The Effects of Groupwork on Mathematics Attainment
in Indonesian Primary Schools

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Abstract

The purpose of this study was to investigate the effects of pupils working in small groups on Mathematics attainment of year-three pupils in ten public primary schools in Palembang, Indonesia. In the intervention group, pupils carried out Mathematics exercises by discussing and helping each other in mixed ability groups while those in the comparison group did the Mathematics exercises individually.

This study used a non-equivalent control group design. To investigate the effects of the differences in classroom pedagogy, Mathematics test had to be devised and its validity and reliability established before the intervention research could be carried out. Children and teachers in the intervention and comparison groups were as similar as possible. In addition, short questionnaires for teachers and intervention group pupils were also administered to obtain their views about the new classroom pedagogy.

Differences on pupils' Mathematics attainment were investigated by assessing the pupils at two time periods: pre-test (at the beginning of the term) and post-test (at the end of the term). The views of teachers and intervention group pupils were collected at the end of the term. The main data analysis was conducted to assess the contribution of pre-test scores, intervention/comparison group, gender and school to children's post-test scores. The views of teachers and pupils were sought as part of post-intervention evaluation.

This study found that the pre-test was highly predictive of the outcome. After controlling for pre-test scores, children in the intervention group scored significantly higher than those in the comparison group. There were no gender differences but there were variations in the effectiveness of individual schools. All intervention group teachers reported that the

pupils learned more Mathematics under the intervention and most of them would use the method for future teaching practice. In addition, most of intervention group pupils liked to work in the small groups, liked to help each other and believed they learned more Mathematics in the small groups.

Acknowledgment

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Chapter One
Primary Schools in Indonesia

1.1 Introduction

This chapter begins with the description of the historical context of primary schools in Indonesia. In the first section, the development of primary school curriculum in Indonesia will briefly be described chronologically and its significant changes will be highlighted. The next section will deal with primary schooling as a part of compulsory basic education in Indonesia. Finally, the subject of the teachers, pupils and curriculum of Indonesian primary schools will be described respectively.

1.2 The Historical Context of Primary Schools in Indonesia

The focus in describing the historical context of primary schools in Indonesia will be on the curriculum development of Indonesian primary schools. It will begin from the first curriculum used in Indonesian primary schools right after independence of Indonesia to the current one.

Since independence, the curriculum of Indonesian primary schools has been revised six times: 1947 Lesson Plan, 1964 Educational Plan, 1968 Curriculum, 1975 Curriculum, 1984 Curriculum, 1994 Curriculum. Each revision on the primary school curriculum has constituted a statutory national curriculum. This means that once the new curriculum (the revised curriculum) is introduced and implemented, the previous curriculum has been automatically abandoned.

1947 Lesson Plan

The 1947 Lesson Plan was developed and introduced in Indonesian primary schools due to the status change of Indonesia from a colonised country to an independent one. The 1947 Lesson Plan

basically aimed to replace the colonial primary school curriculum in order that Indonesia as an independent country had its own national education and teaching system both in the forms of contents and framework. As Jasin (1987) said, the main reason of having the 1947 Lesson Plan was because the Indonesian government, legislative body and education experts agreed that Indonesia as an independent country and nation had to have an education and teaching system which had appropriate values and defined the state's needs both in the form of contents and framework. These were founded on the basis of Pancasila and the 1945 Constitution of the Republic of Indonesia.

'Pancasila' provides the national philosophy for Indonesia. The word refers to five principles ('Panca' = five) and 'Sila' means 'principle'. The values and needs of the nation are therefore based on five principles. They are (1) belief in the one and only God, (2) a just and civilised humanity, (3) the unity of Indonesia, (4) democracy led by the wisdom of deliberations amongst representatives, and (5) social justice for the whole of the people of Indonesia. These five principles are integrated and cannot be separated. In relation to primary education in Indonesia, these five principles should be integrated into the educational activities both directly and indirectly. Directly, the principles are taught under Moral Education of Pancasila and Civics Subjects (it began to be taught as a subject in 1968) and indirectly they are taught in all of the other subjects.

At primary school level, Pancasila is directly taught through giving the children simple examples. For example, how to appreciate other people with other religions (principle 1), how to be a good human being (principle 2), how to be a good Indonesian citizen (principle 3), how to co-operate with other people (principle 4), and how to be fair among the people (principle 5). All these principles are directly and indirectly taught from year one to year six.

On the basis of the 1945 Constitution of the Republic of Indonesia, the values and needs are particularly based on the ideas as stated in chapter 8, article 31, items 1 and 2: every citizen has the right to education, and the government shall establish and conduct a national educational system which shall be regulated by law.

Consequently, the development of the 1947 Lesson Plan was much more strongly influenced by the political changes that occurred in the period after the independence of Indonesia than by any change that was based on educational improvement alone.

The aims of primary schools in Indonesia on the basis of the 1947 Lesson Plan were that primary school pupils could slowly have responsibilities towards their own health, happiness, national life on the basis of One and only God and civilised humanity, and have stronger commitments towards their own physical and mental developments on the basis of cultural sublimity and prosperity (Jasin, 1987). This lesson plan was based on a subject oriented curriculum - each subject was taught independently in terms of teaching objectives, time allocation, teaching and learning materials, and evaluation - and rigidly specified allocation of time for each subject. The teachers always used a formal teaching method (see 1.6.3 below) for their teaching in their classrooms. See Appendix 1.1 for the distribution of subjects under the 1947 Lesson Plan.

1964 Educational Plan

In general, the development and introduction of 1964 Educational Plan was more or less similar to the development and introduction of 1947 Lesson Plan. Jasin (1987) said that the 1964 Educational Plan was developed and introduced in Indonesian primary schools because the political situation required a better implementation of Pancasila in the national education system. Furthermore, he said that the 1964

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Educational Plan was developed on the basis of five main ideas. They were (1) how to educate children to be good citizens, skilful and responsible towards their society and motherland, (2) how to realise the expectations to base the education on Indonesian cultures, (3) how to catch up with the advancement of science and Mathematics, (4) how to improve the teaching and learning processes, and (5) the contents and framework of 1947 Lesson Plan were considered no longer relevant and, therefore, it should be revised.

The aims of the 1964 Educational Plan were therefore slightly different from those of the 1947 Lesson Plan. The 1964 Educational Plan aimed to build the bases of a socialist society where people would have strong commitments towards Pancasila and accept responsibilities for the aims of national revolution. This Educational Plan, like the 1947 Lesson Plan, was still based on a subject oriented curriculum and a rigidly specified allocation of time for each subject. The teachers continued to use the traditional formal teaching methods in their classrooms. See Appendix 1.2 for the distribution of subjects under 1964 Educational Plan.

The 1964 Educational Plan could be grouped into two categories. The first category was for primary schools using a local language (years 1 - 3), and then an Indonesian language (years 4 - 6) as medium of instruction. The second category was for those using the Indonesian language as a medium of instruction from year 1 to year 6. In both cases an emphasis was given to Indonesian language and Arithmetic. Another significant difference between the two categories involved the length of teaching time from year 3 onwards: 30 minutes per teaching hour for the primary schools under the first category and 40 minutes per teaching hour for those under the second one.

1968 Curriculum

The 1968 Curriculum, like the previous ones, was also developed at a time of political change in Indonesia. The implementations of the 1947 Lesson Plan and 1964 Educational Plan were under the Indonesian Old Order. However, starting from 1965 onwards, Indonesia was ruled by the Indonesian New Order. Therefore, the 1964 Educational Plan was considered no longer relevant for primary schools in Indonesia in the view of the Indonesian New Order.

The 1968 Curriculum was developed as an improvement of the 1964 Educational Plan. A new emphasis in the aims of the 1968 Curriculum was that the pupils would have a basic knowledge and understanding about their obligations and rights as Pancasila people and act on the basis of Pancasila after completing their primary schooling (Jasin, 1987). The 1968 Curriculum, like the 1947 Lesson Plan and the 1964 Educational Plan, was also based on a subject oriented curriculum and a rigidly specified allocation of time for each subject. The teachers still used a formal teaching method in their classrooms. See Appendix 1.3 for the distribution of subjects under 1968 Curriculum.

Again, the 1968 Curriculum could be grouped into two categories: the 1968 Curriculum for primary schools using a local language as a medium of instruction, and the 1968 Curriculum for those using an Indonesian language as a medium of instruction. They both continued to emphasise the Indonesian language and Arithmetic as their priorities and had the same total allocations of teaching time for each of their subjects. The subject teaching time allocations between them was changed so that, for example, from year 4 onwards, Arithmetic was taught for 6 teaching hours per week in primary schools using a local language as a medium of instruction and 7 teaching hours per week in those using Indonesian language as a medium of instruction.

1975 Curriculum

Unlike the previous order, the 1975 Curriculum was the first to be developed on the basis of educational improvement. This curriculum was developed on the basis of surveys, field trials of the intended curriculum and the new teaching methods, results of analysing the implementation of the 1968 Curriculum, and seminars (Jasin, 1987). In other words, the development of the 1975 Curriculum was strongly based on the empirical studies.

The aims of the 1975 Curriculum were also revised. One of the new aims established in this curriculum was that the pupils could proceed to higher levels of schooling. The aims of the 1975 Curriculum were that the Indonesian primary school pupils had basic characteristics as good citizens, were physically and mentally healthy, and had basic knowledge, skills and behaviours in order that they could proceed to the higher levels of schooling, get jobs and develop themselves in relation to the life-long education (Jasin, 1987 and Balitbang, 1990). This curriculum, like the previous ones, was still based on a subject oriented curriculum and rigidly specified allocation of time for each subject. The teachers still used a formal teaching method for their teaching purposes in their classrooms. See Appendix 1.4 for the distribution of subjects under the 1975 Curriculum.

Furthermore, the emphasis of the 1975 Curriculum was also on the teaching of Indonesian language and Mathematics. However, the medium of instruction, to be adopted in conducting all of the teaching and learning activities in the classrooms from this point, was only to be in an Indonesian language.

1984 Curriculum

The 1984 Curriculum was developed as a further improvement of the 1975 Curriculum. This curriculum, like the 1975 Curriculum, was developed on the basis of empirical studies. The aims of the 1984 Curriculum were to educate the pupils on the basis of Pancasila in order that they could be good Indonesian citizens and responsible towards the development of the nation, to provide the pupils relevant skills and knowledge in order that they could proceed to the higher levels of education, and to provide the pupils with the basic skills they needed to live in the society and develop themselves on the basis of their own talents, interests, skills and environments (Ministry of Education and Culture, 1989 and Balitbang, 1990). This curriculum was still based on a subject oriented curriculum and a rigidly specified allocation of time for each subject. The teachers still used a formal teaching method for their teaching purposes in their classrooms. See Appendix 1.5 for the distribution of subjects under the 1984 Curriculum.

The emphasis of the 1984 Curriculum continued to be on teaching Indonesian language and Mathematics. But in this curriculum, unlike the previous ones, the teaching of a local language as an optional subject was included.

1994 Curriculum

The development of the 1994 Curriculum for primary schools in Indonesia evolved from the needs of political as well as educational improvement. Politically, the Indonesian government launched a nine-year compulsory basic education in 1993 - six years in primary schools and three years in junior high schools. This condition led the Indonesian government to revise the 1984 Curriculum in order that the revised curriculum for primary schools in Indonesia was more appropriate to cope with the demands of a nine-year compulsory basic education. Educationally, the 1984 Curriculum, to some extent, was no

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longer appropriate in relation to the current educational needs of primary schools in Indonesia. Therefore, the Indonesian government did some revisions on the 1984 Curriculum in order that the new curriculum could really accommodate the current educational needs of primary schools in Indonesia. The revisions, in the sense of quality improvement, were on some subjects, such as Moral Education of Pancasila and Civics, Indonesian language, Science, and Mathematics (Ministry of Education and Culture, 1993). There was also an addition of one subject taught under the 1994 Curriculum - 'local materials'. The distribution of subjects under the 1994 Curriculum can be seen in Appendix 1.6.

The aims of 1994 Curriculum are to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens, and to prepare them to proceed to junior high schools (Decree of Ministry of Education and Culture, No. 0847/U/1992 about Primary Schools, Chapter II, Article 2, Item 1). This curriculum, like the previous ones, remains based on a subject oriented curriculum and a rigidly specified allocation of time for each subject. The teachers continue to use a formal teaching method. Indonesian language and Mathematics remain the priorities and the total allocations of teaching time for these two subjects are the same for each academic year starting from years one to six.

