ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

THE RELEVANCE OF THE TEACHER TRAINING INSTITUTE`S MATHEMATICS TO THE TEACHING OF THE SAME SUBJECT IN THE FIRST CYCLE PRIMARY SCHOOLS IN SNNPR

By

Kiflemariam Bassa

June 2001

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A THESIS SUBMITTED TO
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ABSTRACT

This study has attempted to investigate the relevance of TTI mathematics to the teaching of primary school mathematics. To accomplish this objective two TTIs and eighteen primary schools form the Southern Nations, Nationalities and Peoples Region Government were taken as a sample.

Two types of questionnaires mainly made up of close ended items with Likert method of rating scales with an average rate of relevance point (3.0) were adapted and developed in order to collect information required to answer the basic research questions raised in this study. The questionnaires were distributed to eight TTI mathematics teachers and fifty primary school mathematics teachers. The results of the study generally suggest the existence of :

1) Correspondence of the objectives of TTI mathematics with primary school mathematics.
2) Discrepancies among the contents of TTI mathematics and primary school mathematics.
3) Lack of harmony in both TTI and primary school mathematics syllabuses in teaching methodology
4) Primary school mathematics teachers lack the capacity to teach the subject Confidently because of the mismatch of languase of instruction.

Accordingly, this study recommends to take corrective measures to focus on only very essential contents to teach mathematics in primary schools and TTIs and to give more emphasis to the teaching methods than contents for the teachings of the subject in grades 1 to 4.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The contribution of education to meeting the goals of national development is increasingly getting attention for some years now. Education, particularly in developing countries, is considered to be the single most important factor on which their over all social, economic and political development depends.

However, developing countries seem to be unable to meet their goal because of factors such as diseases, drought, population explosion, political instability, depletion of natural resources, flood and others. Above all, the types of education provided in these countries that was not geared in solving the aforementioned problems can be taken as another essential factor for their low development (Coombs, 1985).

According to Pratt (1980), society's most valuable resource is its people and education is a process by which society invests in the development of its people One of the important functions of education, therefore, is to socialize children and transmit the important values of societies that enable them to live a meaningful life. To this end, teachers, need to facilitate the learning of children by implementing the curriculum which contains the culture, knowledge and skills that believed to be significant to the members of society (Farrant, 1980).

In some situations, the academic problems of students are taken to be the deficiencies of the learners themselves. Recently experts argue that the cause of such deficiencies can be the existence of irrelevant curriculum. There are many evidences that suggest the education in many countries is in crisis. As a result of this, students achievement has declined since they are taught by inappropriate curriculum through inappropriate methods to their level and style of learning (Coombs, 1985; Tekeste ,1990; Mavelock and Huernment ,1977). In Ethiopia, for example, at the time of the introduction of modern western types of secular education in 1908, the curricula of those day were not about the Ethiopian culture social and economic realities. All the curricula, language of instruction and the teachers were alien to the Ethiopian situation except the children (Seyoum, 1996; Tekeste, 1990).

Although the Ethiopian school curriculum gradually changed in objectives, contents, methods through time, there has always been compliant about its impact on children. In addition to this, some experts in the field underline that a school curriculum which do not reflect the needs and interests of society in general and that of the learners in particular is one of the major causes for low attendance and withdrawal of students from schools (Cruel, 1973; Simmons 1980)

1.2 Statement of the problem

Educators who undertook research on teacher training suggest that the contents of teacher training should be in harmony with contents of schools in which the

would be teachers are expected to teach in their future career (Ambaye, 1999). If there is a lack of correspondence between teacher training and school curriculum, it can bring ill preparation of trainees. Since teachers are the corner stones of the whole education program, their training is a vital factor that affect the quality of education. In the training program of teachers, we must be sure whether or not the would be teachers have acquired the necessary professional equipment that enable them to lead and inspire children. It also requires knowing the school situation in which the trainees will find themselves in the future. In this regard a thorough understanding of the needs and interest of school children help to determine what should be put in the curriculum of Teacher Training Institute. It should contain idea, knowledge; skills, attitudes and values students need to develop as a result of what a school does (Callahan and Leonard, 1988). Thus, it is with this understanding that this study aimed at examining the degree of relevance of TTI mathematics teaching material to the teaching of primary school mathematics. Through this the study has attempted to find answers for the following specific questions:

1. Is the TTI training manual on Mathematics relevant to the primary school mathematics in terms of:
    a) Objectives?
    b) Contents?
    c) Methodologies?

2. What are the attitudes of TTI mathematics instructors and primary school mathematics teachers about the relevance of mathematics teaching materials of TTI and primary school?
3. How capable are those teachers trained in the TTIs to teach mathematics in primary schools?
4. What are some of the major factors that contribute for the mismatch of the curricula materials of TTI and Primary Schools:?

1.3 Significance of the Study

The findings of this study would be useful for the designing strategies that may help to:

- take corrective measures so that there will be congruence between TTI and primary school mathematics teaching materials;
- encourages Mathematics teachers of primary schools, TTI mathematics instructors and other curriculum experts to notice the problem and improve their practices;.
- transfer the solutions and recommendations of the study to other courses of the TTIs and primary school subjects.

1.4 Delimitation of the study

There is relatively large number of school curricular materials that need to be investigated. However, shortage of available time and budget has led the researcher to confine the scope of the study to a manageable size. Therefore, the study focused on examination of the congruence of TTI Mathematics training manual and that of primary school mathematics curricula, in the two zones of SNNPR; namely Wolaita, and Kaffa. This was because one of the two TTIs of the region found in Kaffa zone (i.e-Bongal TTI) where as the other TTI (i.e. AMTTI) is situated very near to Wolaita zone. This has facilitated the close observation of the interaction of the TTIs with the primary schools in the vicinity. The subject mathematics was also chosen because the researcher had the experience of teaching mathematics in TTIs and secondary schools of the region.

1.5 Limitation of the study

The research instrument adopted in this study was questionnaires with close ended and open-ended items. Besides the questionnaires, other instruments such as classroom observation and content analysis might have enriched the data and makes the findings of the study more objective and comprehensive. But, for lack of time resources and the remote site of schools in the sample size, other instruments to collect data were not employed. Furthermore, since the

study was based on data obtained from only eighteen sample primary schools of the region, the findings of the study may not unfold all problem areas of the study. Thus, because of these basic shortcomings, the study by no means claims to be comprehensive and conclusive.

1.6 Organization of the study

This paper is organized in to five chapters. The first chapter deals with the background of the study, statement of the problem, significance, delimitation and limitation of the study and definition and abbreviations of key terms. The second chapter is meant for review of the related literature whereas the third chapter dealt with the research methodology and procedures employed. The fourth chapter is for presentation and analysis of the data gathered. While the summary, conclusions, and recommendations are presented in the last chapter.

1.7 Definition of Key Terms and Abbreviations

Curriculum Relevance: The state of intimate relationship between what. Teacher Trainees learn in TTls and the realties in primary schools.

Nationality Language: The language of instruction employed in the first cycle primary schools of SNNPR (included are: Wolaita, Dawuro, Gamo, Gofa, Sidama, Kambata, Hadiya, Kafinenon)

Abbreviations

1. AIDS – Acquired Immune Deficiency Syndrome
2. AMTTI - Arbaminch Teacher Training Institute.
3. BESO- Basic Education System Over hall
4. GCF- Greatest Common Factor
5. ICDR- Institute of Curriculum Development and Research
6. LCM Least Common Multiple
7. MOE: Ministry of Education
8. NETP- New Educational and Training Policy
9. REB- Regional Education Bureau
10 TGE- Transitional Government Ethiopia
11 SNNPR – Southern National, Nationalities and People Region
12 TTI- Teacher Training Institute
13 UNESCO- United Nation Educational Scientific and Cultural Organization.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 The Nature and characturstics of Relevant Curriculum

There may be different meanings and definitions given to the term curriculum, as there are many authorities in the field. It can be defined as an organized set of formal educational or training intentions (Pratt, 1980). For Oliva (1988), it can be taken as what is taught in schools, a set of subjects, a program of studies, a set of material, a sequence of course, a course of study, etc. It can also represent a set of choices among a range of possible contents, methods, organization and presentations.

Despite these differences in definitions, since it is not possible to teach all knowledge, skills and attitudes, every curriculum is also made to contain items selected from the range of contents and learning experiences that are available. During the selection, one among other things, should focus on culturally and socially appropriate contents, learners needs and interests, the learners home language and using appropriate teaching methods (Bao, 1989).

2.1.1. Culturally and Socially Appropriate Contents

Culture is the integrated pattern of human knowledge, belief and behavior. It also includes ideas, customs taboos, codes, institution, tools, techniques, work

of art, ritual, ceremonies and other related components of societies (Encyclopedia Britanica, 1986).

In addition, a desirable curriculum is the one that reflects the above cultural heritage. Emphasizing this, Nyerere in Prewit, 1971:95) writes.

> All children whether they are at school or not must learn the traditional skills of our people... they must learn the stories, poems and the history of the people... These stories are part of their heritage: they must carry them forward into the future.

Besides, as a mean of society for informing the young generation, curriculum need to reflect the ideals, knowledge and skills of society that are believed to be significant. In this regard, it is noted that the task of educating the future generation of a country is deeply embodied in the value system of society (UNESCO, 1985).

Meanwhile, curriculum relevance in the modern context can be addressed through identifying key social problems that could be considered as the core contents of today's education system (Kalafki, 1996). In other words, the curriculum contents to be selected at various levels of the education system have to be closer to the present real life of society like church education in Ethiopia (Girma: 1974). By so doing it gives the learner opportunities and initiatives for the solution of both the individual as well as community

problems. Furthermore, the future curriculum of schools needs to be revised and organized according to the social problems of the future such AIDS, and environment (Marew, 2000).

Of course, as it was mentioned in different times centrally prepared curriculum has limitations to address the needs of grass root people. They are prepared in the center, which is far from the actual life of the learner (Seyoum, 1996; Tekeste, 1990). One way for solving this problem is by reducing the role of the central state and decentralizing the education system (Maclay in Deribssa, 1999). When education is decentralized parents and other community members play a key role in school system that would focus on culturally and socially appropriate learning experiences.

2.1.2 Learner's Needs and Interest

A curriculum that is relevant, addresses the academic needs of learners as well. This is achieved through developing and using learners centered curriculum. The focus of the learner-centered curriculum is the learner and not the teacher. It is prepared in such away that it considers the learner's experience. In this approach learners are active participant in their own learning so that their pervious knowledge and life experiences are valued and used to help construct new knowledge and solve problems. The demand of this kind of education is

seen to come form the learner and it is based on what the learners wanted to learn not on what the planner / educator decided the learners should learn (Rogers, 1984). This includes taking advantage of examples and topics and their application that are likely to treat interest in children. Some pupils may have particular needs that need to be met. These may range from a child who is shy and need encouragement to participate, to a child who has difficulty producing legible hand writing (Nardose. 2001). Such pupils require individual attention for their needs to be met. Some pupils may well have a marked learning difficulty and are identified as having a special educational need. Hence school curriculum has to be sensitive towards pupils' special educational needs and try to identify and meet these needs. (Tirussew, 1999).

