

REPUBLIQUE DU CAMEROUN

Paix – Travail – Patrie

UNIVERSITE DE YAOUNDE I

FACULTÉ DES SCIENCES DE

L'ÉDUCATION

DEPARTEMENT DE DE CURRICULA

ET

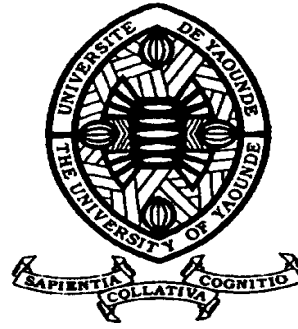
ÉVALUATIONS

CENTRE DE RECHERCHE ET DE

FORMATION DOCTORALE EN

« SCIENCES HUMAINES,

SOCIALES ET EDUCATIVES »



REPUBLIC OF CAMEROUN

Peace – Work – Fatherland

UNIVERSITY OF YAOUNDE I

FACULTY OF SCIENCES OF

EDUCATION

DEPARTMENT OF OF

CURRICULUM

AND EVALUATION

POST GRADUATE SCHOOL FOR

SOCIAL AND EDUCATIONAL

SCIENCES

**THE PROBLEM-SOLVING MODEL AND THE
PROFESSIONAL DEVELOPMENT OF SECONDARY
SCHOOL PHILOSOPHY TEACHERS: THE CASE OF
YAOUNDE VI MUNICIPALITY**

A Dissertation Submitted in Partial Fulfilment of the
Requirements for the
Award of the Master of Arts (MA) Degree in Curriculum and Evaluation

Par : **BATI FAISON YAYA**
B.A. Philosophy and social sciences

Sous la direction de
Dr. KIBINKIRI Eric LEN

Année Académique : 2017



CERTIFICATION

We hereby certify that this work was carried out by BATI FAISON Yaya in the department of Curriculum and Evaluation of the Faculty of Education, University of Yaounde 1.

Head of Department

Prof. Maureen TANYI

President of Jury

Supervisor

Dr. KIBINKIRI Eric LEN

Examiner of Jury

Date _____

DEDICATION

To my mother

Margaret FAISON KINYUY

ACKNOWLEDGEMENTS

The realization of this piece of work could have never been completed without the support and contributions of a good number of persons.

My sincere gratitude first goes to my supervisor, Dr. KIBINKIRI Eric LEN who was never tired of correcting this work and making useful suggestions in order to bring out the best of it.

Special thanks equally go to the Dean of the Faculty of Education, the Head of Department of Curriculum and Evaluation and all my lecturers, for the knowledge, skills and competences they impacted in me to be able to come out with this piece of work.

I am equally indebted to my family: Mr. Francis AYENIKA, Mrs. Margaret FAISON, Mr. Fanka FAISON, Caleb and Cecile-Cassia AYENIKA, for their moral and financial support during the course of this work.

My gratitude also goes to Mr. Ngwonam Denis NGWONAM, Mr. Sama ABANG and Mr. Celestin HALLE for providing materials that helped in building of this work. Thanks equally go to Mr. Zepherinus Ghong NDUM for proof reading the work.

I want to equally appreciate my friends and class mates of the Department of Curriculum and Evaluation, Cheryl SIBEN, Evelyn LOPEZ, Yvette MAKOGHE, Violet FADIMATOU, Marceline LEINYUY, Thecla FANSO, Pamela MBUNYA, Brenda NJI, Relindis TABE and Mary DIALE for their encouragement and support throughout this period.

I am equally grateful to the administrators of G.B.H.S Etoug-Ebe and G.B.H.S. Mendong for granting us the permission to carry out the observation and interviews in their respective schools. Special thanks also go to all the teacher-participants for their cooperation throughout the research process.

ABSTRACT

This work sets out to investigate how Problem-Solving Model influences the professional development of secondary school philosophy teachers. The work was guided by the question: How does the Problem-Solving Model influence the professional development of secondary school philosophy teachers? To answer this question, a review of literature was done on the works of some authors like J. Dewey, E. Kant, C. S. Peirce and K. Nkrumah on their constructivist and pragmatic views. The research employs a qualitative study using a semi-structured interview and semi- structured observation. A total of ten teachers were selected to participate in this study using the non-probabilistic sampling technique from two secondary schools; G.B.H.S. Etoug-Ebe and G.B.H.S. Mendong in the Yaounde VI municipality. The data were analyzed using frequencies, percentages, pie chart, histogram and thematic content analysis.

The results indicated that the identification of the problem influences the professional development of secondary school philosophy teachers except for some few elements like stating the problem, contextualizing and rephrasing the problem that need to be relooked into because teacher practices do not conform to Dewey's pragmatic model. Generating potential solutions have a significant influence on the professional development of secondary school philosophy teachers as their practices such as selecting multiple strategies, operationalizing solution steps and validating the best solution actually conform with the views of the pragmatists. Evaluation as well has an influence on the professional development of secondary school philosophy teachers though, some teachers showed inadequate mastery in some elements such as recalling and contextualizing the problem. A review of some models and an observation of teaching habits of teachers who possess an inadequate knowledge of the problem-solving approach led to the proposed pragmatic triadic model that will guide their practices. From the above findings, the researcher made some proposals for further research. A study could be carried out on the impact of the problem-solving model and the professional development of philosophy teachers as well as on the role of the teacher during problem-solving lessons.

RESUME

Ce travail vise à étudier comment le modèle de résolution de problèmes influe sur le développement professionnel des enseignants de philosophie du secondaire. Le travail a été guidé par la question : Comment le modèle de résolution de problèmes influence-t-il le développement professionnel des enseignants de philosophie du secondaire? Pour répondre à cette question, nous avons fait une revue de littérature sur les travaux de certains auteurs comme J. Dewey, E. Kant, C. S. Pierce et Nkrumah sur leurs points de vue constructivistes et pragmatiques. La recherche utilise une étude qualitative en utilisant une interview semi-structurée et une observation semi-structurée. Au total, dix enseignants ont été sélectionnés pour participer à cette étude en utilisant la technique d'échantillonnage non probabiliste de deux établissements secondaires; Le lycée bilingue d'Etoug-Ebe et le lycée bilingue Mendong dans la municipalité de Yaoundé VI. Les données ont été analysées en utilisant des fréquences, des pourcentages, les histogrammes et une analyse de contenu thématique.

Les résultats indiquent que l'identification du problème influe sur le développement professionnel des enseignants de la philosophie du secondaire, à l'exception de quelques éléments comme l'énoncé du problème, la contextualisation et la reformulation du problème auquel il faut réfléchir, qui ne sont pas conformes au modèle pragmatique de Dewey. La génération de solutions potentielles a une influence significative sur le développement professionnel des enseignants de philosophie du secondaire, car leurs pratiques telles que la sélection de stratégies multiples, l'opérationnalisation des étapes de la solution et la validation de la meilleure solution sont en fait conformes aux points de vue des pragmatistes. En même temps, l'évaluation a une influence sur le développement professionnel des enseignants de la philosophie du secondaire, mais ils ont montré une maîtrise insuffisante dans certains éléments tels que le rappel et la contextualisation du problème.

Un examen de certains modèles et une observation des pratiques des enseignants qui possèdent une connaissance insuffisante de l'approche de résolution de problèmes a conduit au modèle triadique pragmatique proposé qui guidera leurs pratiques. À partir des résultats ci-dessus, le chercheur a fait des propositions pour des recherches plus poussées. Une étude pourrait être menée sur l'impact du modèle de résolution de problèmes sur le développement professionnel du professeur de philosophie ainsi que sur le rôle de l'enseignant de philosophie lors des cours de résolution de problèmes.

TABLE OF CONTENTS

CERTIFICATION	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS.....	iv
ABSTRACT	v
RESUME.....	vi
TABLE OF CONTENTS.....	vii
LIST OF ILLUSTRATIONS	xii
LIST OF ABBREVIATIONS.....	xiii
GENERAL INTRODUCTION	1
CHAPTER ONE: PROBLEM OF THE STUDY.....	3
1.0. Introduction	3
1.1. Background to the Study	3
1.2. Formulation of the Problem of Study.....	10
1.3. Research Objectives	12
1.4. Research Questions	12
1.5. Research Hypothesis	13
1.6. Significance of the Study	13
1.7. Justifications for the Study.....	15
1.8. Delimitation of the Study	15
1.8.1 Geographical Delimitation	15
1.8.2. Thematic Delimitation.....	16
1.9. Definition of Concepts	16
1.9.1. Problem-Solving.....	16
1.9.2. Model	17
1.9.3. Professional Development.....	17

1.9.4. Philosophy	18
CHAPTER TWO: LITERATURE REVIEW	20
2.0. Introduction	20
2.1. Conceptual Framework	20
2.1.1. Concept of Philosophy	20
2.1.2. Concept of Problem-Solving	21
2.1.2.1. Problem-solving	21
2.1.2.2. Cognitive Processes in Problem-Solving	22
2.1.2.3. Problem Identification and definition	22
2.1.2.4. Generating alternatives and selecting a solution	26
2.1.2. 5. Evaluation.....	29
2.1.2.6. Principles for teaching problem-solving	31
2.1.2.7. Problem-solving Models	32
2.1.2.8. Dewey’s Sequence Problem-Solving Model (1910).....	33
2.1.3. Concept of Professional Development	35
2.1.3.1. Content substantive Knowledge.....	36
2.1.3.2. Content Syntactic knowledge.....	37
2.1.3.3. Affective knowledge and beliefs	40
2.1.3.3.1. Beliefs.....	40
2.1.3.3.2. Motivation	41
2.1.4. Models of professional development	42
2.1.4.1. The traditional professional development model	43
2.1.4.2. The job-embedded professional development model.....	45
2.2.0. Theoretical Framework	48
2.2.1. The theory of constructivism and its perspective on problem-solving	48
2.2.2. The theory of pragmatism	51
2.2.3. The Gestalt theory and problem-solving	53
2.2.4. Theoretical Implications of Theories to this Work	54
2.2.4.1. Identifying the Problem; Constructivism and Pragmatism	54
2.2.4.1.1. Prior knowledge	54
2.2.4.1.2. Stating the Problem; Constructivism and Pragmatism.....	55
2.2.4.1.3. Contextualizing the Problem, Constructivism and Pragmatism.....	55

2.2.4.1.4. Rephrasing the Problem, Gestalts and Pragmatism	56
2.2.4.2. Generating Potential Solutions; Pragmatism.....	57
2.2.4.2.1. Multiple Strategies	57
2.2.4.2.2. Emphasis on what works best	57
2.2.4.3. Evaluation; Pragmatism	58
2.3. Empirical Review	58
CHAPTER THREE: RESEARCH METHODOLOGY.....	60
3.0. Introduction	60
3.1 Research Design.....	60
3.2 Presentation and Justification of Area of Study	61
3.2.1. Presentation of Area of Study	61
3.2.2. Justification of the Choice of Site	62
3.3. The Population of the Study.....	62
3.3.1. The Target Population.....	62
3.3.2. The Accessible Population	62
3.3.3. Criteria of Selection	62
3.4. Sampling Technique.....	63
3.4.1. Choice and Justification of the Technique used.....	63
3.4.2. Sample of the Study	64
3.5. Instruments for Data Collection	65
3.5.1. Choice of Data Collecting Instruments	65
3.5.1.1. The Interview Guide.....	65
3.5.1.1.1. Justification of choice of instrument.	66
3.5.1.2. Observation Guide.....	66
3.5.1.2.1. Justification of Choice of Instrument	67
3.6. Validation of Research Instruments	67
3.7. Procedure of Data Collection	67
3.7.1. Semi-structured Interview	67
3.7.2. Semi structured Observation	69
3.8. Method of Data Analysis.....	70
3.8.1. Interview Data Analysis: Thematic Content Analysis	70
3.8.1.1. Justification of Choice of Thematic Content Analysis.....	70

3.8.1.2. Presentation of the Data Analysis Guide.....	71
3.8.1.3. Procedure of Interview Data Analysis	73
3.8.1.3.1. Transcription of Data	73
3.8.1.3.2. Coding the Data.....	73
3.8.2. Observation Data Analysis: Manual analysis.....	73
3.8.2.1. Steps for Data Analysis of Observation	74
3.9. Variables of the Study	74
3.9.1. Independent variables: Problem-Solving Model.....	74
3.9.2. Dependent variable: Professional development	74

CHAPTER FOUR: PRESENTATION OF RESULTS AND DATA ANALYSIS 77

4.0. Introduction	77
4.1. Presentation of the target population.....	77
4.2. Presentation of Data from Observations	78
4.3. Presentation of results from Interview	82
4.4. Summary of Interview Analysis.....	90
4.4.1. Theme 1: Identification of the Problem	90
4.4.2. Theme 2: Generating Potential Solutions.....	92
4.4.3. Theme 3: Evaluation	92

CHAPTER FIVE: INTERPRETATION OF RESULTS AND RECOMMENDATION. 94

5.0. Introduction	94
5.1. Recall of Theoretical and Empirical Data	94
5.1.1. Recall of Empirical Data	94
5.1.2. Recall of Theoretical Data.....	95
5.2. Interpretation of Results	96
5.2.1. Problem Identification and Definition as a Determinant for the Professional Development of Secondary School Philosophy Teachers.....	97
5.2.2. Generating Alternatives and Selecting a Solution as Determinant of Professional Development of Secondary School Philosophy Teachers.....	100
5.2.3. Evaluation as a Factor of the Professional Development of Secondary School Philosophy Teachers	102

5.3. Limitations of the Study	104
5.3.1. Financial Constraints.....	105
5.3.2. Mobilising Assistants and Absence.....	105
5.3.3. Area of study constraints.....	105
5.4. Recommendation.....	105
5.5. Practical Implications of the Study	108
5.5.1. Pedagogical Implications	108
5.5.2. Didactic Implication.....	109
5.6. Suggestions for Further Research	111
GENERAL CONCLUSION	112
REFERENCES	114
APPENDICES	120

LIST OF ILLUSTRATIONS

Tables

Table 1: Statistics of Candidature and Results for the Last Five Examination Sessions	7
Table 2: Philosophy Teacher Participation in National Seminars (2015).....	10
Table 3: The number of teachers in Yaounde VI.....	61
Table 4: Descriptive criterion for Sample Selection	64
Table 5: Interview Guide Analysis.....	72
Table 6: Summary of Table Indicating Research h Variables and Hypotheses	76
Table 7: Identification of Cases	77
Table 8: Observation Result from Data Collection	78
Table 9: Interview results: Identification of the Problem	82
Table 10: Interview results: Generating Potential Solutions.....	85
Table 11: Interview results: Evaluation	87

Figures

Figure 1: Methodological Interaction Orientation	37
Figure 2: Results of problem-solving Model	79
Figure 3: Results of problem identification.....	79
Figure 4: Results of generating potential solutions	80
Figure 5: Results of evaluation.....	81
Figure 6: The Pragmatic Triadic model	110

LIST OF ABBREVIATIONS

Abbreviations

C.G.C.E. : Cameroon General Certificate Examination

G.B.H.S : Government Bilingual High School

A/L : Advanced Level

O/L : Ordinary Level

PSM : Problem-Solving Model

PS : Problem-Solving

Names

A : Ana

B : Bella

C : Carol

D : Dan

E : Ella

F : Frida

G : Gael

H : Helen

I : Ida

J : Jane

GENERAL INTRODUCTION

The new National Curriculum for the Cameroon English sub-system, which came into effect in 2011, features problem-solving as one of the aims for teaching and learning in philosophy. This curriculum according to the Cameroon General Certificate Examination Board (2011a), aims to ensure that all students can solve problems by applying reason or philosophy to a variety of routine and non-routine problems and learners should “develop the necessary tools and techniques of acquiring critical thinking skills, understand the procedures of logic and use them in problem-solving.”(p.1). Across Africa, there has also been considerable interest, at policy level, in developing problem-solving approach in teaching (Wake & Burkhardt, 2013). Problem-solving involves students individually and collaboratively working on complex and unfamiliar problems where, according to Schoenfeld (1992), the methods to use are not obvious or there may be a choice of different methods.

There are two main arguments for the wider use of this student-centered pedagogic approach. Firstly, there is an economic argument which focuses on the fact that developing transferrable and flexible skills is necessary in an increasingly complex formatted world (Skovsmose, 2008). Secondly, there is the issue of student engagement in learning activities. It is suggested here that student-centered problem-solving approaches are more engaging (Martino & Zan, 2010) and this can lead to higher order thinking skills.

At policy level then, there is an interest in student-centered problem-solving orientations in the English sub-system of education. However, there is strong indication that the teaching of philosophy in most secondary schools in Cameroon is predominantly a traditional teacher-led teaching method. It has also been suggested that attempts to reform extant practices through professional development have not been successful (Borko, 2004). This has been attributed to under-developed theories in the field of professional learning (Opfer & Pedder, 2011). In teaching philosophy, the focus on instructional activity is on a problem-solving method but many teachers are reluctant using this method probably because of their beliefs, little knowledge, lack of confidence, lack of available resource material, lack of effective training or they think it is time consuming. Since many teachers were taught on knowledge or content based knowledge, they feel comfortable using this traditional model and view the new model of problem-solving as a bore to them. Wu (1999) argues that teachers

who are not professionally developed in problem-solving skills would not be able to lead their students to a problem-solving environment.

Wu further argues that you cannot teach what you do not know but it seems most philosophy teachers teach what they really do not have a deeper understanding of. In other words, most teachers teach the way they were trained. To ensure that in-service philosophy teachers of the Anglo-Saxon sub-system effectively adopt the new method of teaching, Householder and Boser (1991) pointed to the need for teachers' education programs to use problem-solving models and strategies in their training programs and classrooms to teach problem-solving skills. This can only be achieved if teachers' skills are developed in problem-solving but rather since problem-solving was introduced in the secondary school curriculum, very little effective in-service training has been carried out for the professional development of these teachers.

The objective of this paper is therefore to investigate how the Problem-Solving Model influences the professional development of secondary school philosophy teachers of the Anglo-Saxon sub-system. To realize this objective, the research extends into five main chapters: the problem of the study, the literature review, the research methodology, data presentation, analysis and the presentation of findings as well as recommendations.

In the first chapter, we present the background to the study, formulation of the problem of study, formulation of the research questions, formulation of research objectives, significance of the study, justification of the study, delimitation of the study and definition of the key concepts. Chapter two is a theoretical and conceptual review of literature on the main concepts of Problem-Solving Model (identifying the problem, generating potential solutions and evaluation) and professional development (content substantive knowledge, content syntactic knowledge, affective knowledge and beliefs).

Chapter three focuses on the methodological aspects put in place to answer our research questions. In chapter four, data will be presented, discussed and analyzed. In chapter five, an interpretation of result will be done making reference to the theoretical framework, but we are going to question this framework in line with the data collected. It is this questioning that will permit us to draw didactical and pedagogical implications

The research question for this study therefore is: How does the Problem-Solving Model influence the professional development of secondary school philosophy teachers?

CHAPTER ONE

PROBLEM OF THE STUDY

1.0. Introduction

This chapter focuses on the problem of the study. That is, the formulation of the research problem. To formulate the problem consists of the realization of the following operations: presenting the background to the problem, formulating and clearly presenting the problem of the study, giving the research questions, precisising objectives, specifying the interest and presenting the delimitation of the study and definition of key terms.

1.1. Background to the Study

In a study conducted in 2007 and the subsequent landmark publication of the report “Philosophy, a School of Freedom”, UNESCO has charted new practical orientations for countries to take up the challenge of developing in their citizens the skills of critical thinking through the teaching of philosophy (UNESCO, 2007). In a world characterized by an increasing complexity on the one hand but growing interdependence on the other, there is a universally felt need to initiate and sustain well-argued reflections on our common future, to measure the congruence of national priorities and international urgencies. The centrality of the goal to enhance the human condition was evidenced by the 1995 Paris Declaration for Philosophy which consolidated UNESCO’s commitment to promote the discipline as a rampart against doctrinaire thinking and radicalism (UNESCO, 2005).

The teaching of philosophy is undeniably one of the keystones of a quality education for all. It contributes to open the mind, and to build critical reflection and independent thinking, which constitute a defense against all forms of manipulation, obscurantism and exclusion. The Memorandum on the philosophy programme of UNESCO announced as early as 1946 that, it is not enough to fight against illiteracy. It is still necessary to know what one is to do with the acquired knowledge. This reflection, philosophically significant in its own right, conveys a powerful and relevant message that applies, and will continue to apply to today’s and tomorrow’s educational dynamic. For this reason, philosophy had to expand its teaching where it exists and promoted where it does not exist.

The teaching of philosophy should go on a pragmatic criterion, build an individual's personality and fight against feelings of failure in school or of personal failure. UNESCO's ambition is now to go one step further by involving the largest number of concerned and committed Member States in providing durable support for philosophy within the educational system. To this end, Member States have been invited to perform a diagnosis that is as thorough as possible of the crucial questions concerning the teaching methodology of philosophy at national level, as well as suggestions for action that would deserve to be implemented. By means of this publication, UNESCO wants to contribute to deepening the ongoing debate by putting forward a certain number of facts, practices credited for preventing violence, educating people to live together and to be citizens in a democracy, linguistic mastery in the interaction between thought and language, learning to engage in personal, critical reflection, independent judgment, communicating technical knowledge and self-discipline.

Teaching at secondary level comes at a time of profound change in an individual's life. The objective of the teaching of philosophy at this level aims at strengthening the autonomy of the individual, building a methodology, reinforcing knowledge, building up capacity for judgment and contributing to civic education. According to UNESCO (2007), in a survey of 2007 which involved about 126 states, about 65% of those countries opted that these objectives had to be attained through strict principles such as the building of a methodology that will reinforce critical thinking. The evolution and the revolution experienced during this period have significant consequences to be taken into account in education. During adolescence, one's relationship to the world, with others and with oneself sets into motion a process of structuring and problematic restructuring. Adolescence is, therefore, a propitious time for philosophical questioning. Teaching philosophy at secondary level should thus find a legitimate place in the educational system and was then introduced.

When philosophy was introduced, it was more of theory than practice. The dogmatic and ideological paradigm mostly deals with the teaching and learning of philosophy as an organized and coherent response to fundamental questions about humanity. The focus is on its doctrinal aspects – questions are asked, but their answers are provided, incontestable by virtue of being based on reason. The teacher transmits the official philosophy as doctrinal truth or absolute knowledge in wanting to account for reality. Next was the historical paradigm and in this paradigm, philosophy is a major historical form of culture. The manner in which humanity answers to the questions that it asks about its own condition, has moved from

mythos (myth, which tries to explain things in narrative and metaphorical fashion), to logos (rational discourse, which philosophy shares with science). For example the Socratic dialogue, the Platonic idea, Cartesian doubt and the Kantian imperative.

With these two approaches, philosophy in secondary education faced lots of crises at the international and national levels. In many circumstances, pressure to improve the status of technical or high demands of the world led to a reduction and even cancelling of philosophy classes in some schools with the claim that philosophy serves and should serve no purpose (Zavala, 2005). It became very necessary for UNESCO to establish a programme that will address this problem and make philosophy more practical by introducing problem-solving. Educational institutions and governments as well then recognized the importance of problem-solving with emphasis on the practical application of knowledge (Pushkin, 2007). So the pragmatic approach of John Dewey which endorses practical theory had to be adopted. According to this pragmatic theory, knowledge is validated by its usefulness and so pragmatism had to start gaining ground again as it is felt by some educationists that knowledge has become too theoretical (Johnson & Onwuegbuzie, 2004).

The problem-solving paradigm breaks with the two preceding ones. It has less to do with learning about one or two philosophers than with 'learning to philosophize' as Kant stipulated. Philosophizing begins, as Aristotle said, with astonishment and questioning. It is a process of attempting to think through crucial questions and of trying to answer them from beyond any pre-formed opinions, beyond the commonplace and obvious. The challenge is to learn to think for oneself. To aid this thinking, a philosophy teachers' lessons, should present examples and models of rational thinking and of the concepts in question. Their aim is to make sense of these questions in such a way that the students begin to develop for themselves an appropriate manner of thinking that will progressively become their world view. The aim of teaching philosophy in the final year of English secondary school is then to encourage students to access the deliberated exercise of judgment, to develop a sense of intellectual responsibility, to train independent minds capable of employing a critical awareness of the contemporary world (C.G.C.E. Board, 2011b).

It is necessary to stress that problem-solving aims at training people to think independently and at fostering a critique of knowledge, rather than mere assimilation. In fact, problem-solving plays a critical role in quality education by contributing to enhance the discussions among students and developing conflict resolution skills; enhancing basic skills of

listening, writing and critical thinking, exploring notions of truth, namely through a Socratic method; understanding the rationale of the different subjects that are taught; building the character of the individual and fostering creativity.

In order to foster such higher order cognitive skills, teachers are trained in order that they employ appropriate teaching strategies of the problem-solving approach which immerses learners in active, investigative learning. Gagne (1985), stressed that during this active learning, abstract concepts must be built upon concrete situations in order to operationalize declarative knowledge. This is to say that teaching should be offered in context, and students should learn content while solving realistic problems. A curriculum should offer students the opportunities to learn important philosophical concepts and procedures and teachers should endeavor understanding students confidently while engaging them in carefully chosen tasks. Teachers should help students to identify, refine, and explore conjectures on the basis of evidence and use a variety of reasoning and proof techniques to confirm or disprove those conjectures and communicate their ideas and results effectively.

Contextually in recent times, there has been a growing public anxiety in most African Anglo-Saxon countries about the teaching and learning of philosophy in schools. In Cameroon, philosophy was introduced as a subject at the Advanced Level by the Cameroon General Certificate of Education Examinations Board in 1995 aimed at helping learners to develop a critical mind. This was in line with the Cameroon education orientation law No 98/004 of 14 April 1998 which stipulates in article 4 that: “the general purpose of education shall be to train the children for their intellectual, physical, civic and moral development and their smooth integration into society bearing in mind prevailing economic, socio-cultural, political and moral factors”. Also, the aim of education is to make students *develop creativity, a sense of initiative and the spirit of enterprise*. This supposes that the school is the proper milieu where learning is acquired and students after learning should apply what they have learnt through transfer of the knowledge or better integration in society.

Since its introduction, studies showed that large numbers of students seem to learn very little at school; learning tends to be by rote and students find learning of philosophy to be difficult. This has made the quality of teaching and learning to be questioned over time by parents, educators, and the general public and even by the government. Simon-Pierre Amougui, National Inspector for Philosophy in Yaounde, has mentioned the difficulties associated with teaching philosophy in technical secondary schools in Cameroon. He writes

that ‘in looking at the philosophy courses or lessons given to technical students, it is clear that their objectives, content and teaching approach is often of little interest to the students. He correctly raises the question of ‘student passivity’ and asks “how could it be otherwise when no challenges have been laid, no discussion instituted, no dialogue initiated, between students and teachers?” (Amougui, 1999). All these have been probably because teachers do not teach in the context in which learning is supposed to be used and consequently students cannot apply what they learn in school in their daily lives.

Consequently, a new curriculum was drawn in 2011 with more focus on problem-solving as need was felt in the youths to develop critical and analytical minds that can spur up political and physical development of our country Cameroon in particular and the world in general. A philosophy syllabus was then developed by the C.G.C.E Board (2011b), aimed at:

Ensuring that learners understand the central concepts and procedures of logic and use them in problem-solving and in formulating questions, (...) initiating and sensitizing the learners to develop a critical mind as well as organizing and evaluating distill arguments, (...) helping students to demonstrate a mastery of logical reasoning and skills and identifying, analyzing and responding to critically and logical techniques (p. 1).

The aim of the new syllabus is therefore to train students to think independently and at fostering a critique of knowledge, rather than mere assimilation. But with the introduction of the new program, many students have been passive studying the subject; there has been a lot of failure which might have influenced dropping out from the discipline. All these have been probably because teachers do not teach in the context in which learning ought to be used. Consequently students cannot apply what they learn in school in their daily lives. This dropout is evident looking at the Cameroon General Certificate of Examination Board (C.G.C.E.) enrollment list of students for these past years. This can be seen on table 1 below.

Table 1: Statistics of Candidature and Results for the Last Five Examination Sessions

Year	Registered	Sat	Absent	Pass	Fail	Diff in% pass	Trend	Remarks
2012	11,374	10,815	559	3,684	7,131	-	-	Base year
2013	11,123	10,521	602	3,427	7,094	-1.49	decline	Poor
2014	12,530	11,891	639	6,163	5,726	19.28	rise	encouraging
2015	11,180	11,180	477	5,109	6,071	-6.15	decline	Poor
2016	9,409	8,989	420	3,342	5,647	-8.52	decline	poor

Source: Cameroon C.G.C.E. Board, 2016

Table 1 above shows that there has been a great decline in the number of registered candidates for the past years. In 2014 there were 12,530 registered candidates, in 2015, there were 11,180 registered candidates and in 2016, 9,409 candidates were registered. This shows that for the past three consecutive years, the number of registered candidates has been declining seriously.

Again, from the same table 1, there is an indication that change in percentage pass has been dropping in successive sessions, except 2014 that recorded a leap of 19.82%. And it is worth noting that the paper 3 (problem-solving and analysis) has never gone beyond 38% pass for the past 5 years. Again, candidature has been dropping in successive sessions, except 2014 that recorded an increase in candidature of 0.126%.

At this juncture, a number of factors have been identified to be responsible for these poor performances from the various studies conducted. These include the lack of motivating attitudes by most teachers, poor infrastructural facilities, inadequate textual materials that do not conform to PS, attitude of teachers and students to learning and teaching, lack of teaching skills and competence by teachers, and lack of opportunities for professional development for teachers (Folaranmi, 2002).

The attitudes of teachers, their knowledge and beliefs on the new teaching method are a problem to handle. This is because they believe this method is time consuming which hinders them from covering the vast syllabus. Due to this belief, they engage in a passive rush lecture method instead of constructivist learning theories that promote learners to actively construct their own understandings. From this perspective, the role of the teacher is to help the learner to engage in activities such as exploring, justifying, proving and generalizing the ideas, and procedures of their solution strategies. Teaching should be understood as a dynamic process of inquiry into student reasoning rather than a process of transmitting a set of procedures. The role of the philosophy teacher is to build on students' existing philosophical knowledge as opposed to providing them with new, disconnected pieces of information as is the case with most teachers.

Other studies mentioned that poor classroom organization, lack of management techniques and poorly co-ordinated student activities also reduced the quality of philosophy teaching and learning (Akale & Nwankwonta, 1996). Some other researchers also attribute the low percentage of students who pass examinations, to dissatisfaction with the syllabus that

may not have to do with concrete issues, teachers' qualifications due to inadequate training, workload, experience and disposition, general lack of teaching skills, and the ineffective style of delivery of subject matter.

According to Cameroon education orientation law no 98/ Chapter 3: Section 37,

The teacher shall be the principal guarantor of the quality of education. In this capacity, he shall be entitled, within the limits of the means available, to suitable living and working conditions, as well as to appropriate initial and continuing training.