1.3 Primary Schooling as a part of Nine-Year Compulsory Basic Education

A nine-year compulsory basic education was first launched in Indonesia in 1993. The Indonesian government therefore provides opportunities to all Indonesian school-aged children: six years in primary school and three years in junior high school (Ministry of Education and Culture, 1993a). The nine-year compulsory basic education has the following characteristics: (1) there is no compulsion on the part of pupils to attend, (2) there are no legal sanctions against

parents for pupil non-attendance, (3) there are no special regulations, and (4) the success is measured through the total number of participation in the nine-year compulsory basic education (Ministry of Education and Culture, 1993a).

In fact the only 'compulsion' is on the part of the local authorities to provide all school-aged children with educational provision. The aims of nine-year compulsory basic education are to provide the pupils with the basic knowledge they need to develop themselves as individuals, members of society, citizens and members of the human race, and to prepare the pupils to proceed to senior high schools (Ministry of Education and Culture, 1992).

The nine-year compulsory basic education covers two levels of education - primary school and junior high school. Therefore, each level has its own aims so that there is a clear distinction between the two. The aims of primary schools are to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens, and to prepare them to proceed to junior high schools (Decree of Ministry of Education and Culture, No. 0847/U/1992 about Primary Schools, Chapter II, Article 2, Item 1). The aims of junior high schools are to provide the pupils basic abilities which have wider and higher knowledge and skills than those that they have got from primary schools in order that they can develop themselves as individuals, members of society and citizens, and to prepare the pupils to proceed to senior high schools (Ministry of Education and Culture, 1993b).

Since the introduction of the nine-year compulsory basic education, it is intended that every pupil who has completed his/her primary school will continue his/her study to a junior high school. Consequently, the aims of primary schools in Indonesia are seen as short-term period aims.

That is the aims of Indonesian primary schools will be reinforced and developed in the junior high schools.

1.4 Primary School Teachers

There are two kinds of teachers teaching in Indonesian primary schools. They are class teachers and subject teachers (Physical Education teachers and Religious Education Teachers - Ministry of Education and Culture, 1993b). A class teacher teaches one class of children for the whole of one academic year and a subject teacher teaches in several classes for the same period as the class teacher does.

1.5 Primary School Pupils

The ages of Indonesian primary school pupils range from 6 to 11 years old. This is because in order to be accepted as a pupil in an Indonesian primary school the child has to be at least 6 years old (Decree of Minister of Education and Culture, No. 0847/U/1992 about Primary Schools, Chapter VII, Article 2, Item 1).

1.6 Primary School Curriculum

Schools in this study were following the 1994 Curriculum. Therefore, the focus of this section will be on the implementation of this curriculum.

1.6.1 Aims

The overall aims of Indonesian primary schools can be classified into two:

(1) to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens, and;

(2) to prepare the pupils to proceed to junior high schools.

These two aims should be seen as integrated aims, so that these two aims should be continuously reached side by side from year one to year six. Consequently, teaching and learning activities should continuously reflect attempts to reach these aims as an implementation of the 1994 Curriculum.

1.6.2 Subjects

There are nine subjects taught in Indonesian primary schools (see Appendix 1.6 for detailed distribution of the subjects). Each of these subjects is separately taught from year one to year six, except 'Sciences' and 'Social Sciences' which are taught indirectly under the subject of 'Indonesian Language' for years one and two. Among these nine subjects, one of them is an optional subject: 'Local Materials'. The optional subject is only taught in Indonesian primary schools if there is a demand and all the necessary supporting facilities are available. A legitimate demand may come, for example, from the local community. This is because Indonesia consists of multiethnic communities and each of them may require the pupils to learn specific subjects that may relevant to their own community needs.

Each subject in the 1994 Curriculum has an;
(1) introduction: including general description, general functions, aims, teaching areas and general guidelines, and;
(2) a teaching Programme: including general instructional objectives, general guidelines and areas of teaching materials.

Furthermore, each subject is classified into three separate terms: terms 1, 2 and 3. The length of teaching hours varies: each teaching hour for years one and two is 30 minutes, and for years three, four, five and six is 40 minutes.

Particularly for Mathematics teaching in Indonesian primary schools, the following general guidelines are made:

(1) it should suit the concept/content area/sub-content area and the thinking level of pupils,

(2) it should involve the pupils actively (mentally, physically and/or socially),

(3) the teachers can change the orders of content areas/sub-content areas as long as they are still in the same term.

(4) the teachers can develop their own teaching materials to suit the pupils' conditions and needs in particular area or community as a bridge for their pupils to learn basic teaching materials,

(5) the teachers must use Mathematics coursebooks published by the Ministry of Education and Culture and may use other Mathematics coursebooks published by other publishers as supplementary coursebooks as long as they are still relevant to the curriculum requirements,

(6) the teachers should use selective, simple and accessible teaching aids,

(7) the teachers must evaluate the pupil progress, and;

(8) the teachers should devise weekly, termly and yearly lesson plans

(Ministry of Education and Culture, 1993).

1.6.3 Teaching and Learning Activities

The teaching and learning activities take place in classrooms, except for 'Physical Education' and 'Hand Craft and Arts' which are often held outside classrooms. The teaching and learning activities in every classroom are mostly and may even wholly be carried out through a formal teacher-centred approach. This generally means that the teacher stands or sits in the front of the class close to the blackboard and the pupils sit in rows in front of her. This condition leads the teacher to use a didactic instruction approach and to formal teaching. The pupils learn individually on the basis of pre-set individual exercises taken from the available coursebooks.

Consequently, the pupils have to learn the same 'thing' at the same time.

1.6.4 Assessment

Primary school teachers have to use two types of test in assessing their pupils' progress in any one academic year: formative and summative (Ministry of Education and Culture, 1994). The formative test is held at least three times in one term. This test is used to monitor the pupils' daily and/or weekly progress and weaknesses in order that the teachers know what teaching materials should be reviewed in line with helping the pupils improve their learning. The summative test is used to evaluate the pupils' progress during one term and to report the pupils' progress to their parents. The summative test, if it is held at the end of the third term or the last term from year one to year five in one academic year is also used to decide whether or not the pupils can proceed to a higher grade. However, if it is held at the of the third term of year six, it is used to decide whether or not the pupils can proceed to junior high schools.

Chapter Two

Primary School Teacher Education in Indonesia

2.1 Introduction

Primary school teachers are one of key factors in relation to achieving successful teaching and learning activities in primary school classrooms and this chapter deals with their education. This chapter describes the historical context of primary school teacher education in Indonesia, the current aims, pre-service and in-service training, and the roles of higher education in the development of primary school teacher education.

2.2 The Historical Context of Primary School Teacher Education

Since independence, the development of primary school teacher education in Indonesia can be classified into eight periods. The classification of these periods is based on each implementation of primary school teacher education curricula. These eight periods are (1) 1945-1950, (2) 1950-1955, (3) 1955-1960, (4) 1960-1976, (5) 1976-1984, (6) 1984-1989, (7) 1990-1995, and (8) 1995 onwards. This section describes each of these periods chronologically.

1945 - 1950 Period

Primary school teacher education in Indonesia in the 1945 - 1950 period was still very much influenced by the primary school teacher education curriculum developed by the Dutch. In this period, there were only two cities in Indonesia where primary school teacher education was fully run by the Republic of Indonesia (Ministry of Education and Culture, 1990). They were in Yogyakarta and Padang. These colleges used a revised version of the Dutch-made primary school teacher education curriculum.

In other cities in Indonesia, primary school teacher education in the period of 1945 - 1950 was still run on the basis of Dutch-made primary

school teacher education. There were three types of Dutch-made primary school teacher education in this period. The first one was Opleidingsschool Voor Volksonderwyzers which was a two-year programme of primary school teacher education. To be accepted on this course, one only needed to have completed primary education. The second type was Kweekschool Nieuwe Styl which was a three-year programme. The criteria for acceptance on this type of programme that applicants should have completed their junior high schools. The last type was Opleidingsschool Voor Volksonderwyzers which was also a three-year programme. But unlike the first two, this programme was designed only for females. Within this type of teacher education, there were two programmes: primary school teacher education and junior high school teacher education. One could be accepted in the programme of primary school teacher education if one had completed primary school. However, in order to enter the programme of junior high school teacher education one had to have completed junior high school.

That there were four different types of primary school teacher education in this period was because of the situation and conditions in the Republic of Indonesia at that time. As a country which just gained independence, it could not fully establish primary school teacher education based on the demands of Indonesian primary school teachers. This was of course related to the limited time and finance as well as human resources. Therefore, the government continued with the Dutch-made primary school teacher education which was already operating. However, there was at least one significant attempt by the Indonesian government in this period to try to meet the needs of the new country in terms of primary school teacher education. That was the founding of Indonesian oriented primary school teacher education in Yogyakarta and Padang.

1950 - 1955 Period

Unlike primary school teacher education in the 1945-1950 period, in

the 1950 - 1955 period, there was no Dutch-designed primary school education in Indonesia. In this period, the Indonesian government ran, for the first time, its own primary school teacher education. The primary teacher education in Indonesia was therefore designed to accommodate the demands of Indonesian primary school teachers which were in turn determined on the basis of the general conditions and situations of Indonesian education in this period. In this period, the Indonesian government ran three types of primary school teacher education programmes.

The first type of these programmes was Primary School Teacher Education B (PSTE B) which was a four-year primary school teacher programme and was run in most districts all over Indonesia. To be accepted on this programme students were required to have completed primary school. All students of PTSE B were trained to teach in primary schools.

The second type of primary school teacher programme was Primary School Teacher Education A (PSTE A). Unlike the PTSE B, PSTE A was a revised form of Kweekschool Nieuwe Styl. It was a three-year course and was only held in provincial cities in Indonesia. To be accepted for PSTE A students had to have completed their education to junior high level. All students of PTSE A were also prepared to teach in primary schools.

The last type of primary school teacher education in this period was Preparation Course for Teachers of Compulsory Education (PCTCE). This was a two-year primary school teacher programme. The students of PCTCE were also those who had completed their primary schools. The main reason of running the PCTCE in the 1950 - 1955 period was because there was an urgent demand for primary school teachers in Indonesia. In this period, there were many school-aged children who had already started their primary schooling but there were still few primary school teachers. Therefore, the Indonesian government ran

the PCTCEs as a solution to overcome this problem.

All these three types of primary school teacher education were based on Law No. 4/1950 about national education. This law stated that (1) the basis of education was Pancasila, (2) the medium of instruction was Indonesian language and (3) the aims of education and teaching were to build moral people who were skilful, and to build Indonesian citizens who were responsible for the prosperity of Indonesian society and their motherland (Ministry of Education and Culture, 1990).

1955 - 1960 Period

In the 1955 - 1960 period, primary school teacher education in Indonesia was generally the same as in the period of 1950 - 1955. However, in the period of 1955 - 1960, the Indonesian government considered that the demand of primary school teachers was not as high as in the previous period (1950 - 1955). Therefore, they closed PCTCE and integrated it into PTSE B early in this period. Therefore, in the 1955 - 1960 period, there were only two types of primary school teacher education in Indonesia. They were PTSE B and PTSE A. These types of primary school teacher education were still based on the Law No. 4/1950 on national education (Ministry of Education and Culture, 1990). In other words, these types of primary school teacher education were still run as they had been in the period of 1950 - 1955.

1960 - 1976 Period

The 1960 - 1976 period was a period of great innovation and improvement in primary school teacher education in Indonesia. On the basis of the Decree of Minister of Education and Culture No. 69691/S dated 31 July 1961, all PTSE Bs in Indonesia were closed and changed into junior high schools and all PTSE As were changed and split into Primary School Teacher Training Schools (PSTTS) and Primary School Physical Education Teacher Training Schools (PSPETTS) (Ministry of Education and Culture, 1990). The main function of PSTTS was to prepare and train the candidates of class

teachers professionally for the purpose of teaching in primary schools and kindergartens. In order to be accepted into the PSTTS, applicants were required to have completed junior high school. The main function of PSPETTS was to prepare and train the candidates of subject teachers (Physical Education Subject) for the purpose of teaching in primary schools. PSTTS and PSPETTS were both three-year training programmes.

1976 - 1984 Period

There were still two types of primary school teacher education in this period. They were PSTTS and PSPETTS. Since this study is concerned with the class teachers in Indonesian primary schools, the PSPETTS will not be described further. On the basis of the Decree of Minister of Education and Culture No. 0185/U/1976 dated 21 July 1976, PSTTS was run on the basis of the 1976 Curriculum (Ministry of Education and Culture, 1990).