2.1.3 The Place of the Language of the Learner

When curriculum relevance is under discussion, the question of language of instruction gets a high priority because there can hardly be any education with out language. In order for the teaching learning process to be successful, both the learner and the teacher have to have relatively good command of the language of instruction. If the learners are not perfect in the languages of instruction, they will not be able to read books and other instructional materials in that language. Likewise, teachers have to be proficient in the languages of instruction, other wise they will not be able to impart knowledge effectively.

If the language of instruction and that of a child's home are different it is not difficult to imagine the adjustment problems the child faces. The child being physically and mentally fit for schooling the first thing he or she suffers in school is unfamiliar language used as language of instruction. In Ethiopia, this was exemplified by Tekest (1990) as the switch from grade six where Amharic was used as language of instruction to the use of English in grade seven was very drastic. Hence it can be safely said that children who begin their school with language deprivation are not only handicapped with respect to comprehension but are handicapped in their ability to develop and maintain more abstract mode of thought (Brimer and Pauli, 1971).

All available reports (UNESCO, : 1953 in Fasold, 1984, Coles: 1977, World Bank :1988; MOE : 1994) support that using the child mother tongue not only results in more successful literacy development in that language but also facilitates second language literacy development. However, the application of mother tongue is not with out problem. There are a group of peoples who advocate the problems of using mother tongue as language of instruction. For example, even though South Africa has declared a multilingual policy, in which eleven languages are recognized as official (English, African, Plus nine indigenous African languages) there is still a lot of challenges against using the nine African languages (Rubahgumya in the World Bank Conference 2000)

He goes on saying many parents, especially the middle class, would wish their children to have English as a language of instruction right from the very beginning of schooling in the belief that an international language will give their children ahead start in a competitive world.

In multilingual countries, educational policy makers have serious problems with respect to the prevalence of a good number of languages that are spoken by their people. It is very impractical to have curriculum in these language because of dialects, financial problems and other related factors (Coombs: 1985, Cramer and Brown: 1965) and they recommend to have only one national language in the fear of national disintegration.

However, as Coles argues, learning in mother tongue does not hinder a child from learning a national language. As he said, the provision of instruction in mother tongue must be in the frame- work of the general education system of the particular country to promote national unity (Coles, 1977). The usage of mother tongue as a language of instruction may cost a lot. However, according to Fagerlind and Saha (1983), the more important than the expenditure are the social and economic out comes. In general, according to Coles (1977), educationally, it is best to teach in the mother tongue; political considerations,

however, may well out-weigh, the advantage of doing this. Hence, educational policy makers are left to choose one from the two evils.

2.1.4 Appropriate Teaching Methodology

Every child in a class is different from one another in terms of their emotional, social, physical and mental development. Some of their difference may be innate but most are the results of how they have leaned to learn. Because of this individual difference among pupils, their interest and their preferred learning styles are also different. In other words, some pupils will understand new concepts more easily if they can touch and manipulate it. Others do best if they can read or see visual representations and some grasp better through verbal explanations and sounds. Therefore, unless these individual differences are treated with a variety of teaching methods and materials, there is less likely that learning will take place in the learner (Borich, 1988).

Studies of child development and retention by Dewey in Derbessa et,al (1999) have made clear that children learn best by the principle of learning by doing. For example, in mathematics class children can count their teeth, and make comparisons to the teeth of the younger and older siblings or parents. They can measure their heights, waists, arm circumferences, foot length, and make

graphs of histogram, to record their findings. This would be more productive than reading a textbook and doing exercises.

As it is true in the teaching of other subjects, in mathematics also individual difference must be treated as much as possible with a variety of teaching methodologies (Kasambira 1993, Boric 1988). Accordingly, as a supplement to mathematics instruction, whether individualized, small group or whole class, games and Puzzles that challenge students and make them think are appropriate for periodic use in the class (Posamentier and Stepelemon, 1986). Furthermore, games and models help students to visualize mathematical concepts. There may be different models to be used in mathematics classroom. For example, the take away model or counting back model can be used for subtraction of numbers and repeated addition model could be used for multiplication.

At the lower primary level, mathematics curriculum materials should emphasize understanding manipulation of physical materials and application of mathematics to every day situation .At this level, the focus is on the meanings of the four basic operations (additions, subtraction, multiplication and division) estimation of results, use of mental arithmetic and development thinking strategies. These skills need not be presented at the same time. What is organized in each grade should be a prerequisite for the other. Counting

instruction, for example, forms a major component at first grade instruction and should be continued in second and third grades (Stein, Stein and Sinlbet, 1990). According to Borich (1988:21), the following techniques are very much helpful to have effective teaching learning in any subject:

- Giving students the opportunity to produce newly learned concepts and get feed back
- Maximizing instructional time to increase content coverage.
- Providing direction and control of students learning through questions, structuring and probing.
- Using a variety of materials and audiovisual aids to foster use of student ideas and engagement in the learning process.
- Eliciting responses from students each time a question is asked before moving to the next student or question.
- Presenting materials in small pieces at a slow pace with opportunities for practice.
- Encouraging students to reason out the correct answer.
- Engaging students in verbal questions and answers.

The usage of locally available resources has great advantages to make the teaching-learning process successful. These teaching /learning aids can be found at home, in shops, along the roads, in the fields and many other places. Things like scraps of wood and cloth, tins, papers, bottle tops, card board cartons and boxes, plastic containers, sticks, stones, grass and other plants, leaves, flowers, seeds and soil can all be used to facilitate teaching and learning. (See Appendix G for more examples).

At higher level of education, students can learn from lecture because they have the skills to organize information. But, at lower primary level this is not the

case because students are not proficient in skills of organizing information. An approach dominated by lecturing, places the teacher at the center of learning and can result in passive behavior on the part of the students. Therefore, more active form of learning and instruction such as discussion of the learners small groups and project works, place children more at the center, thus making learning interactive.

As opposed to teacher-centered model, the learner-centered approach is advocated to teach children any subject including mathematics (Knowles: 1980 and Friere: 1972). In this approach students have a chance to interact, to discuss, debate and ask question, explore, experiment and observe their own knowledge through active participation rather than passive receiver of knowledge.

In general, there can be no teaching learning process with out the systematic selection and application of methods and techniques in the overall strategy of implementing curriculum. A particular method or technique is as good as the result it achieves. Neither lecture nor group project nor discussion nor exercises are good or bad by themselves. All are the means to an end and teachers should apply a variety of methods depending on the situation.

So far, the study has attempted to describe factors that are important for developing relevant curriculum. Once these factors are addressed, they have to be incorporated in the objectives, content and methodology of the primary and TTI curricula. In what follows, this study examines the above issues in the training of teachers.

2.2. Relevant Curriculum for Training Teachers

It is unthinkable to have effective curriculum with out having capable teachers to implement it. They impart the necessary knowledge, skills and attitudes in the learners to have a successful educational program. For a curriculum to be successfully implemented, teachers should get involved in selection of contents and learning experiences. Accordingly, as the implementers of the prepared curriculum they must be prepared with the appropriate objectives, contents and methods which are directly related to their career during their training program. Furthermore, they need to be knowledgeable about the learning environment, their pupil and themselves as teachers. They should suggest activities and resources that are feasible and available in their classroom and communities. Above all, they are the people who have the valuable information about student's progress in their learning. Hence, when we talk about curriculum relevance in school system, the type of curriculum for the preparation of teachers become a paramount importance. Such a curriculum should be based on the needs and interest of the learners for which the trainees are being prepared for.

All available evidence indicates that some of the factors that contribute for the failure of sound curriculum emanate from ill preparation of teachers (Bridges: 1998, Azab: 1998, Tekeste: 1990). Accordingly, as the common saying goes teachers teach the way they were taught, the would be teachers need to be trained in the curriculum that reflects the socio -culture, language interest and needs of the learners for whom they are prepared. In general the relevant curriculum of teacher training must include the following basic knowledge:

- Knowledge about the contact
- Knowledge about broad principles and strategics of classroom management and arganization
- Knowledge about curriculum material and program.
- Knowledge about the teaching of particular content topic
- Knowledge about pupils` knowledge, educational contexts, ranging from classroom groups to aspects of the community
- Knowledge about instructoral aims and valves (shulm in Nardose, 2000)

Therefore, teachers should be trained in such away that they would be able to see, analyze and integrate the needs, feeling and aspiration of children in their environment with their communities and the nations need. If they are not prepared in this way, it is meaningless to expect more from them. In this regard Azab (1998:305) said "it is absurd and impractical to demand the

maximum by not providing even the minimum. Such unrealistic demands are bound to lead genuine to frustration and others to giving lip- services only."

2.3. The Need of Ensuring the TTI Mathematics Course to the School Program.

Mathematics is a basic subject in school curricula. Regarding this, Pellery (1991) argued that mathematics instruction has occupied a central position in education from ancient times to the present day. Travers (1991) also indicated the importance of mathematics by stating that between fifteen and twenty percent of instructional time is spent on it.

Besides the importance of mathematics in various aspects of everyday life, it is also needed in industry and high technology. Therefore, as it was explained by Fay(1982), the effectiveness of teaching mathematics has been an important concern in educational research.

Nevertheless, even though mathematics is vitally important subject to be taught effectively, yet it is a subject which many students experience difficulty with. This problem is much attributed to the way they are taught which in turn related to the teachers in particular and the training program in general.

Certainly, the basic training components of teacher education programs need to be in harmony with the curriculum in schools. This is because, the would be teachers are required to know not only the knowledge of pedagogical theories and principles but also an adequate awareness of a subject matter what they are going to teach (Lasely, 1980:39). Otherwise, as it was argued by Carlson (1988) cited in Walker (1990:359), teachers whose knowledge of a subject is too limited can only implement it in a rigid way. In particular, " the changes in schools should be accompanied by a corresponding change in teacher training program." (Anand and Padima, 1984:38 in Ambaye, 1999:4). Nevertheless, there are research reports criticizing that courses in the conventional teacher education programs are suffering from the problem of irrelevance.

The age-long criticisms leveled at the teacher education programs have centered around the types of courses that prospective teachers peruse in their training (Ayers and Brimm, 1975:172). The changes are that the courses in the teacher education institutions tend to lack important contents for the adequate training of teachers to enable them cope with school situation and develop confidence (Ayers and Brimm, 1975:172). For instance, Klinzing (1990) reporting the case from West Germany indicated that student teachers expressed the quality and quantity of course works in training institutions are inadequately related and with little practical work to school problems.