This is an indication that professional training and development standards of teachers should address problem-solving skills since educators are revamping their curricula to focus on problem-solving as a key component of the professional curriculum. With scientific knowledge doubling every five years, it becomes increasingly important for teachers to develop higher order thinking skills through a mastery of the curriculum content. On the contrary, most teachers themselves do not master the said content or subject matter because of the inadequate professional development programmes.

This is evident during multiple choice questions test screening administered to General Certificate Examination examiners invited for the marking session. From the results of the test screening administered, it reveals the extent to which some purported examiners turn out to be. The Chief Examiner of O/Level Logic, reveals that some examiners even scored, 15 %.(Denis Ngonam, personal communication, December 2016). He further explained that the test marks accorded to teachers ranged from 15-80%. While the Chief Examiner for A/Level Philosophy reveals that teachers' performance on test screening of 2015 was at 15%. (C. Ngewoh, personal communication, July 2015) If some examiners who are called up to determine the faith of students are empty, one then begins to wonder what they must have taught the students as well as what they will really be marking.

Furthermore, many teachers lack necessary basic literacy skills as well as higher order thinking skills, while today's workplaces often demand high levels of both skill sets. Economic, organizational, and technological forces have changed the nature of most workplaces. Among these forces are globalization of the marketplace, democratization of workplace decision-making, synchronous production, new technologies, and multiple roles on most jobs. If most teachers lack these skills, it is due to the fact that they rarely attend

seminars. Each year, very few philosophy teachers do participate in regional and national seminars which are organized about once or twice a year. Meanwhile the seminars are said to be obligatory. From the National Pedagogic encounter of philosophy teachers 2015, it is evident that the rate of teacher participation during seminars leaves much to be desired as seen from table 2 below.

Table 2: Philosophy Teacher Participation in National Seminars (2015).

Year	Total number of philosophy teachers in the Centre Region	Total number of philosophy teachers in Yaounde VI	Total number of participants of Yaounde VI	%
2015	68	31	14	45.2%
2016	72	30	17	57.7%

From the above table, it is seen that in 2015 out of the sixty eight teachers from the Centre region only fourteen out of the thirty one from Yaounde VI participated in the seminar scoring 45.2%. This means that more than half the total number of teachers did not participate in a seminar that had to do with the newly introduced problem-solving technique. In 2016, only seventeen out of the thirty teachers participated scoring 57.7%. This shows that just an average number of them participated which is still not sufficient. The statistics gotten proves that teacher participation in seminars warrants more. Meanwhile it is evident that any teacher who does not make efforts to develop professionally cannot be a good teacher.

Not only do teachers fail to attend seminars, but the seminars are inadequate to train teachers because they have a short duration of about 2-3 days during which inspectors mostly do the talking. After the short seminars, some teachers make no attempt on personal research in an effort to better understand the new teaching method put in place. Meanwhile it is known that any teacher who stops learning stops teaching and a good teacher is one on perpetual alert, since it is evident that most teachers teach as they were taught.

1.2. Formulation of the Problem of Study

The education of every generation depends on the society, its needs, resources and other conditions at that particular period. This is so because a country which is unable to develop the knowledge and skills of its people to utilize them effectively in the national economy will be unable to develop in anything else. This explains why as time goes on the philosophy curriculum had to be changed into problem-solving. Teaching is a dynamic

profession and so teachers are as well expected to grow professionally as years pass by in order to be efficient in problem-solving. Despite the global reforms in education today and generating concerns among governments, educationists, major stakeholders and examination bodies, research has observed that in Cameroon, inadequate teaching skills is a call for concern.

The problem here is that of insufficient professional development of secondary school philosophy teachers as Tchombe 2010, (cited in Wemba, 2012), points out that ‘the teaching core is not adequately prepared for the new trends in the education arena’ emerging from different international declarations including the Sustainable Development Goals that educate in ways that respond to the present societal market forces. Most teachers still use the traditional lecture method rather than using the problem-solving approach which fosters critical thinking. Lack of mastery of this approach probably results from the fact that they do not attend seminars to learn more. This is glaring from the 2015 statistics where philosophy teacher participation was at 45.2% for those in the Yaounde VI municipality. Teachers are hardly involved in research activities as well as in-service training. Even when in-service training is done, the time accorded is usually very limited.

Inadequate professional growth in problem-solving will lead to inefficiency and ineffectiveness of teachers in lesson delivery and consequently led to students failing, others dropping out and the production of student who after school cannot apply what they learnt. Students’ failure is evident from the C.G.C.E. A/Level (2016) results of philosophy wherein, out of the 9,409 registered, 8,989 sat, 3,342 passed and 5,647 failed. If students continue to drop the subject and fail in this manner, it will be an indication that the educational objectives are not attained. If the government spends huge sums of money to pay teachers and parents spend time and money to educate their children but end up in dissatisfaction, if students also end up not performing well, they become depressed. Consequently, society will be faced with phenomena such as repetition, dropout, arm robbery and drug abuse. In such a generation, there is no future for the nation though the youths of today are leaders of tomorrow.

From the range of such evidence in the philosophy education literature, it is very clear that philosophy education in Cameroon is faced with numerous problems that need to be addressed so that the goal of equipping students to live effectively in our modern age of science and technology will not become a dream. It is, however, believed that if appropriate steps are not taken to address these lingering barriers to reform, the citizens will not be able to

develop scientific literacy useful for coping in the modern scientific and technological world. Efforts at developing scientifically literate citizens by improving the quality of philosophy teaching and learning in schools is a laudable reform that should preoccupy the minds of the policy makers and all the key stakeholders in education and with the limited resources, the pedagogical needs of teachers can still be well handled.

1.3. Research Objectives

General research objectives

The main objective of this study is to investigate how the Problem-Solving Model influences the professional development of secondary school philosophy teachers.

Specific objectives

- 1- To examine how identifying a problem influences the professional development of secondary school philosophy teachers.
- 2- To investigate how generating potential solutions influences the professional development of secondary school philosophy teachers.
- 3- To examine how evaluation influences the professional development of secondary school philosophy teachers.

1.4. Research Questions

General Research Question

How does the Problem-Solving Model influence the professional development of secondary school philosophy teachers?

Specific Research Question

- 1- How does problem identification influence the professional development of secondary school philosophy teachers?
- 2- How do generating potential solutions influence the professional development of secondary school philosophy teachers?

3- How does evaluation influence the professional development of secondary school philosophy teachers?

1.5. Research Hypothesis

General research hypothesis

Ha: The Problem-Solving Model influences the professional development of secondary school philosophy teachers.

Specific hypothesis

Ha1: Identifying and defining a problem influences the professional development of secondary school philosophy teachers.

Ha2: Generating potential solutions influence the professional development of secondary school philosophy teachers.

Ha3: Evaluation influences the professional development of secondary school philosophy teachers.

1.6. Significance of the Study

The findings of this study will be beneficial to students, teachers, and policy makers. They are expected to expose and acknowledge some of the ills in the teaching and learning of philosophy in order to create room for possible improvement.

To policy makers

This study will permit them to draw up policies and include programs that foster professional development since society is changing and so teachers need to be trained according to the needs of every given era. They should therefore put in place effective in-service interactive training programs wherein teachers will learn by problem-solving through a systematic procedure, active participatory activities and making provisions for trained facilitators on this approach. Some of these provisions include; monetary assistance for the training of facilitators who will create meaningful impact on the trainees. Clearly, there is need for policy makers to focus on training programs of secondary school teachers in order to incorporate a culture of reasoning. The program should instill in teachers the attitude that

philosophy is all about reasoning rather than recall and memorization. Problem-solving programs are an important linkage in developing such attitudes.

To teachers

This study will permit teachers to review their teaching styles, aids, strategies, and methods by adapting them to present contexts like the multi-cultural dimensions of Cameroon (which have to do with new educational innovations). Consequently, they will have a mastery of how to go about enacting the problem-solving curriculum which focuses on both procedural and conceptual knowledge to enable learners to become competent problem-solvers. From this perspective, Amougui, (1999) thinks that teachers have to adopt the skills of guiding, coaching, asking insightful questions and letting learners to engage in activities such as exploring, justifying, proving, criticizing and generalization of ideas. They equally have to teach in the contexts in which learning will be used and applied in their daily lives.

It will also permit them to know the importance of focusing on and identifying a philosophical problem before lesson delivery in order that learners can better follow the lesson. This is so because it is evident that any lesson that is not problem-focused and problem-understood will be ineffective. Consequently, the role of the philosophy teacher is to build students' existing formal and informal knowledge rather than giving them new disconnected pieces of information.

Also, the findings will help teachers to understand that when applying problem-solving, they should encourage the learners to use their contextual knowledge to define the goal (properties of an acceptable solution), then invent a solution. Allow many "right" strategies and solutions, and compare them for efficiency and effectiveness. Encourage practices of similar problem solving strategies across multiple contexts to encourage generalization. The findings of this work will also give them the zeal and motivation to participate in seminars, workshops, in-service trainings wherein they will encounter experiential active learning opportunities with their peers in order to become real professionals.

To curriculum developers

While many learners of today lack necessary basic literacy skills and higher order thinking skills, today's workplaces often demand high levels of both skill sets. To overcome

this problem and attain the sustainable development goal, this work will act as a guide to curriculum developers and ensure that the curriculum should focus on problem-solving as a key component and content selected based on identified philosophical problems linked to our real world context rather than abstract concepts with little to offer to present society.

1.7. Justifications for the Study

This researcher is aware that so much research work has been done on problem-solving and professional development of teachers in other countries particularly in mathematics and some science subjects but doubts about philosophy specifically. In Cameroon, varied works have been carried out on professional development but very few have paid attention to the aspect of PS. The need for government to create new schools and recruit teachers for students to come and earn a degree is one thing but the need to equip these schools/faculties with appropriate learning facilities and maintain the development of these teachers is another thing. In this regard, the researcher seeks to examine the link between problem-solving model and the professional development of philosophy teachers in secondary schools in the Yaounde VI municipality in Cameroon.

1.8. Delimitation of the Study

1.8.1 Geographical Delimitation

The geographical scope of this study was Yaounde VI municipality which has a number of schools like private, mission and public schools. The scope comprises some English secondary schools that offer philosophy in this municipality. They include; Oxford Comprehensive High School(2 teachers), Christian Renaissance(2 teachers), Holy Infant High School(3 teachers), Mevick Bilingual Grammar School(2 teachers), Government Bilingual High School Etoug-Ebe (6 teachers), Government Bilingual High School Mendong (6 teachers), Wisdom International College(2 teachers), Rosel College(2 teachers), NESCAS College (2 teachers), COSBIE (3 teachers), Green Hills Damas (2 teachers), Harvard College (3 teachers), City Bilingual (2 teachers) and Mario Academic Complex (2 teachers).

The teachers involved in the teaching of philosophy in Yaounde VI in the Centre region of Cameroon are thirty nine in number. The classes concerned will be the classes that offer Philosophy and/ or Logic. The teachers concerned in the study will be drawn from some selected schools in this municipality. The study is carried out during intensive school periods

precisely during the second term. This is to ensure that the teachers are available to give their appropriate responses and show case their actual classroom practices.

1.8.2. Thematic Delimitation

Content wise, this study was limited to the problem-solving model and how it is linked to the professional development of secondary school philosophy teachers. The following variables are explored: problem identification and its definition, generating potential solutions, and evaluation. These are identified as elements that could have an influence on the professional development of philosophy teachers. These choices on the one hand show that they are determinants of professional development. There are other approaches and models with less or numerous stages that could contribute to professional development but what interests us is the problem-solving model of Dewey that has been summarized by the author into three stages. We are going to see some of the concepts and stages as used in the study and try to define them.

1.9. Definition of Concepts

Looking at the title of this work; “The Problem-Solving Model and the professional development of secondary school philosophy teachers”, it is necessary to define some of the key concepts for a better understanding. Some of these include: a problem, a model, Problem-Solving Model, philosophy and professional development.

1.9.1. Problem-Solving

Contextually, before we define problem-solving, it will be necessary to first of all define a problem. According to Mayer & Wittrock (2006, p. 287)), *a problem* occurs when you are confronted with a given situation and you want another situation but there is no obvious way of accomplishing your goal. Because every problem needs a solution, he sees problem-solving as a “cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver.” In other words, the ability to understand what the goal of a problem is and what rules could be applied represents the key to solving the problem. According to his definition, there are several important characteristics.

- Problem-solving is a process which occurs within an individual’s cognitive system.
- Problem-solving requires representing and manipulating knowledge that is directed toward a goal.

- Problem-solving is intensely personal because the prior knowledge and skill level of the problem solver determine the facility the person has for solving the problem.
- The problem solver has a goal but may not have an obvious method for reaching the goal.
- Problem-solving can cover a wide range of problems from very broad to very specific.

It is in this same light that Green and Gilhooly (2005, p. 347) state that “problem-solving in all is an activity that structures thought and everyday life in a meaningful way.” Teachers need to possess professional skills that have been learnt and developed; they consist, in part, of methods and strategies that have been incorporated into a performance routine. Teachers should understand problem-solving not only as a process of teaching but also as a way of thinking during the learning process directed towards attaining solutions. Mayer and Wittrock (2006) described problem-solving thinking in terms of reasoning, critical thinking, creative thinking, and decision making that involve specializing, conjecturing and generalizing. This perspective of problem-solving is central to understanding the thinking underlying problem-solving models. This is what orientates the thinking deployed this study.

1.9.2. Model

According to Lunenburg, (2011) models can be defined as interacting parts or a plan that serves to guide actions. To him, a model is a design for learning which embodies a set of assumptions on how teaching should be done and on how teachers acquire or structure their knowledge

In the context of this work, just like Lunenburg says, a model is a process or a set of guidelines that a person applies to various situations (Ormrod, 1999). **A Problem-Solving Model** is therefore a structured way that can guide the problem solver’s cognitive processing directed from a goal state to a solution state. This model is based on the assumption that teachers should use rational problem-solving strategies and a structured approach that will lead to better solutions. Such a model is designed to ensure that teachers themselves can understand what ‘problem-solving process’ is all about in order to be efficient practitioners.

1.9.3. Professional Development

Professional development is understood and described in different ways. Joyce and Showers (2002), for example, defined professional development as “formal and informal

provisions for the improvement of educators as people, educated persons, and professionals, as well as in terms of the competence to carry out their assigned roles.”

Shaffka (2006; cited in Wemba, 2012), defines professional development as a systematized initial, continues and coherent process of professional development of educators in accordance with professional competency standards and frameworks. To him, training should follow a coherent process according to the standards of the curriculum. This means that professional development through intensive training or other forms should train teachers according to the standards prescribed by the curriculum.

In the context of this work, we combine the definitions of Joyce and showers and that of Shaffka to say that professional development refers to any efforts made by teachers, be it formal or informal to improve their competencies in line with the standards of the curriculum. Considering the fact that the Cameroon philosophy curriculum is problem-solving focused, education officials and teachers through their personal efforts should learn to stimulate or inject PSM in the teaching/ learning process.

1.9.4. Philosophy

Philosophy involves the quest for the truth for the sake of wisdom. According to Socrates, it involves a critical examination of reality that is characterized by rational inquiry. A rational form of inquiry is one that is based exclusively on sound arguments and not opinions or beliefs or feelings. Nothing is wrong with opinions or feelings but the discipline of philosophy is there to justify them by bringing in logic rather than opinions. It is in this light that Chukwudum (as cited in Chia, 2005, p. 2) defines philosophy as a critical thinking on man’s existence or reality. To quote him, it is “a path to a systemic coherent discovery and disclosure of the African as a being in the African world”.

According to Nkrumah (1964, p. 6), philosophy is regarded in the light of a series of abstract systems and can be said to concern itself with two fundamental questions; the first question, ‘what there is’ and the second how ‘what there is’ is explained. This second question has to do with explaining things the way they are and ‘not otherwise.’ This is greatly in line with Descartes’ definition of looking at philosophy “essentially as a method” (Descartes, cited in Nebada, Nsoe & Komo 2008, p. 29).

It is in Nkrumah's context that we look at what philosophy entails. The philosophy teacher in this light has to go by a method in the attainment of the objectives of his lesson and should have the attitude of intelligence and will. Amo and Guillaume (as cited in Nebada et al., 2008, p. 34), think that philosophy is not only concerned with episteme or knowledgeability but also with the will and its acts. From this definition, a philosophy teacher therefore is one who has the attitude of constant quest for knowledge to perform his duty with a strong will that results in actions.

CHAPTER TWO LITERATURE REVIEW

2.0. Introduction

This chapter presents related literature; that is, what other researchers have found out about the Problem-Solving Model and its influence on the professional development of secondary school philosophy teachers. In this chapter, we will do a conceptual review of PSM and we will also review literature on professional development. We will later do a theoretical review on pragmatism, constructivism and the gestalt psychologists as well as an empirical review.

2.1. Conceptual Framework

This section examines the major concepts of this study which are problem-solving model (identifying and defining the problem, generating potential solutions and evaluation) and professional development by looking at concepts such as content syntactic, content substantive and affective knowledge. We will also examine some principles and models that surround these concepts.

2.1.1. Concept of Philosophy

As earlier noticed, philosophy in this context is “the study of nature and the meaning of the universe and of human life. This means therefore that philosophy as a subject is concerned with the study of the meaning of the entire creation and the way human beings perceive, live and relate with all other things in the universe. It helps in the construction of the mind through which one understands the real, through a critical and analytical mind. This explains why it has as its main objective; to initiate and sensitize learners to develop a critical mind and to demonstrate the ability of mastery of logical reasoning and skills when encountered with problems.

Much of what is learned in philosophy can be applied in virtually any human endeavor. This is workable because Philosophy builds a strong basis for the theoretical framework of all disciplines which gives them the license of applicability. That is why Nkrumah (1964, p. 6), stipulates that “practice without thought is blind; thought without

practice is empty.” This is both because philosophy touches on so many subjects and also because many of its methods are usable in any field. By studying philosophy, students develop capacities and abilities not only through reading and writing, but also through philosophical dialogue, in and outside the classroom, that is so much a part of a thoroughgoing philosophical education. These abilities include: general problem-solving and persuasive powers.

•**General Problem-Solving:** The study of philosophy enhances one's problem-solving capacities in a way that no other activity does. It helps one to analyze concepts, definitions, arguments and problems. It contributes to one's capacity to organize ideas and issues, to deal with questions of value, and to extract what is essential from masses of information.

•**Persuasive Powers:** Philosophy provides training in the construction of clear formulations, good arguments, and apt examples. It thereby helps one develop the ability to be convincing. One learns to build and defend one's own views, to appreciate competing positions, and to indicate forcefully why one considers one's own views preferable to alternatives.

Philosophy also contributes uniquely to the understanding of other academic pursuits and fields of inquiry. Many important questions about a discipline, such as the nature of its concepts and its relation to other disciplines, do not belong to that discipline, are not usually pursued in it, and are philosophical in nature. Philosophy of science, for instance, is needed to supplement the understanding of the natural and social sciences which one derives from scientific work itself. Philosophy of Literature and philosophy of History are of similar value in understanding the humanities, and Philosophy of Art is important in understanding the arts. Philosophy is, moreover, essential in assessing the various standards of evidence used by other disciplines. Since all fields of knowledge employ reasoning and must set standards of evidence, logic and epistemology have a general bearing on all these fields.

2.1.2. Concept of Problem-Solving

2.1.2.1. Problem-solving

Philosophy has emphasized problem-solving as a means of helping students to develop decision-making skills and teachers to alter their teaching methodology. Problem-solving, as used in mathematics or philosophy education, refers to the process wherein students encounter a problem – a question for which they have no immediately apparent resolution, nor an algorithm that they can directly apply to get an answer (Schoenfeld, 1992).

They must then read the problem carefully, analyze it for whatever information it has, and examine their own mathematical knowledge to see if they can come up with a strategy that will help them find a solution. The process forces the reorganization of existing ideas and the emergence of new ones as students work on problems with the help of a teacher who acts as a facilitator by asking questions that help students to review their knowledge and construct new connections. As the new knowledge is embedded into existing cognitive frameworks, the result is an enrichment of the network of ideas through understanding. The simplified process described above was first summarized in Polya's path-breaking book and has since then inspired much research.

2.1.2.2. Cognitive Processes in Problem-Solving

Mayer and Wittrock (2006) distinguished among four major cognitive processes in problem solving: representing, in which the problem solver constructs a cognitive representation of the problem; planning, in which the problem solver devises a plan for solving the problem; executing, in which the problem solver carries out the plan; and self-regulating, in which the problem solver evaluates the effectiveness of cognitive processing during problem solving and adjusts accordingly.

During representing, the problem solver seeks to understand the problem, including the given state, goal state, and allowable operators, and the problem solver may build a situation model; that is, a concrete representation of the situation being described in the problem. Although solution execution is often emphasized in mathematics textbooks and in mathematics classrooms, successful mathematical problem-solving also depends on representing, planning, and self-regulating. In a 2001 review, Jeremy Kilpatrick, Jane Swafford, and Bradford Findell concluded that mathematical proficiency depends on intertwining of procedural fluency (for executing) with conceptual understanding (for representing), strategic competence (for planning), adaptive reasoning, and productive disposition (for self-regulating).

The problem-solving model engulfs the following stages:

2.1.2.3. Problem Identification and definition

Meeting the learning needs of all students in a class can be a daunting task, especially given diverse learning needs. Hence, every good teacher must always ask: 'Are all of my

students learning and making adequate and appropriate progress?’ In order for a teacher to accurately answer this question, it is critical to continuously observe, think about, and analyze students’ learning relative to his or her teaching and the standards and expectations of that curriculum and grade. In step one, the problem gets identified and understood. Four generalized procedures have been identified by which the problem can be identified and clarified;

The first Procedure involves checking for previous knowledge to the problem or what is mostly termed background knowledge to the problem. This is what Kant (cited in Lawhead: 2006) calls “a priori knowledge” which has to do with knowledge justified independently of or prior to, experience. This background knowledge does not give directly any factual information about the problem to be handled but only gives it a clue. This is what Descartes (cited in Lawhead, 2006) refers to as “innate ideas.” This means that students have some inborn ideas in them and the teacher has as role inciting them to come up with an idea, from what they already know, to the unknown. The definition of a problem at this stage implies that one must have some pre knowledge of the problem. How can one solve a problem without first knowing what the problem is? In fact, identification of the problem is what is called the read and explore stage. In this step, the student first becomes aware of the problem. Dewey (cited in Stumpf and Fieser, 2002, p. 407) notes that to deal effectively with problems I do not need to draw on elaborate value theories but rather should be drawing on past experience or experiment. He explains:

The aim is to familiarize you with the principal parts of problems. But if seriously asked and carefully answered, they are a great help in problem solving: in focusing your attention upon the principal parts of the problem, they deepen your understanding of the problem and they may start you in the right direction.

Awareness and definition comprise the knowledge that is essential to solving the problem. As a practical consequence, teachers need to create situations where students sense that a problem exists and-then create a definition of the problem to be solved. Teachers should provide students with some guidelines for deciding whether a task really is a problem for students in order that they get to understand where they are moving to.

The second procedure for developing understanding of a problem involves the problem statement (Dewey, cited in Stumpf and Fieser, 2003). One suggestion for stating the problem involves bringing out the topic to be treated in a problematic manner or in form of questioning the problem. This is to say that the aspect of the topic which brings out a nuance should be identified by the teacher and presented to the learners. Other authors including Polya suggest that students make lists of important information to gain a more complete understanding of the problem statement and the data at hand. To Dewey, stating the problem can be possible if the teacher and students ask: What is the issue at hand? What must be done? The structure of the problem should be brought out because it could help impact students' problem-solving abilities. Dewey thinks that the problem statement is important and the heuristic processes that might be particularly useful in reaching a solution.

The third procedure for understanding problems is contextualizing the problem which can be done through concrete examples. Effective instruction combines both theory and practice in specific ways. When effective teachers introduce a new concept, they first present a perceptual, concrete example of it to the student. According to Dewey (cited in Stumpf and Fieser, 2002: 404),

the mind is not a fixed substance , and knowledge is not a set of static concepts. Human intelligence is the ability within us to cope with our environment. Thinking is not an individual act carried on in private or in isolation from practical problem. Instead, thinking or active intelligence arises in problem situations; thinking and doing are ultimately related.

They begin with two or more concrete particulars and abstract from them the essential defining characteristics into a concept. It is possible to do this by providing an environment that is conducive to creativity. Many problem-solving theorists have argued correctly for the inclusion of such an atmosphere in classrooms (Christy & Lima, 2007). Contextual teaching presents information in familiar contexts and in contexts in which the information is useful. It is effective because it takes advantage of the fact that learning occurs best when learners process new information or knowledge in such a way that it makes sense to them in their own frames of reference. Contextual teaching is consistent with the way the mind naturally functions, as articulated by, Caine, Cane and Crowell (1999). Contextual teaching recognizes the fact that learning with understanding (as opposed to rote memorization) involves five processes known collectively (after their acronym) as the REACT strategies (CORD, 1999):

relating, experiencing, applying, cooperating and transfer. It is in this light that Dewey (cited in Stumpf and Fieser, 2003, p. 406) thinks that “the spirit of education should be experimental, because our minds are fundamentally problem-solving instruments.

The fourth procedure involves restating or translating the problem. Teachers can ask a number of students to rephrase the problem in order to show appreciation for different perspectives on understanding the problem. The translation procedure works well when reformulating word problems into numbers or number problems into story problems. A teacher can ask students to repeatedly give their understanding on the problem. A twist on this repetition is to ask students to explain problems in their own words. In listening to them describe a story problem in its entirety, a teacher can pinpoint what students do and do not understand. Rephrasing or elaborating on a story can also help to engage a learner. Often, this elaboration involves using a more familiar context or personalization so that the child and her friends are characters in the story.

In summary, the first step in the problem-solving process requires getting an accurate perspective on the nature of the problem. The problem solver usually begins by reading or talking about the problem and then proceeds by focusing on salient features, translating the information or portraying it. Based on Dewey’s pragmatism (cited in Stumpf and Fieser, 2003, p. 407) the review of the literature and the characteristics of good problem-solving, the problem identification steps are:

- Ability to grasp the structure of the problem.
- Apprehend the important structural features of the problem.
- Ability to visualize and interpret quantitative or spatial facts and relationships.
- Generalized memory for mathematical relationships, schemes of arguments and proofs, structural characteristics, and so forth.
- Ability to understand concepts and terms, to note likenesses, differences, and analogies, to identify critical elements and select correct procedures, to note irrelevant information, and to estimate and analyze.
- Analyze the information in the problem more quickly, accurately, and with greater confidence than unsuccessful problem solvers.

2.1.2.4. Generating alternatives and selecting a solution

Finding an alternative solution depends on developing high quality alternatives. To Dewey (cited Stumpf and Fieser, 2003, p. 407), we cannot determine a near formula to determine a solution and what the best means might be for determining an end.” This is so because we have different problems that occur at different moments or eras and every solution to a given problem can only be determined by the problem in question. It is in this same light that Sartre (cited in Nebada et al., 2008, p. 31), confirms that philosophy is not a fixed science and that there are philosophies and not philosophy. This means that it is not like a standard which is fixist. He says : « La philosophie n’est pas; sous quelques forme qu’on la considère, cette ombre de la science, cette éminence grise de l’humanité n’est qu’une abstraction hypostasiée (...). En effet, il y a des philosophies. »

Each epoch in history has its own philosophy and so there is no fixed solution to a problem for the solution will depend on the epoch. Since there are philosophies, there will be a context where one takes its dominance. When the philosophy is alive, it takes its dominance at that time. This is same with solutions to every problem for there is not just a single strategy to solve a problem but many. Consequently, strategies that should be selected to solve problem should be those that suit the philosophy of a given context or epoch. The ability for teachers to accomplish the selection of strategies depends on their knowledge and skills. It also depends on the climate and processes of the period.

The climate of an effective professional development encourages open discussion of ideas, where minority ideas are heard and taken seriously by the majority. Professional development programs should use creativity and other structured techniques to generate alternative solutions to problems while taking into consideration the society or context in which they live. Techniques such as brainstorming and the nominal group technique are used to generate alternatives and select strategies, during which participation of all is encouraged. Since different problems require different strategies for their solution, success in problem-solving demands a repertoire of strategies or game plans. There are many strategies for solving problems. The list below is a compilation from numerous authors (Polya in Lester and Charles, 2003).

- Trial and error; applying possible operations or examples to the information at hand.
- Simulation; using experimental methods on artificial data.

- Simplification; solving a special case (or a simpler version) of the more complicated problem.
- Generalization; creating a larger, more tractable problem and then simplifying that procedure for the case in question.
- Deduction; breaking the larger problem into more manageable supports.
- Induction; summing individual observations to form more general principles.
- Searching for a pattern; finding a 'relationship among properties and exploiting the similarity to find the answer.
- Analogies (visual or word); using similarities among objects (or propositions) to establish relationships among the known and unknown.
- Working backwards; beginning with the desired result, step back and work towards the initial problem state.
- Computation; employing arithmetic, algebraic and geometric techniques to solving word or number problems.
- Organized listing; generating and clustering ideas that represent possible solutions.

According to Peirce (cited in Achingale, 2013), seeing and practising the use of strategies improves learners' problem-solving ability. Teachers should, receive training in the examples of problems solved using the different strategies defined above. Such training is essential as an in-service mode. The activity of selection of strategy requires both experiences in knowing various strategies as well as knowing which to select. Fortunately, for many problems, more than one strategy will work; but unfortunately, there is no rule of thumb for selecting a first strategy. Students should be given opportunities to select and implement a variety of strategies in a variety of (subject matter) contexts.

After the selection of strategies that suit in a given context, the teacher has as task to help students operationalize the solution steps. According to Descartes in *Rules for the direction of the mind*, to get to concrete solutions, "we must begin with a simple and absolutely clear truth and must move step by step without losing clarity and certainty along the way." This explains why in his fifth rule, he says that to get to a solution, we must "reduce

obscure propositions step by step to those that are simpler and then starting with the intuitive apprehension of all those that are absolutely simple and attempt to ascend to the knowledge of all others by *précising* similar steps” (Descartes, cited in Stumpf and Fieser, 2003, p. 228).

Descartes’ intention is to show that to get to an “adequate solution”, the teacher and learners need to divide each of the difficulties of the problem “under examination into many parts” as possible and as necessary. When this is done, then they can follow an order and ascend to more complex knowledge “little by little.” A teacher who follows and applies these rules is likely to support his learners to an easy way of getting a solution. These principles of dividing into “many parts” and ascending “little by little” validate Descartes’ second and third rules of method.

Selecting the best Strategy is where one draws a conclusion or makes a hypothesis about how to solve the problem based on what he or she found in steps one and two. One experiments, looks for a simpler problem, and then conjectures, guesses, forms a tentative hypothesis, and assumes a solution. After generating alternatives, teachers must consider how to select the best solution. Teachers should consider the positive and negative solution of each alternative. The ability to implement the solution must be considered. This involves the ability of teachers and students to enact the solution and the understanding of how outside groups will respond to the solution.