PSTTS which was run on the basis of the 1976 Curriculum was a three-year primary school teacher training programme. It had three departments: (1) primary school teaching programme - it provided the students with substantial knowledge of subjects that would be taught in primary schools, (2) specialisation programme - it provided the students with some specific knowledge on the basis of the students' interests for the purpose of teaching specific subjects in primary schools as well as providing them with substantial knowledge of subjects that would be taught in primary schools, and (3) kindergarten programme - it provided the students with substantial knowledge for the purpose of teaching in kindergartens (Ministry of Education and Culture, 1990). Students of PSTTS were those who had completed junior high school.

1984 - 1989 Period

Primary school teacher education in Indonesia was again improved and developed in this period. The changes were made in this period to

match more appropriately the needs of the primary schools in Indonesia. Unlike primary school teacher education in the 1976 - 1984, in this period, there were three types of primary school teacher education in Indonesia (Ministry of Education and Culture, 1990). They were (1) PSTTS which consisted of two study programmes: (a) primary school class teachers and (b) kindergarten class teachers, (2) PSTTS for handicapped children which consisted of four study programmes: primary school class teachers for (a) deaf children, (b) 'disabled' children, (c) 'unsociable' children and (d) 'idiot' children, and (3) PSPETTS which consisted of one study programme: primary school subject teacher (Physical Education).

Those three types of primary school teacher education in this period were based on the 1984 Curriculum. The 1984 Curriculum was officially implemented in 1984 on the basis of the Decree of Minister of Education and Culture No. 0294/U/1984 dated 24 May 1984. Each type of primary school teacher education had its own curriculum. The 1984 PSTTS Curriculum of study programme for primary school class teachers can be seen in Appendix 2.1.

1990 - 1995 Period
Another great and significant attempt to improve the quality of primary school teachers was made in the 1990 - 1995 period by the Indonesian government. Unlike in the previous periods, primary school teacher education in this period was undertaken at a university or an institute in the form of Diploma-II programme for two and a half years. Consequently, PSTTS, PSTTS for handicapped children and PSPETTS were closed early in this period.

The implementation of the Diploma-II programme for primary school class and subject teachers in a university or an institute was based on the decree of Minister of Education and Culture No. 0854/U/1989 (Ministry of Education and Culture, 1992a). This programme was formally called Diploma-II Programme for Primary School Teacher

Education (D-II PPSTE). The students of D-II PPSTE were those who had already completed senior high school. The students of D-II PPSTE were prepared and trained to be class and subject teachers for the purpose of teaching in primary schools. The distribution of subjects under the 1990 Curriculum of D-II PPSTE can be seen in Appendix 2.2.

1995 Onwards

The most recent attempt to improve the quality of primary school teacher education in Indonesia made by the Indonesian government was the revision of the 1990 Curriculum of D-II PPSTE. Revisions made were on the aims, some subjects under basic education and primary school subject-related areas. These revisions were intended to cope with current teaching needs in primary schools in Indonesia. The revised curriculum is called the 1995 Curriculum of D-II PPSTE. The 1995 Curriculum has been implemented in D-II PPSTE from 1995 to the present time. The distribution of subjects under the 1995 Curriculum of D-II PPSTE can be seen in Appendix 2.3.

The length of study and conditions of students of D-II PPSTE on the basis of the 1995 Curriculum are still the same as they were in the 1984 - 1989 period. i.e. the duration of the training is two and a half years, it is open to those who have completed their education to senior high school level and the programme is designed to prepare and train the students to be class teachers in Indonesian primary schools.

Furthermore, the above eight periods of primary school teacher education in Indonesia can generally be classified into three general periods. This classification is based on the prerequisite levels of entering the primary school teacher education programme. The first period is between 1945 and 1959. In this period, applicants could be accepted as students in an Indonesian primary school education if they had completed either their primary schools or junior high schools, depending on what type of primary school teacher education they

applied for. The second period is between 1960 and 1989. In this period, one had to be educated to junior high school level to be accepted for training as a primary teacher. And during the last period from 1990 to the present, the prerequisites for acceptance are that applicants must have completed their education to senior high school level.

These three general periods of Indonesian primary school teacher education show that serious attempts have been made by the Indonesian government to improve the quality of primary school teachers in Indonesia. However, the development and improvement of Indonesian primary school teacher education has not yet affected the teaching and learning practices in Indonesian primary school classrooms. This is because the teaching and learning practices which have been held in Indonesian primary school classrooms from the independence to the present time have always remained the same. The teachers still use the same teaching method, i.e. a formal teacher-centred teaching approach. Ideally, the development and improvement of Indonesian primary school teacher education should support the development and improvement of teaching and learning practices in Indonesian primary school classrooms. This is because the development and improvement of Indonesian primary school teacher education means producing better and more qualified primary school teachers. These teachers are ultimately expected to carry out better teaching and learning practices in the classrooms. Yet despite the fact that the Indonesian primary school teacher education has been developed and improved several times by the Indonesian government, it has not yet developed and improved the teaching and learning practices in Indonesian primary school classrooms. This is because the teachers still lack the knowledge and skills that are required to implement better teaching and learning practices.

2.3 Current Aims of Primary School Teacher Education

The current aims of D-II PPSTE based on the 1995 Curriculum are that having completed the D-II PPSTE, the students will (1) believe in one and only God, (2) have a great awareness as Indonesian citizens, (3) have substantial thinking skills, theories, concepts, procedures and facts as bases for developing further knowledge, (4) have deeper understanding and knowledge about the development of primary school children's abilities in learning, (5) have educational views, behaviours and skills in relation to developing and implementing the educational processes in primary schools, (6) have individual habits and values that support the development of their teaching profession, and (7) have abilities to communicate socially and professionally among colleagues and members of society (Ministry of Education and Culture, 1995).

These current aims of D-II PPSTE are wider and deeper in scope than the previous ones. These aims are also more relevant to primary education compared with the previous ones. For example, the forth aim is that the students should gain a deeper understanding and knowledge about the development of primary school children's abilities in learning. This aim did not exist in the previous curricula. Higher expectations can also be seen in the distribution of subjects under the 1995 D-II PPSTE Curriculum, for example, basic theories of primary education, education of Indonesian language and literature for lower as well as upper primary education, and pupil learning and development. All these subjects were not fully and substantially taught under the previous curricula of primary school teacher education.

For Mathematics teaching in particular, the implementation of these aims may lead to better provision where the students of D-II PPSTE will enter schools with better learning theories and practices. The future primary school teachers should also enter schools with a better knowledge and skills in relation to Mathematics teaching in primary schools, particularly with regard to the subjects of Education of

Mathematics 1 and Education of Mathematics 2. These aims, as well as well some subjects under this curriculum, also support the implementation of guidelines in the teaching of Mathematics in primary schools, for example, Mathematics teaching should involve the pupils actively - mentally, physically and/or socially. Therefore, theoretically, this curriculum provides a better chance to produce better and more qualified primary school teachers.

2.4 Pre-service and In-service Trainings for Primary School Teachers

In general, the training for primary school teachers in Indonesia are in the forms of pre-service and in-service training. A pre-service training in the form of D-II PPSTE is run for those who want to be primary school teachers. An in-service training for those who have been primary school teachers can be classified into two types: short and long term training. The short-term training can be in the form of seminars, workshops, etc. The long-term training is in the form of D-II PPSTE. The pre-service and long-term in-service trainings are held in universities and/or institutes for two and a half years. In relation to a long-term in-service training for primary school teachers, since 1990 the Ministry of Education and Culture has instructed that all primary school teachers who do not hold a D-II PPSTE qualification must undertake the D-II PPSTE training. This action has been taken in line with improving the quality of primary school teachers in Indonesia. It is expected that all primary school teachers in Indonesia will have D-II PPSTE qualification.

2.5 Roles of Higher Education in the Development of Primary School Teacher Education

Higher education in Indonesia began to play an important role in primary school teacher education for both pre-service and in-service training in 1990. This is because in 1990, primary school teacher education was transferred from a junior high school level (PSTTS and PSETTS) to a university/institute level (D-II PPSTE). Therefore, since 1990 the pre-service and in-service training for primary school

teachers in Indonesia have been held in a university or an institute in the form of D-II PPSTE for two and half years. D-II PPSTE for a pre-service training is run in a university or an institute in the form of class-based teaching. However, D-II PPSTE for in-service training is run in two ways: class-based teaching (run by faculties of teacher training and education and institutes of teacher training and education) and distance learning (run by Open University).

The transfer of primary school teacher education from a junior high school level (PSTTS and PSETTS) to a university/institute level (D-II PPSTE) was taken in line with improving the quality of primary school teachers. This transfer inevitably urges the universities and/or institutes, where the D-II PPSTE as a newly established programme is held, to prepare better and more qualified lecturers than were needed in former PSTTS and PSETTS. Consequently, these universities and institutes send their lecturers to do further studies both within Indonesia and overseas training in the form of degree and non-degree programmes in primary education. Having completed their further studies, it is expected that they can teach and train their students in better ways with better knowledge and skills in order that their students can be better and more qualified future primary school teachers in Indonesia. This will, of course, ultimately be aimed to improve the quality of primary school pupils.

Chapter Three
Literature Review on Primary Education

3.1 Introduction

This chapter explores models of primary education and describes the trends of primary education in Asia and the Pacific countries, including classroom management, teaching styles, the concepts of grouping (whole-class grouping and small groups) and peer support in learning.

3.2 Primary Education

It is very difficult to provide a precise definition of 'primary education' that can be fully accepted by everybody. For example, Alexander (1984) is only able to characterise what primary education is, he is unable to define it. Alexander characterises primary education in three respects, in terms of pupils, teaching system, and teachers. The pupils in primary education in the United Kingdom are children aged between 5 and 11 (It is now more commonly 4 to 11). The teaching system which is used at the primary education level is a class teacher system: one teacher for all or most of the child's schooling for a period of one year and often for longer. This class teacher system can be used as a marker to differentiate primary education from secondary. In secondary school, for example, the teaching system used is a subject teacher system: one teacher teaches one subject. In terms of the teachers in primary education, they have two main functions that are different from those at the secondary level. Those two main functions are (1) that the teachers in primary education have to be able to develop a comprehensive, rounded view of each child, and (2) they have to conceive (nowadays with the help of National Curriculum), plan and implement the whole curriculum to be experienced by each child during the period of a year or more. Conversely, in secondary school one teacher provides the pupils with knowledge and skills of one subject that he/she teaches, and only conceives, plans and implements tuition

on that subject among other subjects in the curriculum to be experienced by the pupils during a certain period of time - not necessarily a year or more.

In Indonesia, the characteristics of primary education proposed by Alexander do not fully match those of Indonesian primary schools as they have been described in Chapter 1. For example, Indonesian primary schools have two teaching systems: class teacher and subject teacher systems. Besides, the age of pupils is from 6 to 12 years old. However, the main functions of the Indonesian primary teachers are similar to those characterised by Alexander. Therefore, the characteristics of primary education described by Alexander cannot be fully accepted in the context of Indonesian primary schools.

Unlike Alexander, Corner and Lofthouse (1990) define primary education in broader and more flexible terms. They claim that primary education does not refer to a clearly specified set of beliefs and practices held by all teachers and influencing all primary-aged children, but to a dynamic variety of competing views as to what the enterprise is all about and how it might be conducted. They argue for a variety of views about primary education which influence the patterns of relationships established between teacher and children, the form of the curriculum undertaken, and the way that schools or classes are organised. This broader and more flexible definition may cope with a variety of primary school characteristics including, for example, those of Indonesian primary schools.

In the past there have been at least three writers who attempted to examine primary education from the perspective of its educational ideologies - consisting of different clusters or beliefs, values, principles, sentiments and understanding, all of these attempt to give meaning and direction to the complex and diverse practical enterprise of teaching

(Corner and Lofthouse, 1990). These three writers were Blyth (1965), Golby (1982) and Richards (1982).

The first of these writers Blyth (1965) distinguishes English primary education on the basis of its traditions. He claims that there are three traditions which underlie English primary education: (1) the elementary tradition - a whole educational process in itself and one which is by definition limited and by implication inferior: a low plateau, rather than the foothills of a complete education; (2) the preparatory tradition - the education of younger children in English primary education is mainly to be conceived in terms of preparation for the later stages of education; and (3) the developmental tradition - its principles are based on theories of child development.

In the context of Indonesian primary schools, from the implementation of the 1947 Lesson Plan to the implementation of the 1968 Curriculum, none of the three traditions described by Blyth can really match the Indonesian primary schools. However, from the implementation of the 1975 Curriculum to the implementation of the 1994 Curriculum, it is only the preparatory tradition that can possibly be considered to be slightly similar to Indonesian primary schools. The similarity can be noted from one of the aims of Indonesian primary schools - to prepare pupils to proceed to the higher levels of schooling as it is in the preparatory tradition of English primary education.