In addition, Sodhi (1983:276), describing the state of teacher education in India, underlined the artificiality of courses. As to him, the courses lack articulation with practical work and teaching skill requirements, theoretical studies in the course such as the Methods of Teaching advocated in the teacher education departments are totally different from what is exercised at schools, resulting in a gulf between the training and actual job. Furthermore, Hawes(1979:55) conducted a research on the conditions of African teachers and found "the lack of correspondence between the needs of schools and Teacher Training Institute programs has brought about lower orientation of trainees of their widening task" (Ambaye, 1999:4).

Above all, in reference to the Ethiopian pre-service primary TTI programs, local studies indicate the following drawbacks: primary teacher training institutes have little identity of their own (Hedwund, 1975:172 MOE 1989:14), the TTI program curriculum lacks relevance to the school curriculum (Mehertu, 1988:7, MOE, 1989:14,1995:1). Methodology courses do not play a significant part in the curriculum and are more academic than professional (Lynch, 1984:11, M.O.E 1989:71,1995:1). Peer teaching and practice teaching seem to be taken as a fulfillment of course work (Abebe and Tassew 1994). No coordination prevails among primary schools and teacher training institutes

(MOE Task Force, 1986:22) (Ambaye, 1999:6). All these call for the need of matching the curriculum of the training institutions to the school program.

2.4 The Teaching of Mathematics at The Primary School Level

2.4.1 Relevant Contents for Primary School Mathematics.

Effective teaching is primarily concerned with setting up a learning activity, which is successful in bringing about the desired behavioral changes. To do so the identification of the right contents for a particular lesson is very important. Questions like, what source should be consulted for the selection of contents for a lesson, involves a number of considerations. Effective and quality curriculum material must give equal attention to what Shwab (1964) calls the 'four common place' the learner, the teacher, the subject matter and the teaching-learning environment. Accordingly, if irrelevant or inappropriate contents and learning experiences are selected, then the students 's time will be wasted and the intended learning out comes will not be attained

To help young children learn mathematics with understanding and appreciation of its role in the world, we should use those contents that help to internalize mathematical concepts. Accordingly, before beginning any new topic in mathematics, teachers should check whether or not pupils have the necessary backgourd. To develop a concept from the learners' reality, we must first establish what the learners' reality is. By doing so, all children can learn mathematics if:

A. Lessons are designed so that students can readily understand what is being presented.
B. Adequate practice with corrective feet back is provided.
C. Progress through the curriculum is asserted regularly (Stein, Stein and Sinlbet, 1990).

In mathematics class the lower order skills of knowing the four basic operations by 'heart' or by 'mind' are the most important skills that need to be mastered at the early ages of students. After these and other essential skills are mastered, we can concentrate on the higher-order skills that help to solve problems that are of great important to themselves and to the world.

Geometric notions such as point, lines, triangles, quadrilaterals, rays, angles, circle and prisms are also some of the contents that need to be included at this level. Students should also learn the four major pre-skills for telling time. These are:

1. Knowledge of the direction in which the hands of the clock move
2. Discrimination of the hour hand from the minute hand
3. Counting by 5, and
4. Switching from counting by fives to counting by ones which is needed to determine the number of minutes (Stein ,Silbert and Camine ,1990).

Probabilities and statistics are introduced through the notion of 'more' or 'less likely' and 'good chance that' and through collection, analysis and presentation of simple data. Furthermore, concepts such as range, mean (average) mode, and median are introduced in these grades as a fundamental concept of statistics. Similarly, the introduction of percentages and ratios usually follow instruction on the basic fractions and decimal skills. Pre- skills for determining the value of a group of coins include the ability to identify and tell the value of individual coins and the knowledge of the 5,10, 25 count by series (Ibid).

According to Parameter and Steplman (1986) , while course of study vary in various parts , basically school children of primary grades need to have the background exposure for the following basic mathematical curriculum:

1. **Set** (concept, notion, kinds, union intersection, complement)
2. **Real numbers**
    A. Integers (positive / negative, order of operation, properties, prime and composite, factors, linear open sentences
    B. Rational (decimals, scientific notation, properties, terminating and repeating decimals, irrationals/ square roots)
3. **Ratios, proportion and percent**
4. **Geometry** (point, line, plane, angles, polygons, perpendicular lines, parallel lines, similarity, circle, solids)

5.Coordinate Geometry (plotting points, Pythagorean theorem, graphing inequalities)

6. Statistics (interpretation of data, mean, median, mode, probability)

2.4.2 Methods for Teaching Mathematics At The Primary Level.

Mathematics teaching may be made meaningful and relevant to the learner when it is in some way tied to his/ her experience, hobbies and interests. In the early grades of primary level, a physical manipulative materials such as children's' fingers are of great value in mathematics teaching. Fingers are the handiest counters which children can use either in one to one correspondence for sums less than ten or in the counting strategy for larger sums. If children use their fingers for those basic mathematical operation they will become very efficient at simple operation and can spend their time and thought on more advanced areas.

In the teaching-learning process of mathematics, practice is a very important activity. No matter how well children understand the basis for addition facts, they will need lots of practice to make the computation automatic. Practice, as an important technique, reinforces previously learned skills while developing new one (Posamenter and Steplman, 1996). Furthermore, a great deal of

practice is necessary to master complex addition facts in order to develop memorization of basic facts through:

1. Paired skills in which students practice with each other
2. Teacher drill in which the teacher presents facts to a group
3. Worksheets
4. Flash card exercise, and
5. Fact games(Sten, Slabert and Camine ,1990).

Similarly, the regular assignment of homework is the best method of exposing students for variety of experiences. It gives students an opportunity to gain a broader understanding of topics and concepts taught in class and also provide a structure for deeper analysis of subjects.

The whole class response is also another kind of practice to be developed in mathematics class. One of the most common form of the whole class drill is the oral drill by which the teachers says / writes a problem and the class answers orally in union. By doing so, children will have an opportunity to master the basic facts of the four basic operations and other fundamental mathematical skills.

CHAPTER THREE

DESIGN OF THE STUDY

Because this is exploratory study aimed at examining and describing the relevancy of TTI mathematics to the teaching of mathematics in primary schools, descriptive research method was employed. To achieve the goal of the study, the examination of mathematics curricular materials and the assessment of the perception of TTI mathematics instructors and primary school mathematics teachers were conducted. To this end, the study employed the following approaches.

The first approach was to present and discuss some principles, theories and facts about the relevance of curriculum in general and that of mathematics in particular. This part dealt with the analytical framework that is most important and appropriate to the analysis and understanding of curriculum relevance.

The second approach was to gather empirical data to determine the degree of the relevance of TTI mathematics teaching material to that of primary school. This section of the report was focused on the quantitative and qualitative data about the respondents perception of the problem raised in chapter one. The sources of data, sampling procedures, instruments of data collection, procedures and methods of data analysis are described below.

3.1 Sources of Data

In this study, the first sources of data were Mathematics curricula materials of first cycle primary schools of the SPNNR. The second source of data was Mathematics training manual of Teacher Training Institute.The Mathematics instructors in Teachers Training Institutes and mathematics teachers of grades 1-4 as well as curriculum experts in Education Bureau were also used as source of data.

3.2 Sampling Procedures of the Study

The relevance of objectives, contents and teaching materials as well as teaching methodologies suggested in the TTI Mathematics curricula were examined by primary school teachers and that of the first cycle primary schools were judged by TTI instructors. This has helped to determine the compatibility of the training manual with that of the primary school.

To this end, two TTIs found in the region were taken as the center of the study on the basis of availability sampling method. The availability sampling method was also applied to Mathematics instructors of the two TTIs. Purposive sampling method was employed to have one wareda from the seven in Wolaitu Zone (i.e. Damota Gale) and one from the six in Kaffa Zone (i.e. Gimbo).

With Regard to primary schools out of 35 primary schools 31.4% from Domota Gale Woreda and out of 26 primary schools, 26.9% from Gimbo Woreda were selected on the basis of purposive sampling method. These schools were taken as the center of the study because those teachers graduated from the two TTIs are found there. The Schools and the number of respondents are shown here under.

From Damote Gale Woreda	**No of respondents**	**From Gimbo Woreda**	**No of respondents**
1.ShashaGale	4	1. Bonga	4
2.WosheeGale	4	2. Barta	3
3.Hibret	3	3. Bandera	4
4.Chewkdavee	1	4 . shetta	4
5.AdeeDamuota	2	5.Kaiya Kella	1
6.Ediget	3	6. Shatta quja	2
7.Boditi	5	7. Kantry	2
8.Sibaye	2	**Total**	**20**
9.OgeJage	2		
10.SiyaraMahee	1		
11.Adecherake	3		
Total	**30**		

In addition to the above facts, the availability sampling method was employed to have teachers who filled the questionnaire. These teachers were teaching mathematics in the grades level of 1-4 in the time of the study. Furthermore, teachers form Damota Gale Woreda were graduates of Arbaminch TTI while teachers from Gimbo Woreda were graduates of Bonga TTI.

3.3 Instruments for Data Collection

In order to secure relevant information about the study, two types of questionnaire were used. The first one is for TTI Mathematics instructors and the other was for primary school Mathematics teachers. Each type of the questionnaire has got four section-the first part, contained the general purpose of the questionnaire while the second part contained the biography of the respondents and some few open ended question that were designed to have the suggestions of the respondents.

The third section of the two types of questionnaires was adopted mainly in the form of Likert- type attitude scale where the level of agreement was on five point rating scales: strongly agree, agree, undecided, disagree and strongly disagree. Each score has an assigned value of 5,4,3 2 and 1. Any item score below an average point of 3 was seen as unsatisfactory, and any item score with an average point 3 and above was regarded as satisfactory level of relevance. The last part of the questionnaire contained open spaces, which were intended

to have the general comment of the respondents. Furthermore, a structured interview was held with Mathematics expert in REB.

3.4. Procedures of Data Collection

After having adequate readings on available literature on curriculum relevance and teacher training, the researcher established the basic questions of the study on which the design, adaptation and development of the questionnaire was based. The draft of the questionnaire was field-tested and then, modified with the former TTI Mathematics instructors. The relevant inputs obtained form the researchers' thesis advisor, comments by senior graduates of the faculty of education with MA degree was also considered before the final administration of the questionnaire.

Moreover, the researcher has visited the two TTIs and each sample schools to explain the general purpose of the research and handed over the questionnaire. However, it was mainly the responsibility of school directors, TTI principles to distribute and collect the questionnaire. On the whole, the researcher distributed and collected the questionnaire with cooperation of Zonal and Woreda Education Bureau officials and TTI principals and school directors.

3.5. Method of Data Analysis

The data collected were tabulated, coded and analyzed. For reporting, analyzing and interpreting the data frequency counts, means, and percentages were used.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF THE DATA

This chapter comprises two major parts. The first part presents the characteristics of the sample population involved in the study, i.e., the profile of the study groups, (TTI Mathematics instructors and primary school Mathematics teachers) in terms of sex, years of service and academic qualification.