The best test of the value of any philosophy to Dewey (cited in Stumpf and Fieser, 2003, p. 405) is to ask: “does it end in conclusions which when referred back to ordinary life-experiences and their predicaments, render them more significant, more luminous to us and make our dealings, with them more fruitful.” Any good solution to him meets three criteria; - its content should be significant in life experiences, the solution should have an adjustment between the individual people and their environment and it is a process that fosters group harmony. Once a set of solutions have been developed, teachers should develop ways of evaluating the benefits and costs of alternatives and focus should be on analyzing alternatives to aid selection. This often leads to the final solution containing elements of multiple alternatives.

Nkrumah (1964, p. 7), also thinks that “Sufficient Reason” is needed to get a final solution from multiple alternatives. To him, every cosmic raw material has an explanation linked to its effect and the fact that we deny a solution to an effect is “because the solution is

not valuable” and the fact that we validate a particular cause is because it appeals to “Sufficient Reason.” This is in conformity with Descartes’ first rule of method that we should never accept anything as true which is not certain and clear to the mind (Descartes cited in Stumpf and Fieser, 2003, p. 228). Thus philosophy teachers during their lessons with learners must be very sure of their solution steps before they validate them. Sometimes none of the available alternative solutions is appealing; in which case, teachers need to help learners select the best objectionable proposal. This leads to rationalizing among teachers and students to bolster their belief that their decision is acceptable. Teachers may over emphasize the positive attributes of a selected solution and deny its negative aspects in order to justify their choice.

2.1.2. 5. Evaluation

Evaluation is one of the most overlooked steps in the problem-solving process. Even when teachers and students do a good job of analyzing the problem and selecting solution, there are unforeseen factors that may lead to failure. Dewey’s problem-solving model is a research based approach to problem-solving that emphasizes the importance of the evaluation stage. In this approach, solutions are considered hypothesis that need to be tested. According to William James (cited in Stumpf and Fieser, 2003, p. 398) the essence of a method is to ensure results and so when solutions are implemented, their impacts are evaluated and used to determine their effectiveness and to identify further actions that need to be taken. In his words, he says:

You must bring out each word in its practical cash value by focusing on results. When we find a theory that does not make a difference one way or another for practical life, then the theory is meaningless and we should abandon it.

The primary stage of evaluation requires examining how the solutions are implanted and what the effects are. These evaluations require that teachers provide the definition of a successful outcome, something it should have done during the problem identification stage. This is to say that it would be impossible to reinvent solutions to every problem that develops without recourse to past knowledge. This recourse to past knowledge is evidence, in itself, that one must not completely construct reality. One must apply knowledge that has already been formed by others and understand that knowledge, or else not solve the problem. The knowledge base enables the principle of cognitive function of problem-solving, the

application of conceptual knowledge, or transfer, to occur (Peikoff, 1993). This is the reason why it is necessary to do a recall of the problem and solution attained before checking the generalizability of the solution.

The evaluation stage therefore provides information for future problem-identification and solving. This step is fairly procedural, and for students that have the requisite knowledge, the implementation and verification steps are generally straightforward. According to Nkrumah (1964, p. 3), for the teachers and learners to evaluate a circumstance or a solution it must be part of the analysis of the facts and events, and to do an analysis of the facts, there must be a “starting point to the inquiry.” By this, Nkrumah means to say that, to evaluate the relationship between philosophy (concepts) and society (practice), there must be a starting point that should direct them in the understanding of the relationship between the two. This starting point is the problem or a recall of the problem.

After the recall of the problem has been done, there is need for the implementation of the solution by the students and teacher. This requires commitment from the teacher to support and enact its solution. It is not useful to agree on a solution that cannot be implemented. To William James (cited in Stumpf and Fieser, 2003, p. 399), ideas become true in so far as they help us to make successful connections amongst various parts of our experience. Truth is therefore part of the process of living. As part of the process, successful experiences make truth, and this constitutes the verification process. This means that teachers should plan on how the solution will be implemented, including consideration of the students, time and resources needed for implementation. Frequently, students are overly dependent upon teachers to evaluate their performance in the classroom. It’s important that students have multiple opportunities to assess their own problem-solving skills and the solutions they generate. The process of self-assessment is not easy, however. It involves risk-taking, self-assurance, and a certain level of independence.

This process of self-assessment helps the learners to be able to check the workability of solutions and attempt to fit human life. According to Nkrumah (1964, p. 3), workability has to do with an understanding of human society and an analysis of facts and an attempt to see how they fit in human life and how they make up human experience. The teacher can effectively promote this by asking the students questions such as: “How do you feel about your progress so far?” “Are you satisfied with the results you obtained?”, “Why do you believe this is an appropriate response to the problem?” Did the solution work? If not, why

not? What went right, and what went wrong? What adjustment does the group or the teacher have to make to ensure the solution works better? Is the solution long term or short term? Is the solution applicable to particular or general cases?

Effective instruction integrates both the concrete and abstract but in a specific sequence. First, new learning requires specific real problems. Second, from these concrete problems, the learner forms an abstract principle or concept. Finally, the student then attempts to apply that conceptual knowledge to a new, never before experienced problem (Peikoff, 1993). From the view of Peikoff, it is glaring that evaluating problem-solving is the application of concepts or transfer. Nkrumah (1964, p. 78) in his own words says: “practice, without thought is blind; thought without practice is empty.” To him, when we think, we must put it in practice. He thinks that we should not get educated for no reason but rather, when educated we should be able to pick out aspects that will be of great help to us. For example, in the triadic circle of the Islamic, Western and African cultures, one who gains education should be able to evaluate, select or pick out aspects that are valuable to use and put into practice.

Transfer or the application of conceptual knowledge is the connecting of two or more real-life problems or situations together because they share the same concept or principle. This is what Dewey (cited in Achingale 2013, p. 98) terms “economic improvement and social rectification.” Transfer or the application of conceptual knowledge helps students see similarities and patterns among seemingly different problems that are in fact the same, or similar, on the conceptual level. Also, in monitoring progress, it is very important to follow through by analyzing the results based on the findings or performance of students. If the teacher notices that the students cannot apply the concepts learnt, then there is need for him to; re-analyze the problem and re-define the problem by reviewing the steps in the problem identification stage to determine if the problem can be re-identified.

2.1.2.6. Principles for teaching problem-solving

According to Foshay & Kirkley (1998), the model should have the following principles:

- Model a useful problem-solving method.** Problem-solving can be difficult and sometimes tedious. Show students by your example how to be patient and persistent and how to follow a structured method. Articulate your method as you use it so can students see the connections.

•**Teach within a specific context.** Teach problem-solving skills in the context in which they will be used with the help of real-life problems in explanations, examples, and exams. Do not teach problem-solving as an independent, abstract skill.

•**Help students understand the problem.** In order to solve problems, students need to define the ultimate goal. This step is crucial to successful learning of problem-solving skills. If you succeed at helping students answer the questions “what?” and “why?” finding the answer to “how?” will be easier.

•**Take enough time.** When planning a lecture/tutorial, budget enough time for: understanding the problem and defining the goal, both individually and as a class; dealing with questions from you and your students; making, finding, and fixing mistakes; and solving entire problems in a single session.

•**Ask questions and make suggestions.** Ask students to predict “what would happen if ...” or explain why something happened. This will help them to develop analytical and deductive thinking skills. Also, ask questions and make suggestions about strategies to encourage students to reflect on the problem-solving strategies that they use.

2.1.2.7. Problem-solving Models

George Polya model of problem solving (1887 – 1985)

George Polya’s major contribution was for his work in problem-solving. Growing up he was very frustrated with the practice of having to regularly memorize information. He was an excellent problem solver and quickly became well known for his research and teachings on problem-solving. In 1945 he published the book *How to solve it*. In this text he identifies four basic principles with a systematic process for solving problems that is now referred to by his name: the Polya 4-Step Problem-Solving Process. These include;

Polya’s First Principle: Understand the Problem

This seems so obvious that it is often not even mentioned, yet students are often stymied in their efforts to solve problems simply because they don’t understand it fully, or even in part. Polya taught teachers to ask students questions such as:

- Do you understand all the words used in stating the problem?

- What are you asked to find or show?
- Can you restate the problem in your own words?
- Can you think of a picture or diagram that might help you understand the problem?
- Is there enough information to enable you to find a solution?

Polya's Second Principle: Devise a Plan

Polya mentions that there are many reasonable ways to solve problems. The skill at choosing an appropriate strategy is best learned by solving many problems. You will find choosing a strategy increasingly easy. A partial list of strategies includes:

- Guess and check -Look for a pattern
- Make an orderly list -Draw a picture
- Eliminate the possibilities -Solve a simpler problem
- Use symmetry -Use a model
- Consider special cases -Work backwards
- Use direct reasoning -Use a formula
- Solve an equation -Be ingenious

Polya's Third Principle: Carry out the Plan

This step is usually easier than devising the plan. In general, all you need is care and patience, given that you have the necessary skills. Persist with the plan that you have chosen. If it continues not to work, discard it and choose another. Don't be misled; this is how mathematics is done, even by professionals.

Polya's Fourth Principle: Look Back

Polya mentions that much can be gained by taking the time to reflect and look back at what you have done; what worked, and what didn't. Doing this will enable you to predict what strategy to use to solve future problems.

2.1.2.8. Dewey's Sequence Problem-Solving Model (1910).

One of the most effective approaches to problem-solving is the Dewey Sequence Problem-Solving Strategy. Created and developed by educator John Dewey, the strategy includes five steps to solving a problem one faces. In his book *How We Think*, Dewey notes

this problem-solving technique is “a consecutive order in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessor...Each term leaves a deposit which it utilizes in the next term.” The Dewey Sequence is comprised of five-steps for problem solving:

•**Define and Analyze the Problem:** Dewey noted that the ability to identify our problem is our biggest setback. However, in following the Dead Fish Theory, once we are able to accept the problem at hand and its source, we can move forward to deciphering the reasoning behind the problem and begin resolving it. Once we have identified the problem, we have to analyze the problem using the 5-why technique. In utilizing the ideas behind a cause-and-effect process, we are able to explore our problem on a deeper level. Keeping with the mentality that nothing is impossible, we are able to acknowledge that if there is a problem, there is a solution.

•**Determine Criteria For Optimal Solution:** In this step, Dewey suggests looking at the costs of the implementation both short-term and long-term, as well as its ability to be implemented or enforced. Additionally, he noted that some resolutions can solve one issue and create another. By looking at the cost-effect initially, we are able to prevent new problems from arising.

•**Propose Solutions:** By brainstorming creative ideas, we are able to better approach our problem in hypothetical terms. When creating alternative solutions, without deep evaluation, we are better capable of looking at the problem in a solution-based mentality. Dewey suggests not spending too much time on options which are not feasible. Instead, trying the same options again from the start using the original version is the best approach. If no solution can be reached, stop and try another option.

• **Evaluate & choose the best solution:** Once we have analyzed all possible solutions available, one solution would be chosen under the scrutiny of three basic questions: Are there any disadvantages of this solution? Do the disadvantages outweigh the advantages? Does the solution conform to the criteria formulated for what is considered successful?

•**Implementing the solution & testing for success:** Testing the solution thoroughly for side-effects is the main goal in the last step of the process. Starting with the lowest-risk solution and its compatibility with your criteria for the optimal solution can help you gauge its success. If the solution did not completely address the problem, evaluate in what areas it was not

successful, so when you go back to implement a different solution you are more knowledgeable in the shortcomings of the solution chosen.

While these problem-solving steps are effective in managing problems, it is important to always allow input from other neutral sources which may give a different approach and vital knowledge not yet noticed or found. Collaboration often leads to finding patterns in problems and by allowing a new approach to the issue, a resolution can be found. However, in many cases of problem-solving, people seek a quick fix to bandage the issue, believing the issue is resolved. Yet, it only addresses the symptoms, not the problem's root cause. Using the Dewey sequence technique, it can aid in solving the root core issue of problems for the long-term.

2.1.3. Concept of Professional Development

Professional development through intensive training refers to the efforts intended to improve teachers' capacity and also all the efforts and activities to improve experienced teachers' job related knowledge, skills and attitudes (Sparks and Louck-horsley, 2003). This type of knowledge according to Shaffka (2006 cited in Wemba, 2012), should be developed through a systematized, modular and coherent and continues process. To be effective, professional development should be based on the teacher's knowledge, curricular and instructional strategies that have a high probability of affecting students' learning and, just as important, students' ability to learn (Joyce and Showers, 2002, p. 13). Philosophy teachers therefore, through formal or even informal personal efforts, have to increase their knowledge of problem-solving through an effort of understanding PSM which is a standard of the philosophy curriculum.

Teacher knowledge has received different conceptualization or different dimensions that have been well documented in the teacher knowledge literature, with respect to the aspects considered the most important by the respective researchers. Subject matter knowledge has received much concern in the teacher knowledge and these include content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational context, and knowledge of educational ends, purposes and values.

From these, Grossman, Wilson and Shulman (1989) reframe the definition of subject matter knowledge to include the "nature form, organization, and content of teacher

knowledge.” These dimensions cover content substantive knowledge, syntactic knowledge, motivation and beliefs about the subject matter. Similarly, according to Mayer and Wittrock (2006), students and teachers need five kinds of knowledge in order to be successful problem solvers: facts (knowledge about characteristics of elements), concepts (knowledge of categories, principles, or models), strategies (knowledge of general methods), procedures (knowledge of specific procedures), beliefs (cognitions about one's problem-solving competence), meta-cognitive knowledge (awareness and control of one's own cognitive processing and includes beliefs).

Given that this study aims to show how in-service philosophy teachers experience professional growth in teaching or applying the problem-solving model, the author deems it necessary to adopt the theoretical framework of teacher knowledge dimensions asserted by Grossman, et al (1989).

2.1.3.1. Content substantive Knowledge

Grossman, et al (1989), defines content substantive knowledge as the factual information, organizing principles, central concepts and propositions that characterize the discipline. In professional development through a problem-solving model, teachers are expected to change their view of content knowledge from disciplinary knowledge to a widened concept of knowledge in philosophy which is inter-disciplinary. Nevertheless, many teachers in Cameroon find themselves teaching completely unfamiliar material as they struggle to acquire new knowledge beyond their original disciplines. This is because most of them have a background in different fields. What results may include their over-reliance on textbooks as a source of relevant facts and information, or lecturing without any student participation in order to avoid being led into unknown territory. Consequently, professional development programs should be content-focused (Hill, Rowan & Ball, 2005) and focus on exposing teachers to the process of doing mathematics (Wu, 1999). This is especially useful for teachers with weak subject matter knowledge as well as in-service teachers who have been teaching for a long time.

Subject matter knowledge matters for student achievement (Hill et al., 2005). Subject matter knowledge for teaching has often been considered to be the content knowledge that students are to learn. In other words, many assume that what philosophy teachers need to know is what they teach. This assumption of what teacher subject matter knowledge is,

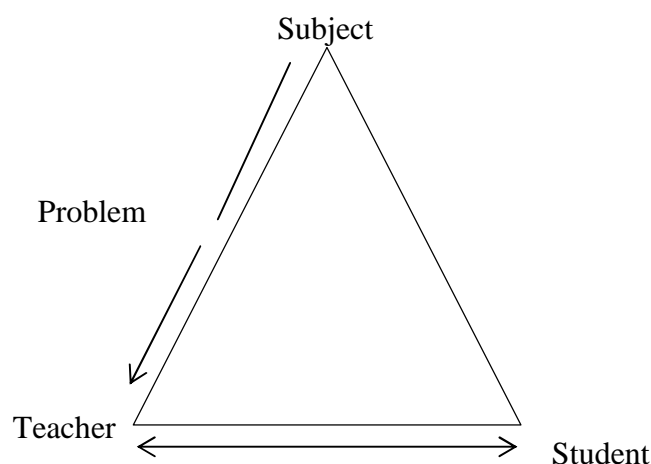
according to Ball and Bass “has blocked the inquiry needed to bring together subject matter and practice in ways that would enable teacher education to be more effective.” Several justifications have been given to the fact that teacher’s philosophical content knowledge matters. Hill et al. (2005), argue that flexibility and ability to choose representations are qualities teachers need to possess. It is striking to read and hear the comments from prospective teachers as they are asked to solve philosophical problems or as they engage in reflecting on their teaching. In many cases, these teachers are fully aware that they lack a conceptual understanding of the subject.

2.1.3.2. Content Syntactic knowledge

Grossman et al. (1989), point out that content syntactic knowledge of a discipline refers to knowledge of the ways in which new knowledge is brought into the field or the central role that enquiry plays in the learning process, where the interplay between the subject matter and the students’ thinking takes place systematically. Having a firm grasp of the syntax of philosophy, teachers realize that the complex problems in a selected issue may be remote from the experience of the students.

During the process of teaching, the philosophy teacher has to scaffold the learners while encouraging group work as well. He has to ask himself what he can do to render the learners independent during learning. This means that the learner is at the center of learning which is illustrated in this triangle.

Figure 1: Methodological Interaction Orientation



Source: Beliga Bessala (2005, p.129, cited in Ndjebmi: 2016, p. 33)

From the above triangle, the author explains that it is the student who is in contact with the subject matter who studies (in our case philosophy) through the methodological orientation of the teacher. The teacher is the facilitator who directs the knowledge of the learner from the discipline through specific methods like scaffolding. The role of the teacher is therefore to take away the frustrations that occur between the learner and the subject matter by providing them with tools and insights that will help them accomplish a given task. His role also consists in helping learners to persist or persevere in the search for solutions. In doing so, he himself has to believe that the solution is eminent and avoid rush when a said task is given to students and as well makes sure he promotes activities that encourage independent learning. He has to avoid giving spontaneous answers or solutions to students in order not to prevent their personal efforts considering the fact that time is needed for them to think and come up with their own solutions. Globally speaking, the teacher who is the mediator has different functions he realizes in class. Some of these include: the function to direct and control, the function of help, the function of communication and consolidation of the didactic content, the function of positive and negative feedback.

To help students establish the conceptual matches, teachers have to provide intervention or inputs by creating learning contexts or environments that activate students' cognitive processes toward the construction of meaning. These contexts match the authentic nature of the students' world. They become where students' thinking is anchored, meaning is created through interactions and dialogue (Ledoux & McHenry, 2004), and reasoned judgment is built on the ideas, concepts, and values constructed in the PS process. This occurs as students' minds are engaged by the learning activities and as they try to make their own sense of the experiences arising from these activities. Hence, teachers facilitate or guide, not tell, in the classroom. Ledoux & McHenry (2004, p. 391) thus assert: "The knowledge and skills built into an interdisciplinary approach allows for the simultaneous construction of both propositional knowledge of facts, concepts and generalizations and procedural knowledge of how to apply selected concepts as strategies."

Taken as a whole, teachers with insufficient syntactic knowledge of philosophy may encounter difficulties with creating learning contexts or environments systematically that enable students to make productive use of their prior learning and cognitive strategies to construct meaning within a content discipline. On this account, the centrality of the issue regarding professional development on problem-solving in philosophy; it is not merely knowledge of pedagogy, but also "knowledge of learners and learning" (Grossman and al.,

1989). With this type of knowledge, teachers would consider their students' cognitive and developmental stage when designing and presenting cognitive and social tasks. Therefore, looking from this cognitive-developmental perspective, it would be necessary for philosophy teachers to provide sufficient inputs through which students activate prior learning for higher cognitive processes to take place throughout the various stages of problem-solving. The instructional strategies that influence students' cognitive stage are as follows:

In the first place, 'scaffolding' is a necessary tool. To facilitate student learning in problem-solving, teachers may provide scaffolds in the form of cognitive strategies or social support for students to anchor learning. These scaffolds are temporary supports to reduce the difficulty of the task while students acquire the necessary skills and understanding to operate independently. Nonetheless, some empirical studies (Myhill & Warren, 2005) reveal that this move to independent learning rarely occurs since scaffolding has been used as a device to enable students to complete a task successfully, rather than a learning support mechanism. Overwhelmed by the need to get a predetermined answer, teachers then miss the opportunities to gain information or clues from students about their prior knowledge or understanding.

An alternative approach to enhance students' capabilities for future learning is to engage students in more effective thinking about the subject matter. For this, Joyce & Showers (2002) provide a variety of teaching models associated with varied instructional goals for teachers to plan or arrange instructional procedures. First, models in the Information-Processing Family emphasize ways to "improve capabilities for acquiring and organizing information, identifying and solving problems, and forming and conveying concepts and generalizations." Secondly, models in the Personal Family focus on developing self-regulating capabilities of the individual, which is consistent with the principle of self-directed learning in the problem-solving approach. Thirdly, as for models in the Behavioral Systems Family, they focus on developing capabilities for behavioral change based on feedback.

Nonetheless, as regards professional development on ways to increase student capabilities for higher cognitive processes, many educational researchers (Hopkins, 2001, p. 351) have argued for empowering teachers to be in charge of their own instructional design. The question is not "Which instructional model should teachers use?" but, rather, "What should we teach teachers about how to use instructional models?" Instead of passively following instructional models, teachers should make sense of them in their context of teaching. Hopkins (2001, p. 72) adds that "the teacher's task is not simply to teach, but to

create powerful contexts for learning” and that “it is the integration of ‘content process and social climate’ that puts the ‘power’ into powerful learning experience.” As for the current Cameroon context, many professional development programs of philosophy introduce new skills and strategies to teachers in disconnected learning contexts, and some even in a de-contextualized manner. Based on the often taken-for-granted assumption that teachers will transfer their learning to new contexts, however, their focus tends to be purely the knowledge of pedagogy. As a consequence, tensions about the translation of knowledge into practice in the actual teaching contexts exist when teachers have no recognition about the “knowledge of learners and learning” (Grossman et al., 1989).

2.1.3.3. Affective knowledge and beliefs

Professional development should include knowledge of affective factors and related beliefs that could impact students’ problem-solving. There is general agreement that affective factors, such as motivation, teacher parenting, interest in the profession, self-confidence, anxiety, and perseverance, should play an important role in problem solving. Lester and Charles (2003) also highlighted affective factors impacting PS consisting of stress, pressure, tolerance for ambiguity, interest, motivation, anxiety to perform, perseverance, resistance to premature closure. Knowledge of such factors could help teachers to portray and support appropriate factors in the classroom.

2.1.3.3.1. Beliefs

There are many structures by which knowledge and ideas can be organized in a discipline. The way that teachers structure the knowledge and ideas has a strong impact on their orientation of the subject matter. Such orientation involves the organization of content and the selection of instructional strategies. Experienced teachers develop pedagogical content knowledge with which they reorganize the content to cater for the needs of students, classroom situations and curriculum. Nonetheless, such reorganization is influenced by their subject matter orientation and personal values. As a consequence, teachers’ attitudes and beliefs have strong implications on the subject matter orientation of problem-solving in philosophy including what they choose to teach and how they choose to teach it.

In guiding students through problem-solving, the teaching and learning perception of many philosophy teachers have to change from the delivery and transmission of knowledge to a constructivist stance. The constructivist theory is based on the premise that recognizes a

student's value as thinker. This educational innovation thus requires changes in terms of teachers' conceptions on student learning and on their own learning. Instead of trying to cover the curriculum content, teachers' central concern in terms of instructional design and delivery is how to promote cognitive change in students. Besides, it focuses on meaningful learning and deep understanding which enable students to transfer what they have learnt to novel situations. Bolhuis & Voeten (2004), assert that teachers' learning conceptions are closely connected to their teaching practices. Given the close interrelationship between teachers' learning conceptions and their teaching practices, the challenge to philosophy teachers would be the conceptual change required, such that they would apply a pedagogical approach consistent with the dynamic nature of knowledge during the problem-solving process.

2.1.3.3.2. Motivation

Another issue of effective teaching and learning through problem-solving is learning motivation. As discussed earlier in this study, the problem-solving model starts with an issue or problem, with students engaged in self-directed learning and teachers being the facilitators in the learning process. The prerequisite is that students are active learners intrinsically moved by a desire to make meaning of the complexities of a wide range of issues, and thus eager to engage themselves in the cognitive processes. The way to promote student engagement in the problem-solving process involves "continuously presenting problems which require them to make categorizations, interpret phenomena and design artifacts." Notwithstanding this, as for many teachers, it has been a common belief that extrinsic motivation strategies can effectively enhance students' learning (Watkins, 2000). A common practice in teaching is to emphasize the power of examinations and giving bonus marks or tips. Currently, catering for student diversity is also regarded as a motivation strategy.

However, while the study of individual differences in the cognitive domain has occupied a central value in the research activity, the conative and affective domains have been a missing paradigm. Given that problem-solving requires students to be active learners, their feelings in the learning process like sense of satisfaction, enjoyment, and self-efficacy actually serve to motivate them intrinsically. Because of this, teachers have to consider their students' aptitude, perseverance, and the ability to understand instruction when planning the actual learning time and the quality of the learning tasks. However, as revealed by Watkins (2000), most teachers emphasize moral training in the classroom, and students have the duty to listen attentively, and show respect for the teacher and other students. On this account, many

philosophy teachers tend to be less receptive to the notion of intrinsic motivation and catering for individual differences in the conative and affective domains.

To summarize the type of knowledge needed by teacher, Polya (as cited by Nekang, 2011, p. 12) opined that positive attitude towards mathematics should be acquired and transferred to students when he said:

The first rule of teaching is to know what you are supposed to teach. The second rule of teaching is to know a little more than what you are supposed to teach.... Yet it should not be forgotten that a teacher of mathematics should know some mathematics and that a teacher wishing to impart the right attitude of mind toward problems to his students should have acquired that attitude himself.

The largest struggle for teachers is not learning new approaches to teaching but implementing them. The reason traditional professional development is ineffective is that it doesn't support teachers during the stage of learning with the steepest learning curve. In the same way that riding a bike is more difficult than learning about riding a bike, employing a teaching strategy in the classroom is more difficult than learning the strategy itself. In several case studies, even experienced teachers struggled with a new instructional technique in the beginning. In fact, studies have shown it takes, on average, 20 separate instances of practice before a teacher masters a new skill, with that number increasing along with the complexity of the skill (Joyce and Showers, 2002).

2.1.4. Models of professional development

There are two most commonly researched professional development models (traditional professional development and job-embedded professional development). We will examine these models and provide an overview of the evidence of their effectiveness. Although there is, of course, overlap between these two models of professional development, they can be distinguished by different goals, formats and content. Opinions differ between the factors of professional development model, system or policy directives, school or program context which must be put in place for teacher learning to take place. By comparing and contrasting these two models, it is important to illustrate that professional development, like all other educational efforts, is subject to changes in direction, paradigm, philosophy and

approach which sometimes are driven by policy changes as well as advances in knowledge base as a result of research.

2.1.4.1. The traditional professional development model

This model consists of workshops, conference sessions, pedagogic day seminars, lectures and other short term training events during which school districts, professional agencies and teacher training colleges offer a menu of topics on which to train teachers. This model is based on the assumption that students will benefit when teachers acquire competencies and good teaching behavior over their career and that the only challenge facing teachers is a lack of knowledge of effective teaching practices and when that knowledge gap is corrected, teachers will then be able to change.

The teacher professional development model that has been in practice in Cameroon schools for the past two decades is the pedagogic day seminar (Inspectorate General of Pedagogy, 2004; Nkwenti Ndongfack, 2010). The pedagogic day seminars are organized at Sub-Divisional levels and usually take place in any chosen school with the aim of improving teachers' professional knowledge, skills and attitudes. Such seminars are organized by the Sub-Divisional Inspectors and Regional Pedagogic Inspectors with the assistance of National Inspectors. The seminars are held one to three times per year and last for a day or two or three. Guskey (2000) recommended that for a teacher professional development programme to be effective, it should be held for a minimum of 60 to 80 hours annually. This shows that the period for which professional development of philosophy teachers is conducted in Cameroon is insufficient.

From this view, it is evident that Pedagogic day seminars with brief interventions are ineffective in promoting long term or lasting change in teachers' practice. Fraser (2005) remarked that this model of professional development is also characterized by knowledge transmission rather than reflective thinking. The author supports this view because knowledge transmission yields to rote learning and poor performances in problem-solving. Rather, the curriculum of today should retreat from such traditional rote, fact-based style of instruction toward teaching that fosters critical thinking and problem solving.

Fraser (2005) notes that the pedagogic day seminar also known as workshop model for teacher professional development is practiced by many countries. One-time seminar or workshop is a widely used model for delivering professional development. Yet, workshops

have an abysmal track record for changing teacher practice and student achievement. In fact, in a recent study, researchers found that while 90 percent of teachers reported participating in professional development, most of those teachers also reported that it was totally useless (Darling-Hammond et al, 2009). This shows that professional development programs offered are ineffective at changing teachers' practice or student learning. It is clear that the traditional model is an insufficient approach in building the capacity of teachers, their knowledge and higher order skills. A considerable body of research suggests that professional development could be effective if the following principles are considered:

- The duration of professional development must be ongoing and significant. Professional development with longer duration has a greater impact on improving teacher practice, and in turn, student learning. This is likely because extended professional development workshops often include time to practice application of the skill in one's own class. This allows the teacher to grapple with the transfer of skills by guiding them in resolving the problem. In a study analyzing the impact of a science professional development program on teacher's practice, researchers found that teachers with 80 hours or more of professional development were significantly more likely to use the teaching practice they learned than teachers who had less than 80 hours of training (Corcoran, McVay and Riordan, 2003).
- There must be support for a teacher during the implementation stage that addresses specific challenges of changing classroom practice. Studies have revealed that when teachers are supported during the implementation phase through coaching, they change their teaching practices. Knight and Cornett (2009) found in a study of 50 teachers that those who had coaching along with an introductory workshop were significantly more likely to use the new teaching practice in their classes than those who were only exposed to the workshop.
- Teachers' initial exposure to concepts should not be passive, but rather should engage teachers through varied approaches so they can participate actively. Just like students, teachers learn better when they are able to actively participate and make sense of the information being presented. Professional development sessions which aim to make teachers aware of a concept have been shown to be more successful when they allow teachers to learn the concept in varied, active ways. These activities can include: readings, role playing techniques, open-ended discussion of what is presented, live modeling, and visits to classrooms to observe and discuss the teaching methodology.

- Modeling is highly effective in introducing a new concept and help teachers understand a new practice. When an expert demonstrates the new practice, it is particularly successful in helping teachers understand and apply a concept and remain open to adopting it (Garet, 2000). For example, instead of hearing about inquiry learning in philosophy, a master teacher might teach a class using inquiry methodology while being observed by a teacher who is learning this skill. In this way, teachers can see how the method is used successfully in a class of real students.
- The content presented to teachers shouldn't be generic, but instead grounded in the teacher's subject matter of philosophy. Several studies have shown that professional development that addresses discipline-specific concepts and skills has been shown to both improve teacher practice, as well as student learning. Teachers themselves report that their top priority for professional development is learning more about the content they teach, giving high marks to training that is content-specific (Darling- Hammond et al., 2009).

2.1.4.2. The job-embedded professional development model

Professional development under the job-embedded model is located within a school program or other local contexts as part of an effort to create ongoing professional communities. Schools develop site-based learning communities where professional development is woven into the fabric of the school community balanced at times with the cross-fertilization of new ideas from outside the school.