The second writer is Golby (1982). Like Blyth, Golby also distinguishes English primary education on the basis of its traditions. However, Golby names those traditions differently from Blyth. He names those traditions as elementary, progressive and technological traditions. The English primary education under the elementary tradition is concerned with the inculcation of essential knowledge to passive pupils. However, English primary education under the progressive tradition celebrates self-expression, individual autonomy and personal growth, but lacks an

adequate theory of knowledge to define the primary curriculum. Unlike English primary education under the first two traditions, the technological tradition stresses utilitarian values associated with the pursuit of science and technology.

In line with the historical context of Indonesian primary schools, only one model, the elementary tradition of English primary education is rather similar to the Indonesian primary schools. The similarity between them is that in Indonesian primary schools, the pupils are generally seen as passive recipients. This condition can be traced through the style of pedagogy which has commonly been used by the teachers - a formal teacher-centred teaching method.

Finally, the third writer is Richards (1982). Unlike the first two writers, Richards identifies four main ideologies that underlie English primary education according to its curriculum. These four main ideologies are liberal romanticism, educational conservation, liberal pragmatism and social democracy. The English primary education under liberal romanticism celebrated the supremacy of the child in the teaching - learning situation and regarded the curriculum as the sum total of the learning experiences both offered to them and created by them as they interact with their surroundings. The English primary education under educational conservation stresses the importance of continuity with the past and views the curriculum as a repository of worthwhile cultural elements which need transmitting from one generation to another. Under liberal pragmatism the curriculum is seen as a set of learning experiences largely but not entirely structured by the teacher, but respecting to some degree both the individuality of the child and the importance of cultural transmission. English primary education under social democracy sees the curriculum as a means towards realising social justice and is focused around the social experience of pupils.

Historically, Indonesian primary schools in comparison to the context of English primary education as described by Richards can be considered, to some extent, similar to 'educational conservation'. This is because historically each Indonesian primary school curriculum directly and/or indirectly reflects the needs of transmitting the worthwhile cultural elements from one generation to another. The needs of transmitting the worthwhile cultural elements from one generation to another in Indonesian primary school curricula can be noted from the subjects taught to the pupils. For example, normative education (1947 Lesson Plan), community education (1964 Educational Plan), family-related education (1968 Curriculum), and moral education of Pancasila (1975, 1984 and 1994 Curricula).

Furthermore, Richards (1979) distinguishes four major belief systems in relation to primary education and their theories and resulting practices. They are child-centred primary education, pragmatic primary education, community-centred primary education and traditional primary education. Each system has its own characteristics which differentiate it from the others.

Child-centred primary education

Firstly, the system under this primary education celebrates the supremacy of the child in the teaching-learning situation, views the children as self-active, self developing human beings who naturally seek to understand themselves and the world around them in their own terms and through their own self-chosen activities. It potrays the children as naturally curious, anxious to make discoveries and to seek opportunities to express their unique individuality, and emphasises the involvement of children in first-hand experience both inside and outside the school and the understanding of individual children as fully as possible. Secondly, this system views a teacher as a facilitator, a catalyst and a manager of learning situations. Thirdly, it considers the curriculum not in terms of subjects to be taught or areas to be covered

but as the sum-total of learning experiences both offered to children and created by them as they interact with their surroundings. Finally, it views the stance of itself towards the community and its culture is equivocal.

Pragmatic primary education

First, pragmatic primary education doesn't advocate a narrow vocational preparation nor a training in the "3Rs" alone. Second, the system under this primary education introduces children to at least some objective knowledge forms in a structured, sequential way and does not disregard children's own knowledge and experience, therefore, the children are not viewed as active "meaning makers" nor as passive "meaning makers". Third, teachers are viewed as positive agents initiating most activities and structuring and sequencing their pursuits. Fourth, it views the local community (including parents) as an influence on children's learning which needs to be harnessed in support of the school's effort but it does not see the community as having an important viewpoint on what should be taught in schools. Fifth, it considers the curriculum as totally integrated or as totally differentiated into separate elements or subjects and regards first-hand experience as valuable. Finally, it views the schools as needing to be responsive to the changing demands of the wider society as well as responsive to the individual, and classes as virtually mixed-ability.

Community-centred primary education

The system under this primary education is generally concerned with the promotion of social justice. Therefore, this primary education views schools as essential agencies in the creation of a fairer society through providing an education designed to produce active and thoughtful citizens. Furthermore, this primary education views all pupils as able to benefit from education, fosters individual talent at least as much as for the good of the community as for the individual her/himself, and acknowledges children's natural curiosity and the importance of first-

hand experience. In addition, it gives a teacher a very positive role in the planning and transaction of curricula which are related directly to the social experience of pupils, and it views the local community as being the setting for much first-hand work and as an active partner in the educational process.

Traditional primary education

In general, the system under this primary education is associated with "traditional" schools and "formal" teaching and its main characteristics are as well-documented as any of the others above. This primary education claims that traditional approaches stress the importance of continuity with the past and the transmission of "worthwhile" cultural elements. Furthermore, this system believes that children are endowed with varying degrees of intellectual ability and that the ability manifests itself as a result of the interaction between children's "innate potential" and the environment. Therefore, it does not assume children to be active learners but believes the children to require extrinsic motivation in order to "fulfil their potential". This primary education views the function of teaching as to initiate learners into "valuable" knowledge forms and skills in an orderly, systematic way and the teacher as the asker of questions and the processor of knowledge; the pupils as the respondents and the receivers. Therefore, It claims that classroom interaction involves the teacher in didactic instruction (as the major mode) in keeping discipline and promoting extrinsic motivation so as to get the pupils to learn. In addition, this primary education takes little regard of the cultural resources and expertise of the local community and parents who are regarded as passive consumers rather than active partners in the educational process. This system considers the practical reflections of the traditional belief-system to include a subject-dominated curricula, specified allocation of time to particular curricula areas, streaming or setting, a predominance of class-teaching, a reliance on "chalk and talk" and marked social distance between teachers and children and teachers and parents. As a whole, this

primary education views schools as vital to the preservation of "standards" and "values" and to the stability of society.

In terms of the four belief systems proposed by Richards, historically, Indonesian primary schools can possibly be considered as examples of traditional primary education. This is because most of the characteristics are similar to those of traditional primary education. For example, they always have subject oriented curricula and a rigidly specified allocation of time for each subject, the teachers use a formal teaching method, and the pupils are considered as passive recipients and are believed to require extrinsic motivation in order to fulfil their potential (e.g. by giving marks to their work). All these characteristics belong to the traditional primary education.

In short, if we compare Indonesian primary schools with English primary schools described by Blyth (1965), Golby (1982) and Richards (1982), and to the four belief systems proposed by Richards (1979), Indonesian primary schools historically can possibly refer to preparatory tradition, elementary tradition, education conservation or traditional primary education respectively. However, if we only compare the current practice of primary schools in Indonesia (on the basis of 1994 curriculum) to the four belief systems proposed by Richards (1979), Indonesian primary schools can possibly be classified into two different models of primary education. On one hand, if we focus on the teaching method (a formal teaching method), curriculum (a subject oriented curriculum with rigidly specified allocation of time for each subject), the pupils (as passive recipients), and the first aim of Indonesian primary schools (to prepare the pupils to proceed to junior high schools), Indonesian primary schools adopt a traditional primary education. On the other hand, if we only focus on the second aim of Indonesian primary schools (to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens), they may also refer to child-centred primary education. This is

because, for example, as individuals, members of society and citizens, the pupils should have opportunities to develop themselves naturally in the classrooms in order that they might have the required basic abilities as individuals, members of society and citizens. This condition may mean that the pupils should be seen as, for example, naturally curious, ready to make discoveries and to seek opportunities to express their unique individuality. These characteristics belong to those of child-centred primary education. Furthermore, in terms of the four belief systems, if we look at Indonesian primary schools from the point of view of the Indonesian educational system (compulsory nine-year basic education for all Indonesian school-aged children - six years for primary school and three years for junior high school), it seems that Indonesian primary schools adopt a much more traditional than child-centred primary education.

3.3 Trends in Primary Education in Asia-Pacific Countries

In most countries of the world, there is widespread acceptance of the principle that education is a fundamental human right. As was proclaimed by the General Assembly of the United Nations in 1948, article 26 of the Universal Declaration of Human Rights states in its opening paragraph that: 'everyone has the right to education'. In the Asia and Pacific countries in the past decades, for example, primary education has been characterised by rapid expansion in school capacity and enrolment. The total enrolment in primary education in this region has more than doubled during the past 30 years, from 160 million in 1960 to an estimated 350 million today (Unesco, 1992). In Indonesia, for example, in 1960 the net enrolment at the primary level was 50.8 per cent whereas in 1993 it was already over 99 per cent (Unesco, 1993a).

In several countries in Asia and the Pacific region, a common trend of primary education is the substantial number of children of primary school age who fail to acquire basic learning skills by the end of the

primary cycle. Such underachievement can result in high drop-out rates and high class repetition rates. Recognising these problems, alongside the relative lack of achievement in primary education in parts of the region and the increasing concern about the quality of primary education, the Ninth Regional Consultation Meeting on APEID (Unesco, 1984) recommended the launching of Joint Innovative Project to raise the achievement levels of children in primary education. The project arose from the conviction that if education inputs are soundly deployed, the achievement of children in primary education can be raised.

According to Unesco (1992), there are five important factors which can raise the achievement of children in primary schools. They are (1) an effective preparation of young children for primary education, (2) an implementation of effective strategies, including methods and materials of instruction and pupil evaluation in schools, (3) a provision of teachers with the competencies, attitudes and perceptions necessary to enhance students' achievement, (4) an effective involvement of the parents and the community in the primary education of children, and (5) an educational administration and supervision that are conducive to enhancing children's achievement at the primary level.

In the Asia and Pacific region, a joint innovative project was put into operation in 1985, with Indonesia, Malaysia, Republic of Korea and Thailand participating. Later, India and Nepal joined the project. In April 1986, the Philippines and Sri Lanka joined, followed by China in the middle of 1987 (Unesco, 1992). All these projects were aimed to improve the quality of primary education.

From 1985 onwards, there have been at least two big international events held in Asia and the Pacific region in an effort to improve primary education. They are the Fifth Regional Conference of Ministers of Education and Those Responsible for Economic Planning

in Asia and the Pacific (MINIDEP V) held in Bangkok in March 1985, and the World Conference on Education for All (WCEFA) held in Jomtiem in March 1990.

In relation to primary education, the MINIDEP V adopted the following declaration:

> " ... (1) the Conference considers that the universalisation of primary education that has already been, or is about to be, achieved in a great many countries of the region in the next five years, and at the latest before the end of the next decade. It considers that primary education available to all should last long enough to enable every child to acquire a solid grounding in basic subjects and in the skills and abilities necessary to develop the child's personality and prepare him or her for adult life, (2) the Conference considers that the universalisation of primary education should go together, in many cases, with an improvement in retention rates and in particular with a reduction in early drop-outs .... (Unesco, 1985:47& 48)"

In 1987, the MINIDEP V launched the Asia-Pacific of Education for All (APPEAL). The APPEAL seeks to facilitate national efforts of member states in Asia and the Pacific with a view to: (a) achieving universal primary education, (b) eradicating illiteracy, and (c) providing continuing education. APPEAL's concept of education for all takes the form of a triad as follows:
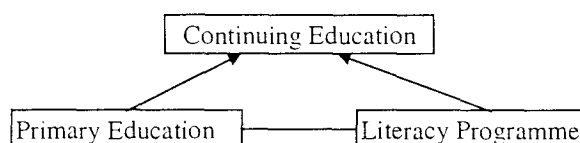
(Unesco, 1992:1)

According to Unesco (1992), the countries in the region of Asia and the Pacific could be grouped into three broad categories based on percentages of literacy and primary school enrolment rates. They are (1) Category A - the countries which had literacy rates over 80 per cent and primary school enrolment rates over 90 per cent, (2)

Category B - the countries with literacy rates between 50 per cent and 80 per cent and primary school enrolment rates over 80 per cent, and (3) Category C - the countries with literacy rates lower than 50 per cent and primary school enrolment rates over 70 per cent.

