger to make the study more representative. The small sample size of 15 may not make the findings of this study representative of the study population.



5.4 Recommendations for Future Research

Based on the findings and shortcomings of the study, the following recommendations are made for future research into the topic

1. Future studies should consider adopting a mixed approach into the topic, where they combine both the qualitative and quantitative approaches to render a more accurate representation of the topic. A mixed approach also makes findings more representative of the population.
2. Future studies should consider larger sample sizes than the 15 used in the current study.
3. Future research into the topic should be conducted at a higher level than the municipal level adopted in this study to determine the pervasiveness of the findings of this study.
4. Future studies should consider samples from other subject areas.

5.5 Conclusion

The study generally revealed that professional development programs are impactful on the content knowledge and instructional practices of teachers of Science in the La Dade-Kotopon municipality. However, this impact is limited by certain barriers which prevent teachers from effectively applying knowledge gained from professional development programs. Given how dependent the effective teaching and learning of Science is on successful application of advanced teaching methodologies acquired in professional development programs, all stakeholders, chiefly the

government, should be committed to alleviating such barriers. This, in the long run will lead to the production of national and internationally competitive students.



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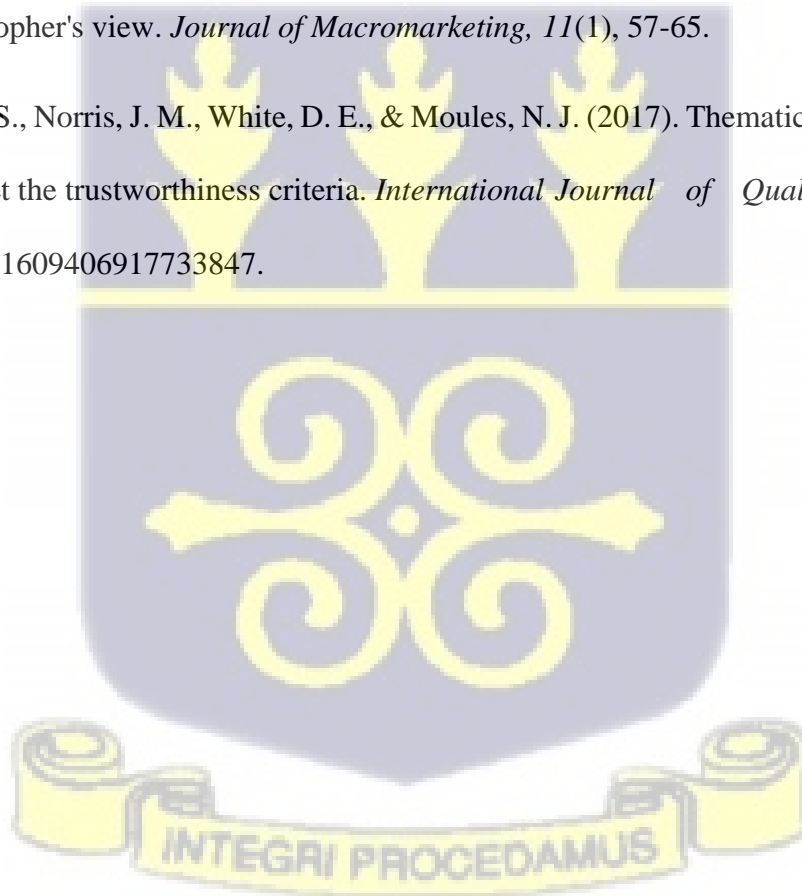
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APPENDICES

APPENDIX 1: ETHICAL CLEARANCE LETTER



UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR THE HUMANITIES (ECH)

P. O. Box LG 74, Legon, Accra, Ghana

My Ref. No...ECH 260/ 21-22 ...

February 23, 2022.

Ivy Boatemaa Danso
Department of Teacher Education
University of Ghana
Legon

ETHICAL CLEARANCE
(ECH 260/ 21-22)

The protocol title below has been reviewed and approved by the ECH Committee.

TITLE OF PROTOCOL: TEACHERS OF SCIENCE' PERCEPTIONS ON PROFESSIONAL DEVELOPMENT AND INSTRUCTIONAL PRACTICES: THE CASE OF LA DADE-KOTOPON MUNICIPALITY IN GHANA

PRINCIPAL INVESTIGATOR: IVY BOATEMAA DANSO


Please note that the final review report must be submitted to the Committee at the completion of the study. Your research records may be audited at any time during or after the implementation. Any modification of this research project must be submitted to ECH for review and approval prior to implementation.