The main activities here include study circles, sharing groups or inquiry groups made up of teachers from the same school or division. The focus is on developing teacher knowledge in the content area, analyzing student thinking and identify how that knowledge can be applied to changes in instructional practices tailored to the local education context. Teachers participating in this type of professional development model often work together over extended periods of time, bringing in and examining 'artifacts of teaching' (Ball and Bass, 2000).

The difference between traditional and job-embedded model is that in conventional forms of in-service training, outside experts do most of the 'talking' while teachers do the 'listening'. In new approaches to professional development teachers do the talking, thinking and learning. This model of teacher professional development is perceived as being more

effective because it is based upon the recognition that learning takes place over time and that active learning requires learners to connect new ideas to previous knowledge (Upitis, 2005).

Though this model is advantageous, many philosophy teachers, when teaching, still fail in engaging learners' prior conceptions about how the world works; developing deep factual and conceptual knowledge, organizing lessons into frameworks that facilitate retrieval and application; and promoting metacognitive and self-regulatory processes that help learners define goals and then monitor their progress towards them.

Similarly, many teachers focus more on content forgetting that teaching is a complex activity shaped by multiple factors such as teachers' knowledge and their beliefs about what is important to teach, how students learn, and how to manage student behavior and meet external demands. Studies show that to develop expertise, individuals need to develop not only factual knowledge but also procedural knowledge of when, how and under what conditions to use their new skills. But it is evident that teachers who do lesson study still encounter some problems in the classroom.

Guskey (2003) has provided descriptions of what characterizes an efficient professional development model for teachers. They all seem to be unanimous that effective professional development of teachers should have positive effects on pupils' learning outcomes. The issue at stake here is that the job-embedded model will have fewer implications if education is not focused on improving students' outcomes which is the "key" to sustainable education.

Regrettably, most efforts to improve student outcomes through professional learning and development are short-lived. Meanwhile, sustainability depends both on what happens during the professional learning experience and on the organizational conditions that are in place.

Timperley & Alton (2008), analyze 97 studies conducted on professional development that led to improved outcomes for the participating teachers. The study aimed at identifying factors recurrent in most recent professional development programs that could foster sustainable development based on improving student learning. The following factors were identified:

- A focus on helping teachers to study their students' thinking. Carpenter and Franke (1998), studying 22 mathematics and science teachers found that change was sustained over longer periods of time when they were trained and supported to really understand what their students were thinking, and teachers had a base from which to generalize practices to other situations and continue learning.
- A focus on valued student outcomes. The cycle of professional inquiry and knowledge-building begins with a question about students' learning needs determined by the community values. Teachers' understanding of what outcomes are important and achievable often evolves in the course of professional learning cycles as new possibilities suggest themselves. What is important is that the teacher always maintains a focus on the students (Timperley & Alton, 2008).
- Teachers learning worthwhile knowledge and skills. Those teaching approaches that have been subject to research and wide debate are most likely to have positive impacts on student outcomes. According to Timperley and al. (2007), teachers need to be able to answer the question, "What knowledge and skills do we, as teachers, need to help students bridge the gap between current understandings and valued student outcomes?"
- Integrating theory and practice relate to curriculum, teaching practice, and assessment knowledge in the areas that are the focus for professional learning. To Timperley and al (2007), teaching is a complex activity in which moment-by-moment decisions are shaped by teachers' beliefs and theories about what it means to be effective. Theoretical understandings give coherence to these decisions.
- Assessment as the basis for professional inquiry. If student learning needs, professional learning needs, and if worthwhile content are to be aligned, teachers must be able to discover what students already know and can do and how to build on that knowledge in deep, rather than superficial ways.
- Providing multiple opportunities for teachers to learn and apply information. To make significant changes to their practice, teachers need multiple opportunities to learn new information and understand its implications for practice. Furthermore, they need to encounter these opportunities in environments that offer both trust and challenge.

- Approaches responsive to learning processes. The promotion of professional learning requires different approaches depending on the importance of adapting approaches to professional learning to fit the kind of new learning involved.
- Opportunities to process new learning with others. Collegial interaction that is focused on student outcomes can help teachers integrate new learning into existing practice. Timperley and al. (2007) think that it is important for participating teachers to be given opportunities to process new learning with colleagues.
- Knowledgeable expertise in facilitating a productive professional learning. Expertise external to the group of participating teachers is necessary to challenge existing assumptions and develop the kinds of new knowledge and skills associated with positive outcomes for students.
- Maintaining momentum. According to Timperley and al. (2007), sustained improvement in student outcomes requires that teachers have sound theoretical knowledge, evidence informed inquiry skills, and supportive organizational conditions. When confronted with specific teaching–learning challenges, teachers through their self-regulatory inquiry skills can go back to the theory to determine what adjustments they need to make to their practice. Self-regulated inquiry skills are also supported by organizational structures. It is difficult for teachers to engage in sophisticated inquiry processes unless site-based leaders reinforce the importance of goals for student learning and assist teachers to collect and analyze relevant evidence of progress.

2.2.0. Theoretical Framework

This section reviews major theories that support the facts and findings of this study. They are: constructivism, pragmatism and the gestalt theories. We will examine each of the theories and show their relation with PSM and education as a whole.

2.2.1. The theory of constructivism and its perspective on problem-solving

Parsons, Hinson & Sardo-Brown, (2001, p. 431) define constructivism as a “cognitive theory emphasizing learner interest in and accountability for their own learning which manifests in student self-questioning and discovery.” It says that people construct their own

understanding and knowledge of the world through experiencing things and reflecting on those experiences. In this same light, Kant (cited in Lawhead, 2006, p. 56), views constructivism “as the claim that knowledge is neither already in the mind nor passively perceived from experience but that the mind constructs knowledge out of the material of experience.”

When we encounter something new, we have to reconcile it with our previous ideas and experience, maybe changing what we believe, or maybe discarding the new information as irrelevant. People therefore learn through an “interaction between thinking and experience, and through the sequential development of more complex cognitive structures” (Pollard, 2002, p. 138). It is based on the idea that students use their prior knowledge or daily experiences to construct a personally meaningful understanding of new content or experiences. The cognitive processes involved enable the students to organize and integrate the knowledge in a mental/conceptual model which becomes a knowledge representation in working memory.

Constructivism is a theory used to explain how people know what they know. The basic idea is that problem-solving is at the heart of learning, thinking, and development. As people solve problems and discover the consequences of their actions through reflecting on past and immediate experiences, they construct their own understanding. Learning is thus an active process that requires a change in the learner. This is achieved through the activities the learner engages in, including the consequences of those activities, and through reflection. People only deeply understand what they have constructed.

The psychological roots of constructivism began with the developmental work of Jean Piaget who developed a theory that analogized the development of the mind to evolutionary biological development and highlighted the adaptive function of cognition. Piaget proposed four stages in human development: the sensorimotor stage, the preoperational stage, the concrete operational stage, and the formal operational stage. For Piaget, the development of human intellect proceeds through adaptation and organization. Adaptation is a process of assimilation and accommodation, where external events are assimilated into existing understanding, but unfamiliar events, which don't fit with existing knowledge, are accommodated into the mind, thereby changing its organization.

Countless studies have demonstrated or tried to discredit Piaget's developmental stages. For example, it has become clear that most adults use formal operations in only a few

domains where they have expertise. Nonetheless, Piaget's hypothesis that learning is a transformative rather than a cumulative process is still central. Children do not learn a bit at a time about some issue until it finally comes together as understanding. Instead, they make sense of whatever they know from the very beginning. This understanding is progressively reformed as new knowledge is acquired, especially new knowledge that is incompatible with their previous understanding. This transformative view of learning has been greatly extended by neo-Piagetian research.

The Russian psychologist Lev Vygotsky's (1896–1934) relevance to constructivism derives from his theories about language, thought, and their mediation by society. Vygotsky held the position that the child gradually internalizes external and social activities, including communication, with more competent others. In his experiments, Vygotsky studied the difference between the child's reasoning when working independently versus reasoning when working with a more competent person. Vygotsky's findings suggested that learning environments should involve guided interactions that permit children to reflect on inconsistency and to change their conceptions through communication. Vygotsky's work has since been extended in the situated approach to learning.

Bandura (1986), in his social cognitive theory, provided a model for self-regulated learning where personal, contextual, and behavioral factors interact to give learners an opportunity to control their learning. Drawing on social cognitive theory, he describes self-regulated learning as an active, constructive process whereby learners set goals for their learning, plan actions, and monitor and regulate their cognition. These actions can mediate the relationships between individuals and the context and their overall achievement (Zimmerman, 2000).

The rationale behind engaging learners in a constructive process of learning is that we cannot impose ideas on learners and achieve understanding. Mewborn (2003, p. 49) summarized the relevance of engaging teachers in professional development programs by stating that, "...one cannot expect teachers to change their teaching practices simply because they have been told to do so." On the other hand, learning during professional development programs is contextual; learning occurs through dialogue, discussion, and interaction; that learners must be actively involved; that a variety of models be used; and that learners be engaged in reviewing, critiquing, and revising one another's work. Mousoulides & Philippou

(2005) described self-regulation as students' ability to setting goals planning activities, monitoring progress, controlling, and regulating their own cognitive activities.

The theory of constructivism has been greatly criticized. According to Kant (cited in Lawhead, 2006, p. 132), all we can know is the world of experience (phenomena) because knowledge is confined within the boundaries of experience. If knowledge is better gotten from the 'phenomena', then what about knowledge of the metaphysical reality (the noumenal realm)? Does he mean that we should suspend judgment and remain silent about a reality external to our experience? However, the theory had its own contributions in the field of education.

2.2.2. The theory of pragmatism

The term pragmatism is derived from the Greek word *pragma* (meaning deed, work or act), which is a derivative of the word *prass*, meaning to practice, or to achieve (Singh, 2007). The etymological meaning identifies pragmatism as a practical (action-oriented) approach to finding solutions for existing problems and issues. Pragmatism signifies practicality, compromise, prudence and a clear goal orientation in dealing with problems. Pragmatism is identified as an American philosophical movement founded by C. S. Peirce, John Dewey, and William James. Pragmatism is also viewed as a philosophy that invites deep commitment to practice.

It was Charles Sanders Peirce who first mentioned what he called "pragmatism", his thesis being that the real meaning of an idea is to be found in its concrete result, especially in its practical consequence of human action. Pierce believed in the reality of what is called universal concepts which refer to a number of particular objects. He believed that these concepts have real existence; they are not just fictions. A problem for holding such a view is that of explaining in what sense they are real. And to explain the sense in which they are real is to explain the meaning of the concepts. Pragmatism for Peirce therefore becomes a theory of meaning.

William James reported the view that the meaning of a word involves knowing what you will do and what experience you will get. Knowledge, according to him, consisted, not simply of the passive method of looking at our past experiences from memory, but the active projection of past experiences as well as current ones into the future. Knowledge is the imaginative reconstruction of something we have not experienced in terms of what we have

experienced. Such experiences however are not carried out in a vacuum. It takes into account future possibilities in the light of present problems

Pragmatists see their action as driven by dialectics, a process of arriving at truth through confrontation of different points of view. Hence, the most common interpretation of the term pragmatism is applying what works best, making it a philosophy or theory of 'workability' (Achingale, 2013, p. 89). To the pragmatists, what is true is what works best in enabling one to overcome an immediate problem. They also view knowledge in terms of its ability to work and provide satisfactory impacts or by its usefulness: What can we do with it? Recently, pragmatism (Schaffler, 1999) has started gaining ground again as it is felt by some educationists that teachers have become too theoretical again. The pragmatic view stresses the practical character of educational programs, emphasizing the active phases of teaching.

The pragmatists promote an inquiring mind with respect to physical laws. "Inquiry itself is action, but action regulated by logic, sparked by theory, and issuing answers to motivating problems of practice" states (Scheffler, 1999, p. 4). According to Dewey, Knowledge takes place within human experience, interaction between man and his environment. To him, knowledge getting activity begins when we start, not merely to think but to think reflectively. Reflective thought properly takes place when a problem confronts us and in trying to solve the problem, we manipulate our environment. For pragmatism, knowledge is viewed as being both constructed and based on the reality of the world we experience and live in. Learning from experiences is an active process. The mind is viewed as a capacity for active generation of ideas whose function is to resolve the problems imposed to the organism (the human being) by the environment. Pragmatism encourages imaginative theorizing by the student but at the same time insists upon control of such theorizing by the outcomes of active experimentation (Scheffler, 1999).

William James' view of pragmatism (cited in Stumpf and Fieser, 2003) reports the theory of truth. To him, man is a social being and therefore truth is a social product. He contends further that individual truths are corrected and altered under social influence until certain beliefs are accepted generally. Hanssen (1980) wrote that the basic philosophical framework of pragmatism is that, ontologically, experience is what is most real. Epistemologically, experience is the best way of knowing the truth. Finally, democratic experience is the highest known value. Therefore, from the pragmatic point of view, reality cannot be defined any more absolutely than anything else. Therefore, reality is not an abstract

idea and is certainly not embodied in some impersonal scientific or cosmic law. The pragmatist believes that all axiological judgments of aesthetics and ethics must be fundamentally human judgment. The pragmatist sees no need, whatsoever, for an impersonal moral law. Man has within his power the ability to make judgment on everything that affects him as man. Therefore, from the pragmatist's standpoint, good is found in usefulness and workability of best solution.

On the other hand, the pragmatists can be criticized for holding to the claim that what works best ('workability of solution') is true and acceptable with satisfactory results but the problem is; we can never say that an idea is true or false because we can never know all its long range consequences. Still, the same solution can be both true and false since its consequence maybe satisfactory for some people and unsatisfactory for others. This shows that, the question of verification after validation of a solution still remains and this explains why Arendt (1968), greatly criticized the pragmatists. She thinks that modern empirical science is never ending and that it is a self-correcting process that never reaches its own ideal truth, yet they claim to be able to ground knowledge in empirical experience. This claim to her is paradoxical because for an idea to have a pragmatic value for one, it means that one thinks in terms of the corresponding value of truth for that person. However, the pragmatists have a great contribution in education as will be seen subsequently.

2.2.3. The Gestalt theory and problem-solving

For the Gestalts, thinking was not a reproductive recombination of learned associations but the meaningful effort to understand the fundamental nature and affordances of the given problem situation and the desired goal as a whole. They assumed that thinking obeyed similar basic principles as perception. The gestalts idea was that major transitions during the process of problem-solving are characterized by restructuring the given information in new and non-obvious ways. Restructuring reveals the fundamental structure of the problem. Problem solving was viewed as a process of a goal directed behavior that clears out existing barriers in the service of gaining a desired end (Öllinger & Knoblich, 2009).

Between 1914 and 1917 Wolfgang Köhler investigated chimpanzees on Tenerife Island. He addressed the question of whether chimps are able to solve problems in an intelligent way. He hoped to find evidence against the Behaviorist dictum that animals solve problems by pure trial and error. He claimed that intelligent behavior can be observed when

the obvious way to the goal is blocked by a barrier. That is, intelligence is used to elude existing barriers in new and unfamiliar situations. He created situations in which his apes had to solve problems. Sultan, the star pupil, was asked to get a banana that was out of reach. There were two sticks lying around in the compound. After a few minutes Sultan purposefully joined the sticks together and successfully fished for the banana. For Köhler these findings provided evidence that some animals were able to solve problems not simply by blind and mindless trial and error attempts, but by insight into the affordances of the given situation.

Max Wertheimer, the most famous and influential Gestaltist, was particularly interested in the sudden moment of restructuring that accompanied insight in a given problem. Wertheimer contrasted productive thinking with the reproductive thinking of Thorndike. He was certain that productive thinking is superior to reproductive thinking, because it is characterized by gaining deep insight into the relations of the given problem constituents and their role in the given task, and the resulting solution. Restructuring to him was the basic mechanism for resolving problems and to explaining great scientific inventions across a wide range of domains.

Gestalt theory informs educational programs aimed at teaching students how to represent problems. Teachers should encourage their students to discover the relationship of the elements that make up a problem; Incongruities, gaps, or disturbances are essential stimuli in the learning process; Educational instruction should be based on the Laws of Organization

2.2.4. Theoretical Implications of Theories to this Work

There are a number of the above mentioned views competing in education. Constructivists tend to celebrate complexity and multiple perspectives, though they do share at least a few educational prescriptions.

2.2.4.1. Identifying the Problem; Constructivism and Pragmatism

2.2.4.1.1. Prior knowledge

Constructivists believe that prior knowledge impacts the learning process. In trying to solve novel problems during professional development programs, perceptual or conceptual similarities between existing knowledge and a new problem can remind teachers of what they already know. This is often their approach towards solving novel problems. Information not connected with a learner's prior experiences will be quickly forgotten. In short, the learner

must actively construct new information into his or her existing mental framework for meaningful learning to occur. This is what the philosopher Descartes (cited in Stumpf and Fieser, 2003), referred to as “innate knowledge.” Asking students what they already know about a topic and what puzzles them affords an opportunity to assess children's prior knowledge and the processes by which they will make sense of phenomena.

2.2.4.1.2. Stating the Problem; Constructivism and Pragmatism

Constructivist learning is based on the active participation of learners in problem-solving and critical thinking, given real and authentic problems. Teachers are invited to engage in a fictitious problem occurring in a simulated real-world environment. Also, the pragmatist, Abel (1972), believed in the reality of what are called universal concepts which are used to refer to a number of particular issues or problems. He believed that these concepts have real existence; they are not just fictions. This means that the starting point of knowledge or learning should be focused on a particular problem at stake. The teacher should endeavor to see into it that learning is based on real world or concrete problems that will make more meaning to the learners. Pragmatism for Peirce, therefore, becomes a theory of meaning because concrete problems, whether well-defined or ill-defined, will help to direct learning to a meaningful end.

According to Allen Newell there must exist a problem that can be represented as a problem space, a representation of the initial state, goal state, and all possible intervening stages and search heuristics, a strategy for moving through the problem space from one state of the problem to the next. This is to say that no solution can be gotten without a problem. In this same light, James (cited in Stumpf and Fieser, 2003), thinks that the meaning of a word involves knowing what you really want to do; for, it is by knowing it that one can do it better.

2.2.4.1.3. Contextualizing the Problem, Constructivism and Pragmatism

Constructivist learning is based on the active participation of learners in problem-solving and critical thinking—given real and authentic problems. Teachers are invited to engage in a fictitious problem occurring in a simulated real-world environment. Teachers should provide rich and realistic and environmental contexts not only to provide relevant information for solving the problem, but also to create a realistic context. If the students buy in to the proposed problems, they will be engaged in problem-solving. To help students establish the conceptual matches, teachers have to provide inputs by creating learning contexts

or environments that activate students' cognitive processes toward the construction of meaning. These contexts match the authentic nature of the students' world. They become the anchor of students' thinking. Hence, meaning is created through interactions and dialogue (Ledoux & McHenry, 2004), and reasoned judgment is built on the ideas, concepts, and values constructed in the PS process. This occurs as students' minds are engaged by the learning activities and as they try to make their own sense of the experiences arising from these activities.

According to Dewey, Knowledge takes place within human experience; the complete network of interaction between man and his environment. To him, the knowledge getting activity begins when we start not merely to think, but to think reflectively. Reflective thought properly takes place when teacher or the student is confronted with a problem and in trying to solve the problem, they manipulate their environment. This means that in teaching, teachers should use an approach that is contextual, relevant and progressive rather than strictly abstract. If teachers are trained in context and use guiding actions in real-world settings, then they will develop a strong professional knowledge. Thus, pragmatic approaches are generally more concrete and specific than abstract theories. Driver, Rushworth & Robinson, (1994) found that children's understanding of a phenomenon (interpretations that fit their experiences and expectations) differ from scientific explanations. This means that students distinguish school science from their "real world" explanations. Studies of adult scientific thinking reveal that many adults hold non-normative scientific explanations, even though they have studied science.

2.2.4.1.4. Rephrasing the Problem, Gestalts and Pragmatism

According to the gestalts like Max Wertheimer (1959), during the teaching and learning process, it is necessary for the teacher to restructure the given information of a problem for better understanding. This is because through restructuring, the fundamental structure of the problem is revealed. The Gestalt theory of problem-solving is further described by the pragmatist, Peirce (cited in Stumpf and Fieser, 2003, p. 395), who holds that problem-solving occurs easily when our ideas are distinct and clear. For when ideas are distinct and clear, we are able to translate them into some type of operation. Mayer (2006) noted that ideas come about with a kind of insight which occurs when a problem solver moves from a state of not knowing how to solve a problem to knowing how to solve a problem. During insight, teachers and students should devise a way of representing and rephrasing the

problem that enables solution. Philosophy teachers should conceptualize what happens during insight: they can do this by building a schema in which all the parts fit together, suddenly reorganizing the visual information so it fits together to solve the problem, restating a problem's givens or problem goal in a new way that makes the problem easier to solve, removing mental blocks and finding a problem analog (i.e., a similar problem that the problem solver already knows how to solve).

2.2.4.2. Generating Potential Solutions; Pragmatism

2.2.4.2.1. Multiple Strategies

Pragmatists do not believe in any pre-conceived, final, fixed and immutable strategies to solving a problem as advocated by positivistic theorizing (Morgan, 2007). In solving problems, teachers should bear in mind that there are plural problems and dynamic realities (multiple truths). In solving different problems, different strategies could be used depending on the type of problem as stipulated by Sartre and Kant. This is because there is no knowledge that is certain and/or universal. Pragmatism not only rejects the narrow confines and structures of absolutism, but also offers an approach grounded in the emerging conversation that supports a diversity of viewpoints about phenomena (Rorty, 2004; Rosamond, 2007). Unlike other worldviews, pragmatism is not informed by formal theory, but by accumulated practices, practitioner and administrator knowledge, the findings from previous research and the views expressed by the public (Biesta & Burbules, 2003). During the solution phase in problem-solving, the teacher offers a more diverse and interpretive approach that would help to solve problems and should try hard to refute the Aristotelian methods (belief in given reality) and one-dimensional constructs.

2.2.4.2.2. Emphasis on what works best

Pragmatism emphasizes what works best, that is, finding a measure of goodness that works rather than what may be 'inherently' true as celebrated by positivists (Goodman, 2005). Teachers, to be professionally developed, should emphasis on the utility of the best strategies during problem-solving that suit a given situation and organize activities and experiences that are useful to the present needs of the learners' problem and that meet the future expectations of adult life (Petrou, 2007). Peirce (cited in Stumpf and Fieser, 2003, p. 395) looks at pragmatism as a philosophical movement that stresses practical consequences and values as standards by which concepts are to be analyzed and their validity determined. In other words,

teachers should have in mind that ideas or principles are true so far as they work in a given situation.

2.2.4.3. Evaluation; Pragmatism

Pragmatism aims at creating useful knowledge by addressing the pressing issues, contemporary problems and transferring acquired knowledge into action. In pragmatism knowledge is considered to be true and valuable only to the extent of its contribution to a specific context. The pragmatic approach supports the connection between knowledge, experience and practice. To pragmatists, knowledge is useful when it helps people to better cope with the world or to create better organizations. The notion of usefulness applies across two dimensions: epistemological (is this information credible, well-founded, and reliable?) and normative (does this help advance our projects?). This is an indication that when teaching through problem-solving, teachers need to create contextual learning that will make more meaning to the learners in order to help them to be better problem-solvers in their daily lives.

After looking at the various theories and their relationship with Problem-Solving Model, we are going to do an empirical review to see some of the findings on problem-solving related issues and professional development.

2.3. Empirical Review

Reluctance to deviate from traditional teaching methods and to learn and incorporate a new teaching philosophy and practices is a major obstacle to the adoption of the problem-solving approach in teaching. Garton and Cano (1996) found that teachers devote less than 20% of instructional time to a problem-solving approach to teaching. Classroom teachers cooperating with the study spend most of their time on maintaining subject-matter interest; student-teachers focused primarily on seeking information to resolve the problem.

Learning style is another factor thought to influence teachers' use of problem-based instruction and student outcomes. Various research studies have found that "teachers could organize their lessons on a problem-solving basis, but did not follow through with the active problem-solving teaching". Gorton and Cano (1996) report that teachers with a concrete rather than abstract learning style were more apt to use problem-solving in teaching. In a study of Illinois secondary students in agriculture, Dyer and Osborne (1996) found that

students classified as "field-independent" learners significantly increased their scores when taught using a problem-solving rather than subject-matter approach.

Additionally, a study analyzing the effects of teaching which across all learning styles; field-independent (concrete) learners, field-dependent (abstract) learners, and field-neutral (somewhere between concrete and abstract) learners showed that field-neutral learners "scored significantly higher on achievement tests when taught in classes using the problem-solving approach" (Dyer & Osborne 1996). This approach was superior, however, only when relevant and meaningful problems were introduced. The results from these and other studies of problem solving in agriculture education suggest that "each type of learning style benefited from instruction using the problem-solving approach".

CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

After having stated the problem and fixed the objectives of this study, it is necessary to present the methodological trend which permits us to observe the phenomenon that constitutes the object of our study. In this chapter, we look into the following elements: the research design, presentation of the research site, the sample selection, choice of sampling technic, instruments of data collection, validation of instruments, methods of data analysis variables of the study and operationalization of concepts.

3.1 Research Design

The study was in the qualitative paradigm using a case study approach. The reason for the qualitative paradigm is that it enables the researcher to investigate the process of teaching/learning through problem-solving in a natural setting, where the data collection process is carried out in an uncontrolled environment to explore participants' experiences (Borg & Gall, 1996 cited in Amin, 2005). The researcher used a mixed qualitative design of observation and interview and the results are later triangulated to see if the results are consistent. This qualitative method enables the researcher to explore the complexities that are beyond the scope of more 'controlled' approaches and also provide a chance to look at the case from the inside and study the research as a process rather than as a significance of the result (Gillham, 2000).

Case studies investigate and report the complex dynamic and unfolding interaction of events, human relationships and other factors in a unique instance. The researcher studies the problem-solving process of teaching of secondary school philosophy teachers and its relationship with professional development by doing a qualitative and comprehensive study. This is because case study probes deeply and analyzes interaction between the factors that explain present status or that influence change or growth (Amin, 2005, p. 200). This study is taken from the real experience that the teachers have of teaching in the classroom, since the

Problem-solving model is a factor that relates to professional development. Case study explores the significant feature of the case and studies the aspect of the case in a greater depth and in smaller numbers (Bassey, 1999).

Amin (2005, p. 200) explains, "Case studies arise out of the desire to understand complex social phenomena.... the case study allows an investigation to retain the holistic and meaningful characteristics of real-life event." Consequently, Paille (cite in Amin, 2005, p. 45) proposes six stages in strict respect of the order of case study; the choice of the case who participates in the research, the choice of data collecting instrument, the choice of data analysis, putting in place distinctive and instructive aspects, and tracing/ drawing their theoretical and practical implications.

3.2 Presentation and Justification of Area of Study

3.2.1. Presentation of Area of Study

In order to permit the readers to better understand our study area, we presented the site which is the Yaounde VI municipality. In this municipality fourteen schools that actually offer philosophy in Anglo-Saxon secondary school classes were identified with a total number of thirty nine teachers. These schools include:

Table 3: The number of teachers in Yaounde VI

	Name of school	No of teachers
Public	Government Bilingual High School Mendong	6
	Government Bilingual High School Etoug-Ebe	6
Private	Oxford Comprehensive High School	2
	Wisdom International College	2
	Mario Academic Complex	2
	City Bilingual	2
	Harvard College	3
	Green Hills Damas	2
	COSBIE	3
	NESCAS College	2
	Holy Infant High School	3
	Mevick Bilingual Grammar School	2
	Christian Renaissance	2
Rosel College	2	
Total	14	39

3.2.2. Justification of the Choice of Site

The researcher chose the Yaounde VI municipality because it has more schools that offer philosophy, more teachers that could be contacted and more of the English Sub-systems of education because there are many English speaking people living in this area. Due to proximity of this municipality, the researcher deemed it necessary collecting data in her resident area. The choice of these government schools were because, from the statistics gotten, they each have more philosophy teachers while the others have a maximum of three teachers per school. Consequently, due to time constraint, necessity and certainty to meet more teachers, the researcher had to make these choices since she had some criteria these teachers had to meet.

3.3. The Population of the Study

Amin (2005, p. 235) defines a population of study as a complete collection of all the elements that are of interest in a particular investigation. Population here refers to all members of the target of the study as defined by the aims and objectives of the study.

3.3.1. The Target Population

This refers to all the people of the specified group to which the investigation relates. The target population of this study comprises all the secondary school philosophy teachers of the Anglo-Saxon sub-system in the Yaounde VI municipality as earlier mentioned.

3.3.2. The Accessible Population

Accessible population refers to those elements of the group within the reach of the researcher. Thus in this study, the accessible population was made up of 10 teachers from two secondary schools. These schools are;

- Government Bilingual High School (G.B.H.S.) Etoug-Ebe
- Government Bilingual High School (G.B.H.S.) Mendong

3.3.3. Criteria of Selection

The sample size or target population included ten secondary school philosophy teachers from Government Bilingual High School Etoug-Ebe and Government Bilingual High School Mendong. We named them anonymously as Teacher A, Teacher B, Teacher C,

Teacher D, Teacher E (for teachers in (G.B.H.S. Etoug-Ebe). While Teacher F, Teacher G, Teacher H, Teacher I and Teacher J (for teachers in (G.B.H.S.) Mendong). Again for practical reasons and anonymity, these teachers will be cited using pseudo names and or masculine form.

To select the sample size or target population, certain criteria were defined namely:

- Be a secondary school philosophy teacher of any sex.
- Actually teaching logic or philosophical problems.
- Must have taught for a period of about seven years
- Must be a holder of DIPES II Diploma.

The second criterion was chosen because the researcher was familiar with both branches of philosophy. Systematic philosophy is a generic term that applies to philosophical methods and approaches that attempt to provide a framework in reason that can explain all questions and problems related to human life. Examples of systematic philosophers include Plato, Aristotle, Descartes, Spinoza, and Hegel while logic has to do with the methods and principles which permits one to distinguish a correct reasoning from an incorrect one. Consequently, both branches have a lot to do with problem-solving approach.

The third criterion was chosen to check the pedagogical practices of those who had been in the field at least before the introduction of the new syllabus and to see if they had actually learnt and mastered this approach through professional development programs. The fourth criterion was to be sure that those involved were actually trained teachers who are expected to at least have some pedagogical content skills. At the end, five (5) teachers who met the selection criteria were selected from G.B.H.S. Mendong, five (5) from G.B.H.S. Etoug-Ebe.

3.4. Sampling Technique

To select participants for the study, we applied a judgmental non probability sampling technique which deals with cases as proposed by Amin (2005, p. 241).

3.4.1. Choice and Justification of the Technique used

Non probabilistic because it is commonly used in qualitative and case studies, wherein the elements of the population do not have a well-defined chance of being selected and may not be clearly defined. The researcher adopted a judgmental or purposive sampling because

the study handles a particular aspect which is the influence of PSM on professional development. We therefore applied this technique since the research was based on a comprehensive process to get sufficient relevant information on teachers' actual practices. In effect, we were out to understand how the problem-solving process relates to the professional development of philosophy teachers.