In general, each category has its own emphasis on the development of primary education. Category A countries would have to improve the quality of primary education, extend compulsory schooling years to 9 - 10 years, and strengthen their continuing education programmes for youth and adults to enable them to become active partners in industrial development. Category B countries would need to strengthen their primary education programmes to provide access to all girls and other children from disadvantaged groups, to reduce dropout rates and to improve the quality of primary education. They would also need to strengthen and improve their literacy and post-literacy programmes for youth and adults, to enable them to contribute to rural and industrial development. Category C countries would need to strengthen and improve primary education in terms of enrolment, retention and graduation, as well as to strengthen their literacy programmes for out-of-school-children, youth and adults. They would also need to promote post-literacy and continuing education for neo-literates and early school leavers (Unesco, 1992).

In Asia, the countries that belonged to category A were, for example, Japan, Mongolia, Myanmar, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam. Indonesia, China, Laos and Malaysia, for example, belonged to category B. The countries that belonged to category C, such as Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan (Unesco, 1992).

The World Conference on Education for All (WCEFA) called for an expanded vision and renewed structures, curricula and conventional delivery systems, while building on the best in current practice. This

expanded vision included one area that focused on learning acquisition and learning outcomes rather than exclusively upon enrolment, participation and completion of certification requirement, (Little, 1994:2). This study, in particular, may, to some extent, response to this vision because it concerns with the improvement in learning acquisition as well as learning outcomes, e.g. Mathematics. In addition, the conference also endorsed the Framework for Action to Meet Basic Learning Needs. One of the basic learning needs endorsed in this framework for each country to set its own targets for the 1990s is an improvement in learning achievement (Unesco, 1993).

Having briefly described the efforts made to improve primary education in Asia and the Pacific region by the Ninth Regional Consultation Meeting, the MINIDEP V and WCEFA, it is clear that there are general set goals that have been and will be reached. One of the goals is the universalisation of primary education. Universalisation of primary education implies that all school-age children are enrolled in school, remain for a full cycle of primary education and are exposed to a quality education (Unesco, 1990).

In relation to universalisation of primary education in Asia and the Pacific region, the development of primary education can be seen quantitatively and qualitatively. Quantitatively, primary education has been characterised by rapid expansion on school capacity and enrolment at the primary level as is the case for Indonesia. Qualitatively, primary education in this region has been continuously improved. Great efforts have been made in relation to improving the quality of primary education in Asia, such as (1) The Andhra Pradesh Primary Education Project in India, (2) The Active Learning through Professional Support Project in Indonesia, (3) The Plantation Sector Education Development Programme in Sri Lanka, and (4) The Shiksha Karmi Project, Rajasthan, in India (Little, 1994).

In short, the trends of primary education in Asia and the Pacific countries can generally be classified quantitatively and qualitatively. A quantitative trend refers to an expansion on school capacity and enrolment that has been and will be continuously increased to accommodate all primary school aged children in each country of the region. A qualitative trend refers to an improvement of primary education, such as teachers' knowledge and competencies, teaching methods and curriculum. However, these trends cannot be seen separately; the efforts on quantitative and qualitative improvements have been and will need to be done side by side.

In line with a qualitative trend in particular, one aspect of improvement in primary education to be considered which has an impact on the teaching and learning processes in classrooms is how the teachers manage their classes in order that their pupils can learn effectively and efficiently. Therefore, the following sections of this chapter will describe and discuss this matter.

3.4 Classroom Management in Primary Schools

There have been many efforts to define and describe classroom management in primary school. In late 1970s, Lemlech (1979) defines classroom management as an orchestration of classroom life: planning curriculum, organising procedures and resources, arranging the environment to maximise efficiency, monitoring student progress, anticipating potential problems. In the 1980s, there were at least eight writers who attempted to define classroom management. They were Medland and Vitale (1984), Doyle (1986), and Evertson, Emmer, Clements, Sanford and Worsham (1989). Unlike Lemlech, Medland and Vitale (1984) focus more on the teachers' skills in handling the teaching and learning activities in classrooms. They claim that classroom management is a system of skills that teachers learn in order to work effectively with students and ensure that students' social

behaviour is compatible with whatever academic programme teachers present and motivate students to progress in academic achievement. Thus, effective classroom management is a necessary condition for effective student learning. However, Doyle (1986) is more interested in what the teachers are doing in classrooms in line with maintaining orders. As he claims, classroom management refers to the actions and strategies teachers use to solve the problem of order in classrooms. Evertson, et. al. (1989) define classroom management differently from Medland and Vitale, and Doyle, but their ideas are slightly similar to those of Lemlech. They claim that classroom management is based on children's understanding of the behaviours that are expected of them. Therefore, classroom management depends on very careful planning of the classroom's organisation, rules, procedures and initial activities. In late 1990s, Arends (1997) provides another definition of classroom management. He states that 'good classroom management' is a prerequisite to effective classroom instruction and that it should vary according to the type of student activity being used: whole-group, small-group, or seatwork.

Looking at the ways the above writers define classroom management, there is a tendency that classroom management will always be an issue for discussion in relation to improving the quality of teaching and learning activities in primary schools. This is because (1) every classroom has its own unique set of conditions, students, and problems which requires adaptations of the classroom procedures (Medland and Vitale, 1984), (2) the classroom is a complex place (Kasambira, 1993), and (3) the classroom is a place for learning (Hastings, Schwieso and Wheldall, 1996).

Arends (1997) and Doyle (1986) point out six intrinsic features that make the classroom complex to understand and demanding to teach in: multidimensionality, immediacy, unpredictability, publicness and history.

Multidimensionality refers to the fact that classrooms are crowded places where teachers and children with different backgrounds, interests and abilities compete for scarce resources. For example, teachers explain things, give directions, manage conflict, make assignments and keep records; pupils listen, read, write, engage with each other in discussion and conversation, form friendships, and experience conflict. Therefore, the teachers must learn to take these multidimensional activities into account and accommodate them in some manner.

Simultaneity as the term infers many things happen at the same time in the classrooms. For example, during a whole class presentation, a teacher must explain ideas clearly while watching for signs of inattention, noncomprehension, and misbehaviour on the part of individuals; and during a discussion, a teacher must listen to a student's answer, watch other students for signs of comprehension, and think about the next question to ask. Each of these situations illustrate a basic feature of classroom life, and the teachers must be able to recognise and manage this simultaneous occurrence of different events.

Immediacy is the rapid pace of classroom events and the immediate impact they have on the lives of teachers and children. For example, teachers have hundreds of daily exchanges with their students - they are continuously explaining, reprimanding, praising and challenging; children also have hundreds of interactions with their teachers as well as with each other. Many of these events are unplanned, and therefore their immediacy gives teachers little time to reflect before acting.

Unpredictability refers to the fact that many classroom events take unexpected turns and confront teachers in unpredictable ways. For

example, distractions and interruptions are frequent; and unscheduled visitors are common. Consequently, it is difficult for the teacher to anticipate how a particular lesson or activity will proceed on a particular day with a particular group of pupils.

Publicness means that classrooms are very public places and almost all events are witnessed by others. For example, children's behaviours are constantly being scrutinised by their teachers; children watch each other with considerable interest. Therefore, it is very difficult for any aspect of one's classroom life to be private.

History refers to the fact that classrooms and their participants gradually become a community that shares a common history. For example, classes meet six days a week for several months and thereby accumulate a common set of experiences, norms and routines; and each classroom develops its own social system with particular structures, organisation and norms. Though classrooms may look alike from a distance or on paper, each class is actually as unique as a fingerprint. Each develops its own internal procedures, patterns of interaction, and limits. Therefore, each class slowly holds a certain constancy which then becomes its individual history.

Furthermore, according to Medland and Vitale (1984), there are three elements of classroom management which represent the means the teachers use and the educational ends pupils obtain: setting, conditions, consequences and behaviour. The setting is the physical background or location in which instruction occurs, typically the classroom with its tables, chairs, desks, and blackboard. The conditions include all events arranged by teachers that guide and prepare pupils for learning. The consequences include all events that follow from pupil behaviour. The behaviour includes all that a pupil says and does, including thinking and feeling.

Evertson, et. al. (1989) claim that good classroom management does not just happen. Smoothly running classrooms where children are fully involved in learning activities and that are free from disruption and misbehaviour do not happen accidentally. They exist because teachers have a very clear idea of the types of classroom conditions and pupil behaviours that provide good learning environments, and they work very hard to produce such behaviour and conditions. In addition, a carefully planned system of rules and procedures makes it easier for a teacher to communicate her expectations to her children, and also helps ensure that the procedures she sets up will be workable and appropriate. Although the rules and procedures vary in different classrooms, but there are no effectively managed classrooms operating without them. It is simply not possible for teachers to conduct instructions or for children to work productively if they have no guidelines.

Looking at the above definitions and/or descriptions of what classroom management in primary school it suggests that there are three general elements: the teacher, the pupils and the ways that the teaching and learning activities take place in a classroom between the teacher and the pupils. These three factors seem to be the central focus of classroom management in primary school classrooms. Of these three respects, the teacher as a person who has full responsibilities ultimately determines the atmosphere of her classroom.

In Indonesian primary schools the teacher's responsibilities can broadly be defined in terms of preparation, organisation and recording. Preparation refers to what the teacher does (in the sense of preparing what is to be taught, how it will be taught, and for how long at one occasion) before she enters the classroom. This is done on the basis of the curriculum requirements. Organisation refers to what the teacher does in the classroom in relation to handling the teaching and learning activities as well as maintaining order so that pupils can learn

effectively - being quiet is commonly considered a good classroom practice. Recording refers to the notes the teacher makes in the classroom in relation to monitoring and evaluating the pupil progress as an administrative document. These three things can probably be found in every classroom in Indonesian primary schools although they may vary, to some degree, according to the teacher's personality and length of teaching experience.

In relation to the definitions proposed by the writers described earlier in this section, practical classroom management in Indonesian primary schools may possibly fit, to some degree, with the definitions proposed by Lemlech (1979) - organising procedures, monitoring children's progress and anticipating potential problems; Medland and Vitale (1984) - teachers' skills in handling the teaching and learning activities in the classrooms; and Doyle (1986) - involving the actions and strategies teachers use to solve the problems of order in their classrooms. However, it may not fundamentally cope with the other definitions proposed by Evertson, et. al. (1989) and Arends (1997) because they put emphases on different aspects, such as understanding children's behaviours and childrens' activities respectively.

Furthermore, If we look at practical classroom management in Indonesian primary schools from the point of view of the belief systems proposed by Richards (1979), it is obvious that Indonesian primary schools adopt a traditional primary education model. This is because the classroom management practised by the teachers in Indonesian primary schools emphasises actions and strategies for the purpose of maintaining order - being quiet. This is exemplified in that the pupils are passive, the teachers keep discipline and use extrinsic motivation, e.g. grades, to keep the pupils learning. These characteristics belong to those of a traditional primary education model.

3.5 Teaching Styles

Galton (1982) claims that a teaching style is a consistent set of teaching tactics. Teaching tactics are the strategies that have to be worked out by means of the exchange between the teacher and the children. The tactical exchange is intended to emphasise either an aspect of class control, the development of social and personal skills in the pupils or the pupils' cognitive development. It broadly means that teaching style refers to a teacher's strategies to handle teaching and learning activities in relation to achieving a particular goal.

Furthermore, Dean (1992) describes a teacher's style in the context of primary school as the way the teacher does things in the classroom. It means that whatever a primary school teacher does in her classroom directly or indirectly will reflect her teaching style. He further claims that there are four factors which influence a primary school teacher's teaching style: personality, experience, philosophy and values, and context. Personality: the teacher's teaching style depends in the first place upon the kind of person she is. Experience: the teacher's experience is an important factor in determining style, particularly, her experience of other teachers at work gives her a choice of ways of teaching and those she chooses to become part of her style. Philosophy and values: the teacher's beliefs about education and what it is that constitutes good teaching and good learning situations, and her values generally, will affect the way she teaches. Context: the teacher's teaching style is affected by the particular group of children she is teaching as well as the accommodation and resources available to her.

Teaching styles, according to Dean (1992), can be demonstrated as follows:

(1) *the activities a teacher decides to undertake herself (her style is evident in what she decides to do as a teacher)*: the way she

presents material to children is part of her style; at almost every point in the day she is making choices about how she will act and these add up to a style.

(2) *the use of time*: in choosing what she does, a teacher is making choices about how to use time and how the children will use time allotted.

(3) *the organisation chosen(the way a teacher organises is part of her style)*: she has a wide choice of patterns of organisation, in the combination of class, group and individual work she decides to use; she also decides how much choice her children may have and the extent to which she teaches them to work independently.

(4) *methods of tackling work (the way a teacher sets about the task of the classroom is all part of her style)*: she may tell children what to do or have a programme which they work through as they wish; she may discuss how work will be done with them and incorporate their ideas, not only into what they do but into how it is done, or she may insist that work is done in the way that she had dictated.