4.1. Characteristics of the Population

The two types of questionnaires prepared were distributed to nine TTI Mathematics instructors and fifty-three primary school Mathematics teachers. Of the total number of questionnaires, 88.9% from the TTI instructors group and 94.3% from primary schools were appropriately filled in and returned. Based on the response obtained from the two study groups, their characteristics were examined in terms of sex and years of service as shown in the following table.

Table I

Respondents by Sex, and Years of Service

Item	Frequency of Response from			
	TTI Instructors (N = 8)		Primary School Teachers (N=50)	
	No	%	No	%
A. Sex 1. Male	8	100	37	74
2. Female	-	-	13	26
Total	8	100	50	100
B. Service Years 1. 1-5 years	7	87.5	25	50
2. 6-10 years	1	12.5	16	32
3. 11-15 years	-	-	6	12
4. 16-20 years	-	-	3	6
5. Above 20 years	-	-	-	-
Total	8	100	50	100

As it can be seen from the table I above, all of the TTI instructors under study, i.e, 100% and 74%of primary school Mathematics teachers belong to the same sex category i.e, male. Female representation in this study was only 26% from primary school group.

As female participation rate in Ethiopia education has been low (TGE, 1993), there was no single Mathematics instructor in the TTIs of the region. From this, one can fairly see how female would be teachers are affected during their training and how this negatively affect their teaching after graduation.

Regarding the service years of the respondents about 87.5% of TTI Mathematics instructors and 50% of the primary school Mathematics teachers had 1 to 5 years of service as teacher trainer and primary school teacher. Besides 12.5% of instructors primary school mathematics teachers had 6 to 10 years of service and 18% of the primary school teachers had served for 10 years and above.

It would, therefore, be possible to generalize from the data that the majority of primary school teachers are fresh and enthusiastical to use skills they acquired from their training hence good for this study. On the other hand, the TTI instructors involved in the study are so fresh that they may not have enough exposure to conceptualize the whole training program and may not have developed the ability of examining primary school curriculum.

Table II

Respondents by Qualification and Language of Instruction.

Item	Frequency of Response from			
	TTI Instructors (N = 8)		Primary School Teachers (N=50)	
	No	%	No	%
A. Qualification 1. College diploma	5	62%	-	-
2. First degree	3	37.5	-	-
3. Second degree	-	-	-	-
4. TTI certificate	-	-	50	100
5. Other	-	-	-	-
Total	8	100	50	100
B. Medium of instruction they use 1. Nationality language	6	75	48	96
2. Amharic	2	25	2	4
Total	8	100	50	100

It has been recorded in table II above, that 62.5% of the TTI instructors were diploma holders while only 37.5% of them had first degree in their field of specialization (i.e mathematics). On the other hand, all the primary school teachers who were teaching Mathematics involved in the study group had TTI certificate from either of Teacher Training Institute found in the region.

As per the policy of MOE (1994), TTIs are supposed to be staffed by teachers who have the minimum of first-degree qualification. In view of this, there were a significant number of under qualified TTI instructors in the region. This in turn may have a negative impact on reviewing and commenting the relevance of Mathematics teaching materials of primary schools and TTIs.

Item B of table II above, reveals the distribution of respondents in terms of the language of instruction they were using. Accordingly, 75% of instructors and 96% of primary school teachers were using nationality languages. From these the six, instructors belong to AMTTI because it is only this TTI that applies nationality languages as a language of instruction. On the other hand, 25% of instructors were from Bonga TTI where Amharic is used as language of instruction.

From the above discussion, one can easily see the difference of the language of instruction used in Bonga TTI and schools in Kaffa Zone. On the other hand, those primary school teachers who were teaching in the Wolaita Zone used the same language both in the training institute and in their schools. Those 4% primary school teachers who use Amharic are the teachers who teach in the model primary school found in Bonga TTI compound. Therefore, we can simply infer the problematic conditions of teachers to implement the curriculum because of the difference of the language of instruction in Kafa Zone.

Practice and discussion with AMTTI instructors also proved that they have no exposure of learning in the languages that they were teaching, in their elementary, secondary or tertiary education. It was also mentioned that they were assigned as instructor in this TTI because of their ability to speak their languages.

As a whole, the two study groups were asked about the types of problems they encountered because of the instructional languages in the open-ended questionnaire. Accordingly, they responded the following:

- Absence of glossary and dictionary in the languages they were using.
- Absence of orientation or workshop on how to use the language of instruction.
- The variation of the words that express the same concept in different grades e.g. the word that expresses angles in Kafenon language in grades 3 and 4 lacks consistency.

4.2 Presentations and Analysis of Data

4.2.1 The Objectives of Primary School and TTI Mathematics Curriculum Materials

The major objectives of the TTI mathematics curriculum material and that of primary is presented below in table III.

Table III

Major Objectives of TTI mathematics	Major objectives of primary school mathematics
• Enabling trainees to teach mathematics at the grade levels 1-4 • Enabling trainees to relate mathematics to objective conditions of primary school children • Enabling trainees to apply different kinds of methodology • Enabling trainees to solve the problems of their students as well as the problems of the community in the future	• developing the pupils mental abilities in calculation • encourage the study of science and technology • enabling the chilld to practically apply what has been learned • developing student's mobility in thinking and interpreting • enabling the students to pursue any training • enabling the students to develop a positive attitude towards society

(Source Mathematics Syllabi, ICDR 1990) (See Appendix C and D for the details)

As it can be seen from the list above, if trainees are trained in line with the stated objectives of TTI mathematics curriculum, the corresponding objectives of primary school mathematics curriculum can be achieved with out problem. For example, if trainees are equipped in how to teach mathematics in grades 1-4 as per the first objective of TTI mathematics, this will enable teachers to carry out those objectives of primary school mathematics and hence, it can be said that there is harmony between the two groups of objectives. Further more, according to the interview conductedn expert in Mathematics, the objectives of the two Mathematics curriculum materials are derived from NFTP of 1994 and show no discrepancy among them.

4.2.2 The Contents of TTI mathematics teaching materials

The mathematics teaching material of TTI has seven major contents. These contents were further broken down in to sub contents and presented in the third part of the questionnaire prepared for primary school Mathematics teachers. (See Appendix A). These teachers were asked to put an x mark in the space provided to correlate to one of the five rating (scales strongly agree = 5, agree = 4 undecided = 3, disagre e= 2 and strongly disagree = 1). Any item score below an average point 3 is taken as unsatisfactory and any item score with an average point 3 and above is regarded as a satisfactory level of relevance. Accordingly, the responses are tabulated and analyzed in the following tables (Table IV-X).

Table IV

The Inclusion of Logic - Related Contents In The Primary School Mathematics Curriculum (Teachers Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
1.1 Proposition	9	10	9	10	12	2.9
1.2 Open proposition	4	5	10	13	18	2.3
1.3 Connectives	5	5	12	14	14	2.5
1.4 Negation	5	5	11	15	14	2.4
1.5 Conjunction	5	5	10	15	15	2.4
1.6 Disjunctions	5	4	10	13	18	2.3
1.7 Implication	4	4	11	16	15	2.3
1.8 Bi- implication	2	3	13	17	15	2.2
1.9 Compound proposition	4	4	9	17	16	2.3
1.10.Equivalent compound proposition	1	3	12	18	16	2.1
1.11 Quantifiers	6	7	10	13	14	2.6
1.12 Deductive & Inductive Logic	7	8	12	13	10	2.8
						Aggregate mean 2.4

Table IV above, indicates that the responses of primary school mathematics teachers regarding the inclusion of logic related contents to the primary school mathematics curriculum. The aggregate mean value of the 12 items is found to

be 2.4 which is below the satisfactory point average (mean =3.0). This implies that logic related contents that are found in the TTI Mathematics curriculum are non-existence in primary school Mathematics curriculum and hence, the inclusion of logic related contents in the training program has no direct relation to the teaching of primary school mathematics.

Table V

Inclusion of Set- Related Contents in Primary School Mathematics Curriculum (Teachers' Response)

Item	Frequency in each scale					
	5	4	3	2	1	Mean
2.1 Set and set notation	17	14	13	6	-	3.8
2.2 Finite and Infinites	16	16	12	6	-	3.8
2.3 Venn diagram	18	8	14	10	-	3.6
2.4 Equal sets	14	13	13	10	-	3.6
2.5 Sub sets	10	14	15	11	-	3.5
2.6 Equivalent sets	14	14	13	9	-	3.7
2.7 Union of sets	13	16	12	9	-	3.7
2.8 intersection of sets	15	14	10	11	-	3.6
2.9 Complements of sets	1	5	11	16	17	2.1
2.10 Cartesian products	-	1	16	16	17	2.0
						Aggregate mean 3.3

Table V above shows the opinions of primary school teachers about the incorporation of set related contents in primacy school Mathematics. The aggregate mean value of the 10 items is found to be 3.3, which is above the mid point (Mean 3.0). This implies that set- related contends that are found in TTI mathematics curriculum materials are on average included in the primary school Mathematics. But a close observation of the individual items in the table reveals that of the set related contents, the following are rated below the average: complements of set (mean = 2.1) and Cartesian products (mean value = 2.0). From, these one can understand that the inclusion of these sub contents is not relevant to the teaching of Mathematics in primary school.

Table VI

Inclusion of Numbers and Numerals Related Contents in Primary School Mathematic Curriculum (Teachers Response)

Items	Fervency in Each scale					
	5	4	3	2	1	Mean
3.1 Different number systems	3	5	20	22	-	2.8
3.2 Counting and whole numbers	38	8	3	1	-	4.7
3.3 Divisibility	36	10	3	1	-	4.6
3.4 Factors and multiples	36	7	6	1	-	4.6
3.5 Fractions	27	19	3	1	-	4.4
2.6 Operations and Relation on numbers	35	8	6	1	-	4.5
3.7 Irrational numbers	8	1	25	6	10	2.8
3.8 Order, operations and properties of whole numbers and positive rational numbers	38	22	3	2	5	3.9
3.9 The order and relation of real numbers	10	10	12	9	9	3.1
3.10 Intervals on real numbers	-	3	13	22	12	2.1
						Aggregate mea 3.8

Table VI above indicates the responses of primary school mathematics teachers regarding the inclusion of the contents related to numbers and numerals in primary school mathematics. The aggregate mean value of the 10 items is 3.8.

This implies that numbers and numerals related contents that are found in TTI Mathematics curriculum material are on average included in primacy school Mathematics. However, close investigation of each items in the table reveals that there are sub contents that are rated below the average point taken for relevance. Included are: different number systems (mean = 2.8), irrational and rational numbers (mean = 2.8), and intervals on real numbers (mean = 2.1). This implies that these sub contents of TTI Mathematics lack direct relation with the teaching of primary school mathematics.