3.4.2. Sample of the Study

To constitute this sample, we used a purposive sampling technique based on the researcher's judgment. In effect, we chose this technique with regard to our problem. To this effect, the researcher had to choose teachers based on her enumerated criteria and those who accepted to participate in the research. The sample constitutes ten (10) teachers drawn from our mother population of 12 teachers, selected from two (2) schools of the Yaounde VI municipality.

The method of case study insists on the fact that understanding a particular case will permit that of the general and vice versa.

Table 4: Descriptive criterion for Sample Selection

participant	sex	diplomat	Years of teaching	Branches of philosophy taught	Age	School
Teacher A	Female	DIPES II	12 years	Logic/textual study	40	Etoug-Ebe
Teacher B	Female	DIPES II	08 years	Logic/ western philosophy	36	Etoug-Ebe
Teacher C	Female	DIPES II	12 years	Logic/western/African philosophy	40	Etoug-Ebe
Teacher D	Male	DIPES II	15 years	Logic /African philosophy	45	Etoug-Ebe
Teacher E	Female	DIPES II	07 years	Philosophical problems/ logic	35	Etoug-Ebe
Teacher F	Female	DIPES II	21 years	Philosophical problems/ logic	32	Mendong
Teacher G	Female	DIPES II	09 years	Philosophical problems/ logic	38	Mendong
Teacher H	Female	DIPES II	08 years	Logic/Western philosophy	35	Mendong
Teacher I	Female	DIPES II	10 years	Logic/philosophical problems/ western philo	37	Mendong
Teacher J	Female	DIPES II	07 years	Logic / textual study	33	Mendong

From the above table, it is noticed that most (nine) of the teachers were female. This could be explained by the fact that women are more populated than men and more often, majority of students in training schools are girls than boys. It is also noticed that all the teachers teach logic. This is because logic is thought from form 3-5 and in lower and upper sixth classes, while the other branches are taught only in High School. Most of the teachers fall within middle age which confirms the fact that it is a baby subject still growing in the Anglo-Saxon system.

3.5. Instruments for Data Collection

Collecting data consists in going to look for information relative to the study. To this effect there is the necessity of a data collecting instrument and the choice of instrument depends on the criterion and precise factors such as; the nature of the problem posed by the research topic.

3.5.1. Choice of Data Collecting Instruments

Two methods were used in the study to get more valid information to meet the purpose of the study. These were semi-structured interview and semi-structured observation. Observation was chosen because it is one of the most common ways of finding out about things and it is used in almost all of our daily activities. (Berg, 1989 cited in Amin 2005) and can provide first-hand information which is more valid.

3.5.1.1. The Interview Guide

This guide was elaborated on the basis of the variables, criteria and indicators of the conceptual framework defined at the start of this work. The instrument was constructed in four main parts. The first part began with a demographic data which included; assurance of confidentiality of the respondent, the date, the school, the subject, the class, the period, teacher, age and duration of the lesson. Part two had to do with the identification and definition of the problem which involved; prerequisite knowledge of the problem (asking what students know about the problem), the actual problem situation, reformulation or rephrase of the problem and contextualization of the learning. The third part was generating multiple solutions with the following items: using strategies in solving problems operationalizing solution steps and selection of best solution. The fourth part had to do with evaluation with these items: recalling the problem by regressing to get back to the general

established principle, asking students to check the workability of the solution and establishing a “link” with possible contextual usages (particular, general, analogous solutions). The last part had to do with professional development.

3.5.1.1.1. Justification of choice of instrument.

The researcher interviewed five teachers after observing their lessons and the nature of the interview was semi structured because of its flexible nature (Robson, 1998). With semi-structured interview the interviewer is prepared to be flexible in terms of the order in which the topics are considered, and perhaps more significantly, to let the interviewee develop ideas and speak more widely on issues raised by the researcher. This type of method permits the researcher during the human interaction to select useful information from this interview. This type of interview supposes the use of an interview guide made up of a list of written questions on the topic which has to be covered during the interview. The order of formulation of questions can vary from one participant to another and the researcher could probe the interviewee using questions linked to the guide. This is done while ensuring the latter is not interrupted and given the possibility to express himself.

3.5.1.2. Observation Guide

The guide was elaborated on the basis of the variables, criteria and indicators of the conceptual framework defined at the start of this work. The instrument is constructed with five main parts. The first part began with a demographic data which included: the date, the school, the subject, the class, the period, teacher and his age and duration of the lesson. Part two had to do with the identification and definition of the problem with the following items; checking previous knowledge, stating the problem situation, contextualization of problem and rephrasing the problem. The third part was generating multiple solutions with the following elements: using strategies in solving problems operationalizing solution steps and selection of best solution. The last was professional development with three items: content substantive knowledge, content syntactic knowledge and affective knowledge and beliefs.

As such, through interviews, we get to better understand the actions of the teachers interviewed on the way they teach in order to determine if a problem-solving model will influence professional development.

3.5.1.2.1. Justification of Choice of Instrument

Semi-structured Observation is employed with a formal and organized procedure, consisting of a set of well-defined categories or checklist organized and planned before the studies (Amin, 2005). This is because when carried out in a disciplined way, it becomes one of the purest forms of research as it taps directly into behavior rather than perceptions. However some of the items on the checklist can be reshaped if need be. The observations helped us with opportunity to see if teachers were really acquainted with the process of problem-solving and provide us with an opportunity to triangulate with the interview.

3.6. Validation of Research Instruments

According to Amin (2005), validity refers to the ability to produce findings that are in agreement with theoretical and conceptual values; that is, to produce accurate results and to measure what is supposed to be measured. The supervisor of this work validated the instruments. He checked to ensure that the instruments were appropriate for the collection of relevant data. Corrections were made before approval of instruments so that it was good for final administration.

3.7. Procedure of Data Collection

During the data collection procedure, we used two procedures since we have two different instruments.

3.7.1. Semi-structured Interview

The interview was done at G. B. H. S. Mendong after teaching sessions where every lesson takes about fifty (55) minutes and all the classes from form three to five have a total number of fourteen (19) periods per week. That is, eight (8) hours in Upper Sixth, eight (8) hours in Lower Sixth and two (1) hour each for form three, four and five. The field research in this school took about two (2) weeks on four phases: the preparatory phase, trial observation, the conducting phase and interviewing participants. The final stage had to do with the readjustment which consists in putting down all that is not said by participants.

First of all, we contacted the administration of G.B.H.S. Mendong on March 6th 2017 in order to obtain their authorization, given the fact that observation and interview concerned their teachers. During this encounter, we solicited them to interview philosophy teachers on their teaching practices. The request to carry out a research was granted that same day and

since the head of philosophy department was in school, the vice principal immediately called and notified her to inform other colleagues. After the encounter, a consent form was deposited. The consent form was to draw their attention to the importance of the research and to guarantee confidentiality of information collected from participants. Then a time table for all the teachers was given to the researcher and was asked to start when ready. The first appointment was fixed for 7th March, 2017 by the head of department with teachers who were to teach the following day.

The interview took place in the staffroom of G.B.H.S. Mendong after every observed lesson. To this effect, each of the teachers concerned had to create a convenient time to be interviewed preferably during the last period of the day. Five interviews had to be conducted with five teachers after observation of their lessons. The observation was to ensure that they report their actual practices. The staffroom was chosen because there was need for a neutral environment and need for other materials like infrastructure, a chair and table, a pen and paper to note nonverbal elements of the participant. The teachers as well had to be informed about the duration of the interview (30-40 minutes maximum), and that they had to keep away their telephone such that we don't get distracted.

Our first interview was conducted during the first week of March during which two teachers were interviewed. Our difficulties encountered during the process permitted us to redefine the framework of the interview checklist and the thematic guide to suit better in the study. From the trial interviews, three items were restructured and rephrased because it was noticed the teachers had a different understanding to it.

The five interviews in the said schools took place at close range from 13-24 March: 13th march 2017; 15th march 2017; 17th march 2017; 21st march 2017 and 24th march 2017. The interview days were chosen at the convenience of the teacher concerned preferable after their last period of the day when they had more time. The researcher had to interview the teacher after the observed lesson. The interview was based on the different variables (identification of the actual problem, generating potential solutions, evaluation) after different teaching sequences. The three variables each had different items that were identified by the researcher and these items acted as guides to the interview. The researcher had as task to restructure the question to participants each time they did not understand or derailed from the discussion. We took down notes while at the same time registering the discourse with the help

of a tape recorder. At the end, we appreciated his efforts and collaboration and promised to come back to them in time of need.

During the final stage, it was necessary that we listen to the taped information together with the interviewee in order to complete all left out information, comprehensive errors and asking them for more clarification.

3.7.2. Semi structured Observation

The observation was done at G. B. H. S. Etoug-Ebe during teaching sessions where every lesson takes about fifty (50) minutes and all the classes from form three to five have a total number of fourteen (14) periods per week. That is, six (6) hours in Upper Sixth, five (5) hours in Lower Sixth and one (1) hours each for form three, four and five. The field research in this school took about one (1) month on three phases: the preparatory phase, trial observation phase and observing participants proper. To carry on well with the investigations, the researcher made prior arrangements to ensure that the necessary conditions were favorable (the site, the period of the collect and while assuring the confidentiality of participants). All these were to ensure that the observation goes on hitch free.

First of all, we contacted the administration of G.B.H.S. Etoug-Ebe on February 6th 2017 in order to obtain their authorization, given the fact that observation concerned their teachers. During this encounter, we solicited them to observe teachers teaching practices. This request was accepted and an appointment was fixed for 8th February, 2017 since the authorities needed to inform the teachers concerned. The researcher pleaded with the school authority to draw the attention of teachers to the importance of research and to guarantee confidentiality of information collected. The authorities were notified that the five (5) teachers who met the criteria would each be observed five times, summing up to twenty five (25) observation sessions. So, the teachers needed not to panic.

Secondly, the pre-observation stage had to do with meeting participants and doing self-introduction while presenting the objective of the research and assuring them confidentiality. The pre-observation stage was conducted during this same week of first encounter on February 08th -10th 2017 during which four trial observations were carried out on three teachers. The difficulties encountered during the process permitted us to redefine the framework of the observation checklist, the thematic guide to suit better in the study. From the trial observation, two items were readjusted and two others removed from the checklist.

Finally, we moved to the observation stage proper. This had to do with scientific observation which permits us to examine what is happening in a real life situation. It is in this light that Seulyi (cited by Angers 2008 p. 345) decomposes observation into 3 distinct activities: to observe is to notice that something is there; knowing that thing or person and to evaluate the person or thing. In effect, the direct observation was done within three weeks from 13th February to 03rd march 2017 and each teacher was observed twice per week. Thus a total of twenty five lessons were actually observed. During this period we observed the teaching/learning process. Specifically, our attention was focused on the ability/skills of the teachers in carrying out a particular activity in problem-solving appropriately.

The observation was based on the different variables (identification of the actual problem, generating potential solutions and evaluation) in different teaching sequences. The three variables each had different items of observed activity that were identified by the researcher. Each of the identified activity was ticked each time it occurred and this activity was called tallying. Since the observation was focused on teaching activities, each activity that occurred even once was ticked and taken into consideration. This is to say that if 'teacher A' contextualized five times in his five different lessons, he must have had all the points and was given five points. From the tallying, the total percentages per teacher were gotten and later that of the overall group of teachers.

3.8. Method of Data Analysis

The technique of data analysis was not chosen haphazardly but is justified by the type of data collected known as semi-structured interview and semi-structured observation.

3.8.1. Interview Data Analysis: Thematic Content Analysis

Whatever the discourse that is juxtaposed, it is necessary to transcribe the interview and type up field notes to produce a scientific construct of reality. It is necessary to make use of rigor to analyze the information collected. This is possible thanks to the technique of content analysis, precisely the thematic content analysis.

3.8.1.1. Justification of Choice of Thematic Content Analysis

The thematic content analysis was chosen because it is mostly used in interview and qualitative observations (Amin, 2005, p. 324). It consists in transcribing qualitative data, to do an analysis guide, to code the collected information and treat them. Analysis describes the

research material and studies the significance. This section looked into the main stages of thematic content analysis. As such, this technique tries to give an account of what the respondent says in an objective and valid manner. Amin, (2005, p. 43), defines it as a technic of research for objective description of the systematic content of communication.

3.8.1.2. Presentation of the Data Analysis Guide

Our analysis guide was focused on the following points: Identification and definition of the problem, generating multiple solutions, evaluation and professional development of secondary school philosophy teachers. This guide permitted the examination of the process of teaching through problem-solving and the professional development of teachers with some modalities that define the activity occurrence of teachers. Here, we checked if the activity is present, absent or the teacher is performing a different act.

Table 5: Interview Guide Analysis

Themes	Code	Sub Themes	Code	Activity Occurrences		
				+	-	#
Identifying and defining the problem	A	Checking for previous knowledge or background knowledge to the problem	A1			
		Stating the problem situation	A2			
		Contextualizing the problem	A3			
		Reformulating the problem	A4			
Generating potential Solutions	B	Selecting strategies to solve problems	B1			
		Operationalizing solution steps	B2			
		Selecting the best solution	B3			
Evaluation	C	Recalling the problem	C1			
		Checking workability of solution	C2			
		contextualizing the solution	C3			
Professional Development	D	Aptitude of mastering facts and concepts	D1			
		Aptitude of scaffolding learners	D2			
		Aptitude of motivating learners	D3			

+	Activity Present
-	Activity Absent
#	Others

3.8.1.3. Procedure of Interview Data Analysis

The procedure is understood generally as the transformation of an oral discourse into a text, then the construction of an analysis instrument to study the significance of the proposals.

3.8.1.3.1. Transcription of Data

The analysis of data involved a two-stage process in which data collected were first reduced and organized in a written form. These texts, called word verbatim represent the raw data of the investigation and transcription is done with the hands. This permitted the organization of material gotten from the field in a form that will be easily accessed for analysis. Instead of treating the registered audio directly, it is preferable to write it down to ease reading. We did a hand transcription which was later on typed. The word verbatim of all that was said and done by the interviewee and the observation process was done without changing the text, without interpreting and without abbreviations.

3.8.1.3.2. Coding the Data

According to Amin (2005), coding is a process of organizing material, taking text, data or pictures, segmenting images or sentences into categories and labeling those categories. When the qualitative data is transcribed, before coding, an analysis guide is constructed, composed of a criteria of indicators called analysis categories. Qualitative brute data is categorized according to the analysis guide

The second stage featured a range of analytic approaches, involving the analysis of observed lessons and interviews. Interviews with teachers were analyzed and coded in order to identify the challenges teachers face in teaching using the suggested approach and to see if they are professionally developed. These were compared and triangulated with results from observation lessons.

3.8.2. Observation Data Analysis: Manual analysis

After the juxtaposed tally collected, we had to take time to do a manual counting of all activity frequency occurrences to get the number of activity occurrences, then later the percentages.

3.8.2.1. Steps for Data Analysis of Observation

The data analysis procedure of the observation was done by manual counting of all activity occurrences. After the observation of teachers, the number of occurrences of activity of each teacher was counted to get the number or frequency of occurrences per teacher and later for all the five teachers. From the frequency occurrences for all the teachers, we obtained the total frequency and from this, the percentages per theme were gotten and then the general percentage. From the general percentages, graphs (pie chart and histograms) were later presented. The quantification of the results was for better understanding.

3.9. Variables of the Study

3.9.1. Independent variables: Problem-Solving Model.

The theoretical reference retained is that of presenting a problem and solving it through a step by step process with the help of the teacher as stipulated by Dewey. He illustrates these stages into six different functions; define the problem, analyze the problem, determine criteria for optimal solution, propose solutions, evaluate & choose the best solution, implement the solution and test for success. These stages have been summarized by the author into three different principal stages in a classroom situation. They have to do with the following: identifying a problem, generating potential solutions and evaluation.

The first modality which has to do with identifying a problem had the following indicators: Checking for previous knowledge or background knowledge of the problem, stating the problem situation, contextualizing the problem by concrete representation and reformulating or redefining the problem.

The second concerns generating potential solutions by the teacher and the learners. This was analyzed by the following indicators: selecting different possible strategies to solve problems, operationalizing solution steps by evaluating the different steps and selecting the best contextual solution.

The third modality concerns evaluating the solutions (checking the solution) with the help of the teacher which was analyzed by the following indicators: recalling the problem, checking workability of solution and contextualizing the solution.

3.9.2. Dependent variable: Professional development

The first modality dealing with professional development has to do with content substantive knowledge with the following indicators: mastering the facts (in-depth knowledge

of subject area), mastering the concepts (ability to identify and cluster examples using interdisciplinary knowledge) and principles (ability to predict and explain the behavior of a system)

The second modality has to do with content syntactic knowledge with the following indicators: efficient teaching strategies like scaffolding and encouraging group work.

The third modality concerns affective knowledge and beliefs which will be examining the following indicators: the teachers' belief in attaining objectives and teachers' ability to motivating the learners to persevere in seeking the solution.

These different variables, modalities and indicators can be summarized in the table below.

Table 6: Summary of Table Indicating Research h Variables and Hypotheses

General Hypothesis	Specific Hypothesis	Variables	Indicators	Modalities	
Problem-Solving Model influences the professional development of secondary school philosophy teachers.	HR1		-Checking for previous/ background knowledge		
	Identifying and defining the problem influences the professional development of secondary school philosophy teachers	VI. 1 Problem Identification	-Stating the problem situation -Contextualizing the problem -Rephrasing the problem	-Present -Absent -Others	
		VD Content Substantive knowledge	-Facts (subject matter) -Concept (interdisciplinary knowledge)	-Present -Absent -Others	
	HR2		-Selecting strategies to solve problems -Operationalizing solutions steps -Selecting best solution	Present -Absent -Others	
	Generating potential solutions influence the professional development of secondary school philosophy teachers	VI. 2 Generating potential solutions			
		VD Content Syntactic Knowledge	-Efficient teaching strategies (scaffolding) -Working in groups	Present -Absent -Others	
	HR3	Evaluation influences the professional development of secondary school philosophy teachers	VI. 3 Evaluation	-Recalling the problem -Checking workability of solution -Contextualizing the solution	-Present -Absent -Others
			VD Affective knowledge	-Belief in attaining the objectives of the lesson -Motivating the learners to persevere in seeking solution	Present -Absent -Others

CHAPTER FOUR

PRESENTATION OF RESULTS AND DATA ANALYSIS

4.0. Introduction

After collecting raw data, the task is then to put it in a language that will facilitate understanding of the results according to the explanatory theory of the study. Such is the function of this chapter whose different articulations are: the identification of case studies, presentation of observation data results, presentation of interview data results and summary of data analysis.

4.1. Presentation of the target population

Table 7: Identification of Cases

participant	sex	diplomat	Years of teaching	Branches of philosophy taught	Age
ANA	Female	DIPES II	12 years	Logic/textual study	40
BELLA	Female	DIPES II	08 years	Logic/Western philosophy	36
CAROL	Female	DIPES II	12 years	Logic/Western/African philosophy	40
DAN	Male	DIPES II	15 years	Logic /African philosophy	45
ELLA	Female	DIPES II	07 years	Philosophical problems/ logic	35
FRIDA	FEMale	DIPES II	21 years	Logic/ Philosophical problems	32
GAEL	Female	DIPES II	09 years	Logic/ Philosophical problems	38
HELEN	Female	DIPES II	08 years	Logic/Western philosophy	35
IDA	Female	DIPES II	10 years	Logic/ Philosophical problems / western philosophy	37
JANE	Female	DIPES II	07 years	Logic/ textual study	33

The above table presents the different cases identified from our population. In the presentation of data, we will sometimes qualify Ana, Bella, Carol, Dan, Ella, Frida, Gail, Helen, Ida and Jane as A, B, C, D, E, F, G, H, I and J respectively. This is to avoid redundancy of name occurrence. To this effect, participants were selected according to the prescribed criteria namely: the name of the teacher, his sex, age, duration of teaching and professional diploma.

4.2. Presentation of Data from Observations

Following the observations we carried out guided by problem identification, generating potential solutions and evaluation, the frequency of activities that were tallied, were counted and percentages were obtained as shown below.

Table 8: Observation Result from Data Collection

Theme	Activity	Frequency Occurrence					Total Frequency	Percentage	Total Percentage	Remarks
		Anna	Bella	Carol	Dan	Ella				
1- Identification of problem	Checking previous knowledge	3	3	3	2	2	13	8.67	33.33	Out of twenty-five lessons problem identification stands at 33.33%
	Stating the problem	3	2	2	2	3	12	8		
	contextualizing the problem	2	2	3	2	2	11	7.33		
	Rephrasing the problem	2	3	3	3	3	14	9.33		
2- Generating potential solutions	Using multiple strategies	5	5	3	5	4	22	14.67	43.34	This is the most occurred activity with 43.34%
	Operationalizing solution steps	4	4	4	5	4	21	14		
	Selection of best solution	4	4	4	5	5	22	14.67		
3- Evaluation	Recall the problem	2	3	2	3	1	11	7.33	23.33	This is the least occurred activity with 23.33
	Check workability of solution	3	3	3	4	3	16	10.7		
	Contextualize solution	1	1	2	1	3	08	5.33		
TOTAL		29	30	29	32	30	150	100	100	

The above table 8, summarizes the three main variables of Problem-Solving Model that we observed. The results of these three elements of the model are presented in the following figure:

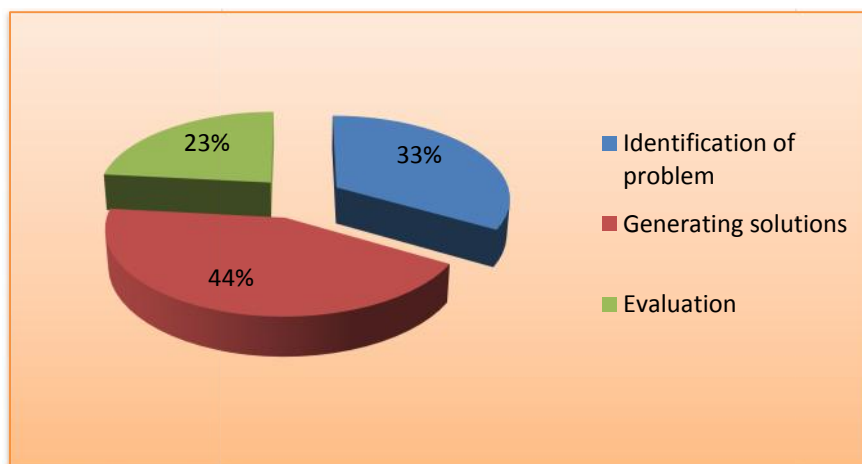


Figure 2: Results of problem-solving Model

From figure 2 above, it is noticed that of the three variables observed (identification of the problem, generating potential solution and evaluation), the highest function of problem-solving that influences the professional development of philosophy teachers is generating potential solutions with a percentage of 43% and the least function is evaluation with 23% while identification of problem stands at 33%. From this presentation, we can see that the PSM has three main themes that will be analyzed below.

Looking at theme 1 which is based on problem identification, it has four sub-variables namely; checking for previous knowledge, stating the problem, contextualizing the problem and rephrasing the problem. The result of the observation is shown on figure three below.

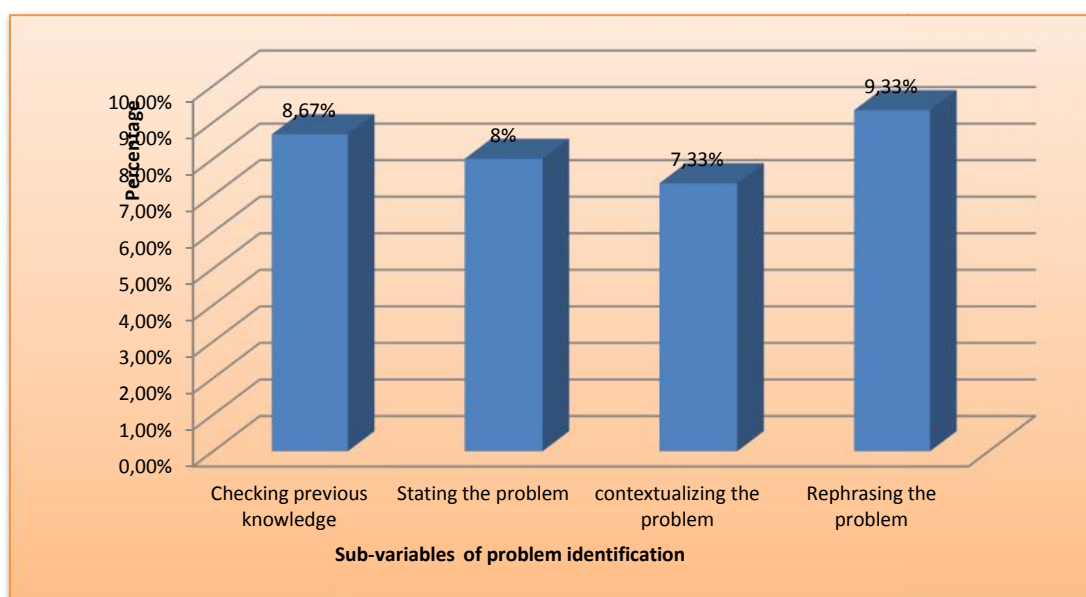


Figure 3: Results of problem identification

From the figure 3 above, most teachers carried out the activity of rephrasing the problem at 9.33%. This is so because out of the 25 lessons observed, teachers effectively carried out rephrase in 14 lessons with the least being Anna who does so in only two of her lessons. The least activity that teachers carried out was contextualizing the problem which scored 7.33% and only 11 of the 25 lessons was contextualized for better understanding as Anna, Bella, Dan and Ella do so only in two of their lessons each. This was closely followed by stating the problem which follows with 8% during which three of the teachers each actually carried out this function only in two of their lessons out of the five. Of the twenty five lessons, teachers did checking of previous knowledge in thirteen lessons. For example, out of the five lessons, teacher A, B and C do it in three of their lessons each while D and E did it twice each. This shows that they sometimes practice it and sometimes not but D and E most often do not do it.

The second theme is generating potential solution which includes, using multiple strategies, operationalizing solution steps and validation of best strategy.

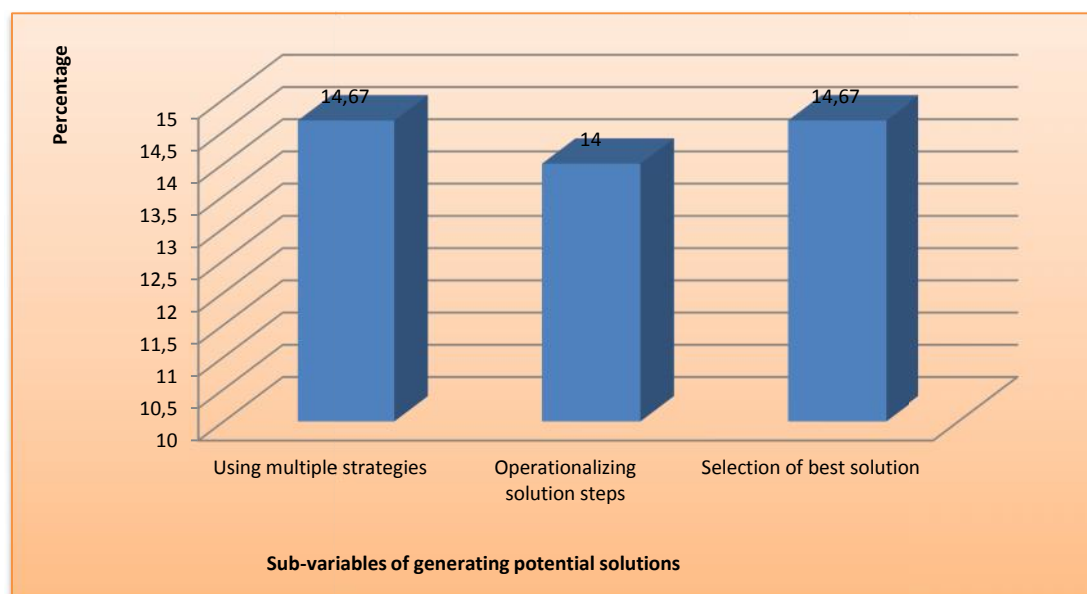


Figure 4: Results of generating potential solutions

This figure shows that most teachers do perform the various activities with the highest being using multiple strategies and validation of strategy with 14.67% each. Out of the twenty five lessons, this function was done in twenty two lessons. For example, out of the five lessons, teacher A, B and C do in four of their lessons each, while teacher D and E did it in all

their lessons. The least activity here was operationalizing a solution step that is carried out in twenty one lessons with 14%. This shows that of the five lessons observed for each person, they all carried out their functions in at least four lessons except for Carol who used a selection of multiple strategies in only three of her lessons. For example, out of the five lessons, teacher A, B, C and E did it in four of their lessons each, while teacher D did it in all his lessons.

Theme three which is based on evaluation has the following sub- variables; recall of the problem, checking the workability of the solution and evaluation.

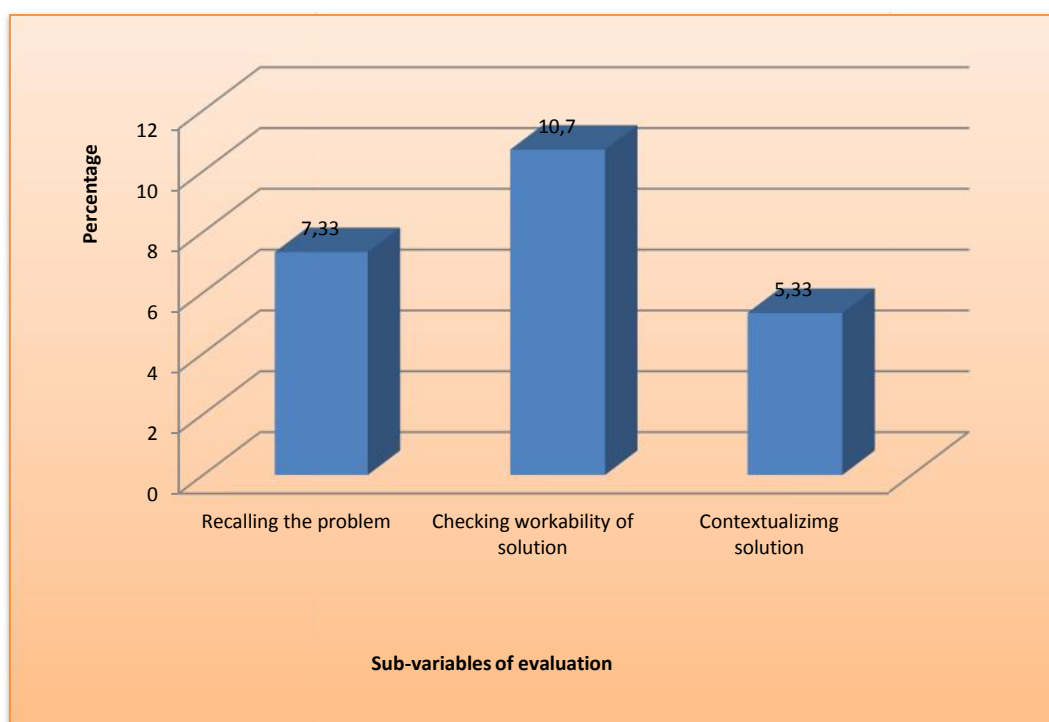


Figure 5: Results of evaluation

From the above figure 5, the contextualization of solution is the least activity carried out with 5.33%. Out of the twenty five lessons, teachers contextualized the problem in 8 lessons with teacher A, B and D scoring the least. This was so because they failed to carry out this function in four of their lessons each and they rarely motivated or scaffold the learners during the solution phase. Checking the workability of solution scored the highest with 10.7%. It is read that out of the twenty five lessons, teachers checked workability of solution sixteen times. Looking at the activity of recall, Ella failed to do recall in four of her lessons

while Carol failed to do so in three of her lessons probably because they did not really have a good mastery of the facts. The function of recall stands at 7.33%.