(5) *communication (the way a teacher communicates with children is all part of her style)*: she may spend a lot time talking about how things should be done or about the actual tasks children are doing; she may talk down to children or talk at a level which is stimulating so that they have to think hard to follow what she is saying; she may also talk a great deal or give a lot of the time to getting children to talk.

(6) *inter-personal behaviour (this is linked to communication)*: teachers vary in how friendly they are with the children they teach and in how they treat children.

All these six factors reflect each teacher's teaching style that make her, to some extent, different from the others.

Bennett, Jordan, Long and Wade (1976) have a different theory of teaching styles from Galton and Dean. They defined teaching styles in terms of characteristics that the progressive and traditional primary

school teachers posses. The following characteristics seen in Table 3.1 are claimed by Bennett, et. al. as two different teaching styles:

Table 3.1:

Characteristics of Progressive and Traditional Teachers

Progressive	Traditional
Integrated subject matter	Separate subject matter
Teacher as guide to educational experience	Teacher as distributor of knowledge
Active pupil role	Passive pupil role
Pupils participate in curriculum planning	Pupils have no say in curriculum planning
Learning predominantly by discovery techniques	Accent on memory, practice and rote
External rewards and punishments not necessary	External rewards, e.g. grades
Intrinsic motivation	Extrinsic motivation
Not concerned with conventional academic standards	Concerned with academic standards
Little testing	Regular testing
Accent on co-operative group work	Accent on competition
Teaching not confined to classroom based	Teaching confined to classroom based
Accent on creative expression	Little emphasis on creative expression

Furthermore, as a result of an analysis of questionnaire responses by third and fourth year junior teachers in over 700 schools in the north-west of England, Bennett, et. al. broke down the above teaching styles further. They categorise teaching approaches of primary school teachers in his study into 12 teaching styles. These teaching styles broadly range as a continuum from informal (progressive) to formal (traditional). The detailed description of each style can be seen in Appendix 3.1.

The Oracle study carried out by Galton and Simon (1980) classified teaching styles into four: individual monitors, class enquirers, group instructors and styles changers. Individual monitors work mainly on an individual basis and therefore spend much time in monitoring individual progress. Class enquirers use a good deal of class teaching and teacher-managed learning with open and closed questions in class discussion. Group instructors spend a larger amount of time than the others on group interaction and less on individual attention,

which allows them to engage in more questioning and making statements. In the case of the styles changers, fifty per cent of teachers used mixed styles to meet different demands. The group of style changers breaks down into: (a) infrequent changers who gradually change style according to the observed needs of the group over the year, (b) rotating changers who work with pupils seated in groups each working at a particular aspect of curriculum and change the group activities by rotating the groups during the course of a day or week, and (c) habitual changers who make regular changes between class and individualised instruction. This group used questioning relatively little and had the lowest amount of time spent interacting with pupils.

Mumford (1982) has a slightly similar categorisation to Galton and Simon. He suggests four different modes regarding teaching styles which he relates as activists, reflectors, theorists and pragmatists. Activists are those who enjoy the here and now, are dominated by immediate experience, thrive on challenge but get bored with implementation and long-term consolidation and who do not necessarily recognise problems. Reflectors are those who stand back and ponder, collect data and analyse it, consider all possible angles, and are cautious. Theorists are those who are keen on basic assumptions, theories, principles, models; are rational and logical, detached and analytical; are able to assemble disparate facts into coherent theories. Pragmatists are those who search out new ideas, experiment, use lateral thinking, and see 'problems' as new opportunities and 'challenges'.

There have been a few researchers that have tried to prove the influence of teaching styles on pupil progress in primary schools. One was Bennett, et. al. (1976) who carried out a quasi-experimental design that involved 37 teachers to represent seven (types 1, 2, 3, 4, 7, 11 and 12) out of 12 styles (see Appendix 3.1 for the detailed

description of these 12 styles). The seven styles could be collapsed into three general styles: informal, mixed and formal. Types 1 and 2 represented informal styles; 3, 4 and 7 represented mixed styles; and 11 and 12 represented formal styles. The results form a coherent pattern. The effect of teaching style is statistically and educationally significant in all attainment areas tested - Mathematics, reading and English. In reading, pupils of teachers using formal and mixed styles progress more than those of informal teachers, the difference being equivalent to some three to five months' difference in performance. In Mathematics, pupils taught by teachers using formal style are superior to both mixed and informal pupils, the difference in progress being some four to five months. In English, pupils taught in formal style again out-perform pupils taught by both mixed and informal styles.

When Bennett and his colleagues' findings were re-analysed by Aitken, Bennett and Hesketh (1981), the only significant teaching style differences were in English, where the formal style had the highest mean, mixed the lowest, and informal is in the middle. In Mathematics, the formal and informal styles were close, and substantially above the mixed style. In reading, informal has the highest mean, mixed the lowest, and formal was in the middle. These results of re-analysis carried out by Aitken, Bennett and Hesketh weaken the previous findings by Bennett, et. al. However, all of these results at least prove that teaching styles affect the pupils' attainment.

The ORACLE team from Leicester University (Galton and Simon, 1980) also attempted to relate teaching styles to pupils' attainment in basic skills (measured on modified Richmond Tests) and in so-called 'study skills'. The results were derived from tests on mathematics, reading and language skills administered to over 120 pupils (aged 8+ to 10+) at the beginning and end of the academic year 1976/1977. The teaching styles referred to are described as styles 1 (Individual monitors) , 2 (class enquirers), 3 (group instructors) and 4 (styles

changers - infrequent changers, rotating changers and habitual changers). The results showed that: (1) the class enquirers were the most successful in mathematics and language skills, (2) the pupils of the infrequent changers made the greatest gains in reading, (3) in language skills the class enquirers enjoyed no over-all superiority from either the group instructors or the infrequent changers and did not differ significantly from that achieved by the group taught by the class enquirers, (4) rotating changers had considerable problems in improving the level of their pupils achievement in basic skills, (5) the rotating changers' pupils and those of the habitual changers and the individual monitors were also less successful than either the class enquirers, infrequent changers or group instructors. The general conclusion that can be drawn from this study is that the teachers nevertheless have in common that they interact with the pupils more frequently than teachers using the less successful styles (Galton and Simon, 1990).

In general, teachers in Indonesian primary schools can broadly be characterised as using a formal teaching style, consider the pupils as passive recipients, use extrinsic motivation and external rewards to encourage the pupils to learn, consider that they are distributors of knowledge and skills, use regular testing, and are concerned with academic standards.

3.6 Grouping

Brown (1988) claims that a group exists when two or more people define themselves as members of it and when its existence is recognised by at least one other. Classroom groupings of various sizes and compositions have been used for a variety of purposes and therefore the uses of groups will depend on many factors (Kutnick and Rogers, 1994). One of the factors indicates that groupings are often chosen to meet the needs of classroom organisation and physical structure rather than being designed to promote the

instructional/learning capabilities of children - number and sizes of groups often being set by the numbers of tables and chairs around each table (Tann, 1981; Good and Marshal, 1984; and Dreedan, 1984). In other words, groupings are often seen as a means for classroom and learning organisation (Kutnick and Rogers, 1994). However, if we want to use groups effectively, the groups themselves should not be used simply as organisational features of the classroom, but they should also be used to provide the pupils security among themselves, opportunities to communicate and interact effectively among themselves. In groups, the pupils must have and use their skills of listening, questioning, challenging, helping and providing explanation to others (Bennett and Dunne, 1990).

In terms of group size, Kutnick and Rogers (1994) claim that it should not be thought of as limited to a small group (4 - 8 pupils) but it should be seen as a continuum from individuals to the whole class. Furthermore, Galton and Williamson (1992) reviewed studies on classroom groups and found four distinct types of classroom groupings: small groups, pairs, individuals and whole class.

3.6.1 Whole-Class Grouping

Whole-class grouping or the traditional/formal approach is a relatively under researched area (Kutnick and Rogers, 1994). The whole-class grouping has, at least, the following characteristics: (a) the core of this type of teaching is that we have one person (the teacher) who instructs a large number of pupils (Merrett, 1994), (b) the general pattern is that the teacher talks and instructs and then the pupils recite the material and learn it by heart and then might be required to copy vast amount of material from a blackboard into their notebooks (Merrett, 1994), (c) the teacher talks, demonstrates and gives the pupils the chance to exercise and establish new skills (Merrett, 1994), (d) instruction models which view teachers as the only source of knowledge and skills (Bennett, 1994), and (e) it places the teacher

in didactic control of knowledge and socialisation in the classroom (Kutnick and Rogers, 1994).

Whole class grouping has some advantages, such as (1) it is an efficient means of transmitting information to a large number of children simultaneously (Kutnick and Rogers, 1994; and Jacinta and Regina, 1986), (2) it provides order, control, purpose and concentration (Kutnick and Rogers, 1994), (3) it makes the root learning tasks work effectively (Johnson and Johnson, 1985), (4) it allows each pupils to work individually, sitting in rows, without being interrupted by the others (Kutnick and Rogers, 1994), and (5) it provides better academic/educational results (Bennett, 1994). However, this kind of grouping also has disadvantages. For example, the teacher often 'pitches' work to the middle level of ability and this may underestimate high-ability pupils while placing low-ability pupils in a situation where they cannot succeed (Alexander, Rose and Woodhead, 1992). Therefore, it should not be surprising that the whole-class group displays extremes of very high and very low achievement scores (Good and Marshal, 1984).

3.6.2 Small Groups

According to Kutnick and Rogers (1994), a small group consists of 4 and 6 pupils together for sitting and/or learning purposes. In terms of grouping purposes, Galton and Williamson (1992) claim that there are four purposes of grouping the pupils: seating groups, working groups, co-operative groups and collaborative groups. Seating groups are those where pupils sit in the groups but do not work as a group. In other words, where children work on a similar theme or curricula area at their own pace. Working groups are those where children work on the same task, because they are at approximately the same stage of learning, but they work as individuals with a minimum of co-operation. In co-operative groups, unlike the two previous groups, the pupils complete a task which is organised in

such a way that individual pupils with in the group contribute to a joint outcome. In collaborative groups, all pupils in the group contribute to a single outcome and are often involved in problem-solving activities, particularly in cases where the group has to debate a social or moral issue and produce an agreed solution or recommendations.

In short, Galton and Williamson (1992) summarised the classification of different grouping arrangements of pupils in the primary classroom as shown in the Table 3.2 below:

Table 3.2:

Classification of Different Grouping Arrangements

Type	Task Demand	Intended Outcome
Seating Groups	each pupil has a separate task	different outcomes: each pupil completes a different assignment
Working Groups	each pupil has the same task	some outcome: each pupil completes the same assignment independently
Co-operative Groups	each pupil has separate but related task	joint outcome: each pupil has a different assignment
Collaborative Groups	each pupil has the same task	joint outcome: all pupils share the same assignment

In terms of criteria for forming the groups, Kerry and Sands (1982) suggest four criteria by which groups may be formed: (1) age groups - these are occasionally used as a convenient way of grouping for some activities; (2) attainment groups - these groups based on attainment levels are very useful for setting up specific and well-matched tasks; (3) interest groups - it is important to enable children with shared interests to work together from time to time (there may be particular advantages for the social cohesion of the class when children are of different levels of attainment, sex, race, social class); (4) friendship groups - these are popular with children and provide opportunities for social development. Furthermore, Kutnick and

Rogers (1994) also suggest that groups can be formed by pupils' ability (homogeneous ability and heterogeneous ability), gender, friendship, age and personality.

Small groups also have advantages, such as (1) the pupils can improve their self-image (Kerry and Sands, 1982; Yeomans, 1983; and Biott, 1987), (2) sitting the children in groups would seem to indicate a desire for children to share not only facilities but also ideas (Galton and Williamson, 1992). Furthermore, Bennett and Dunne (1992) identify some other advantages, such as (1) it would help children get along in strength and weaknesses as well as those of others, (2) it could make their own interpretations clearer to themselves by having to explain something to others, (3) children could gain some opportunity to teach as well as to learn, and (4) it was hoped that apathetic children would be infected by the enthusiasm of a group while able children would benefit by being caught up in the thrust and counter-thrust of conversation in a small group of children similar to themselves.

Out of the above advantages, there are also some weaknesses that have been identified. For example, (1) getting the children to work together is not an easy task (Galton and Williamson, 1992), (2) how to distribute the range of pupil ability among groups (Kutnick and Rogers, 1994), (3) although children sit in groups there is usually no specific demand for them to work together, and rarely there is a group given no opportunity to work on a group task (Bennett and Dunne, 1992), and (4) that pupils are seated around tables does not mean that they will or can work as a small group (Kutnick and Rogers, 1994).