Please report all serious adverse events related to this study to ECH within seven (7) days verbally and in writing within fourteen (14) days.

This certificate is valid till February 22, 2023. You are to submit annual reports for continuing review.

Please accept my congratulations.

Yours Sincerely,



Professor C. Charles Mate-Kole
ECH Chair

Cc: Dr. Joyce Anku, Department of Teacher Education, UG
Rev. Phyllis Bernice Kwarteng Donkor, Department of Teacher, UG

APPENDIX 2: DATA COLLECTION INSTRUMENT

INTERVIEW GUIDE

*My name is Ivy Boatemaa Danso from the Department of Teacher Education at the University of Ghana. I am conducting a study on the topic “**Junior High School Teachers of Science’ Perceptions on Professional Development and Instructional Practices: The Case of La Dade-Kotopon Municipality in Ghana**”, and I would be grateful if you could participate in an interview session to share your views on a few issues relating to the topic.*

Please note that all your responses will be strictly confidential, and kept strictly under anonymous conditions on a locked device. Therefore, I encourage you to answer the questions in their entirety: However you are free to skip any question if you find that particular question distressful. Thank you.

1. For how many years have you been teaching?
2. What do you understand by professional development program?
3. Have you ever been part of any professional development program?
4. What are some of the professional development programs you have attended?
5. Which one(s) of them do you think was/were impactful
6. Which one(s) was/were not impactful?
7. Do you believe the programs you have attended so far have improved your content knowledge, and if so, how?
8. What are instructional practices?
9. Which instructional practices do you mostly used in the classroom during teaching?

10. How have the professional development programs you attended influenced your instructional practices?
11. What instructional strategies were recommended in any of the professional development programs you attended especially in Experimento training?
12. What makes it easy to implement the content learned during the training?
13. What are your motivations for implementing the strategies learned during the training?
14. What are some of the challenges you encountered at the municipal level during your implementation?
15. What are some of the challenges you encountered during your implementation in your school?
16. What are some of the challenges you encountered during your implementation in your classroom?



APPENDIX 3: SAMPLE TRANSCRIPT (Respondent 1, Female)

Interviewer: For how many years have you been teaching?

Respondent: I have been teaching for 6 years now

Interviewer: What do you understand by professional development program?

Respondent: Errmm all training programs received to improve your teaching and learning since it's teaching and learning that we are doing. So additional trainings that we have to improve our teaching and learning, methods, content-wise, classroom management too.

Interviewer: Have you ever been part of any professional development program?

Respondent: yes a lot

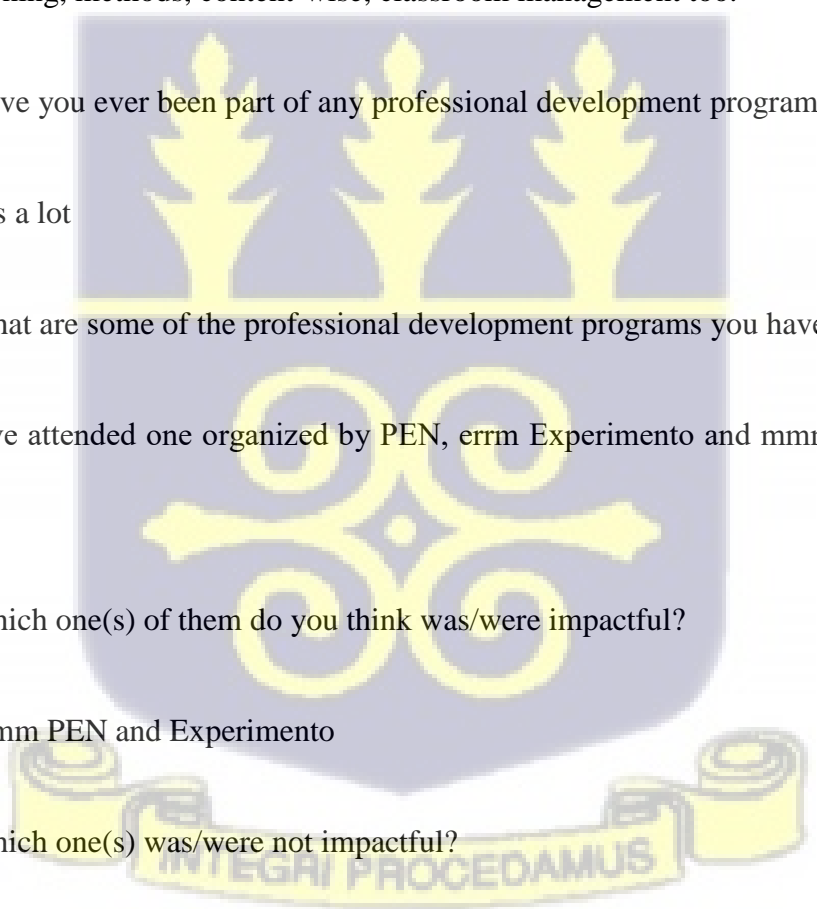
Interviewer: What are some of the professional development programs you have attended?