The general conclusion which resulted from these observations was that evaluation was the least theme mastered by philosophy teachers while generating potential solutions was the activity they carried out most. In problem identification, stating the problem and contextualizing the problem caught our attention because most of the teachers could not really accomplish the said tasks in most of their lessons probably because of poor knowledge of interdisciplinary concepts or the belief that time is not enough. Theme three on evaluation also caught our attention for the fact that recalling the problem and contextualizing the solution was omitted or poorly executed by most teachers. This was due to their belief that there is no time to waste on checking the solution. We will try to understand this situation better with the results of our interview.

4.3. Presentation of results from Interview

Table 9: Interview results: Identification of the Problem

Theme	Verbatim
Identification Of The Actual Problem I	<p><i>“From revision of past lesson, I introduced them to the new topic of the day which is women’s, rights then the issue at stake. After we looked at characteristics of women’s rights (...). I later helped the students in bringing out, clearly or rephrase the issue at stake which was to find out if there is any need to advocate for the rights of women. Again, I asked the students some of the rights of women that are violated and if these violated rights are justifiable.” (Ida)</i></p>
	<p><i>“After the correction of assignment; I then announced the topic of the day “propositional functions.” (...). From the topic we went further to look at the parts of a proposition after which, I presented a statement on the board (if it is a fruit then it is sweet)... From the proposed statement, a propositional function was then constructed by elementary quantification by establishing the relationship between the universal quantifier and existential quantifiers.” (Jane)</i></p>
	<p><i>“The first thing we did was to do a recall on historical materialism which is a basic idea that underlies dialectical materialism (...). After they had</i></p>

	<i>understood what it was, I then introduced them to the new topic and we all took time to differentiate between the two. Later we looked at the modes of production and the super structure of the sub-structure.” (Helen)</i>
	<i>“First of all, I asked them what we did in our last lesson and when they recalled the topic. I asked them to give brief discussion on all what we saw during the last class. After this stage was completed (...). I then presented the topic of the day which was HIV/AIDS. In order that they follow the lesson well, I emphasized we were looking at the morality of HIV/AIDS, I then asked them to define it and provide some of the means of contraction.” (Gael)</i>
	<i>“I started the lesson by asking them what they will do if they happen to get pregnant till the point where one of them suggested an abortion; then I stated the topic and issue at stake which was to determine if abortion is morally justifiable. I later asked them the definition, the types of abortion, and reasons why people commit abortion.” (Frida)</i>

The definition of a problem implies that one must have some background knowledge of the problem. How can one solve a problem without first knowing what the problem is? As a practical consequence, teachers need to create situations where students sense that a problem exists, then create a definition of the problem to be solved. It is a starting point that the teacher designs and has to do with opening the way, and not imposing results. It has to do with placing the learner at the beginning of a task. To this effect Frida affirms: “I started the lesson by asking them some of the effects of having sex till the point where one mentioned ‘pregnancy.’ I later asked what they will do if they discovered they got pregnant as students, till the point where someone suggested an abortion.” Helen adds: “I asked them to do a recall on the lesson on historical materialism since it was the basis of dialectical materialism.” Meanwhile some of the other teachers; G., J and I. go by the traditional teaching method which goes from revision of past lesson to the introduction of a new topic. To this effect, Ida affirms that: “From revision of past lesson, I introduced them to the new topic of the day which is women’s rights (...)”.

It also involves stating the problem situation clearly which has to do with presenting a task to students. It is in this well-defined situation that the following elements: the goal clearly defined, initial important information presented, constraints and procedural knowledge. Gael

declares that: “we have just discovered our topic for the day is HIV/AIDS and so our focal point will be examining its moral implication or effects”. Ida and Frida do same when they say: “then I notified them the topic and issue at stake which was to determine if abortion is morally justifiable”. Other teachers J and H rather follow the classical way of presenting the topic instead of the problem raised by the topic. Jane declares: “After the correction of assignment; I then announced and put the topic of the day “propositional functions on the board...”

Again, problem identification in problem-solving also involves restating or translating the problem. Teachers can ask a number of students to rephrase the problem in order to show appreciation for different perspectives in understanding the problem. Ida says: “I later helped the students in bridging out clearly or rephrase the issue at stake which was to find out if there is any need to advocate for the rights of women.” Other teachers at this stage rather looked at the relevant features of the problem (causes, magnitude etc.). This means that they omit rephrasing the problem. This is the case of H, F, and J. “I then asked them to define it and provide some of the means of contraction.” (Gael)

Another criterion for understanding problems is contextualizing the problem which can be done through concrete examples. Effective instruction combines both theory and practice in specific ways. When effective teachers introduce a new concept, they first present a perceptual, concrete example of it to the student. To this effect, Ida asserts: “Again, I asked the students some of the rights of women that are violated and if these violated rights are justifiable.” Others rather focus on or proceed to definition, types and characteristics rather than contextualizing as Frida “I later asked them the definition, the types of abortion, and reasons why people commit abortion.” Also, Gael stipulates:

I emphasized we were looking at the morality of HIV/AIDS, I then asked them to define it and provide some of the means of contraction.” The other two teachers (J., H.) during this stage are rather establishing the theoretical relationship between concepts.” Jane declares: “From the proposed statement, a propositional function was then constructed by elementary quantification by establishing the relationship between the universal quantifier and existential quantifiers.

Table 10: Interview results: Generating Potential Solutions

Theme	Verbatim
<p data-bbox="244 1144 264 1173">2</p> <p data-bbox="188 1312 347 1451">Generating Potential Solutions</p>	<p data-bbox="371 320 1394 633"><i>“As we stated the problematic, we went further to look at the characteristics of women’s right. We look at the different strategies that could be used to advocate women rights after which each of the strategies was analyzed in detail to determine the better strategy (...). From all the solutions and analysis done by students, a conclusion was drawn by adopting the best solution that solves the problem of women’s right.”(Ida)</i></p>
	<p data-bbox="371 656 1394 1014"><i>“Since we had to go by elementary quantification, I ensured that they identified and differentiated between the universal quantifier and existential quantifier. As they get to differentiate between the two, we then start by recalling the parts, constructing universal and particular propositions, then representing them into symbols. This is usually a step by step process of selecting and eliminating solutions done on the board by the students.”</i> (Jane)</p>
	<p data-bbox="371 1037 1394 1406"><i>“We had to emphasize that dialectical materialism has to do with modes of production, conflict and social relation. These 3 elements are interacting such that the people use the factor of production and interact to satisfy their needs, but when a new need arise there is a new mode of production that could later give rise to a new super structure. From this, we concluded that human society evolves thanks to the evolution which is class struggle.”</i> (Helen)</p>
	<p data-bbox="371 1429 1394 1686"><i>“To solve the problem of HIV, I asked them first how the virus could be contracted and later on same of the ways of prevention,. From the multiple responses gotten, such as abstinence, faithfulness, use of condom and others. We selected the most applicable ones that could really help in preventing the virus.”</i> (Gael)</p>
	<p data-bbox="371 1709 1394 2011"><i>“I asked them the various reasons why people commit abortion. When they gave their reasons, we had to also look at the views of the pro and anti-abortionists. These views were later compared with those of the students. Each view and argument was analyzed critically and reasonable ones selected. Finally we took sides with the antiabortionists who think that abortion is a morally condemned act.”</i> (Frida)</p>

Generating potential solutions involves techniques such as brainstorming and the nominal group technique that are used to generate alternatives and select strategies, during which participation of all is encouraged. Since different problems require different strategies for their solution, success in problem-solving demands a repertoire of strategies as Sartre stipulates. The activity of generating solution requires both experiences in knowing various strategies as well as knowing which to select. To this effect, Gael says: “we went ahead to state the ways through which HIV could be contracted and general or some of the ways of prevention.” Frida also declares: “I asked them the various reasons why people commit abortion.” It necessary we look at the different strategies that could be used to advocate women rights (...). (Ida). Four teachers (F. J. H. I.) went by selecting strategies except Jane who was doing differentiation as she says: “Since we had to go by elementary quantification, I ensure that they identified and differentiated between the universal quantifier and existential quantifier.”

After generating alternatives, teachers must consider how to select the best solutions by operationalizing solution steps. Teachers should consider the positive and negative solution of each alternative. The ability to implement the solutions must be considered. Once a set of solutions have been developed, teachers should develop ways of evaluating the benefits and costs of alternatives and focus should be on analyzing alternatives to aid selection. This often leads to final solution containing elements of multiple alternatives. Ida asserts: “from the list of proposed solutions, each was critically analyzed in order to get those that were more appealing.” Then, “As they get to differentiate between the two, we then start by recalling the parts, constructing universal and particular propositions, then representing them into symbols. This is usually a step by step process.” (Jane). All five teachers (H., G., and F.) did operationalize their solution.

It also involves validating the best solution. Gael shares this idea: “after the students cited the ways of contraction and prevention of HIV/AIDS, we went further to select the best workable solution from all those listed. This was gradually done through the process of elimination (...). Frida as well concludes: “Finally we took sides with the antiabortionists who think that abortion is a morally condemned act.” Validating the best solution was evident in all five teachers when Jane affirms: “This is usually a step by step process of selecting and eliminating solutions done on the board by the students till we get to the best.”

Table 11: Interview results: Evaluation

Theme	Verbatim
<p style="text-align: center;">3</p> <p>Evaluation (Checking)</p>	<p><i>“I just gave them a short problematic which focused on the topic of the day and asked them to reflect on... To make sure they see the reality of women’s rights, mention was made of the United Nations Declaration on the elimination of violence against women. This document was adopted on 20th December 1993... After we read some of the laws, I gave them home work on the lesson for the next class to bring back their reactions.”(Ida)</i></p>
	<p><i>“This is usually a task for me but what I do is simply ask them to recall all what we have been doing throughout the lesson. If they happen to recall all what we have been doing, then i consider that the objectives were attained (...). The essence for me was that the students could understand and differentiate between the universal and existential quantifier, be able to represent propositions in symbols. At this level, I am satisfied because it is usually difficult to contextualize symbolic logic.” (Jane)</i></p>
	<p><i>“Finally, I make the students understand that history is a continuous process that evolves with time. And so with time, if the poor fight, they will one day own land and property like the rich (...). To know that my objectives have been attained, I ask them what they will do in a capitalist system of government where the rich grow richer while the poor grow poorer.” (Helen)</i></p>
	<p><i>“To end my lesson, I asked them to recall the problem statement or problematic (...). We did a recall, also, of the methods of prevention and then the moral implications proper (...). Not quite, we did not really take time to look at the applicability of the content in context, this was due to time constraint, and we just outlined the moral implications by taking down notes.” (Gael)</i></p>
	<p><i>The students were surprised, some were showing satisfaction and confidence after reasoning with the pro-abortionist that abortion is unjustifiable despite whatever reason. This is because the Cameroon penal code of 337 condemns it to be criminal...</i></p>

<p><i>Contextualizing was easy to be done, I simply asked them to talk individually what they will do if they happened to realize they were pregnant. This question was addressed to boys as well as girls.</i></p> <p>(Frida)</p>

During evaluation, it is necessary to do a recall of the problem and solution attained before checking the generalizability of the solution. This is because it would be impossible to reinvent solutions to every problem that develops without recourse to past knowledge. This recourse to past knowledge is evidence, in itself, that one must not completely construct reality from nothing. Ida proposes: “I just gave them a short problematic which focused on the topic for the day and asked them to reflect on (...). Gael in this same light proposes: “To end my lesson, I asked them to recall the problem statement or problematic (...).” The other three (J., H. and F.) rather were doing a summary of the lesson without recalling the problem. Jane affirms: “This is usually a task for me but what I do is simply ask them to recall all what we have been doing throughout the lesson and we do a summary.”

The teacher has to ensure that he and his students check the workability of the solution. This will permit the students to follow the lesson better and attain the said objectives. Frida asserted:

After definition of abortion and analyzing the pro and anti-abortionists views and those of students, we concluded that abortion is morally condemned as postulated by the anti-abortionists and the Cameroon criminal code.” “Also, the students understand that history is a continuous process that evolves with time. And so with time, if the poor fight, they will one day own land and property like the rich (...)

The others like (I., G., and J.), because of the belief that problem-solving is a constraint or rush attitude, rather did a summary and home work. It’s evident when Ida declares: “After the recall, we read some of the laws together, I gave them home work on the lesson for the next class to, bring back their reactions”.

Evaluation also involves, the learner forming an abstract principle or concept from concrete problems. The student is expected to attempt to apply that conceptual knowledge to a new, never before experienced problem or situation. Teachers should note that teaching how to conceptualize accounts for generality or transfer to new situations. Frida confirms:

At the end of the lesson, I had to ask them after studying the arguments, theories, moral implication of abortion and knowing fully well that it is condemned by the Cameroon penal code of section 337, what will each of them do if they discovered they were pregnant after being raped?

In this same light, Helen says: “To know that my objectives have been attained, I ask them what they will do in a capitalist system of government where the rich grow richer while the poor grow poorer.” Other teachers (J., I., G.) due to their beliefs that problem-solving is time consuming, difficult to apply and given that they have to rush to cover the program, rather adopted the traditional teaching method of dictating notes. Gael affirms: “we didn’t really take time to look at the applicability of the content in context. This was due to time constraint, and we just outlined the moral implications by taking down notes.”

Theme 4: Professional Development of Philosophy Teachers

Professional development has as indicators content substantive knowledge, content syntactic knowledge and believes and motivation.

Content substantive knowledge refers to the factual information, organizing principles, central concepts and propositions that characterize the discipline. In other words, the teacher should have concrete and interdisciplinary knowledge of facts and should be able to prompt, assists students to recall the facts they already know about the problem. Ida affirms: “the lesson started with a recall of the past lesson and a little summary of it all. From revision of past lesson, I introduced them to the new topic of the day.” Gael adds, “I asked them to recall what we did in our last lesson and to give brief discussions on all what we saw.” The teacher also has to have knowledge to call on the learners to establish a link between what they already know about the problem and what they have to learn during problem-solving. Frida affirms: “I started by asking them what they will do if they happen to get pregnant till the point when one of them suggested an abortion, then I notified them it was the topic of the day.”

Content syntactic knowledge of philosophy refers to knowledge of the ways in which new knowledge is brought into the field or the central role that enquiry plays in the learning process. This process has to do with metacognition and so the teacher should possess knowledge of scaffolding or involving learners in group discussion to make students active learners during problem-solving. Frida proposes: “in order to solve the problem of abortion

which is rampant in our society, the students needed to give reasons and justify why people commit abortion, after which we looked at the views of the pro and anti-abortionist, I asked them their position and justifications.” Ida affirms: “as students do not understand, we use the technic of questioning to make it simpler.” Gael uses a different technic in doing this. She affirms: “when they don’t understand we call others to explain to them better or I go closer to them.” Frida and Helen adopt another way when they assert: “I flatter them by calling them per names like ‘dear’, ‘baby’ and wake them up when they are sleeping.”

Finally, teachers’ beliefs and motivating attitudes refer to the capacity of the teacher to be sure to keep the learners in an active trend from the identification of problem to getting the solution and contextualizing the solution. He has to have the knowledge of making learners to persevere throughout the learning process. Ida says: “the children were really excited and interested and considering the fact that most of them had much knowledge and experiences to share on the rights of women.” Gael adds, “The child must love whatever is going on in order to get fully involved. This explains why the teachers must have the ability to make his lessons dramatic and animating.” Also, Frida affirms: “to get the students involved, I motivate them by bringing the learner to seek interest in learning, sometimes I use authority, gifts or small encouragements to get them involved”. While some do intrinsic motivations, others (H., and J.) rather do extrinsic motivations which only have a short term effect on the learner as Helen affirms: “I motivate them by giving them money, promising some marks or giving them food during break.”

4.4. Summary of Interview Analysis

During the analysis of the five different interview write-ups of the teachers, we distinguished three principal steps that the teachers followed during their teaching. These are: the identification of problem, generating potential solutions and evaluation. We identified common elements in their write-ups which permits us to note the different steps they exercised during their teaching.

4.4.1. Theme 1: Identification of the Problem

Checking Previous Knowledge

Three teachers, (G. J and I) follow the classical method of moving from the revision of the past lesson to the announcing the new topic of the day. Ida affirms: “From revision of past lesson, I announced the new topic of the day.” Two others (F and H) actually do the

recall by starting from what the learners already know on the topical issue to discover what they are to do. Frida says: “I later asked what they will do if they discovered they got pregnant as students, till the point where someone suggested an” abortion.”

Stating the Problem

Two teachers, (J and H) go by the classical way of writing just the topic on the board without bringing out the actual problem or problematic in the topic. Jane declares: “After the correction of assignment, I then announced and put the topic of the day.” The other three really do problematize the topic as Frida says: “then I notified them the topic and issue at stake which was to determine if abortion is morally justifiable.”

Contextualizing the Problem

One teacher, (I) actually helps to bridge the gap and make the students to understand the problem contextually when she says: “I asked the students some of the rights of women that are violated and if these violated rights are justifiable.” Four others (F. H. J and G) rather focus on definition, types and characteristics and relationships rather than contextualizing as Frida “I later asked them the definition, the types of abortion, and reasons why people commit abortion.”

Rephrasing the Problem

One teacher (I) bridges the gap by making students to understand the problem clearly when she says: “the issue at stake was to find out if there is any need to advocate for the rights of women.” Four others (F. H. J. G.) rather go by looking at the definition and characteristics as Gael declares: “I then asked them to define it and provide some of the means of contraction.”

Looking at theme one, concerning the identification of problem, the following indicators caught our attention: (A2) on stating the problem, (A3) on contextualizing the problem and (A4) on rephrasing the problem. This is because teachers did not do what was expected during the stages. This means that these indicators did not really determine their professional development.

4.4.2. Theme 2: Generating Potential Solutions

Selection of Multiple Strategies

Four teachers, (G. F. H. I.) went by the selection of strategy as Gael says: “we went ahead to state the ways through which HIV could be contracted and general or some of the ways of prevention.” Except teacher (J) who went straight to searching solutions.

Operationalize Solution Steps

All five teachers did actually operationalize the solution steps of the problems. This is evident when Jane stipulates: “As they get to differentiate between the two, we then start by recalling the parts, constructing universal and particular propositions, then representing them into symbols. This is usually a step by step process.”

Validate the Best Solution

All the teachers again actually validated the solutions as Jane affirms: “This is usually a step by step process of selecting and eliminating solutions done on the board by the students till we get to the best.”

Looking at the second stage on generating potential solutions, indicator (B1) on selection of strategy caught our attention because teacher J does not go about this. However the other stages and others do have all the stages correctly done.

4.4.3. Theme 3: Evaluation

Recall of the Problem

Two teachers, (I and G) did a recall of the problem when Gael stipulates: “I asked them to recall the problem statement (...).” The other three (J., H., F.) rather are doing a summary of the lesson without recalling the problem though it was still a good thing. Jane affirms: “I ask them to recall all what we have been doing throughout the lesson (...)”

Checking Workability of Solution

Three of the teachers checked the workability of the solution when Frida asserts: “after definition of abortion (...) we concluded that abortion is morally condemned.” (Helen). Three others (I. and G.) do a summary and home work as Ida declares: “After the recall (...) I gave them home work on the lesson for the next class (...)”

Contextualization of Solution

Two teachers, (F. H) do contextualize their lessons as Helen says: “I ask them what they will do in a capitalist system of government where the rich grow richer while the poor grow poorer.” Other teachers (J., I., and G.) adopt the traditional teaching method of dictating notes. Gael affirms: “we didn’t really take time to look at the applicability of the content in context; this was due to time constraint (...)”

Looking at the final step which is evaluation, all the indicators are to be looked into: (C1) and (C3). The indicator (C1) on recalling the problem indicates that only two teachers carry this function as propounded by the pragmatic theory. The indicator (C3) on contextualizing solution is not frequent with the teachers as most of them don’t do it.

In the next chapter, we are going to make sense and give direction to the results or data that have been presented above.

CHAPTER FIVE

INTERPRETATION OF RESULTS AND RECOMMENDATION

5.0. Introduction

After having presented and discussed the results in the precedent chapter, we are going to make sense and give a direction to the discussion by referring to the theoretical framework that guided us in choosing our research hypothesis. This chapter is out to answer the question whether our assertions can be validated by the empirical data. That is, whether our affirmation that PSM has an influence on professional development is validated by empirical data. To this effect, this chapter has five sections: a recall of the empirical, theoretical data and the interpretation of results, limitation, recommendation, practical implication and suggestions for further research.

5.1. Recall of Theoretical and Empirical Data

5.1.1. Recall of Empirical Data

As regards the analysis of the data collected from the field, these main points are evident:

The problem-solving model makes reference to an assemblage of the different phases of a lesson that identifies the teacher as professionally developed when he is armed to help students realize the objectives of the lesson. This goes through the following stages: revision, discovery and understanding of a concrete problem which requires the teacher to present an image or a didactic support to students, analysis which has to do with teachers and students seeking solutions to the problem and its workability, synthesis which deals with a recapitulation of the analysis in order to take a stance or gain retention and finally evaluation which makes reference to the notion of the day at the end of the lesson whereby the students need the knowledge to apply back home.

Problem identification implies that the teacher has knowledge of the problem and should be able to lead students see that a problem exists, carefully read it in order to understand it and make meaning of it. He should be able to lead students to view the problem in a given context. All these are aimed at familiarizing the student with a given problem. All

these he does successfully if he masters the content and concepts, scaffolds learners, promotes group work that will permit them better understand the problem.

Generating potential solutions has to do with searching the different strategies that apply to given problems, use creativity and other structured techniques to generate alternative solutions to problems. Since different problems require different strategies for their solution, success in problem-solving demands a repertoire of strategies or game plans. The professionally developed teacher, to do so successfully, should possess the aptitude of scaffolding, motivating and making learners believe they will attain the best solution.

Evaluation is done at the end of the lesson. It corresponds to the final stage of the lesson. Consequently, it permits the teacher to verify if his objective has been attained. The students must be actively involved in this stage in order to retain the concept or principle, if not it will be difficult for them to apply what was learnt. The professionally developed teacher should have the aptitude of interdisciplinary and philosophical knowledge to better direct students' mind.

5.1.2. Recall of Theoretical Data

Looking at the theoretical framework that we constructed, pragmatism was a point of concern. Pragmatism maintains the relation between thought and action (thinking and doing) as propounded by Dewey's pragmatic model (1910) and Nkrumah who concluded that thinking must have a direct impact on our daily life. The pragmatists think that this knowledge that is used in solving problems must be constructed by the learners. According to Dewey, a problem-solving model is a necessary tool for professional development of secondary school philosophy teachers. Consequently, a teacher who is professionally developed masters the problem-solving model. This model guarantees mastery and success in their teaching as it helps them to put in place some proper roles and attitudes in teaching. When this model is applied in training teachers, they develop professionally and will be able to teach by problem-solving, develop the capacity of identifying a problem, master strategies to solve problems and establish a link between many situations.

When the teacher is professionally developed, he has to be aware that the students will later transform the acquired knowledge and skills. It is during this process of problem-solving that transfer is manifested, this is because the student becomes more conscious thanks to the identification of the actual problem (it guides the learners from a given domain as stipulated

by the objectives, which is from the problem stage to the evaluation stage with the help of the teacher who masters the content and concepts, scaffolds students and motivates them). This is to say that the problem guides the learners to the right track. To Dewey, this identified problem should be contextual to make more meaning to the learners. This is possible if reflective thought is involved in transforming a practical situation and when the mind is an instrument that reconciles the individual and his environment (Dewey cited in Stumpf and Fieser, 2003). Again, such meaningful problems should be well understood by learners with the help of the teacher who helps them to rephrase or redefine it by motivating or scaffolding learners.

Teachers during the problem-solving process need to develop a self-critical attitude and help learners adopt different strategies in solving problems by motivating the learners to persevere in seeking solutions and believing that a solution will be workable. That is the reason why Pierce thinks that “during teaching, a conclusion must be subjected to different tests so that where necessary, adjustments are made to fit new evidences to suit new insights” (Pierce, cited in Achingale 2013, p. 90). Professionally developed teachers should emphasize on the utility of the best strategies during problem-solving that suit a given situation and organize activities and experiences that are useful to the present needs of the learners’ problem and that meet the future expectations of adult life (Petrou, 2007). In this process, Pierce says the workability of the solution relies on the fact that “the hypothesis which works is the one that is true”. The truth, the meaning of concepts and workability of solution are derived from the effects and results portrayed in action. Consequently, every valid thought must then end in an action. This model has three different stages. They are: the identification and definition of the problem, generating and validating potential solutions and evaluation.

5.2. Interpretation of Results

The interpretation of results has to do with the results of the study following the order of the research hypothesis. Dewey’s Problem-Solving Model indicates that the model is pertinent in understanding the professional development problems of secondary school philosophy teachers. This model is based on the fact that the teacher who is professionally developed is the one who is capable of exercising all the problem-solving steps notably; define the problem, analyze the problem, determine criteria for optimal solution, propose solutions and evaluate.

5.2.1. Problem Identification and Definition as a Determinant for the Professional Development of Secondary School Philosophy Teachers

According to Dewey's pragmatism, this has to do with a teacher who is in a position of inciting and motivating learners to come up with an idea from what they already know to the unknown. This implies that students must already have some knowledge of the problem. How can one solve a problem without first knowing what the problem is? That is why Dewey (cited in Stumpf and Fieser, 2002, p. 407) says; to deal effectively with problems I do not need to draw on elaborate value theories but rather should be drawing on past experience and experiment. After this stage of background knowledge, the teacher brings out the problem statement (Dewey cited in Stumpf and Fieser, 2003). The problem statement should clearly bring out the nuance of the topic because it helps in reaching a solution. To be able to have students understand the problem, the teacher should show professional development through a mastery of philosophical and interdisciplinary concepts. This problem situation should be contextual as the teacher proposes to the student a significant task that is evident out of class. To this effect, he has to ensure that the students have well understood the task. If not, he has to help them understand by bringing out the constraints and directing their metacognition to get the problem explicitly. He does this through questioning till the point where they grasp the meaning and be armed to start to execute the task. The problem should be rephrased to clarify all misconceptions and misunderstandings and the teacher does this by scaffolding and motivating learners.

From the examination of the observation of data from the field, it appears that this problem identification is carried out by teachers in the field in divergent ways while others do not master how to go about it. Two teachers failed checking for the background knowledge in three lessons while three others failed in two lessons because most of them go by the classical way of revision of past knowledge only. From revision of past lesson, instead of bringing out the issue at stake they rather announce or put up the topic on the board in the name of stating the problem. Such is the case of Ella who asks: "can someone remind us of what we saw last class (...) very good, today we will look at the truth table." Gael adds: Checking for previous knowledge was not done in twelve of the twenty five lessons while stating the problem failed to be effected in thirteen lessons which leave much to be desired.

The interviews present a similar picture and leave much to be desired as well because we observe that this procedure is not applied by all teachers investigated given that they

follow different procedures. Of the five teachers, three of them proposed the classical method; revising instead of bringing out clearly the actual problem in the topic as Ida affirms: “From revision of past lesson, I introduced them to the new topic of the day which is women’s rights (...)”. Jane also declares: “After the correction of assignment; I then announced and put the topic of the day on the board.” Only two others actually checked for previous knowledge. Frida says: “I later asked what they will do if they discovered they got pregnant as students, till the point where someone suggested an” abortion, then I notified them the topic and issue at stake which was to determine if abortion is morally justifiable.”

Problem identification has to do also with the teacher being able to contextualize the problem so that it gives the learners a real picture of the task to be carried out. From the observations carried out, this was the least activity carried out by the teachers though it’s a very important activity. Out of the twenty five lessons, it was carried out just in eleven lessons which leave much to be desired. This is evident when Ella says:

What is the use of truth tables? (...) anyway, let’s not waste time on that, science students will see the use of truth tables as they progress. Now, we are going to see how to construct a basic truth table. We said earlier that a basic truth table has how many columns?

Few teachers actually carried out this function of contextualization because most of them don’t take that into consideration and some complain and believe that it is difficult to contextualize some problems especially in logic. Others rush to cover their lessons planned for the day while others do not really master the content. Four of the five teachers each failed to contextualize the problem in three of their lessons.

This is evident again in the interviews as only one teacher out of the five actually helps to bridge the gap and make the students to understand the problem contextually as Ida stipulates: “I asked the students some of the rights of women that are violated and if these violated rights are justifiable.” Four others rather go by looking at the definition and characteristics as Gael declares: “I then asked them to define it and provide some of the means of contraction.” Frida adds: “I later asked them the definition, the types of abortion, and reasons why people commit abortion.”

As regards the redefinition of the problem, from the observations, this was the most carried out activity by the teachers with a frequency of fourteen times at 9.33%. To this effect,

Bella posits: “I said earlier that today we will look at faith and reason. Can faith and reason complement each other? Or is reason actually the only source of reason? Look at these two questions and tell me if they have the same meaning (...) in the real sense, what do we mean by faith and reason?” Bella, Carol, Dan and Ella omit this function in three of their lessons, while Anna fails to do so in three of her lessons as she goes to defining the term in the name of redefining the problem. She says: ““open your textbooks books let’s read the definition together (...) after reading and identifying the 3 types of proposition and 3 terms, we are going to establish a link between these.”

From the interviews four teachers fail to redefine the problem and this gives a contrary view to that obtained from observations. This is a little contrary to the results obtained from observation where, in all, the teachers attempt rephrasing the problem in at least two lessons. Most of them rather go by looking at the definition and characteristics of the problem as Gael declares: “I then asked them to define it and provide some of the means of contraction.” Helen adds:

After they understood what it was, I then introduced them to the new topic and we all took time to differentiate between the two terms: dialectical and historical materialism. Later we looked at the modes of production the super structure of the sub-structure. **indent**

It appears therefore that the Problem-solving Model through problem identification is an activity that is evident in philosophy teachers’ professional development through checking for previous knowledge as teachers’ acts conform to Kant’s constructivism and pragmatism that students use prior knowledge or daily experience to construct meaning. Rephrasing the problem also determines the professional development of teachers. But from the interview results, rephrasing is not eminent in most teachers. This is because when interviewed, some of them were not aware of what they actually did during their lessons and so professionally, they don’t know what it entails or because they are in a rush, to finish their lessons. This practice of theirs does not conform with the gestalt and pragmatic theory that ideas must be easy and clear in order to direct learning to a goal that is easier to solve.