In line with teaching Mathematics in primary schools in particular, the studies of using small groups have been done by several researchers. Two of them are Slavin (1987) and Webb (1985).

Slavin (1987) examined research on elementary school Mathematics instruction where the teacher divided the Mathematics classroom into two or three groups. Among the seven studies being examined, six of them indicated that teachers who grouped their pupils in learning Mathematics achieved better results than teachers taught the class as a whole. This finding was criticised by, for example, Gamoran (1987) and Hiebert (1987). They questioned the validity of Slavin's finding because there were no observational data and way of knowing why or how grouping patterns influenced achievement. However, Slavin's finding at least may suggest pupils learned Mathematics in small groups achieved better results than those learned Mathematics individually.

Webb (1985) examined four categories of student interaction in small groups in conjunction with finding out the relationship between student interaction and achievement in Mathematics. The four categories are (1) non-specific interaction (the frequency of general participation in peer interaction), (2) giving help, there are three types of help given: (a) all instances of help, (b) explanations and (c) terminal responses, and (4) sequences of behaviour (responses to request for help). The results of his studies show that (1) there is no significant relationship between non-specific interaction and achievement, (2) giving explanations is consistently and positively related to achievement but all instances of help and terminal responses tend not to be related to achievement, (3) there is a tendency that receiving explanations tend to be beneficial for achievement although the results are not entirely consistent, and (4) there are no consistent relationships between giving all kinds of help and achievement and receiving all kinds of help and achievement.

Furthermore, Webb (1991) reviews and analyses research linking task-related verbal interaction to learning in small groups in

Mathematics classrooms. He finds that (1) giving help — (a) giving elaborated explanation may generally be beneficial for achievement but only few of the partial correlations between giving other kinds of help (non-elaborated explanation) and achievement are statistically significant, (b) giving content-related explanations is positively related to achievement, however, giving other kinds of help (non-content related explanation) is not related to achievement; (2) receiving help — (a) receiving content-related explanations does not seem to be beneficial for achievement, (b) receiving help other than content-related explanations is either negatively related or nor related to achievement; (3) other kinds of behaviour — (a) off-task interaction and achievement shows a negative relationship.

In short, most of the studies which have been examined by Slavin (1987) and Webb (1985 and 1991) may show us that the pupils doing Mathematics in small groups tend to achieve a better achievement than those doing Mathematics individually or under a whole-class teaching method.

In reference to the belief systems proposed by Richards (1979), Indonesian primary schools broadly refer to a traditional primary education, but to some degree, it also refers to a child-centred primary education. Furthermore, from the research on classroom management and teaching style, Indonesian primary school practice would be strongly categorised as traditional primary education rather than child-centred primary education. In line with the idea of grouping, the teaching and learning activities held in Indonesian primary school classrooms are always in the form of whole-class grouping. To some degree, this is acceptable if we look at the model of Indonesian primary schools because this kind of grouping has advantages that are relevant to the requirements of Indonesian primary schools. However, Indonesian primary schools do not wholly adopt a traditional primary education, they also, to some degree,

adopt child-centred approaches. It may therefore be more advantageous if a whole-class grouping is combined with small groups. By combining these two kinds of grouping, the disadvantages of whole-class grouping can be minimised by the existence of small groups. The combination may also provide a better learning outcome because not only the teacher's knowledge and skills are used to enhance the pupils' learning outcome but also those of the other pupils'.

3.6.3 Peer learning support

The potential value of children as helpers of other children in an educational setting has been recognised for a long time (Foot, Morgan and Shute, 1990). In a classroom the children can only help each other if they interact with each other. Therefore, to make it happen, the teacher as a person who has full authority in the classroom should provide the children with opportunities so that they can interact each other.

The benefits to be gained from pupils interacting with their peers should not be underestimated (Clegg and Billington, 1994). Although children's interactions with other children as claimed by Hatch (1984) are quantitatively different from their interactions with adults - they may be much simpler. Furthermore, Hatch (1987) claims that children's interactions with other children offer special opportunities for practising social skills and for developing a wide range of interactive competencies with relative equals. In addition, Clegg and Billington (1994) states that one of the prerequisites of successful learning is interaction with peers.

In the past, according to Shute and Paton (1990), there has been a large body of evidence which suggests that peers can be a valuable resource for encouraging cognitive development and academic achievements. Furthermore, Damon (1984) confirms that

psychological and educational research has established beyond doubt that children can have a powerful influence upon one another's intellectual development. Therefore, Clegg and Billington (1994) say: "In their interactions in the classroom, the children need to be reassured that they have much to give, as well as to learn, from each other and that working together can be beneficial to all involved".

When the children have opportunities to interact, the more capable or knowledgeable have chances to help the less capable or knowledgeable ones. Children who cannot do their work alone can make better progress if they are helped by the more capable or knowledgeable ones. As Vygotsky (1962 and 1978) says, the more capable or knowledgeable children push the less capable or knowledgeable to the leading edge of their intellectuality. Theoretically, this is called a theory of teaching as assisted performance (Tharp and Gallimore, 1991).

In the theory of Teaching as Assisted Performance, one term is popularly recognised: zone of proximal development (ZPD).The zone of proximal development is defined as that zone within which a child can achieve with help, with the support of the environment, of others, things they would be unable to achieve on their own. In relation to the theory of 'teaching as assisted performance', Tharp and Gallimore cite Vygotsky to propose a four stage model in the zone of proximal development. At stage one, the child may have a very limited understanding of the situation, the task, or the goal to be achieved. At stage two, the child carries out the task without assistance from others, however, this does not mean that their performance is fully developed. At stage three, the child has emerged from the ZPD into the development stage for the task. At this stage, assistance is no longer needed. Indeed, assistance would now be disruptive. At this stage, performance is no longer

developing, it has already developed. At stage four, what a child formally could do, she can no longer do. Therefore, a further retreat may be required - e.g. further explanation or help.

In relation to peer learning support, assistance is really needed when the children are at stage 1, 2 or 4. In the classroom, the assistance can only come from the teacher and peers. Therefore, at these stages, working in small groups may provide opportunities for children to help each other.

Now, let us analyse the present implementation of Indonesian primary schools on the basis of the models of primary education, trends of primary education in Asian-Pacific countries, the definitions of classroom management, effects of teaching styles, advantages and disadvantages of grouping and the importance of peer learning support towards pupil learning outcome.

Indonesian primary schools, as they have been described in Chapter 1, are run on the basis of a subject-oriented curriculum with rigidly specified allocation of time for each subject through using a formal teaching method where the pupils are considered as passive recipients and sit in rows and do their work individually. This practice is ultimately directed to reach two main aims - (1) to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens, and (2) to prepare the pupils to proceed to junior high schools.

From the point of view of models of primary education, Indonesian primary schools, to some degree, may refer to a preparatory tradition (Blyth, 1965), an elementary tradition (Golby, 1982), an educational conservation (Richards, 1982), and a traditional primary education (Richards, 1979). However, as a whole, Indonesian primary schools cannot be simply classified within any single model of primary education as described by any of these writers because, in fact,

Indonesian primary schools are more complex. For example, Indonesian primary schools may be seen as belonging to a preparatory tradition if they are only seen on the basis of their second aim (to prepare the pupils to proceed to junior high schools); an elementary tradition if they are only seen on the basis of the teaching method being used and the status of the pupils (a formal teaching method and pupils are as passive recipients); as educationally conservation if they are only seen on the basis of the subjects being taught; transmitting the worthwhile cultural elements from one generation to another (e.g. Moral Education of Pancasila subject - in reference to 1994 Curriculum); and to a traditional primary education if they are only seen on the basis of curriculum (a subject oriented curriculum with rigidly specified allocation of time for each subject), teaching method (a formal teaching method), status of pupils (as passive recipients), and Indonesian educational system (compulsory nine-year basic education).

However, if the Indonesian primary schools are seen from the other side (from the first aim - to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens), they cannot be classified as in the preparatory tradition, elementary tradition, educational conservation and traditional primary education as described by Blyth (1965), Golby (1982), Richards (1982), and Richards (1979) respectively, they may possibly refer to a child-centred primary education (Richards, 1979). Therefore, the current implementation of Indonesian primary schools needs to be re-considered because it does not fully respond to the whole needs of Indonesian primary schools themselves. For example, the current implementation of Indonesian primary schools tends to satisfy the second aim (to prepare the pupils to proceed to junior high schools) but it does not fundamentally touch the first one (to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens).

One of the ways that this can be done in order that the aims of Indonesian primary schools can be fully implemented is through adjusting the current teaching methods.

Furthermore, if we look at Indonesian primary schools from a point of view of trends of primary education in Asia-Pacific countries, Indonesia belongs to one of the Category B countries. This means that primary schools in Indonesia still need to improve their quality. In line with the improvement of quality of primary education in Indonesia, the current implementation of Indonesian primary school curriculum needs to be re-considered. One of the ways that quality can be improved is through re-considering the teaching method in use because the current teaching method is not encouraging peer learning support.

Next, let us look at the current implementation of classroom management in Indonesian primary schools from a point of view of the definitions of classroom management as proposed by Lemlech (1979), Medland and Vitale (1984), Doyle (1986), Evertson, Emmer, Clements, Sanford and Worsham (1989), and Arends (1997). To some extent, the current implementation of classroom management in Indonesian primary schools may match the definitions proposed Lemlech (1979), Medland and Vitale (1984), Doyle (1986). They respectively put emphases on organising procedures, monitoring children's progress and anticipating potential problems; teachers' skills in handling the teaching and learning activities in the classrooms; and involving the actions and strategies teachers use to solve the problems of order in their classrooms and so does the current classroom management in Indonesian primary schools. However, it does not fundamentally match the definitions proposed by Evertson, et. al. (1989), and Arends (1997) because they respectively focus on different aspects, such as understanding children's behaviours and children's activities. In other words,

classroom management in fact covers much wider areas than those proposed by Lemlech (1979), Medland and Vitale (1984), Doyle (1986) or those that are currently implemented in Indonesian primary schools - preparation, organisation and recording. Therefore, the current classroom management in Indonesian primary schools needs to be re-considered in order that it can be more advantageous and meaningful towards enhancing the pupil learning outcome.

Classroom management relies on the teachers, pupils and teaching and learning activities, therefore, the roles of teachers and pupils, and the teaching and learning activities in Indonesian primary schools need to be re-considered in order that the needs of Indonesian primary schools themselves can be satisfied and the current aims can be met. One of the ways that this can be done in line with satisfying the whole needs of Indonesian primary schools is through adjusting the current teaching method. By adjusting the teaching method, the roles of teachers and pupils will automatically be changed and therefore, the ideal classroom management for the purpose of satisfying all of the needs of Indonesian primary schools can be established.

Furthermore, studies on teaching styles carried out by Bennett (1976) and the Oracle team (1980), although their findings are contradictory, they prove that teaching styles at least affect pupil learning outcome. For example, Mathematics achievement is higher when the teachers used formal and informal teaching styles than when adopting mixed teaching styles (Aitken, Bennett and Hesketh, 1981); and when the teachers use a class enquirer teaching style than individual monitors, group instructors and styles changers (Galton and Simon, 1980).

On the basis of the variety of definitions of teaching style as already described earlier in this chapter and the effects of teaching styles as

found in the studies carried out by Bennett and Oracle team (although their findings are against each other), the Indonesian primary school teachers' teaching style should be re-considered in order that the pupil learning outcome can hopefully be increased. If we look at the model of Indonesian primary schools (e.g. they mostly refer to a traditional primary education but to some degree they also refer to a child-centred primary education), the trend of primary education in Asia-Pacific countries (e.g. Indonesia still needs to improve, for example, the quality of primary education), and a need to establish more active roles of teachers and pupils in the teaching and learning activities (e.g. from point of view of classroom management), therefore, the Indonesian primary school teachers' teaching style also needs to be adjusted in order that the pupil learning outcome can be increased. An adjustment on teaching style means an adjustment on teaching method.