Respondent: I've attended one organized by PEN, erm Experimento and mmm the one by the circuit too.

Interviewer: Which one(s) of them do you think was/were impactful?

Respondent: mmm PEN and Experimento

Interviewer: Which one(s) was/were not impactful?



Respondent: oww every training sessions you will learn something by all means, but since we are grading them, those two.

Interviewer: Do you believe the programs you have attended so far have improved your content knowledge, and if so, how?

Respondent: All the programs I have attended so far have one or the other improved my Science knowledge. Our knowledge is refreshed by the programs. We get access to instruments that we mostly don't have in our schools

Interviewer: What are instructional practices?

Respondent: all practices that will help in teaching and learning for instance your teaching method or your individual initiatives that will enhance your teaching and learning.

Interviewer: Which instructional practices do you mostly used in the classroom during teaching?

Respondent: i use activity based involving students in let's say experiments or discussions in their small groups so that they have upper hand in whatever you are discussing so they also contribute. They see the things physically and gives them more idea of whatever you are discussing.

Interviewer: How have the professional development programs you attended influenced your instructional practices?

Respondent: it has improved a lot, even how you start the whole teaching, like erm your teaching style; involving more activities in learning so that you don't talk too much.

Interviewer: What instructional strategies were recommended in any of the professional development programs you attended especially in Experimento training?

Respondent: inquiry method that will enable students to find out things for themselves after the teaching and learning so that it wouldn't be that you are giving them information, they can find out information themselves.

Interviewer: What makes it easy to implement the content learned during the training?

Respondent: the materials used is concrete not abstract so you see it and they also use ermm ermm laid down questions like activity cards or printouts so you read it, follow the activity, you write your view about your observations. It's not restricted to expected outcomes.

Interviewer: What are your motivations for implementing the strategies learned during the training?

Respondent: we were given erm apparatus after the program, so I already have the teaching and learning materials so there's no way i will go to the class to teach in abstract. So the items are already there handy unless special ones that are also in the environment.

Interviewer: What are some of the challenges you encountered at the municipal level during your implementation?



Respondent: some of the topics had no materials that they demonstrated the lessons with. We were taught alright but there were no materials to back the discussion. Yes that's a challenge from the municipal level.

Interviewer: What are some of the challenges you encountered during your implementation in your school?

Respondent: some of the items you have to buy it but the head claims that no money no money. Those that they can they are able to, most of the items too are also expensive, so the financial aspect because as for certain things or certain apparatus you have to get the real one not improvised one because they don't give the same effect when you use improvised and real items. The timing, Science for instance you have to use erm 70 minutes but because of the practical aspect you have unable to finish whatever you planned for the day, it will eat into other subjects, you have to end the lesson. So if the period can also be increased so that we can have erm 8 periods a week just like other subjects like Maths or English.

Interviewer: What are some of the challenges you encountered during your implementation in your classroom?

Respondent: the number, the children are so... we have large number over here, so you have to group them in smaller groups and when they work in smaller groups, it's more effective than large groups. That also implies using more of the items, so our number is a challenge and their background is affecting them, so they have misconceptions about the subject. So certain questions they ask, you can see that it's from the environment, they tell them things that are not true or they

want to find out. So their background is also affecting them in learning and teaching of the Science for instance in the classroom. And the classroom structure, most of them don't have fans and it's very warm and it affects their concentration. Another one is the period allocation, some of them have it in the afternoon, 2-3 in or 1-2 continuously when it happens after that period, after morning sessions, concentration is very low and you find it difficult to get their attention. So the timetable should be such that we will have some morning sessions for Science, afternoon like that so that it wouldn't be that one class has all afternoon, no it means if means if there's any programs, afternoon sessions, they will be losing such periods.