We also discover that most philosophy teachers at the beginning of the lesson present a topic at the beginning of a lesson instead of a problem situation as stated by the pragmatists that a well-defined problem makes more meaning. Meanwhile, a study analyzing the effects of teaching approach across all learning styles; concrete learners, abstract learners, and field-

neutral (somewhere between concrete and abstract) learners showed that field-neutral learners "scored significantly higher on achievement tests when taught in classes using the problem-solving approach" (Dyer & Osborne 1996). This approach was superior, however, only when relevant and meaningful problems posed the right way were introduced. Consequently, when teachers fail to present real problem statements to learners, learning will not be significant.

Again, most philosophy teachers do not present contextual problems to learners that could incite and motivate learners to be interested and follow the lesson better. Thus they do not go by the pragmatic paradigm that real authentic problems, and not fictitious problems, should be used in a simulated real-world environment. In a study on how teachers could organize their lessons on a problem-solving basis, Dyer & Osborne (1996) found that students classified as concrete learners significantly increased their scores when taught using a problem-solving rather than subject-matter approach, while abstract learners decreased in scores. This makes us to conclude that problem identification influences the professional development of secondary school philosophy teachers but for some aspects that needs to be taken into consideration by the teachers.

5.2.2. Generating Alternatives and Selecting a Solution as Determinant of Professional Development of Secondary School Philosophy Teachers

The issue here is for the teacher to be able to help the students in finding solutions. Finding an alternative solution depends on developing high quality alternatives (Zander, 1994). To Dewey (cited Stumpf and Fieser, 2002, p. 407), we cannot determine a near formula to determine a solution and what the best means might be for determining an end." Teachers who are professionally developed should help students use techniques such as brainstorming and the nominal group techniques to generate alternatives and select strategies during which participation of all is encouraged, scaffolding, perseverance and motivation. Since different problems require different strategies for their solution, success in problem-solving demands a repertoire of strategies and knowledge and skills from the teacher who must master the concepts and strategies if he is professionally developed. From the strategies selected, the teacher goes step by step working out the solution in order to select best solutions. To Dewey (cited in Stumpf and Fieser, 2002, p. 405), to get the best solution is to ask: "does it end in conclusions which when referred back to ordinary life-experiences and their predicaments render them more significant (...) and more fruitful?" Any good solution to him meets three criteria: its content should be significant in life experiences, the solution

should have an adjustment between the individual people and our environment and it should be a process that fosters group harmony.

Looking at the results from field observation, this function scores the highest frequency and percentage of 43.34% and is omitted by three teachers in only one lesson each. It is evident that all five teachers are professionally developed as they go by selecting strategies, operationalizing solution steps and validating the solutions in all their five lessons. Dan for example carries out all three functions in all his five lessons. He says:

Having known the two elementary quantifiers, we are going to see how we can represent statements and test their validity. The rule is that we refer to the universal quantifier by reading off the predicate term. I need two volunteers to move to the board and represent the statement “all students are monkeys” where Sx =students, Mx =monkeys (...). Ok, let’s see what Mary and John have and which of them is correct (...). Ok then, John is correct. Meanwhile we remember that an existential quantifier is valid only when true. Is the statement valid or not and why? (...). Good it is valid also because it conforms to the mind and intellect and it is invalid when it doesn’t conform to the mind.

Ella also does these three stages successfully in four out of her five lessons. She stipulates:

Now, we are going to see how to construct a basic truth table. We said earlier that a basic truth table has how many columns and how many variables? We need a volunteer to represent that on the board in a table. (...) We need a volunteer to use the table on the board to come up with other truth tables. (...) look on the board and tell me how we can derive a conjunction, disjunction.(...)“good, from what we can all see from the board, all three students have the correct truth table and they have all identified how from it, we can derive a conjunction.

The interview results confirm this as all five teachers follow the three procedures in their lessons except for Dan who fails to do so in one of his lessons. Gael effectively carries out this function when she says:

To solve the problem of HIV, I asked them first how the virus could be contracted and later on some of the ways of prevention. From the multiple responses gotten, such as abstinence, faithfulness, use of condom and others, we selected the most applicable ones that could really help preventing the virus.

Jane also executes this function as she stipulates:

Since we had to go by elementary quantification, I ensure that they identify and differentiate between the universal quantifier and existential quantifier. As they get to differentiate between the two, we then start by recalling the parts, constructing universal and particular proposition, then representing them in to symbols. This is usually a step by step process of selecting and eliminating solutions done on the board by the students.

From the above, since most teachers carry out this function, it scores the highest percentage. This is because in selecting strategies during problem-solving, they act in conformity with the pragmatist and Sartrean view that there is ‘no philosophy, there are philosophies’ (Sartre cited in Mebanda et al, 2008: 39). This means that because there are different problems, there should be different solutions and there are multiple ways teachers and learners can solve problems. The teachers and learners go by the use of “Sufficient Reason to select the best solution” depending on the practical consequences they have on them (Nkrumah 1964: 7). We can conclude by saying that generating potential solutions influence, significantly, the professional development of secondary school philosophy teachers.

5.2.3. Evaluation as a Factor of the Professional Development of Secondary School Philosophy Teachers

According to Peikoff (1993), the knowledge base enables the cognitive function of problem-solving and the application of conceptual knowledge for transfer to occur. This is the reason why it is necessary for the teacher to do a recall of the problem and solution attained before checking the generalizability of the solution. The students need to have the requisite knowledge that will permit them implement and verify solutions and the teacher needs to guide, scaffold and motivate them towards the solution. This is because it is not useful to agree on a solution that cannot be implemented. Philosophy teachers should note that effective instruction integrates both the concrete and abstract but in a specific sequence. First,

new learning requires specific real problems and from these concrete problems, the learner forms an abstract principle or concept. Finally, the student then attempts to apply that conceptual knowledge to a new, never before experienced problem (Peikoff, 1993). From the view of Peikoff, it is glaring that evaluation in problem-solving is the application of concepts or transfer.

In the role of the recall of the problematic, the teachers observed do not proceed the normative way as out of the twenty five lessons, recall is carried out only in eleven lessons. This is so because one teacher fails to do a recall in four of his lessons while two others fail to do so in three lessons as is the case with Ella who ends her lessons prematurely by omitting this step. She says: “good, from what we can all see from the board, all three students have the correct truth table and they have all identified how from it, we can derive a conjunction”. She concludes by saying that: “we will end here for today, as you go home, check on how to draw a truth table for compound statements.”

From the interviews, two teachers actually do a recall of the problem when Gael stipulates: “I asked them to recall the problem statement (...).” The other three rather do a summary of the lesson without recalling the problem. Jane affirms: “I ask them to recall all what we have been doing throughout the lesson (...).”

Checking workability of solution shows from the lessons observed that one teacher did not do so in one of his lessons while three others did not do so in two of their lessons each. Carol declares: “haven seen how to represent statement forms in to symbols, we will end there for today and continue in our next class. Hoping everybody can distinguish between universal and existential quantifiers and can translate them into symbols?”

As to the contextualization of solutions, this is the element with the lowest score as three of the five teachers observed failed to contextualize solutions in four of their lessons each and one other did not go by the norms in three of his lessons. Ella says:

looking at the example on the board, Paul concluded that the argument is valid since the conclusion follows from the premises and the quantifier can be read off from the predicate term”. “Now, when you get home, represent the following exercises and we will correct them tomorrow.

Those interviewed show some difference with those observed at the level of rephrasing the problem, as the majority (three) rather do a summary and give take-home work as Ida declares: “After the recall (...). I gave them home work on the lesson for the next class (...)” Three teachers of the five interviewed fail again as those observed to apply the norms and adopt the traditional teaching method of dictating notes. Gael affirms: “we didn’t really take time to look at the applicability of the content in context; this was due to time constraint (...)”

Evaluation influences the professional development of secondary school philosophy teachers as they really make an attempt in checking the workability of solutions as stipulated by Pierce’s pragmatism. However, while some of them do recalling and contextualizing the solutions, others hurry or omit this step and complain of time constraint when compared with the material they have to cover. These practices show that from the beliefs and attitudes of these teachers, they do not really give concrete and deep explanations to students. To this effect, they fail to conform to Nkrumah’s pragmatic criticism that: “practice without thought is blind; thought without practice is empty” (Nkrumah, 1964:78). This shows that, most philosophy teachers still practice the traditional method of teaching by encouraging thinking without practice.

Finally, from the interpretation of results, we can summarize by saying that, PSM influences the professional development of secondary school philosophy teachers. Identifying the problem influences their professional development but teachers need to pay particular attention on stating the problem, contextualizing and redefining the problem since some of them have inadequate mastery. On the other hand, generating potential solutions influences significantly their professional development as their practices conform to those of the pragmatists. Evaluation as well influences philosophy teachers’ professional development but for recalling and contextualizing solutions that needs more attention.

5.3. Limitations of the Study

This research did not go on smoothly as the researcher was faced with some difficulties in the course of carrying out the study such as: financial constraints, mobilising assistants and absence and area of study constraints.

5.3.1. Financial Constraints

The researcher had to motivate some persons in order to get the required information or statistics that was needed to build up this work and from some, it took a longer period to get the required information which in one way or the other contributed in slowing down this work.

5.3.2. Mobilising Assistants and Absence

To carry out the interviews at Government Bilingual High School Mendong was not easy for the researcher who had to convince the administration before permission was granted to carry out the research in the said institution. It was not always easy for the researcher to convince some teachers to stay in school after their lessons to be interviewed. Again, some teachers did not turn up during their teaching days, making the researcher call them and reschedule teaching and interview sessions another day.

5.3.3. Area of study constraints

This was actually to be carried out in the North West region where there are many philosophy teachers but due to the present crises in the region, we had to make a change of cite.

5.4. Recommendation

Throughout our research, the three stages of the problem-solving model that guide a teacher in a classroom situation notably, identification of the problem, generating potential solutions and evaluation have been evaluated to see if philosophy teachers are professionally developed in administering them. Here, it is worth noting that each of the stages has a link to the degree of professional development of teachers. Consequently, it is evident from the findings that these stages are not really valorized by most teachers. It shows that the non-valorization of these stages by secondary school philosophy teachers is evidence that their level of professional development in problem-solving is inadequate. To this effect, our recommendation will be directed to teachers, the government, inspectors, education stakeholders and curriculum developers.

-To Teachers:

Teachers should put in their best for the attainment of educational objectives by going in for personal research on the problem-solving approach which is at the basis of their curriculum regardless of the short term three days organized seminars. They should bear in mind that during teaching, there is need to place greater emphasis on the objectives, the problem or real concepts, reasoning, deduction, connections between thought and practice and higher order thinking in lessons (Stacey (2002, p. 122). Also, they should always make efforts to do personal research considering the fact that they complain that seminars or workshops for a good teacher is one that never stops learning.

To implement a problem-solving approach, teachers need to improve their interpersonal skills and group dynamics; they need to be able to adapt instructional strategies, resources, and activities to promote students' development of basic skills, thinking skills, and personal qualities (Crunkilton 1992; Flowers 1992). Those teaching especially logic need to rethink and revisit their classroom teaching methods to ensure that students like this subject and potential students of 790 Philosophy too start building up a positive attitude there from rather than dropping as has been the case for the past years.

They should note that true focus of all educational endeavors is the student learner. Problem-based learning models must reflect the changing external environment of the workplace and society and include curriculum that has been designed to correlate with that environment. Such activities encourage interdepartmental and interdisciplinary cultural milieus which create positive energies for the faculty, student, and community.

There are some principles that guide teachers (Savery & Duffy 1995) present a list of instructional principles that guide the practices of teaching and the design of learning environments, anchor all learning activities to a larger task or problem, support the learner in developing ownership for the overall problem or task, design an authentic task, in which the cognitive demands are consistent with the demands in the environment for which the learner is being prepared, design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning, design the learning environment to support and challenge the learner's thinking, encourage testing ideas against alternative views and alternative contexts; and provide opportunity for and support reflection on both the content learned and the learning process.

-To the government:

There is need to sensitize the public on the importance and nobility of the profession and to rethink the criteria for recruitment into the core. This is to help erase the idea of teaching being a “dumping ground” or “stepping stone”

-To inspectors:

Inspectors should endeavor to organize in-service training programs of longer duration and ensure that teachers are actively involved; not as passive listeners. During such seminars, they should organize debates and presentations that involve teachers by assigning compulsory tasks and problem based activities to them. Ackerman et al. (1997) suggest that problem-based activities be used to integrate technology into the instructional program. They suggest that these activities “provide the context for learning particular skills, use a team approach for reaching the best solution, and give a reason for using instructional technology.”

The different inspectors assigned to different schools have to make it clear to teachers that to implement a problem-solving approach, they need to improve their interpersonal skills and group dynamics; they need to be able to adapt instructional strategies, resources, and activities to promote students’ development of thinking skills, and personal qualities. Inspectors could try all these practices by regularly organizing sub seminars in their assigned schools with the few teachers concerned. Inspectors could group teachers of a particular locality to share ideas together. This should done making sure everyone is involved and producing reports after each session.

-To stakeholders and curriculum developers:

There is need to focus on the need that preparation programs at the elementary level of training need to incorporate a culture of reasoning. Teachers need to be instilled with the attitude that philosophy is all about reasoning and not rote memorisation. Problem-solving courses (especially the aspect of logic which teachers must encounter in the field) in the curriculum at elementary level are necessary to develop such attitudes.

The problem-solving approach to teaching has been used with success in many disciplines like medical, environmental, business and social sciences. Crucial to its success in improving student achievement is the use of problems that are relevant and meaningful to

students (Dyer and Osborne 1996). The student is the focus of teaching and so it is easier for them to transfer from familiar to unfamiliar situations of learning.

5.5. Practical Implications of the Study

5.5.1. Pedagogical Implications

Theoretically, this study situates the problem-solving model and its relationship to the professional development of secondary school philosophy teachers. Consequently, it indicates the axis that permits teachers to be professionally developed or competent in their profession.

The theoretical analysis of Dewey's pragmatism indicates that for teachers to practice transferability, they should benefit from this model or be trained using this model in order that students will benefit better from them. This supports the saying which goes that 'teachers teach the way they have been trained'. Teachers who do not benefit from this model and lack the skill will be classified as 'garbage in, garbage out'. The model includes problem identification, potential solution, evaluation and constant retroaction given to the learners during the execution of a task. During the execution of tasks at every stage, the teacher should be able to act on three axis; reflection, concept and action and the axis of resource or the environment. The reflective action permits the learner to carry out metacognition whose transfer is usually a daunting task. It is a difficult task because metacognition is learnt and directed and supposes the putting in place of this PSM through the stages of problem identification, generating potential solution and evaluation.

The analysis of results of this study shows that transfer is not really learnt by most learners because it is not a learning objective of most teachers or is poorly handled by some when they make an attempt. In effect, we notice that some of their objectives are not in line with Blooms taxonomy that promotes transfer: "know how", "know" as proposed by some of the respondents. Such a weakness was noticed with Ida who said: "at the end of the lesson, the students had to know the rights of women and instances of its violation." Morissete (2002, cited in Ndjebmi, 2016p, p. 95) assimilates that this type of objective does not have a long term transfer. This explains why most students after school can't practice what they had learnt in school. At the end of lessons, students should be capable of "doing" and not "knowing."

Le Boterf (2010 cited in Ndjebmi, 2016:95), indicates that the capacity of transfer results from a reflection of an expertise of contextualization than of learning from general methods of solving problems as Jane says during her lesson:

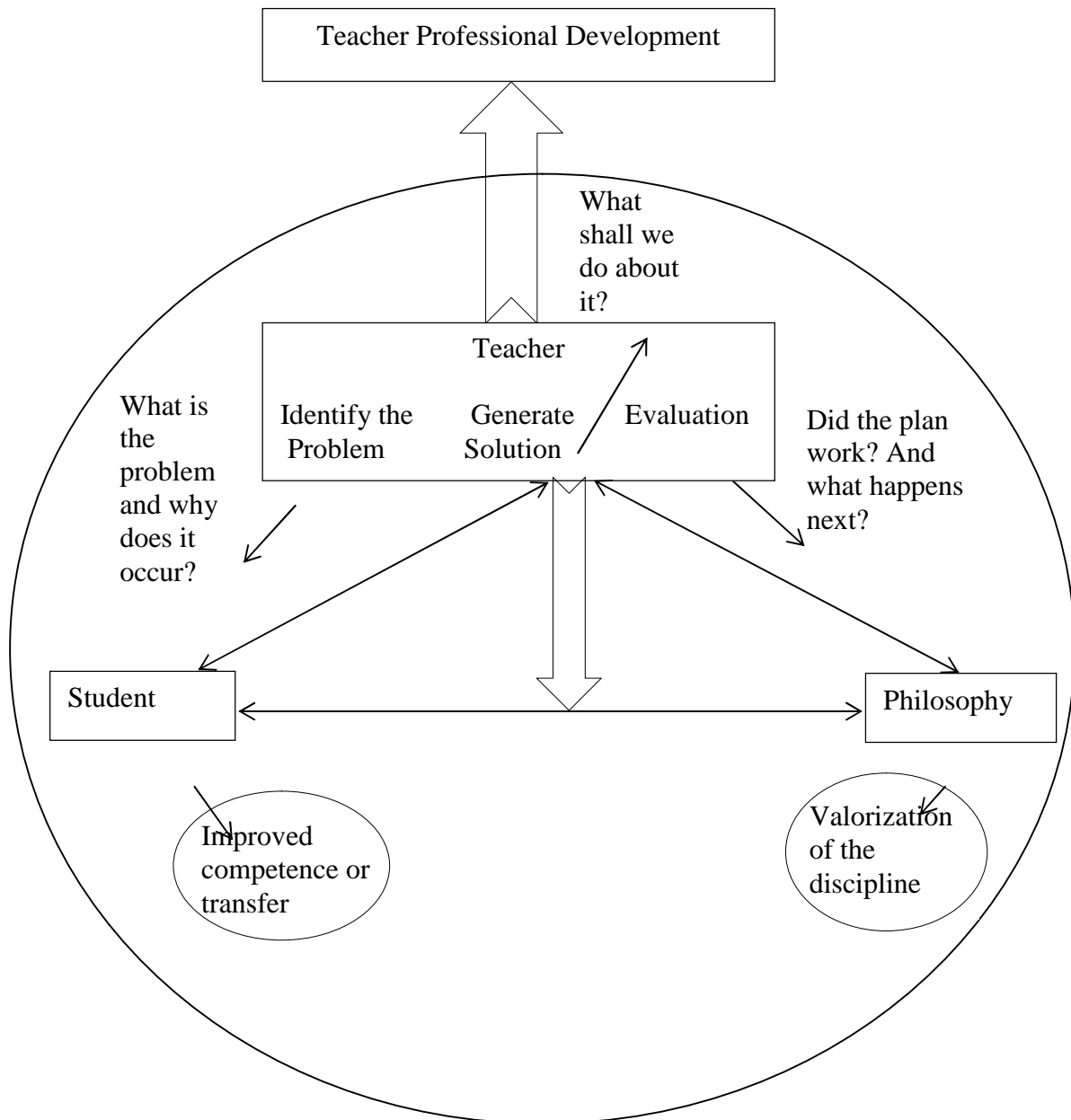
The lesson started with a recall of the past lesson, the notification of the topic (truth tables), the definition of truth tables and immediately the construction of truth tables by determining the number of variables required, exercises on the construction of truth tables, correction of exercises and finally take a home assignment (...). At this level I am satisfied because it is usually difficult to contextualize symbolic aspects that are treated in logic.

This description is sufficient to make us understand that this type of procedure of teaching is not favorable to direct efficient and conscious learning and transfer of learning. Stacey (2002, p. 122), recommends that in order to promote conscious transfer of learning, greater emphasis should be laid on real concepts, reasoning, deduction, connections between taught and practice and higher order thinking in lessons. This calls teachers to identify real contextual problems during lesson planning and avoid abstract concepts with little to offer to contemporary society.

5.5.2. Didactic Implication

The data analysis permitted us to notice that the teachers did not take note of some of the indicators that were adapted from the pragmatic model of Dewey. To this effect, we propose a model that secondary school philosophy teachers could follow in their practical activities in order to be professionally developed. Being professionally apt will mean helping students to develop critical minds and also to be able to transfer learning. This model is a combination of Sternberg's Problem-Solving Model (2003), and the didactic triangle (Bessala 2008, p. 129) that have been adapted by the author. Some principal guiding questions that could direct the practice of teachers and professional development programs in Cameroon on what they need to do at every stage have been added.

Figure 6: The Pragmatic Triadic model



The above model shows the relationship between the teacher, the student and the discipline of Philosophy. The three elements are interrelated as they are linked to each other (student-philosophy, philosophy-teacher and teacher and student). But the teacher is at the top level because he is a facilitator who helps students to establish their link content by giving those tasks. Helping them to accomplish their tasks means the teacher should have a mastery of the problem-solving skills. These include; identification of the problem, generating potential solutions and evaluation. When a teacher masters all these and applies them properly, the students will have improved competence and will be able to transfer knowledge learnt. The end result of a teacher who is professionally developed will be the production of

improved competency on the part of the students and the valorization of Philosophy on the other hand. When the students valorize the discipline, it builds them up as critical thinkers as they look at things from a holistic perspective when solving their problems. When a teacher is able to execute all these tasks, it renders him fit or professionally developed.

5.6. Suggestions for Further Research

This study investigated the relationship between the problem-solving model and the professional development of secondary school philosophy teachers of the English Sub-system in the Yaounde VI municipality. For further research, researchers can carry out investigations in the following light:

The elements that were poorly handled by the different cases during our analysis constituted great indicators such as the first indicator (A3) having to do with contextualization of the problem, the fourth indicator (C1) that has to do with recalling the problem and (C3) is based on searching the different domains on which what has been learnt will be applied.

It is on the basis of these indicators that we will propose that future research could be carried out.

Studies could be carried out on the impact of the problem-solving model on the professional growth of Philosophy teachers by the use of this model to train and carry out an experiment to evaluate if an impact was created.

Further studies should be carried out to investigate teacher competences and their attitudes towards the problem-solving approach in the teaching of philosophy and the causes of poor performance in public examinations in Cameroon.

Studies could also be carried out on the teacher's role in teaching through problem-solving in the classroom. This is what Solomon and Morocco (1999:234) termed "a diagnostic teacher."

GENERAL CONCLUSION

The objective of this work was to investigate how Problem-Solving Model influences the professional development of secondary school philosophy teachers. We noticed that some teachers do not carry on well with their teaching task during problem-solving lessons and this is an indication that they are not really professionally developed. Meanwhile in the paradigm of teaching, it is because the teacher teaches well that students learn well. With this perspective, we lay more emphasis on the process of teaching that accounts for their professional development. The knowledge that students gain from school should help them better fit in society and teachers are there to guide them to this knowledge. To this effect, to be professionally developed, it is imperative that teachers have a mastery of the problem-solving steps. From this emerges our research question: How does Problem-Solving Model influence the professional development of secondary school philosophy teachers? The response to this question is that Problem-Solving Model influences the professional development of secondary school philosophy teachers. We therefore operationalize our research question into three: -How does problem identification influence the professional development of secondary school philosophy teachers? How do generating potential solutions influence the professional development of secondary school philosophy teachers? How does evaluation influence the professional development of secondary philosophy teachers?

In chapter two, a conceptual, theoretical and empirical review was done focusing on the main variables of the study namely; problem identification (identification of the problem, generating potential solutions and evaluation) and professional development (content substantive knowledge, content syntactic knowledge, motivation and beliefs) and other related concepts. To have the answers to our research question, in chapter three, we carried out a semi-structured observation and interview on ten teachers in the Yaounde VI municipality. A non-probabilistic sampling technique was used to collect data while employing a calculation of frequencies and percentages for observation and a thematic analysis for interviews.

In chapter four, the results were presented, discussed and analyzed. This analysis permitted us to evaluate if secondary school philosophy teachers are professionally developed by showing a mastery of the model in their classroom practices. At the end, in chapter five, it appears glaring that Problem-Solving Model influences the professional development of

secondary school Philosophy teachers. The data obtained shows us that identification of the problem influences professional development of secondary school Philosophy teachers as they carry out checking for previous knowledge and rephrasing the problem though results from interview show contrary on rephrasing the problem. It seems those interviewed rush to the solution step without redefining the problem because they are rushing to cover the lesson planned for the day. Stating and contextualizing the problem, are inadequately carried out by philosophy teachers because most of them start their lessons by revision and then announcing the topic instead of bringing out the problem in the topic.

Secondly, looking at the relationship between generating potential solutions and professional development, it is noticed that most teachers put into practice what is expected of them. That is, they properly execute the steps of selection of strategies; operationalization solution and validation of solution as stipulated by the pragmatists. Thus we could say that generating potential solutions significantly influences professional development of secondary school philosophy teachers.

Thirdly, the problem-solving step that relates to professional development is evaluation. The evaluation process influences the professional development in that teachers do a recall of the problem, check workability of solution and contextualize the solution. But most of them did not aptly carry out a recall of the problem nor contextualize solutions. This makes them not conform to the pragmatic idea of applying concepts or solutions in the context in which they will be used. From the proposed pragmatic triadic model, we call on teachers to be more conscious in lesson preparation and teaching process, especially in the domains of contextualization and stating the problematic that gives more meaning to learning.

REFERENCES

Books

- Abel, R. (1972). *Man is the Measure: A central invitation to the problem of Philosophy*, New York: Free Press.
- Achingale, P. (2013). *Gateway to western philosophy*, Unpublished. Yaounde: Net Print.
- Amin, M.E. (2005). *Social science Research: Conception, Methodology and Analysis*. Uganda: Makerere University Printery.
- Bandura, A. (1986). *Social foundations of thought and actions: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bassey, M. (1999). *Case study research in educational settings*, Buckingham: Open University Press.
- Belinga Bessala, S. (2008). *Didactique et Professionnalisation des Enseignants*. Yaoundé: édition Clé.
- Biesta, G.J. & Burbules, N. (2003). *Pragmatism and educational research*. Lanham, MD: Rowman and Littlefield.
- Caine, G., Caine, R., & Crowell, S. (1999). *Mindshifts: A brain-compatible process for Professional development and the renewal of education*, Tucson, Arizona: Zephyr Press.
- Chia, N. V. (2005). *African Philosophy and the History of Western Philosophy*, (unpublished) Bamenda: Concept printers.
- Corcoran, T., McVay, S., & Riordan, K. (2003) *Getting it right: The MISE approach to professional development*. Philadelphia, PA: Consortium for Policy Research in Education
- CORD (1999). *Teaching science contextually*, Waco, Texas: CORD Communications, Inc.
- Driver, R., Rushworth, P., and Wood-Robinson, V. (1994). *Making sense on secondary sciences: making sense of children's ideas* (1st ed) Amazon: Routledge.
- Foshay, R., Kirkley, J. (1998). "Principles for Teaching Problem Solving." Retrieved from http://www.plato.com/pdf/04_principles.pdf
- Fraser, C. A. (2005). *Towards a Unified Model of Professional Development*, Aberdeen: University of Aberdeen.
- Gagne, R. M. (1985). *The Conditions of Learning and Theory of Instruction*, (4th ed.). New York: Holt, Rinehart and Winston.
- Gillham, B. (2000). *Case study research methods*, London: Continuum.
- Goodman, R. (Ed) (2005). *Pragmatism: Critical concepts in philosophy*. London: Routledge.

- Green, A.J.K. & Gillhooly, K. (2005). *Problem-solving*. In Braisby, N. and Gelatly, A. (Eds) *Cognitive Psychology*, Oxford University Press. Oxford.
- Grossman, P.L., Wilson, S.M., & Shulman, L.S. (1989). Teachers of substance: Subject matter knowledge for teaching. In M.C. Reynolds. *Knowledge base for beginning teacher* New York: Pergamon Press.
- Guskey, T. R. (2000). *Evaluating Professional Development*, Thousand Oaks, CA: Corwin Press.
- Hopkins, D. (2001). *Powerful learning and powerful teaching*, New York: Routledge.
- Joyce, B., & Showers, B. (2002). *Student achievement through staff development*, Alexandria, Virginia: Association for Supervision and Curriculum Development.
- Knight, J. & Cornett, J. (2009). *Studying the impact of instructional coaching*. Lawrence, KS: Kansas Coaching Project for the Center on Research on Learning.
- Lawhead, W. F. (2006). *The Philosophical Journey, An Interactive Approach*, (3rd ed) New York: McGraw-Hill
- Lester, F., & Charles, R. I. (2003). *Teaching mathematics through problem solving*, Reston, VA: National Council for Teachers of Mathematics.
- Lunenburg, F. C. (2011). *Educational Administration Concept Practices*, United States: Cengage Learning, Inc.
- Mayer, R. E., & Wittrock, R. C. (2006). Problem solving. In P. A. Alexander & P. H. Winne (Eds.) *A Model of Teacher Professional Development Based on the Principles of Lesson Study*. Brisbane: Queensland University of European Research in Mathematics Education, Larnaca, Cyprus.
- Mewborn, D. S. (2003). Teaching, teachers' knowledge, and their professional development. In J. Kilpatrick, W. G. Martin, & D. Schifter (Eds.), *A research companion to principles and standards for school mathematics* (pp. 45-52). Reston, VA: The National Council of Teachers of Mathematics.
- Nebada, H.N., Nsoe, M.N., and Komo, L.B. (2008). *La Philosophie, Tle A B C D E, Nouveau Programme*, Espagne : Le Presses de Graphic.
- Nkrumah, Kwame. (1964): *Consciencism: Philosophy and Ideology for Decolonization*, London: Heinemann.
- Ollinger M., Knoblich G. (2009). "Psychological research on insight problem-solving" in *Recasting Reality* (eds) Atmans. Pacher H., Primas H., editors Berlin-heidelberg: Springer.
- Ormrod, J. (1999). *Human learning* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Parsons, R.D., Harison, S. and Sardo-Brown, D. (2001). *Educational psychology: a practitioner researcher model of teaching*. Canada: Wadsworth.