Table VII

The Inclusion of Ratios, Proportion and Percents in Primary School Mathematics Curriculum (Teachers Response)

Items	Fervency inhale scale					
	5	4	3	2	1	Mean
4.1 Ratio	5	20	5	6	14	2.9
4.2 Proportion	5	13	12	6	14	2.8
4.3 Per- cent	20	21	4	4	1	4.1
						Aggregate mean 3.6

As shown in table VII above, the responses of primary school teachers confirm that the inclusion of contents related to ratio proportion and percents in primary school mathematics is above the average point 3. However, the close

observation of individual items reveals that there are two items that are rated below the average point 3.0. These are ratio (mean = 2.9) and proportion (mean = 2.8). This implies that the inclusion of contents related to ratios and proportions in the TTI Mathematics curriculum is meaningless unless they are happen to be reflected in the primary school mathematics curriculum.

Table VIII

Inclusion of Equations and Inequalities Related Contents in Primary School Mathematics Curriculum (Teachers Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
5.1 Solution sets of equations and in equalities	22	21	6	1	-	4.3
5.2 Solving equation of one variable	24	18	3	4	1	4.2
5.3 Solving linear equations by drawing graphs	9	10	15	6	10	3.0
5.4 Solving word problems	22	21	3	1	3	4.2
5.5 Solving inequalities of one variable	21	19	3	2	5	40
5.6 Solving systems of simultaneous equations	3	5	11	16	15	2.3
5.7 Solving 2^{nd} degree equations of the one variable	3	10	6	16	15	2.4
						Aggregate mean 3.5

In the table VIII above, primary school mathematics teachers were asked to rate the contents of TTI Mathematics that are related to equations and inequalities in relation to primary school mathematics. According to their responses obtained, the inclusion of contents related to equations and inequalities in primary school has an aggregate mean value of 3.5. This implies that the contents related to equations and inequalities are satisfactorily contained in primary school mathematics. But, the close observation of individual items in the table reveals that there are some sub contents that have the mean values below the average (3.0). These sub contents are solving systems of simultaneous equation (mean 2.3) and solving 2^{nd} degree equation (mean 2.4). Hence, these subcontents, have no direct significance to the teaching of primary school mathematics.

Table IX

Inclusion of Plane and Solid Geometry Contents In Primary School Mathematics Curriculum (Teachers Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
6.1 Point, Straight line and plane	32	9	4	1	4	4.3
6.2 Straight line, line segment and rays	30	20	-	-	-	4.6
6.3 Parallel lines	27	20	1	1	1	4.4
6.4 Drawing straight lines (e-g bisecting line segment, drawing perpendicular line to the given one etc)	7	8	12	13	10	2.8
6.5 Measuring classification and identifying the relations of angles	8	11	15	6	10	3.0
6.5 The reflection translation and rotation of figures and the common properties of the three movement	-	2	14	22	12	2.1
6.7 Polygons (triangle and quadrilaterals)	22	16	7	2	3	4.0
6.8 Congruency of triangles and drawing triangles	8	11	15	6	10	30
6.9. Circle and angles, and polygons and circle	3	5	11	16	15	2.3
6.10 The area and perimeter of plane figures (square, rectangle, triangle, parallelogram & trapezoid)	9	10	9	10	12	2.9
6.11 Solid geometry (prism, cylinder, pyramid, cone and sphere)	7	8	12	13	10	2.8
6.12 Calculation of the volume and area of different solid figures	5	5	12	14	14	2.5
						Aggregate mean = 3.2

Table IX above contains the responses of primary school teachers about the inclusion of contents related to plane and solid geometry. The aggregate mean value of their responses is 3.2 which implies that the inclusion of the contents related to plane and solid geometry is above the average point 3.0. This implies that these contents are satisfactorily included in primary school Mathematics.

However, the close examination of individual items reveals that there are sub contents that are rated below the satisfactory point (3.0). These items include, drawing straight lines (perpendicular lines, bisecting lines etc, mean = 2.8) area and perimeter of plane figures mean = 2.9), solid geometry mean =2.8) and the calculation of the volumes and areas of different solid figures mean=2.5). This implies that these contents are not well treated in the primary school Mathematics. Hence, unless they are not treated well, there is no importance to put them in the TTI Mathematics curriculum.

Table X

Inclusion of Contents Related to Statistics and Probabilities in Primary School Mathematics Curriculum. (Teachers Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
7.1 Descriptive Statistics	-	7	15	15	13	2.3
7.2 Presentation of Data	8	11	15	6	10	3.0
7.3 Statistical values	13	11	12	9	5	3.4
7.4 Presentation of data on graphs	8	7	19	6	10	2.9
7.5 Probabilities	-	2	14	22	12	2.1
						Aggregate mean 2.7

Table X above indicates that responses of primary school teachers regarding the incorporation of the contents related to statistics and probabilities in primary school mathematics curriculum materials . The aggregate value of the 5 items is found to be 2.7 wh.ch is below the average point 3. This implies that the inclusion of contents related to probabilities and statistics in the TTI Mathematics curriculum material is meaningless unless it is gives an appropriate coverage in the primary school Mathematics.

As a whole, as seen from the tables IV - X and from the responses obtained in the open ended questionnaire and from the discussion conducted with

mathematics expert, (See Appendix H) the following are the contents that are found in the TTI mathematics teaching materials but has less or no relevance to primary school mathematics teaching.

- Logic
- Complements of sets
- Cartesian products
- Absolute value
- Different number systems (Roman number, Greek number, etc.)
- Base numerations other than base 10 (base five, base two, etc.)
- Irrational and rational numbers
- Intervals on real numbers
- Ratio and proportion
- Solving system of simultaneous equation
- Solving 2nd degree equations of one variable
- Bisecting lines, drawing perpendicular lines
- Reflection, translation and Rotation
- Circle and polygons
- Area and perimeter of plane figures
- Prisms, cylinder, cone and sphere
- Volumes of different solid figures

- Descriptive statistics
- Presentation of data on graphs
- Probabilities

As discussion held with respondents the above contents are more related to secondary and tertiary education level. Therefore, attempts must be done to incorporate or to give enough emphasis so that these contents are reflected in primary school Mathematics satisfactorily. Otherwise, according to Bishop (1986) the TTI Mathematics curriculum should forget the frills and fancies and focus on those absolutely essentials.

4.2.3 The Contents Of Primary School Mathematics Teaching Materials

Since grade 4 is the last grade for the first cycle primary level and the contents of grades 1 to 3 are consolidated in this grade, grade 4 mathematics contents are taken for the analysis of the study. These contents and sub contents are presented in the last part of the questionnaire prepared for TTI instructors. (See Appendix B). Here, instructors were asked to rate these contents to show the degree of their relevance to the teaching of TTI mathematics curriculum. Accordingly, the data obtained from the instructors is presented in the following four tables (Table XI, XII, XIII, XIV,).

Table XI

Inclusion of Whole Number Related Contents in the Training

(Instructors Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
1.1 Tables of numbers	-	2	3	3	-	2.8
1.2 Powers of 10 & their multiples	-	6	-	1	1	3.4
1.3 Operations on multiples of 10	1	5	1	-	1	3.6
1.4 Whole numbers up to 1,000,000	2	2	2	1	1	3.4
1.5 Order of whole ramblers up to 1,000,000	1	4	-	2	1	3.3
1.6 Addition & subtraction on whole numbers up to 1,000,000	1	4	1	2	-	3.5
1.7 Units of length	2	3	3	-	-	3.9
1.8 Units of length and writing in decimals	1	6	1	-	-	4.0
1.9 Comparison and putting whole numbers in to order (up to 1,000,000)	1	4	1	1	1	3.4
1.10 Equalities and inequalities	5	2	-	1	-	4.4
1.11 Numbers greater than 1,000,000	-	4	3	-	1	3.3
1.12 Unit of mass	-	1	3	4	-	2.6
1.13 Sequence of whole numbers	2	5	-	-	1	3.9
1.14 Comparison of more numbers	2	3	2	-	1	3.6
1.15 Unit of time	-	-	5	2	1	2.5
1.16 Equations that contains multiples	1	4	2	1	-	3.6
1.17 Approximate measurement	3	-	4	1	-	3.6
1.18 Rounding off whole numbers	2	5	1	-	-	4.1
1.19 Approximate operation on products	-	3	1	2	2	2.6
1.20 Approximate operation on quotients	-	3	2	2	1	2.9
1.21 Whole numbers on number rays	1	7	-	-	-	4.1
1.22 Bar graphs	-	2	2	4	-	2.8
1.23 Coordinate plane	-	3	2	-	3	2.6
					Aggregate mean	= 3.4

Table XI indicates that the responses of mathematics instructors regarding the incorporation of the whole number related contents in the training activities. Mean while, the aggregate mean value of the 23 items is found to be mean 3.4, which is above the mid point (mean = 3.0). This implies that whole number related contents that are found in primary School Mathematics curriculum materials are on average included in the training. However, a close examination of the individual items in table X reveals that, of the whole numbers related sub contents, the following are rated below the average: table of numbers (mean = 2.8), unit of mass (mean = 2.6), unit of time (mean = 2.5), approximate operation on products (mean = 2.6), approximate operation on quotients (mean = 2.9), bar graphs (mean = 2.8) and coordinate plane (mean = 2.6). From these one can understand that the inclusion of these sub contents is limited in the training which may negatively affect the performance of the would be teachers.

Table XII

Inclusion of the Four Fundamental Operations in the Training

(Instructors Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
2.1 Addition & substratum of whole numbers	3	5	-	-	-	4.4
2.2 The properties of addition and subtraction	3	4	-	-	1	4.0
2.3 Word problems and equations	5	3	-	-	-	4.6
2.4 Addition & subtraction	1	4	1	1	1	3.4
2.5 Problems on more addends & subtrahends	1	1	3	3	-	3.0
2.6 Multiplication of whole numbers	4	3	1	-	-	4.4
2.7 Properties of multiplication	4	3	-	-	1	4.1
2.8 Distributive properties	2	4	-	1	1	3.6
2.9 Multiplication involving carrying	1	2	1	3	1	2.9
210 Multiplication by powers of 10	1	5	1	-	1	3.6
2.11 Multiplication by distributed two or more digital numbers	-	2	1	3	2	2.4
2.12 Division of whole numbers	2	6	-	-	-	4.3
2.13 Divisibility of whole numbers	5	3	-	-	-	4.6
214 Division with remainder	2	4	-	1	1	3.6
2.15 Division by one digit number involving borrowing	2	3	1	2	-	3.6
2.16 Division of quantity or magnitude	1	3	1	3	-	3.3
2.17 Computation of averages	-	3	1	2	2	2.6
2.18 Division of approximate values	-	3	1	3	1	2.8
2.19 Division by multiples of 10 involving borrowing	-	3	1	3	1	2.8
2.20 Division by non multiples of 10 having two digits	3	2	-	3	-	3.3
						Aggregate Mean = 3.6

Table XII above comprises the responses of instructors regarding the incorporation of the contents related to the four fundamental operations in the training of Mathematics. The aggregate mean value of the 20 items is found to be 3.6, which is above the satisfactory point 3.0. This implies that contents related to the four fundamental operations that are found in primary school Mathematics curriculum materials are on average included in the training.