- Peikoff, L. (1993). *Objectivism: The philosophy of Ayn Rand*. New York: Meridian.
- Petrou, M. (2007). *Teachers' mathematics content knowledge*. Retrieved from the http://ermeweb.free.fr/CERME%205/WG11/11_Petrou.pdf on 23 march 2013
- Robson, C. (1998). *Real world research: A resource for social scientists and practitioner-researchers*. USA: Blackwell.
- Rorty, R. (2004). *Pragmatism*. In *Routledge Encyclopedia of Philosophy*. London: Routledge.
- Rosamond, B. (2007). The political sciences of European integration: Disciplinary history and EU studies. In K. E. Jørgensen, M. A. Pollack & B. Rosamond (Eds.). *The SAGE Handbook of European Union politics*. London: Sage.
- Scheffler, I. (1999). "Epistemology of education." In R. McCormick, & C. Paechter, C. (eds). *Learning and knowledge*. London: Paul Chapman publishing.
- Schoenfeld, A.H. (1992). Learning to think mathematically: Problem solving, metacognition, and sense making in mathematics. In Grouws, D. (Ed.) *Handbook of research on mathematics teaching and learning* (pp. 334–370). New York: MacMillan.
- Singh, Y. K. (2007). *Philosophical foundation of education*, New Delhi: A P H Publishing.
- Skovsmose, O. (2008). *Travelling through education: Uncertainty, Mathematics Responsibility*. Rotterdam: Sense Publishers.
- Solomon, M.Z., Morocco, C.C. (1999). *The diagnostic teacher: Constructing new approaches to professional development*. New York: Teachers College Press.
- Stacy, K. (2003). *The need to increase attention to mathematical reasoning*. In H. Hollingsworth, J. Lokan & B. mcCrave (Eds.) *teaching mathematics in Australia*. Camberwell: ACER.
- Stumpf, S.E. and Fieser, J. (2003). *Philosophy, History and Problems*, (6th ed). New York: McGraw-Hill.
- Timperley, H. et al. 2007. *Teacher Professional Learning and Development: Best Evidence Synthesis Iteration [BES]*. Wellington, New Zealand: Ministry of Education. Available at <www.educationcounts.govt.nz/goto/BES>.
- Wertheimer, M., (1959), *Productive thinking*, New York: Harper and Brothers.
- Zimmeman, B. J. (2000). "Attaining self-regulation: A social cognitive perspective." In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds), *Handbook of self-regulation* (pp. 245-262), San Diego, CA: Academic Press.

Reviews

- Amougui, S.-P. (1999). Améliorer l'enseignement au lycée technique [Improving teaching in technical high schools], *Diotime-L'Agorà*, 4.
- Bolhuis, S., & Voeten, M.J.M. (2004). Teachers' conception of student learning and own learning. *Teachers and Teaching: theory and practice*, 10(1), 77-98.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3-15.
- Christy, A. D., & Lima, M. (2007). Developing creativity and multidisciplinary approaches in teaching Engineering problem-solving. *International Journal of Engineering Education*, 23, 636-644.
- Darling-Hammond, L., Chung Wei, R., Andree, A., & Richardson, N. (2009), *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. Oxford, OH: National Staff Development Council.
- Dryer, J.E., & Osborne, E.W. (1996). Effects of teaching approach on problem-solving ability of agricultural education students with varying learning styles. *Journal of Agricultural Education*, 37(4), 38-45.
- Garet, M. (2000). Designing professional development that works. *Educational Leadership*, 57 (8), 28-33.
- Garton, B. L., and Cano, J., (1996). The relationship between cooperating teachers and student teachers' use of the problem-solving approach to teaching. *Journal of Education*, 37 (1), 48-45.
- Guskey, T. R. (2003). Professional Development That Works: What Makes Professional Development Effective? *Phi Delta Kappan*, 84, 748-750.
- Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. *Journal for Research in Mathematics Education*, 42, 371-406.
- Householder, D. L., & Boser, R. A. (1991). Assessing the effectiveness of change to technology teacher education. *Journal of Technology Education*, 2(2), 16-31.
- Johnson, R.B., & Onwuegbuzie, A.J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7).
- Ledoux, M., & McHenry, N. (2004). A constructivist approach in the interdisciplinary instruction of Science and Language Arts methods. *Teaching Education*, 15(4), 385-399.
- Martino, P.D. & Zan, R. (2010) "Me and maths": towards a definition of attitude grounded on students' narratives. *Journal of Mathematics Teacher Education*, 13(1), 27-48.
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained. *Journal of Mixed Methods Research*, 1(1), 48-76. <http://dx.doi.org/10.1177/2345678906292462>.

- Mousoulides, N., & Philippou, G. (2005). Students' motivational beliefs, self-regulation strategies and mathematics achievement. In H. L. Chick & J. I. Vincent (eds.), *Proceedings of the 29th Conference of the International Group for the Psychology of Mathematics Education*, (Vol. 3, pp. 321-328). Melbourne, Australia.
- Myhill, D., & Warren, P. (2005). Scaffolds or straitjackets? Critical moments in classroom discourse. *Educational Review*, 57(1), 55-69.
- Opfer, V.D. & Pedder, D. (2011) Conceptualising teacher professional learning. *Review of Educational Research*, 81(3), 376–407.
- Pushkin, D. 2007. Critical thinking and problem solving-the theory behind flexible thinking and skills development. *Journal of science education*, 8(1), pp 13-19.
- Sparks, D. & Loucks-Horsley, S. (2003). Five Models of Staff Development. *Journal of staff development* (vol.10, No.4) copyright, National staff development Council, 1989. Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). USA:
- Timperley, H.; Alton-Lee, A. 2008. Reframing teacher professional learning: An alternative policy approach to strengthening valued outcomes for diverse learners. In: Kelly, G.; Luke, A.; Green, J. (eds). *Disciplines, knowledge and pedagogy. Review of Research in Education*, 32, Washington DC: Sage Publications.
- UNESCO. 2005. *High-Level Experts' Meeting on the UNESCO Teacher Training Initiative for sub-Saharan Africa*. Paris, UNESCO. (ED/HED/TED/2005/ME/7/REV).
- UNESCO. 2007. Report by the Director- General on new strategic orientations for the UNITWIN/UNESCO Chairs Programme. *Executive Board; 176th*. Paris, 2007. (176 EX/10.
- Upitis, R. (2005). Experiences of Artists and Artist-Teachers Involved in Teacher Professional Development Programs. *International Journal of Education and the Arts*, 6, 1-11.
- Wake, G.D. & Burkhardt, H. (2013) Understanding the European policy landscape and its impact on change in mathematics and science pedagogies. *ZDM*, 1–11.
- Watkins, D. (2000). Learning and teaching: a cross-cultural perspective. *School Leadership and Management*, 20(2), 161-173.
- Wicks, A.C, Freeman, R.E. (1998). Organization studies and the new pragmatism: Positivism, anti-positivism, and the search for ethics. *Organization Science*, 9, 123-140.
- Wu, H. (1999). *Professional development of mathematics teachers*. *Notices of the AMS*, 46, 535-542.
- Zavala, C. 2005. Rethinking the why and the how of philosophy. Personal communication presented on the occasion of the National Philosophy Congress of Peru.

Laws/texts

Law no 98/004 of 14 April 1998 on the orientation of education in Cameroon.

Cameroon General Certificate Examination Board (2011a). Syllabus, Buea: Logic, 570.

Cameroon General Certificate Examination Board (2011b) Syllabus, Buea: Philosophy, 790

Thesis

Ndjebmi, L. (2016). *Etayage de L'enseignant et construction des savoirs chez les élèves du niveau 1 à l'école primaire*. Unpublished Master's Degree Dissertation. Yaounde : university of Yaounde 1.

Nkwenti Ndongfack, M. (2010). *ICT Integration in Cameroon Primary Schools: A Case Study of Government Primary Practicing School Angele, South Region*. Master's Dissertation, Kuala Lumpur: Open University Malaysia.

Wemba, V. (2012). *Secondary school administrative process and teacher professional development*. Unpublished Master's Degree Dissertation. Yaounde: University of Yaounde 1.

Websites

[http://dx.doi.org/10.1002/1098-2736\(200011\)37:9<963::AID-TEA6>3.0.CO;2-0](http://dx.doi.org/10.1002/1098-2736(200011)37:9<963::AID-TEA6>3.0.CO;2-0)

<http://unesdoc.unesco.org/images/0014/001437/143738e.pdf>

<http://unesdoc.unesco.org/images/0014/001499/149919e.pdf>

<http://unesdoc.unesco.org/images/0013/001388/138818e.pdf>

www.crdp-montpellier.fr/ressources/agora/

<http://dx.doi.org/10.1287/orsc.9.2.123>

APPENDICES

Appendix 1: Interview Guide for Philosophy Teachers

Date & time:**School:****Subject:**
Class: **Period:** **Age:**..... **Teacher:**..... **Duration:**

This interview guide is aimed at collecting data or information from the respondents. It is worth noting that this guide will be used for individual interviews. Our type of interview goes with a partial interrogation (questioning). This is to say that it is a non-directive interview. Before the communication phase, we will like to precise some parameters of the interview to the respondents, namely;

- Confidentiality of collected information.
- The objective of this interview.
- The choice of the respondent.
- The theme of the interview.
- Taking down notes of the responses given by the respondent.

Objective of interview: To evaluate a teacher's ability of identifying a problem, generating potential solutions and evaluating solutions to problems.

Elements guiding the interview: Problem-Solving Model of teaching

Theme 1: Identification of the actual problem

- Prerequisite knowledge of the problem (asking what students know about the problem).
- The actual problem situation and its nature (moral, political, logic, metaphysics, epistemology).
- Contextualization of the learning
- Reformulation or rephrase of the problem

Theme 2: Generating potential solutions

- Selection of strategies
- Identification of necessary solution steps
- Selection of best solution by evaluating each solution

Theme 3: Evaluation

- Recalling the problem by regressing to get back to the general established principle.
- Asking students to check the workability of the solution.
- Establishing a "link" with possible contextual usages (particular, general, analogous solutions).

Appendix 2: Observation Grid of Philosophy Teaching Sessions

Date & time:School:Subject:
 Class: Period: Age..... Teacher..... Duration:

Elements observed: The problem-solving model of teaching

Objective of observation: To evaluate a teacher's ability of identifying a problem, generating potential solutions and evaluating.

Elements Of Observed Activity	Tally of activity occurrence	percentage
Identification of the actual problem -Positioning previous knowledge - Stating the problem situation -Contextualization of problem -Rephrasing the problem		
Generating potential solutions -Using strategies in solving problems -Operationalize solution steps -Selection of best solution		
Evaluation (checking) - Recall of the problem -Check workability of solution -Contextual usages of solution		
Professional Development -Aptitude of knowing facts & concepts -Aptitude of scaffolding learners -Aptitude of motivating learners to persevere in seeking solution		

Instruction for Recording: Make a tally (i.e. code) in the appropriate cell to show the occurrence of any specific activity.

Appendix 3: Observation cases

Case: Teacher Ana

Date: 13th February 2017

Teacher: *“we had an assignment last class, and we will begin today by correcting the assignment. Can someone recall what it was all about?”*

Student: does a recall and it was based on immediate inference.

Teacher: *“two volunteers should move to the board and present the last assignment for us all to do the correction and validate the correct answer”.*

Teacher: *“from the correction of assignment, we are going to proceed to check what knowledge we have about immediate inference before we move to mediate inference. What is immediate inference? What is opposition and what is education? What are their types?”*

Student: provide answers to these questions

Teacher: *“we have succeeded in positioning ourselves with the different types of immediate inference, so what then is a mediate inference?”*

Teacher: *“from the definition of an inference, what can we say a syllogism is?”*

Class: silent

Teacher: *“open your textbooks books let’s read the definition together”*

Class: all reading *“it is an argument with three propositions, (major, minor premises and conclusion) and three terms (major, middle and minor terms).”*

Teacher: after identifying the 3 types of proposition and 3 terms, we are going to establish a link between these.

Teacher: *after identifying the 3 types of proposition and 3 terms, we are going to establish a link between these. And to establish the link, we will look at the relationship between each of the three terms and from it we construct a syllogism.*

Teacher: *to construct a syllogism, we are going to start by establishing the link between the terms.*

Proposition 1; is link between the middle and major term.

Proposition 2; is link between the minor and middle term.

Proposition 3; is link between the minor and major term.

“From this relationship, can someone construct a syllogism respecting these rules and steps?”

Class: three students are called up to move to the board.

Teacher: *“three students were called up to the board to construct syllogisms while respecting the rules and steps. An analysis of each was conducted and the best was validated which met*

the condition. That is, the middle and minor terms are both related to the major term. Thanks to the relationship between the middle term, we can then establish a relationship between the minor and major terms”.

Teacher: *“we earlier defined a syllogism and said a syllogism has three propositions with three terms. This means that the parts as well as all three terms are related.*

Teacher: *“from proposition 2 where the middle term is found, we can establish the link between proposition 1, 2 and 3 as seen on the suggested propositions on the board”.*

Teacher: *“from proposition 2 where the middle term is found, we can establish the link between proposition 1, 2 and 3 as seen on the suggested propositions on the board. In our next class, we will look at the structure of a syllogism as well as the rules of constructing a syllogism.*

Case: Bella

Date: 16th February 2017

Teacher: *“Last class we saw who the scholastics were and so today, we are going to see faith and reason. But before we look at a new topic today, who can remind us briefly of what we saw last class.”*

Student: gives a reminder of what was seen last class.

Teacher: *“I said earlier that today we will look at faith and reason. Can faith and reason complement each other? Or is reason actually the only source of reason? Look at these two questions and tell me if they have the same meaning (...).”*

Teacher: *“in the real sense, what do we mean by faith and reason?”*

Class: silent

Student: *“faith means belief in God while reason means thinking”.*

Teacher: *“good. So, can you please give your own understanding of the two problematic we saw earlier?”*

Student: *“the first one means they are complementary while the second means they are opposing or different”.*

Teacher: *“in the real sense, by religion we mean God or faith and by reason we mean philosophy. Consequently we are out to see if faith or God can help in anyway in our daily reasoning” (done)*

Teacher: *use your reasoning and deduce which comes first, reason or faith?*

Student: *‘faith.’* **Teacher:** *why?*

Student: *‘because we are born as Christians.’*

Teacher: *‘are you sure?’*

Student: quiet.

Teacher: *‘when you were born, did you know God?’*

Student: *‘No’*

Teacher: *‘did you have reason?’*

Student: *‘yes’*

Teacher: *‘look at this example and tell us what you notice.’*

Teacher: *‘class, look at the stages of this example and tell us what you notice. In order words, does faith comes before reason or vice versa?’*

Teacher writes an example on the board, “God is omniscient and gives us thinking.

Everybody has thinking.

Therefore, everybody beliefs in God”.

Teacher Bella: *“from the argument on God and human thinking, we all tried together to determine which is more important and we concluded that philosophy and religion go hand in gloves. That explains why Aquinas and others had given a deep reflection on this relationship”.*

Teacher: ‘do you belief in God?’

Students in chorus: ‘yes’

Teacher: ‘do you go to church’

Students in chorus: ‘yes’

Teacher: ‘why do you belief in what you cannot see?’

Teacher: *“if a mad stranger visits your house begging food or money and owing to the fact that you are a Christian, what will you do knowing fully well that some of these people are evil?.”*

Student: *“I will use my reason invoke God and pray on the item before giving him.”*

Teacher: *“very good Peter, we conclude then by saying that in order not to become an atheist and spoil this world, we must put the two together.”*

Case: Carol**Date:** 23rd February 2017**Teacher:** *“in our last class, we saw what truth tables are. Does anybody have problems drawing the truth tables?”***Students:** *“no sir”.***Teacher:** *“ok, let us move to another aspect of logic. Look at the truth table on the board and identify the truth values of $P \supset q$ and $\sim q \supset \sim p$. What is the truth value?”***Student:** *“they have the same truth value”.***Teacher:** *“good’ in logic we call them logical equivalence or statement form which is what we are going to see today”.***Teacher:** *“our topic of today is statement form which “is a sequence of symbols which represent a statement” and there are three types namely; tautologos, contradictory and contingent. What is a statement form? And what are the different forms a statement can take?” .done.***Teacher:** *‘we earlier said that a statement form is the different forms a statement can take, so, the statement “Paul is strong and tall” and “ the principal is kind but strict” are different but they have the same statement forms which is conjunction (p.q).’***Teacher:** *someone should please give another example of a conjunction and disjunction statement forms.***Teacher:** *‘let’s look at this example together.’***Teacher:** *‘look at this example and try to represent it by symbol. “All students are intelligent’***Teacher:** *‘who can try?’***student:** *‘goes to the board and writes “ $Sx \supset Ix$ ”***Teacher:** *‘please class look at that and comment.’***Student:** *‘the universal quantifier is omitted’***Teacher:** *‘good. Can you do that?’***Student:** *‘I know it’s not there but I don’t know where to place it’***Teacher:** *‘ok. Who can help to place it?’***Student :** *$(x)Sx \supset Ix$ teacher: ‘excellent’***Teacher:** *“haven seen how to represent statement forms in to symbols, we will end there for today and continue in our next class.***Teacher:** *“I do hope everybody can distinguish between universal and existential quantifiers and can translate them into symbols?”***Entire class:** *“yes sir”***Teacher:** *“good”, “we are going to continue in our next lesson”.*

Case: Dan

Date: 27th march 2017

Teacher: writes on the board and ask, what is the meaning of “ ”?

Class: silent

Teacher: *‘how will you represent the statement “All believers are Christians”?’*

Class: silent

Teacher: *“ok, you people don’t want to talk. While writing on the board. Is it that difficult? Since you people don’t want to talk, today we will look at universal quantifiers.”*

Teacher: *“we are looking at the quantifier” while writing on the board (x) in every given x, for any x, for all x. The universal quantifier is therefore “x” while the existential quantifier refers to for some x represented as “ x”.*

Teacher: *‘the universal quantifier can be represented as “x (Bx∩Cx)” which means all believers are Christians, while the existential quantifier is represented as x (Bx.Cx) meaning some believers are Christians. Thus the universal quantifier is “x” and existential “ ”*

Teacher: *haven known the two elementary quantifiers, we are going to see how we can represent statements and test their validity.’*

Teacher: *‘haven known the two elementary quantifiers, we are going to see how we can represent statements and test their validity. The rule is that we refer to the universal quantifier by reading off the predicate term. I need two volunteers to move to the board and represent the statement “all students are monkeys” where Sx=students, Mx=monkeys.*

Student: represents the symbols on the board. $John = x(Sx \cap Mx)$, $Mary = (x)(Sx \cap Mx)$

Teacher: *‘ok, let’s see what Mary and John have and which of them is correct.’*

Class: murmuring in confusion

Teacher: *‘why can’t you understand this? Is it that difficult? Ok then, the John is correct. Meanwhile we remember that an existential quantifier is valid only when true. Is the statement valid or not and why?’*

Student: *‘valid because it is not true.’*

Teacher: *‘good and also because it doesn’t conform to the mind and intellect’*

Teacher: *“we were out to look at the elementary quantifier and we identified 2 of them. Who can remind us?”*

Student: *‘we saw the universal and existential quantifiers.’*

Teacher: *‘now, who can represent these propositions into symbols?’*

“All students are intelligent persons.

All philosophers are students

Therefore, all philosophers are intelligent persons.

Given that Sx : students, Ix :intelligent and Px : philosophers.

Class: 3 students walk to the board to present their different views after which the best is validated.

Teacher: *“looking at the example on the board, Paul concluded that the argument is valid since the conclusion follows from the premises and the quantifier can be read off from the predicate term”. “Now, when you get home, represent the following exercises and we will correct them tomorrow.”*

Case: Ella

Date: 02nd march 2017

Teacher: *“can someone remind us of what we saw last class”.*

Student: *“last class we looked at punctuations in logic and their different signs.*

Teacher: *“very good, today we will look at the truth table”.*

Teacher: teacher writes a topic on the board “the truth table” *“what is a truth table?”*

Class: silent

Teacher: *“Mary try*

Student: *“it is a table that helps us in judgment”*

Teacher: *“not really. Ok let me help the class. It is a table which lists the possible combinations of truth and falsity, each function records whether the truth function will be true or false. Take note that this table comprises three columns which correspond to the three different functional connectives”.*

Teacher: *“what is the use of truth tables?”*

Class: silent

Teacher: *“anyway, let’s not waste time on that, science students will see the use of truth tables as they progress.”*

Teacher: *“now, we are going to see how to construct a basic truth table. We said earlier that a basic truth table has how many columns?”*

Student: *“three”*

Teacher: *“and how many variables?”*

Student: *“two which are p & q”*

Teacher: represent that on the board in a table.

Student: draws a table on the board

Teacher: *“We need a volunteer to use the table on the board to come up with other truth tables”.*

Student: draws an additional table on the board.

Teacher: *“look on the board and see how we can derive a conjunction, disjunction.”*

Students: 3 students move to the board to write their views and the teacher corrects by helping to select the best solution.

Teacher: *“good, from what we can all see from the board, all three students have the correct truth table and they have all identified how from it, we can derive a conjunction”. We will end here for today, as you go home, check on how to draw a truth table for compound statements.*

Appendix 4: Interview Cases

Case: GAEL;

Date: 13th march 2017

Researcher: *Could in please remind us of the objective of your lesson?*

Interviewee: It was a question of the existence of HIV/AIDS its influence on the morality of the society

Researcher: *could you please recall the different moment of your lesson; or how you proceeded in attaining the objective?*

Interviewee: First of all, I asked them what we did in our last lesson and when they recalled the –topic. I asked them to give brief discussion on all what we saw during the last class. After this stage was completed (...) I then presented the topic of the day which was HIV/AIDS. In order that they follow the lesson well, I emphasized we were looking at the morality of HIV/AIDS I then asked a student to define HIV/AIDS and its consequences in our society. We went further to look at some of the means of HIV/AIDS contraction such as transfusing from infected persons, contaminated syringes metals, infected mother to unborn child a sharp objects.

Researcher: *In looking for ways to save this problem, what did you do?*

Interviewee: To solve the problem of HIV, I asked them first how the virus could be contracted and later on some of the ways of prevention,. From the multiple reposes gotten, such as abstinence, faithfulness, use of condom and others, e selected the most applicable ones that could really help preventing the virus.

Researcher: *At what moment do you put an end to your lesson?*

Interviewee: To end my lesson, I asked them to recall the problem statement or problematic...and it was important to note that our lesson was focused on HIV/AIDS, its effects or moral implication in the society. Finally, did a recall also of the methods of prevention and then the moral implication proper.

Researcher: *How do you get to know your objectives have been attained?*

Interviewee: It's very easy to identify that the objectives heave been attained when students portray a charge in behavior

Researcher: *DO the students establish a link between what they study and real life situation?*

Interviewee: Not quite, we didn't really take time to look at the applicability of the content in context, this was due to time constraint, and we just outlined the moral implication by taking down notes. .

Researcher: *How do you proceed when a child does not understand?*

Interviewee: When a child does not understand, there are times that I call others to explain to them or I go closer to them and explain the student concerned

Researcher: *During the process of learning, how do you get the learner involved?*

Interviewee: This is usually a daunting task in teaching because sometimes the student is passive and does not want to learn. But to me, I try to make sure the child must love what we are doing. But in the case of today, it was not a problem because we were touching HIV/AIDS which was a point of interest to most of them. That is the more reason why teachers must make their lessons interesting and animating. This goes to support the fact that teaching is a call and not a place people come seeking for 'matricule.'

Case: FRIDA**Date:** 15th march 2017**Researcher:** *Can you please remind us of the goal of your lesson?***Interviewee:** The lesson was on the mortality of abortion. To this effect, the students needed to be asked to identify the acts had are not acceptable and those that are acceptable in society.**Researcher:** *How did you proceed in order to attain this objective?***Interviewee:** I started the lesson by asking them what they will do if they happen to get pregnant till the point where one of them suggested an abort; then I notified out the topic and issue at stake which was to determine if abortion is morally justifiable. I latter asked them the types of abortion**Researcher:** *When looking for ways to some the philosophical problem identified, what did you do?***Interviewee:** I asked them the various reasons why people commit abortion. When they gave their reasons, we had to also look at the views of the pro and anti-abortionist. These views were later compared with those of the students. Each view and argument was analyzed critically and reasonable ones selected. Finally we took side with the antiabortionists who think that abortion is a morally condemned act.**Researcher:** *What did you observe before and after the process of learning?***Interviewee:** The students were surprised and some were showing satisfaction confident after reasoning with the pro-abortionists that abort is unjustifiable despite whatever reason, because the Cameroon penal code of 237 condemns it to be criminal.**Researcher:** *How did you get to know objectives were attained?***Interviewee:** This was easy to be done, i simply asked them to talk individually what they will do if they happened to realize they were pregnant. This question was addressed to boys as well as the girls**Researcher:** *When students get lost, what do you do?***Interviewee:** I flatter the child by calling her pet names like 'dear', 'baby', 'my only one' to get her involved in the lesson. There was another case that was sleeping and so I had to walk to him and wake him up.

Researcher: *What did u do to really get the learner involved in following up the lesson?*

Interviewee: To get learners involved, we need to do a motivation, be it intrinsic or extrinsic. But I mostly do intrinsic by bringing learners to seek interest in learning. Sometimes, I use authority to get them involved, or gifts, or small encouragements to get them involved. To get a student involved, I had to ask her if she had committed abortion since she was sleeping and the entire class burst into laughter. This made her to remain focused.

Case: JANE**Date:** 17th march 2017**Researcher:** *Could you please remind us of the context and goal of your lesson?***Interviewee:** The lesson was based on ‘propositional functions’ specifically the branch of logic.**Researcher:** *What was your starting point in the attainment of the objective?***Interviewee:** The lesson started is a correction of assignment on the difference between a statement form and a statement after which we looked at the rules inference used in testing validity. After the correction of assignment, i then announced the topic of the day “proposition functions.”**Researcher:** *Could you please tell us in detail how you then proceeded?***Interviewee :** From the topic we went further to look at the parts of a proposition then after which I presented a statement on the board (if it is a fruit then it is sweet)... From this statement, a prepositional function was then constructed by elementary quantification by establishing the relationship between the universal quantifier and existential quantifiers. Then, we went further to do exercises on representing singular proposition and later particular propositions into propositional functions.**Researcher:** *What do you do before the lesson comes to an end?***Interviewee:** Before the end of the lesson, I ensure that they identify the difference between the universal quantifier I existential quantifier and how they are represented by symbols for example, looking at the example if this is a fruit, then it is sweet is a universal proposition can be represented this $(x) (Fx \supset s x)$ **Researcher:** *What do you do to ensure your objectives have been attained?***Interviewee:** This is usually a task for me but what I do is simply ask them to recall all what we have been doing throughout the lesson. If they happen to recall all what we have been doing then, i consider that the objectives were attained. The essence for me was that the students could understand and differentiate between the universal and existential quantifier, be able to represent propositions in symbols.

Researcher: *At the end of the lesson could the students establish any link between the content a real life situation?*

Interviewee: The essence for me was that the students could understand and identify or differentiate between the universal and existential quantifiers, be able to represent propositions in symbol: At this level I am satisfied because it is usually different to contextualize symbolic aspects that are treated in logic.

Researcher: *What do you do to bring student who don't understand?*

Interviewee: we change the manner of questioning by making them to understand what we want in line with the objectives. I asked a student to recall what we had earlier been doing and when he couldn't, I had to rephrase the meaning of (x) because that's what scared him.

Researcher: *How does the student really get implicated in the lesson?*

Interviewee: The students get involved when they answer questions asked by the teacher. Since there are some students who refuse to talk when asked to answer questions, because of time constraint, I just move on rather than waste time on them. It's true that sometimes I give bonus marks.

Case: HELEN**Date:** 21st march 2017

Researcher: *You are just from finishing your lesson, could you please remind us of the objective?*

Interviewee: It issue here was to look at the theory of dialectical materialism of Karl Marx.

Researcher: *How did you go about to attain this objective?*

Interviewee: The first thing we did was to do a recall on historical materialism which is a basic idea that underlie dialectical materialism and after they understood what it was, I then introduced them to the new topic and we all took time to differentiate between the two. Later we looked at the modes of production the super structure of the sub-structure.

Researcher: *In looking for ways to solve the philosophical problem of stake, what did you do?*

Interviewee: We had to emphasize that dialectical materialism has to do with modes of production, conflict and social relation. These 3 elements are interacting such that the people use the factor of production interact to satisfy their needs but when a new need arise there is a new mode of production that could later give rise to a new super structure (From this , we concluded that human society evolves thanks to the evolution which is class struggle).

Researcher: *How do you put an end to your lesson?*

Interviewee: To end my lesson I check if the solution established really works well. We did this by giving of example of a master slave relationship when the principal factor of production is land. Between these two groups of people was business and this new class of people (traders), this then challenged political situation and gave rise to a new society that resulted from a revolution. Finally, I make the students understand that history is continues process that evolves with time. And so with time, if the poor right, they will one day own land and property like the rich

Researcher: *How do you get to know your objectives have been attained?*

Interviewee: I not that difficult, to know that my objectives have been attained, I ask them what they will do in a capitalist system of government where the rich grow richer while the poor grow poorer

Researcher: *Do the students really establish the link between the theoretical aspects of the lesson real life situation?*

Interviewee: Somehow but most of them could not answer what they will do in a capitalist society

Researcher: *When the child is in difficulty, what do you do to get the learner fully involved?*

Interviewee: When the learner is lost, it's simple as I walk to the board and try to give examples of all we have talking about. This I do with the belief that most of them easily learn by examples. If the case persists, then I call on another student to do so because it could also be a problem of my choice of words.

Researcher: *How do you get the learner fully involved in the lesson?*

Interviewee: What I do is to motivate them and most often I do so by flattering them I will give bonus marks or simply promise to give them money to buy something during break. Each time I promise marks, you need to see how active they become.

Case: IDA**Date:** 24th march 2017**Researcher:** *Can you please recall the objective of your lesson?***Interviewee:** Our focus was to look of the rights of women, the justification of women's right as well as the steps taken to protect the right of women. Also we looked at the violation of women's rights.**Researcher:** *What was your starting point to attain this objective?***Interviewer:** The lesson started we are recall of the past lesson and a little summary of all that we saw during the past lesson. From revision of past lesson, I introduced them to the new topic of the day which is women's rights. After we worked at characteristics of women's rights, I later helped the students in bridging out clearly or rephrase the issue at stake which was to find out if there is any need to advocate for the rights of women.**Researcher:** *Could you please recall the different moments of the lesson that helped you realize the objectives?***Interviewee:** As we stated the problematic, we went further to look at the characteristics of women's right. It necessary we look at the different strategies that could be used to advocate women rights after which each of the strategies was analyzed in detail to determine the better strategy. Examples too were examined to see some applicable cases of women's rights. Such as some crimes that affect women (forced marriages, marital violence, unequal treatment before the law etc). This as well had to do with some of the ways through which women's rights are violated.**Researcher:** *What do you do before the end of your lesson?***Interviewee:** From all the analysis gotten from the students, we concluded by adopting a solution to the problem of the rights of women. The solution to this was that it is imperative to allow women to choose freely whether in their families or not.**Researcher:** *What did you do to ensure that your objectives have been attained?***Interviewee:** This is a very important stage to me in teaching just like the first stage. I just gave them a short problematic and asked them to reflect on. The problematic was "women's

rights exist but need to be taken care of.” Asses the validity of this statement. Then I asked them to tell me what is expected. In short, this stage has to do with a recall of the problem statement so that the students are able to grasp something from all that was discussed earlier. At this level, I just give them notes by dictating.

Researcher: *Did you ensure that the students have a link between concepts and practice?*

Interviewee: To make sure they see the reality of women’s rights mention was made on the United Nations Declaration on the elimination of violence against women. This document was adopted in 20 December 1993... After we read some of the laws, I presented them some practical cases to take home, analyze and bring back their reactions the following day

Researcher: *What do you do when your students do not understand?*

Interviewee: As students do not understand, we use the technic of questioning. This means that making the question simpler. The case of today’s lesson was simple because the problem was evident and more concrete and most of them were versed with it.