However, the careful observation of each item indicates that there are some sub contents related to the four fundamental operations, which are rated below the average point 3. These include multiplication-involving carrying (mean = 2.9), multiplication by distributed two or more digital numbers (mean = 2.4), computation of averages (mean = 2.6), division of approximate values (mean = 2.8), division by multiples of 10 involving borrowing (mean = 2.8). From this one can fairly conclude that the coverage of these contents in the training program is very limited which can negatively affect the career of would be teachers in the future.

Table XIII

Inclusion of Geometry Related Contents in the Training
(Instructors Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
3.1 Points and positional relation of straight lines	2	5	-	1	-	4.0
3.2 Positional Relation of two Straight lines	5	2	1	-	-	4.5
3.3 Rays	6	2	-	-	-	4.8
3.4 Extending and copying line segments	3	4	-	1	-	4.1
3.5 Comparison of line segments	1	4	2	1	-	3.6
3.6 Plane	2	3	2	1	-	3.8
3.7 Lines that indicate direction	1	3	2	1	1	3.3
3.8 Translation	3	2	1	1	-	3.9
3.9 Translation and direction of translation	3	1	3	1	-	3.8
3.10 Images on translations	4	1	1	2	-	3.9
3.11 Properties of translation	4	1	1	2	-	3.9
3.12 Images of figures on translation	4	2	1	1	-	4.1
					Aggregate mean	= 4.0

Table XIII above indicates the responses of TTI instructors about the inclusion of contents related to geometry in the training activities. Accordingly, the mean values of the 12 items are found to be 4.0. In addition to this, there is no single item that has the mean value below the average point. This implies that those contents related to geometry found in primary school Mathematics curriculum are well treated in the training program of mathematics course in the TTI.

Table XIV

Inclusion of Positive Rational Numbers in the Training

(Instructors Response)

Items	Frequency in each scale					
	5	4	3	2	1	Mean
4.1 Fractions of a whole	5	3	-	-	-	4.6
4.2 Comparison and putting in order those fractions with the sane denominators	4	4	-	-	-	4.5
4.3 Equivalent fractions	5	3	-	-	-	4.6
4.4. Decimals and decimal fractions	5	2	1	-	-	4.5
4.5 Positive rational numbers	4	3	1	-	-	4.4
4.6 Converting fraction to decimals and vice versa	5	2	-	1	-	4.4
4.7 Comparisons of decimals and putting them in order	5	2	1	-	-	4.5
4.8 Addition of fractions with the same denominator	3	2	1	1	1	3.6
4.9 Addition and subtraction of decimals	3	4	1	-	-	4.3
						Aggregate Mean = 4.4

Table XIV above indicates that the responses of TTI mathematics instructors about the inclusion of contents related to positive rational numbers in the

training activities. The aggregate mean value of the 9 items in the table is 4.4 which implies that the contents related to positive rational numbers are given an appropriate emphasis to enable trainees to teach these contents in the primary school.

As a whole, according to the discussion held with TTI mathematics instructors and mathematics experts in the REB a primary school mathematics teachers to perform what is expected of them confidently, the above contents if primary school mathematics must be treated to the maximum in TTIS, They further suggest that, other than treating those irrelevant contents in the TTIS, all the centents of primary school mathematics need to give the necessary coverage so that tha would - be - teachers would have the capacity to perform confidently in the place of their assignment.

4.2.4 The Suggested Methods to teach Mathematics In The TTI And Primary Schools

The suggested teaching methods of TTI mathematics are dominated by the lecture of the instructors whereby he/she discuss, shows, and explains things to trainees so that they become able to memorize all the facts.

On the other hand, those teaching methods suggested in primary school mathematics syllabi emphasize the assignment of daily exercises to children as a means for the permanent fixation of basic knowledge, abilities and skills of arithmetic and geometric instructions. This in turn leads to the development of critical thinking in the learner and gives ample opportunities to solve problems hence, problem solving approach is maintained. The suggested methods of teaching mathematics in the TTI and primary only. Can be summarized as in the table below Table XV.

Table XV

Methods to Teach in TTIs	Methods to Teach in Primary Schools
• Opening discussion of different topics with trainees • Using different questions prior to a new concept • Showing how to solve equations, inefualities, problems, exercises, etc. • Showing Ven-diagram on set operations and different figures to discuss geometrical figures • Discussing the advantage of teaching-learning mathematics.	• Carrying out daily exercises • Motivating and relating the contents to pupil`s knowledge and experience • Applying oral and written calculation • Sequencing exercises from simple to complex • Encouraging pupils independent work • Systematically develop pupil`s abilities to find the necessary steps of procedures of solving word problems • Encouraging the exact use of appropriate terminology and sybmols for solving algorithms in oral and written calculation

Source, ICDR, 1990 (See Appendix E and F for the details)

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Table XV

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• Opening discussion of different topics with trainees • Using different questions prior to a new concept • Showing how to solve equations, inefualities, problems, exercises, etc. • Showing Ven-diagram on set operations and different figures to discuss geometrical figures • Discussing the advantage of teaching-learning mathematics.	• Carrying out daily exercises • Motivating and relating the contents to pupil`s knowledge and experience • Applying oral and written calculation • Sequencing exercises from simple to complex • Encouraging pupils independent work • Systematically develop pupil`s abilities to find the necessary steps of procedures of solving word problems • Encouraging the exact use of appropriate terminology and sybmols for solving algorithms in oral and written calculation

Source, ICDR, 1990 (See Appendix E and F for the details)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This final chapter deals with the summary, the conclusion, drawn from the major findings of the study, and the recommendations made on the basis of the study.

5.1 Summary

5.1.1. The Objectives and Methodology of the Study

The major objective of this study was to examine and assess the relevance of TTI mathematics teaching material with primary school mathematics, teaching material in the Southern Nations, Nationalities and People's Regional Government.

In order to achieve the above objective basic questions were raised regarding the relevance of TTI mathematics to primary school mathematics, the attitudes of both mathematics instructors in the TTIs and primary school mathematics teachers about the two materials and about some of the major factors that centribute for the mismatch of the TTI and primary schools mathematics curriculum materials.

The study was carried out in the two TTIs found in the region using availability sampling method. The two zones included in the study Wolaita and Kaffa were chosen on the basis of purposive sampling. Sample Primary schools were chosen using purposive sampling method. To collect first hand data two types of questionnaires were prepared-one for TTI mathematics instructors and the other for primary school mathematics teachers. The first group of the study consisted eight instructors while the second group consisted fifty primary school mathematics teachers. A total collection of completed usable questionnaires was fifty-eight in numbers. There was also structured interview conducted with Mathematics experts in REB.

In the review of related literature, views of many researchers and practitioners on related topics such as what is curriculum relevance? The characteristics of curriculum relevance in terms of language, culture and society, learners' interest and need, appropriate teaching methods and the curriculum of teacher training were reviewed.

The data obtained through questionnaires were organized and tabulated in frequency distribution table so that some statistical tools such as percentages and mean values were calculated and analyzed. Finally, the following major findings were reached upon.

5.1.2 Findings

1. There is strong relationship between the objectives of TTI Mathematics syllabus and that of primary school Mathematics.
2. The majority of TTI Mathematics instructors group have rated the contents of primary school Mathematics curriculum to be relevant to TTI Mathematics teaching material.
3. When closely observed, there are some sub contents from primary school Mathematics that were rated below the satisfactory point 3 to be relevant to TTI mathematics. These include tables of numbers, unit of mass, unit of time approximate operation on products and quotients, bar graphs coordinate plane, and others.
4. The TTI Mathematics teaching materials gives more emphasis to the contents than methods.
5. There were no dictionaries or glossaries prepared in nationality languages that could enrich instruction in the primary schools as well as in TTIs.
6. The contents of TTI Mathematics were more related to secondary high schools Mathematics than primary schools.
7. Out of the total of seven chapters of TTI Mathematics teaching materials four chapters (3,4,5, and 6) were found to have the mean values that were greater than the accepted point for agreement to be relevant with primary school Mathematics. On the contrast, the three chapters (1,2 and 7) have the

mean values which were below the accepted one for agreement. As a whole there are a significant number of contents that were found in the TTI Mathematics teaching material that have no direct relation with primary school mathematics.

8. Some terminology were found to be inconsistency when text books were translated into nationality languages, i.e., one concept was expressed in different words at different grades. For example, the name given to concept "angle " in Kafeneno language varies in grade 3 and 4.
9. It was found that there are primary school Mathematics teachers who have got their training in Amharic medium but teaching in the nationality languages.
10. It was mentioned that in the region, there were a significant number of teachers who had no exposure for the newly adopted mathematics curriculum but implementing it in schools.

5.2. Conclusion

Based on an analysis of the data and the findings of the study, the following major conclusions are derived:

1. Curriculum relevance is the state of the intimate relationship between what children learn in school and the major life realities in the society. To

promote these, teachers must be trained according to what they are going to perform in their future career. In this regard, although primary school Mathematics contents are relevant to TTI Mathematics teaching material, there are some contents that were treated in TTIs but not in primary school Mathematics.

2. From the data collected, there were a significant number of contents that were contained in TTI Mathematics teaching material but never appeared in primary school Mathematics. Although these contents had no direct relevance to primary school Mathematics, it was reasonable to conclude that they were made to be included in TTI Mathematics in order to develop the mathematical ability of trainees.
3. It is a common understanding of educators that implementation of curriculum changes require training. However, the effort made to prepare TTI instructors to teach in the nationality languages was non-existence. Furthermore, it was safe to conclude that it was because of lack of training we see the inconsistency of terminolgies given to the some concepts at different grade levels. The absence of glossaries or dictionaries prepared in the nationality languages worsen the problems of variations of words for a single concept.
4. Regarding the way contents of teacher training should be taught, several studies indicate that would be teachers should be taught by the same method

which they will be expected to use in their future career. Accordingly, to teach primary school children, giving more attention to the methodology part is more important than the content part, Since the TTI Mathematics teaching material gives more attention for the contents than the methods, this has influenced primary school Mathematics teachers to conduct lecture dominated presentation.

5. To teach in nationality languages after being trained in Amharic medium can create frustration and confusion for primary school mathematics teachers to implement whatever relevant and appropriate curriculum.

5.3 Recommendations

In view of the findings of the study and the conclusions drawn, the following recommendations are provided:

1. As it was said time and again the would be teachers must be trained in line with what they are expected to perform in their future career. They must not be considered as secondary or tertiary level students to be full of information or knowledge. Rather as a dealer with school children and should be equipped with the ability of presenting one single concept using different methodologies. Hence, TTI Mathematics teaching material need to be concentrate more on methodologies than contents.

2. In order to ensure curriculum relevance of the TTI and primary school Mathematics, consideration must be given not to treat those concepts that are presented in one but not in the other. Contents of TTI Mathematics that were identified not to be treated in any one of the primary school Mathematics must be discarded. However, co-curricular activities may be organized in the form of Mathematics club to widen the Mathematical abilities of trainees. Similarly those contents that appeared in the primary school Mathematics text must appear in the TTI Mathematics so that relevance will be maintained.
3. Since teachers are the backbone of the whole education program, their education becomes the focal point and the vital factor affecting the quality of education. They must posses a considerably deeper knowledge of the subject they are going to teach. This is possible when the teacher trainers themselves have a deeper knowledge about the subject they are teaching. Therefore, TTIs must be staffed with instructors who have the necessary qualification for the level. Trainers must also qualify to be the minimum of 'leading teacher' in the newly adopted career structure of teachers.
4. As the deliverer of the curriculum to students, the teacher has a role recognized as being critical to the success of the curriculum. They must implement without any frustration and confusion. Therefore, primary school

teachers need to be trained in the medium of instruction that they are going to use at school.

5. It is seriously advisable to have training for primary school mathematics text book writers, translators and for others who take part in developing the curriculum so that they will be capable of using appropriate words, illustrations diagrams and the like to make it fit for the needs and interests of school children.
6. TTI principals, REB officials, and other concerned educators should take all the necessary steps to have females as instructors in the training institutes so as to promote female participation in every educational activities.

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APPENDICES

APPENDICES

Appendix A

Addis Ababa University
School of Graduate studies
Faculty of Education

Department of curriculum and Instruction
(Questionnaire prepared for Primary school mathematics Teachers)

PART ONE

The purpose of this questionnaire is to collect information about the relevance of primary school mathematics to the training of mathematics in the TTI. The information secured through this questionnaire will be used only for the research purpose. I, therefore, kindly request you to provide genuine information for it highly determines the success of the study.

Thank you in advance
for your cooperation

(N.B. it is not necessary to write your name.)

PART TWO

Direction: please put mark 'X' for all your correct responses in the space provided with the exception of questions that require written response.

1. Name of the institute you have taken your training.

   A. Arbamich TTI _____ B. Bonga TTT_____

2. Sex A. Male _____ B. Female _____
3. Total years of service in the profession
   A. 1-5 _____ D. 16-20 _____
   B. 6-10_____ E. 20 and above _____
   C.10-25_____
4. What was the language of instruction during your Training program?
   A. Nationality language _____ B. Amharic _____
5. Are the language of instruction of your training and the language of instruction in your school the same? A. Yes _____ B. No_____

6. If your answer for question No.'5' is 'No' please mention some of the problems (if there are any) due to this mismatch in the space provided._____
_____
_____
_____
_____

7. Are there any contents of TTI mathematics that are not treated in primary school mathematics?
   A. Yes _____ B. No _____

8. If your answer for question no. 7 is 'yes' please mention these topics/concepts in the space provided. _____

_____

_____

_____

_____

9. Are these any contents in primary school mathematics that you face difficulty to teach?

A. Yes _____ B. No _____

10. If your answer for question no. 9 is 'Yes' please mention some of these contents in the space provided_____

_____

_____

_____

_____

PART THREE

The following are the contents of TTI mathematics curriculum. Please, indicate your agreement by putting a 'X' mark in one of the five alternatives given: (Strongly agree = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree = 1) to show their relevance to the teaching of primary school mathematics.

Chapter One	**Frequency in each scale**				
	5	**4**	**3**	**2**	**1**
1.1 Proposition					
1.2 Open proposition					
1.3 Connectives					
1.4 Negation					
1.5 Conjunction					
1.6 Disjunction					
1.7 Implication					
1.8 Bi- implication					
1.9 Compound proposition					
1.10.Equivalent compound proposition					
1.11 Quantifiers					
1.12 Deductive & Inductive Logic					

Chapter Two					
2.1 Set and set notation					
2.2 Finite and Infinities					
2.3 Venn diagram					
2.4 Equal sets					
2.5 Sub sets					
2.6 Equivalent sets					
2.7 Union of sets					
2.8 intersection of sets					
2.9 Complements of sets					
2.10 Cartesian products					
Chapter Three					
3.1 Different number systems					
3.2 Counting and whole numbers					
3.3 Divisibility					
3.4 Factors and multiples					
3.5 Fractions					
3.6 Operations and Relation on numbers					
3.7 Irrational numbers					
3.8 Order, operations and properties of whole numbers and positive rational numbers					
3.9 The order and relation of real numbers					
3.10 Intervals on real numbers					
Chapter Four					
4.1 Ratio					
4.2 Proportion					
4.3 Per- cent					
Chapter Five					
5.1 Solution sets of equations and in equalities					
5.2 Solving equation of one vain able					
5.3 Solving linear equations by drawing graphs					
5.4 Solving word problems					

5.5 Solving inequalities of one variable					
5.6 Solving systems of simultaneous equations					
5.7 Solving 2nd degree equations of the one variable					
Chapter Six					
6.1 Point, Straight line and plane					
6.2 Straight line, line segment and rays					
6.3 Parallel lines					
6.4 Drawing straight lines (e-g bisecting line segment, drawing perpendicular line to the given one etc)					
6.5 Measuring classification and identifying the relations of angles					
6.6 The reflection translation and rotation of ;one figures and the common properties of the three movement					
6.7 Polygons (triangle and quadrilaterals					
6.8 Congruency of triangles and drawing triangles					
6.9. Circle and angles and polygons and circle					
610 The area and perimeter of plane figures (square, rectangle, triangle, parallelogram & trapezoid					
6.11 Solid geometry (prism, cylinder, pyramid cone and sphere)					
6.12 Calculation of the volume and area of different solid figures					
Chapter Seven					
7.1 Descriptive Statistics					
7.2 Presentation of Data					
7.3 Statistical values					
7.4 Presentation of data on graphs					
7.5 Probabilities					

2Y

PART FOUR

Please, forward your general comments regarding the relevance of primary school mathematics teaching to the training of mathematics in TTIs _____

_____

_____

_____

_____

_____

Appendix B

Addis Ababa University
School of Graduate studies
Faculty of Education

Department of curriculum and Instruction
(Questionnaire prepared for TTI mathematics instructors)

PART ONE

The purpose of this questionnaire is to collect information about the relevance of TTI mathematics to the teaching of the some subject in the primary schools of grades 1 to 4 the information secured trough this questionnaire will be used only for the research purpose. I, therefore, kindly request you to provide genuine information for it highly determines the success of the study.

Thank you in advance for
your cooperation

(N.B. it is not necessary to writ your name)

PART TWO

Direction: please put a mark/x/ for all your correct responses in the space provided with the exception of questions that require written responses.

1. your qualification:-
   A. College diploma _____ B First degree _____
   C. Second degree _____ D. Other specify _____

2. Sex; A. Male _____ B. Female _____
3. Yours years of experience as trainer of teacher:
   A. 1-5 _____ B. 6-10 _____ C. 11-15 _____
   D. 16-20 _____ E. 20 year and above _____
4. Place of work A. AMTTI _____ B. Bonsa TTI _____
5. The language of instruction you are using is
   A. Nationality language _____ B. Amahric _____

6. Have your ever faced any problem because of the language of instructional?
   A. Yes _____ B. No _____
7. If 'Yes' please, mention some of these problems_____
_____
_____
_____
_____
_____
_____

8. Have you ever examined primary school mathematics?
   A. Yes, _____ B. No _____

9. If your answer for the question '8' is yes, please indicate the areas/contents/ that are not treated in TTI mathematics

A. _____ F. _____
B. _____ G. _____
C. _____ H. _____
D. _____ I. _____
E. _____ J. _____

(N.B if need be, use the back side of this page)

10. How do you see the relationships of the suggested teaching methodology in the syllabi of TTI and primary school mathematics .

A. Very strong _____ D. Weak _____
B. Strong _____ E. Very weak _____
C. I can't decide _____

PART THREE

The following are the consolidated mathematics contents of grades 1 to 4. Please indicate your agreement by putting a 'X' mark in one of the five alternatives given: (Strongly agree = 5, agree = 4, undecided = 3, disagree = 2 and strongly disagree =1) to show the relationship with TTI mathematics contents.

Chapter One	**Frequency in each scale**				
	5	**4**	**3**	**2**	**1**
1.1 Tables of numbers					
1.2 Powers of 10 & their multiples					
1.3 Operations on multiples of 10					
1.4 Whole numbers up to 1,000,000					
1.5 Order of whole ramblers up to 1,000,000					
1.6 Addition & subtraction on whole numbers up to 1,000,000					
1.7 Units of length					
1.8 Units of length and writing in decimals					
1.9 Comparison and putting whole numbers in to order (up to 1,000,000)					
1.10 Equalities and inequalities					
1.11 Numbers greater than 1,000,000					
1.12 Unit of mass					
1.13 Sequence of whole numbers					

1.14 Comparison of more numbers					
1.15 Unit of time					
1.16 Equations that contains multiples					
1.17 Approximate measurement					
1.18 Rounding off whole numbers					
1.19 Approximate operation on products					
1.20 Approximate operation on quotients					
1.21 Whole numbers on number rays					
1.22 Bar graphs					
1.23 Coordinate plane					
Chapter Two					
2.1 Addition & substratum of whole numbers					
2.2 The properties of addition and subtraction					
2.3 Word problems and equations					
2.4 Addition & subtraction					
2.5 Problems on more addends & subtrahends					
2.6 Multiplication of whole numbers					
2.7 Properties of multiplication					
2.8 Distributive properties					
2.9 Multiplication involving carrying					
210 Multiplication by powers of 10					
2.11 Multiplication by distributed two or more digital numbers					
2.12 Division of whole numbers					
2.13 Divisibility of whole numbers					
214 Division with remainder					
2.15 Division by one digit number involving borrowing					
2.16 Division of quantity or magnitude					
2.17 Computation of averages					
2.18 Division of approximate values					
2.19 Division by multiples of 10 involving borrowing					
2.20 Division by non multiples of 10 having two digits					
Chapter Three					
3.1 Points and positional relation of straight lines					
3.2 Positional Relation of two Straight lines					

3.3 Rays					
3.4 Extending and copying line segments					
3.5 Comparison of line segments					
3.6 Plane					
3.7 Lines that indicate direction					
3.8 Translation					
3.9 Translation and direction of translation					
3.10 Images on translations					
3.11 Properties of translation					
3.12 Images of figures on translation					
Chapter Four					
4.1 Fractions of a whole					
4.2 Comparison and putting in order those fractions with the sane denominators					
4.3 Equivalent fractions					
4.4. Decimals and decimal fractions					
4.5 Positive rational numbers					
4.6 Converting fraction to decimals and vice versa					
4.7 Comparisons of decimals and putting them in order					
4.8 Addition of fractions with the same denominator					
4.9 Addition and subtraction of decimals					

PART FOUR

Please, forward your general comments regarding the relevance of TTI mathematics to the teaching of primary school mathematics in the space provided.

_____

_____

_____

_____

_____

Appendix-C

Objectives of TTI Mathematics

A. General Objectives

- Enabling trainees to teach mathematics at the grade levels 1-4.
- Enabling trainees to relate mathematics to the objective conditions of primary school children
- Enabling trainees with different kinds of teaching methodology
- Developing problem solving skills so that trainees will solve their problems as well as the problem of their students in the future.

B. Specific Objectives

- Conceptualize what mathematics in and its advantages.
- Recognize logics, do different exercises and prove theorem based on the topic.
- Define set, express it in different ways and identify the type and relationship of different sets.
- Identify the difference between numbers and numerals and indicate the place values of digits.
- Differentiate whole numbers, rational numbers, irrational numbers and be able to locate them on number line.
- Develop skills required to find factors and multiples of numbers and calculate GCF and LCM.
- Apply intervals on real numbers and show the relationship of different sets of numbers on the Ven-diagram.
- Identify the relationship of ratio proportion and percent
- Explain the historical background of algebra
- Develop skills required to solve equations and inequalities with one variable, system of simultaneous equations with two variables and quadratic equation of one variable.
- Develop the fundamental concepts of plane geometry.
- Explain the relation between rays and angles, identify different kinds of polygons suchas triangle, rectangle, square trapezium and parallelogram.
- Differentiate transformation, reflection and rotation.
- Identify the relationship of circle, angles and straight lines.
- Develop the skills required to calculate area and perimeter of different plane figures.

- Explain the different properties of solid figures and calculate their volumes.
- Develop the skills required to collect, organize and interpret data.
- Be able to find the probability of the occurrence of events.
- Develop a positive attitude toward mathematics and recognize that sex variation has nothing to do with mathematical abilities.
- Compare the contents and objectives of primarily school mathematics with TTI mathematics.
- Expose trainees to variety of methodologies to teach primary school mathematics and be able to produce teaching aid materials from locally available materials. (Source ... TTI, Mathematics Syllabus 1990)

Appendix D

Objective of Grade 4 Mathematics

The objectives of grade 4 mathematics, as put in the syllabus, can be summarized as follow:

A. General Objectives

- Strengthen and extending the knowledge and capability acquired by pupils in grades 1 to 3
- To develop pupils capability in calculating with positive whole number, rational numbers and decimals with confidence.
- Familiarizing with the concept of translation and be able to carryout simple geometric construction neatly and clearly.
- ~~Be able to~~ solve simple problems independently by using mathematical means.
- Helping pupils to improve their lings tic expressions with respect to the exact use of mathematical terminologies and symbols.
- Develop the habit of representing and arranging the solution process in a clear manner, checking the correctness of the results gained.
- To help pupils learn mathematic with pleasure and interest, develop self- confidence in working efficiently.

B. Specific objectives

- Represent whole numbers and express them as some of multiples of powers of 10
- Compare and order whole numbers and determines the successors and predecessor (except for 0) of any given whole number.
- Distinguishing the relationship that exist among the four main operations. reality the commutative and associative properties of

- know the important properties of translation and be able to identify and construct images of given geometrical figure , points, straight lines, and other simple closed figures.
- Describe simple mathematical problems explain reason out simpe mathematical statements or chosen solution procedures (algorithms).
- Represent parts of a whole number by fraction (and vice versa) and determine simple fraction, involving quantities.
- Order add and subtract fractions with like denominators and add subtract decimal fraction
- Acquire solid abilities and skill sin working with the quantities of length mass and time and will also be to represent quantities in decimal form and convert quantities form one unit into another guide . (source Grade 4 Mathematics Syllabus, ICDR 1990)

addition and multiplication and the distributive property of multiplication over addition of whole numbers.

- addition and subtraction of two -digit numbers
- multiplication and division by 10, by 100 and by 1000.
- multiplication of one digit whole numbers by multiple of 10 (i.e 10,20,30...90) by multiple of 100 (I,e 100, 200 300,... 900) and the corresponding division .
- Division of two digit whole numbers by one digit with quotient,
- Multiplication of two whole numbers which are each multifold of 10 (i.e 20,30,40, ... 90).
- Division (with reminder different form zero) of whole numbers containing at least two digits by one -digit whole numbers .
- Acquire solid abilities and skills in written calculation with muli digit whole numbers including.
  i. addition of two or more addends
  ii. subtractions of one subtrahend
  iii. multiplication of two factors (whole numbers)
  iv. division by one and two digit divisors without or with remainder.

- Acquire skills in working with variable in terms, expression, equations, inequalities tables, and in solving word problems.
- Gain skills in working with positive rational numbers, specially those represented by decimals.
- Know important units of money, length, firme and mass and identify the important relations that exist among the units of the same quantity (magnitude)
- Solve word problems) with the development of skill in:

  i identifying the solution arguments
  ii Identify important and relevant number values
  iii using tables and graphical representations properly
  iv checking whether the results gained are correct or not.

- Name, describe and recognize different cases of positional relations existing between points and straight ling, between straight lives and straight line.
- Use drawing instruments to draw parallel and perpendicular lines and construct geometric shapes of parallelogram trapezium, rectangle and squares.

Appendix- E

The Suggested methodology to teach grade 4 mathematics

The following are summary of the major teaching methods suggested :

- Carrying out daily exercise' because carefully planned exercise are effective means for the permanent fixation of basic knowledge, abilities, and skills of arithmetic instruction.
- Similarly in geometric instruction there have to be adequate doily exercise which are aimed at ensuing the fundamental geometrical knowledge abilities and skills.
- Motivating and relating the content of instruction to pupils pervious knowledge and practical experience.

- Applying the following techniques when selecting and arranging exercise and problem for miscellaneous exercises:
    - involving different kinds of calculation procedures (i.e oral, written calculation)
    - sequencing exercises in evel of difficulty increasing (form simple to complex)
    - Involving different types of problems (word problems, problem with or with out variables , problems with solutions and without solution)
- Pupils' independent work has to be encouraged and further developed
- Challenging with the use of available knowledge in the acquisition of bew knowledge and creating relation with the previous knowledge.
- Special attention has to e paid to the systematic development of pupils abilities in finding the necessary steps of procedures of solving given word problems.
- Giving attention for on exact and clear representation of mathematical problems especially for solving algorithms in oral and written calculation. This include the exact use of appropriate mathematical terminology and symbolism (Source Grade 4 Mathematic syllabus ICDR 1990)

Appendix F

The Suggested Methodology to teach TTI Mathematics

The following are the summary of the major methods to teach mathematics at the TTI.

- Discussing different examples to show the advantages of studying mathematics.
- Using different questions that leads to logical reasoning and use tables of truth values to develop the concept of logic.
- Using different examples to indicate the difference between finite and infinite set.
- Letting trainees to compare and contrast the different ways of writing numbers.
- Asking trainees to tell about the difference of different set of numbers (e.g. whole number, rational number, irrational number).
- Using sets, show how to operate on numbers and discuss their order.
- Using sets, show how to find the multiples of whole number.
- Division of rectangles into small squares to teach fraction.
- Using Ven-diagram to help trainees to show the relation of set of numbers.
- Showing and discussing what proportions, rations and percentages are.
- Explaining the historical development of algebra and defining some new concept.
- Showing how to solve equations of one and two variables, and second degree equations using examples.
- Show how to write word problems into equations.
- Showing how to solve equations and inequalities.
- Showing the solution of equations on graphs.
- Showing the solution of inequalities using number lines.
- Discussing the advantage of studying geometry.
- Discussing points and straight lines
- Relating number rays and rays from the source of light
- Relating different objects in the surrounding to geometric figures, show how to construct models for geometric figure,
- Discussing the difference and similarities of different geometric figures.
- Discussing circle and lines that intersect at one point as well as at more than one points.
- Show how to find the area and perimeter of rectangle and square.
- Encourage trainees to differentiate the properties of solid figures and show how to calculate their areas and volumes.
- Show how to collect organize and interpret statistical data (eg. weight, height, age of trainees)

Appendix G

Teaching/Learning Aids from Local Materials

Item	Most important properties	Possible uses
tins	can be used as container, rigid and unbreakable, not transparent	water play, sinking and floating, weighing, germinating seeds
bottles and jars	can be used as container, rigid but breakable, transparent	use like tins, especially when it is necessary to see inside
bottle caps	small, separate, identical units, made of metal	for counting, weighing, sinking and floating, heating pans
seeds	small, separate, non-identical objects	for counting and estimation, sorting and classification, germination
matches	small, separate, identical objects, long and thin, made of wood	for counting and pattern making, a unit of length, can be dyed colors and used to make other objects
match boxes	cuboid shape, small container with drawer and cover	containers for small objects, for construction play, to measure (using long, medium and short sides)
plastic bags	flexible and transparent, holds liquid, air tight	containers, seed germination, improvised aquaria
pieces of wood	rigid, solid, can be worked	for weighing, rulers, sinking and floating
paper	flexible, flat, multiple colors and textures	to conceal objects, conduct electricity (if silver foil), drawing, writing, tearing, cutting, pasting
string, thread or yarn	flexible, thin, strong and continuous material	for measuring length and constructing other items

Community—One of the most important educational resources is the community or

[24] Taken from B. L. Young, Teaching Primary Science. 1979. London: Longman.

Appendix H

Addis Ababa University
School of Graduate studies
Faculty of Education

Department of curriculum and Instruction
(Interview to be Discussed with mathematics Experts in Education Bureau)

The purpose of the interview: The purpose of the interview is to collect some important data for the assessment of the syllabus of TTI and primary school mathematics so as to give suggestive ideas for this study. In this case, there is no doubt that your kind help is extremely invaluable to make the study reliable, valid and fruitful. Hence, you are kindly requested to give your frank opinion cooperatively on the basis of the following interviews.

Direction: Whenever you answer the following questions either positively or negatively please, give rationales for your answer.

Thank you for your Cooperation in Advance

1. Have you ever examined the TTI Mathematics syllabus?

   If Yes:

   are the objectives, contents and methods contained appropriate for training of primary school mathematics teacher?

2. Do you see any contents/ concepts that are irrelevant to primary school mathematics that are found in TTI Mathematics?

   If yes,

   Please, mention some of them?

3. Have you ever examined primary school mathematics teaching materials?

   If Yes,

   What do you comment about its relevance with TTI Mathematics Curriculum?

4. Do you think primary school mathematics teachers face difficulties in handling primary school mathematics?
5. If your answer for question "4" above is yes, do you think it is because of the deficiency in the training program? Explain?

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university and that all source of materials used for the thesis have been fully acknowledged.

KIFLEMARIAM BASSA

This thesis has been submitted for examination with my approval as university advisor.

Dr. MAREW ZEWDIE