In the context of grouping, the current implementation of teaching and learning activities in Indonesian primary school classrooms, we can see that whole-class grouping does not fully satisfy the current needs of Indonesian primary schools themselves because by using a whole-class grouping in conducting the teaching and learning process, the whole aims of Indonesian primary schools cannot fully be achieved. The current practice only emphasises the transfer of knowledge and skills from the teacher to the pupils that leads to the passive roles of the pupils. In reference to the model of Indonesian primary schools, the trend of primary education in Asia-Pacific countries where Indonesian needs to improve, for example, the quality of primary education, a need to establish more active roles of pupils in the teaching and learning activities, and adjust the teachers' teaching style. The use of a whole-class grouping should therefore be re-considered. This is important in relation to improving the pupil learning outcome. If we closely look at the advantages and disadvantages of whole-class grouping and small groups, it seems a

good idea if the Indonesian primary school teachers use both in their teaching and learning activities. This is because the disadvantages of whole-class grouping can be minimised by the existence of small groups. Besides, by using both groups, the roles of teachers and pupils will be more active. This will directly and indirectly improve the pupil learning outcome. Furthermore, the use of both sized groups will also satisfy the whole aims of Indonesian primary schools because the pupils will actively play their roles as they do outside the classrooms - although the roles may relatively different.

Having analysed the current implementation of Indonesian primary schools from points of view of models of primary education, the trends of primary education in Asian-Pacific countries, definitions of classroom management, effects of teaching styles, the advantages and disadvantages of grouping and the importance of peer learning support, we can see that an adjustment in the current teaching and learning methods, is necessary. The adjustment should be aimed to suit the current model of Indonesian primary schools (reaching their whole aims), improve the quality of primary education in Indonesia, make the roles of teachers and pupils more active, provide a more flexible teaching style, introduce a combination of whole-class grouping and small groups in the teaching and learning process, and provide the pupils opportunities to interact each other in order they can help each other. This adjustment is ultimately expected to increase the pupil outcome.

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Chapter Four

A Groupwork Intervention

4.1 Introduction

This chapter describes the development of intervention, rationales of research design and the development of research instruments (a test and questionnaires). The intervention in this study focused on teaching and learning Mathematics in ten Indonesian public primary schools in Palembang, Indonesia for a period of one term. The subjects of the intervention are year-three class teachers and pupils in those schools. The selected research design for this study is based on Design 10 as proposed by Campbell and Stanley (1963) that they call the Non-equivalent Control Group Design. There are two kinds of research instruments are used in this study: a Mathematics test and questionnaires. A Mathematics test is used to assess the pupils' Mathematics base-line (a pre-test) and their Mathematics attainment (a post-test). Questionnaires are used to obtain teachers and pupils' views on the implementation of intervention.

4.2 Development of the Intervention

First of all, the background of intervention will be described, leading on to the description of the intervention.

4.2.1 Background of the Intervention

Fundamentally, education in Indonesia has been and will always be run nationally on the basis of the 1945 Constitution of Republic of Indonesia, article 31, items 1 and 2, that is every Indonesian citizen has a right to have an education and Indonesian government attempts and runs a national education system which is based on laws. These laws are based on the decrees of Minister of Education and Culture. These laws tend to be revised, in a sense of quality and quantity improvements, in relation to coping with the conditions of

Indonesia and fulfilling the needs of general national development in Indonesia.

Nowadays, the aims of national education in Indonesia are to develop the whole person by enhancing devotion to God almighty, developing intelligence and skills in individuals, ensuring that all pupils are physically and mentally healthy with well-adjusted personalities, promoting good moral conduct, patriotism and social development, so that the people will be able to develop themselves and take joint responsibility for the development of the nation (Ministry of Education and Culture, 1992). Consequently, any form of education in Indonesia should be led and aimed to reach these aims. Due to the aims of national education are still very broad and education in Indonesia is graded into four levels (primary schools, junior high schools, senior high schools and higher education), therefore, it is very important to have specific aims for each of those levels in order that (1) there is a clear-cut between one level and another, and (2) each level can theoretically and practically support each other - the lower level is aimed as a basis for the upper one.

The latest revision of the aims of national education, particularly for primary school and junior high school levels, happened in 1993. This revision was done because the Indonesian government started launching a nine-year compulsory basic education for all school-aged Indonesian children. A nine-year compulsory basic education is a nine-year basic education that consists of six years at the primary school and three years at the junior high school (Ministry of Education and Culture, 1992). Therefore, since then, it is compulsory for every Indonesian child to take the nine-year basic education. Due to the implementation of nine-year basic education, the Indonesian government has also set up the aims of nine-year compulsory basic education as well as has revised the aims of primary schools and junior high schools.

The aims of nine-year compulsory basic education is to provide the pupils basic knowledge so that they can develop themselves as individuals, members of society, citizens and members of human beings, and to prepare the pupils to proceed to senior high schools (Ministry of Education and Culture, 1992). The revised aims of primary school are to provide pupils basic abilities in order that they can develop themselves as individuals, members of society and citizens, and to prepare the pupils to proceed to junior high schools (Decree of Minister of Education and Culture, No. 0847/U/1992 about Primary Schools, Chapter II, Article 2, item 1).

The revision towards the aims of primary schools inevitably caused a revision towards the primary school curriculum too. The Indonesian primary school curriculum in the last 50 years has been revised for six times - 1947, 1964, 1968, 1975, 1984 and 1994. Although the curriculum of Indonesian primary schools has been revised six times, there are always two aspects of it which always remain the same. They are (1) the form - it is always in the form of subject oriented curriculum with rigid time allocations and (2) the implementation - it always requires primary school teachers to teach by using a formal teaching method. The latest primary school curriculum was firstly introduced and implemented in the primary schools in the academic year 1994/1995 (July 1994). This curriculum also contains those two aspects. The revisions of the aims and curriculum of Indonesian primary schools led the Indonesian government, particularly the Ministry of Education and Culture, to try out several attempts in the form of pilot projects in order to find out better and more appropriate ways to help primary school pupils learn in classrooms. These attempts were merely aimed to reach the whole aims of primary schools.

The latest attempt that the Indonesian government did started in 1980 and ended in 1994. At this period of time, the Indonesian

government, practically, the Ministry of Education and Culture, conducted a pilot project funded by the World Bank and helped by the consultants from Institute of Education, University of London which is called ALPS Project - Active Learning through Professional Support Project. This project covered some rural public primary schools in 7 provinces out of 27 provinces in Indonesia. They were in Cianjur (West Java Province), Lombok (West Nusa Tenggara Province), Binjai (North Sumatra Province), Maros (South Sulawesi Province), Sidoarjo (East Java Province), Bandar Lampung (Lampung Province) and Banjarmasin (South Kalimantan Province) (Tangyong, Wahyudi, Gardner and Hawes, 1989).

This project was about school improvement. School improvement as it is claimed by Hopkins and Wideen (1984) is a nebulous term and one that requires clarification. Velzen, Miles, Ekholm, Hamyer and Robin (1985) agree with Hopkins and Wideen claim about the term 'school improvement'. They say that the term 'school improvement' is a term many people use, but its meaning is ambiguous, almost anything - in-service training, the adoption of an innovation, curriculum change, new teacher hiring standards, or a national reform - can be labelled 'school improvement'. According to Hopkins and Wideen (1984), there are two senses in which the phrase 'school improvement' is generally used. The first is the common-sense meaning which relates to general efforts to make school better places for pupils and students to learn, and the second one is a strategy for educational change that enhances student outcomes as well as strengthening the school's capacity for managing change. The second sense as they claim is about raising student attainment through focusing on the teaching and learning process and the conditions which support it.

However, the definition of school improvement which has been widely accepted is defined by Velzen, Miles, Ekholm, Hamyer and

Robin (1985). They define 'school improvement as a systematic, sustained effort aimed at change in learning conditions and other related internal conditions in one or more schools, with the ultimate aim of accomplishing educational goals more effectively. As this definition is still rather abstract, then they clarify this definition through providing detailed descriptions on what this definition really means. For example, a school is an organisation of teachers and students usually found in one physical building (depending on the local context, the school may also formally include principals or school leaders, specialists, parents, counsellors, etc.), a systematic, sustained effort is school improvement as a carefully planned and managed process that takes place over a period of several years, change means any alteration in learning conditions or related conditions internal to school, learning conditions are organised activities of the school directed by teachers or others aimed at accomplishing educational goals, and related internal conditions are all aspects of the school that connected in any way with learning conditions and to intended attainment of pupil goals. The ultimate aim of school improvement is to enhance pupil progress, attainment and development (Stoll and Fink, 1996).

In line with school improvement in the context of Indonesian primary schools, the ALPS Project focused on, one of them which is closely related to this study, a change of teaching method. This project introduced and tried out a child-centred method, the method that has been implemented in the western countries for years, in some primary schools in those seven provinces. The introduction and implementation of the method in Indonesian primary school classrooms brought about some changes in teaching and learning conditions. For example, the project should adapt the existing primary school curriculum, train the teachers and provide the schools with all supporting learning facilities as required by the method used.

As a result, at the end of the project, the implementation of the child-centred method had faced the Indonesian government towards some critical and fundamental problems. These critical and fundamental problem can be classified into four three problems which are related to (a) primary school curriculum, (b) primary school teachers, and (c) cost of implementation.

These three critical and fundamental problems arose due to the change of teaching method implemented at the pilot primary schools. At these pilot primary schools, the teachers had to use a child-centred method instead of a traditional method (a formal teaching method) in teaching their pupils. These two methods have a wide range of differences as Brady (1985) describes as follows - in the form of continuum:

Teacher-Centred Method	Pupil-Centred Method
a. views learning as acquisition of knowledge; intellectual development	a. views learning as acquisition of experience, affective development
b. teacher's main function is to instruct	b. teacher's main function is to evoke
c. emphasises teacher as judge, censor	c. emphasises teacher as facilitator, supporter
d. teacher selects learning experiences	d. pupils contribute to selection of learning experiences
e. encourages teacher-pupil interaction	e. encourages pupil-pupil interaction
f. emphasis on tests and grades	f. emphasis on less traditional evaluation
g. does not encourage group work	g. encourages the use of groups
h. evaluation is a teacher responsibility	h. evaluation is jointly determined
i. emphasises teacher control	i. emphasises pupil interaction

Furthermore, Richards (1979:50-55) distinguishes traditional primary education against child-centred one as follows:

Traditional primary education:

"is associated with "traditional" schools and 'formal' teaching, has well-documented characteristics, claims that traditional approaches stress the importance of continuity with the past and the transmission of 'worthwhile' cultural elements, sees schools as vital to the preservation of "standard" and

"values" and to the stability of society, believes children be endowed with varying degrees of intellectual ability, believes that ability manifests itself as a result of the interaction between children's "innate potential" and environment, does not assume children to be active learners but are believed to require extrinsic motivation in order to 'fulfil their potential', sees teaching as to initiate learners into 'valuable' knowledge forms and skills in an orderly, systematic way, sees the teacher as the asker of questions and the processor of knowledge; the pupils as the respondent and the receiver, claims that classroom interaction involves the teacher in didactic instruction (as the major mode), in keeping discipline and in promoting extrinsic motivation so as to get the pupils learn, takes little regard of the cultural resources and expertise of the local community and parents are regarded as passive consumers rather than active partners in the educational process, and considers the practical reflections of the traditional belief-system include subject-dominated curricula, specified allocation of time to particular curricula area, streaming or setting, a predominance of class-teaching, a reliance on "chalk and talk" and marked social distance between teachers and children and teachers and parents."

Child-centred primary education:

"celebrates the supremacy of the child in the teaching-learning situation, takes a view of the nature of children as self-active, self developing human beings who naturally seek to understand themselves and the world around them in their own terms and through their own self-chosen activities, sees children as naturally curious, anxious to make discoveries and to seek opportunities to express their unique individuality, sees a teacher as a facilitator, a catalyst and a manager of learning situations, considers the curriculum not in terms of subjects to be taught or areas to be covered, but as the sum-total of learning experiences both offered to children and created by them as they interact with their surroundings, sees the stance of itself towards the community and its culture is equivocal, and emphasises the involvement of children in first-hand experience both inside and outside the school and the understanding of individual children as fully as possible."

Having looked at and borne in mind of the characteristics of the teacher-centred and child-centred methods, and the traditional and child-centred primary schools, now let us discuss why the latest attempt of the Indonesian government did not fully succeed.

A. Primary School Curriculum

The 1994 Indonesian primary school curriculum as well as the previous ones are based on subject oriented curriculum and rigidly specified allocation of time for each subject. They all also require primary school teachers to use a formal teaching method for their teaching purposes in their classrooms. Conversely, the child-centred primary schools are based on some-total of learning

experiences as an integrated curriculum and require the teachers to function as facilitators, catalysts and managers of learning.

These two great differences have caused serious dilemmas. How primary school teachers can function as facilitators, catalysts and managers of learning and use a child-centred method which is based on the sum-total integrated learning experiences if the existing curriculum is still based on a subject oriented curriculum and requires the teachers to teach their pupils with a formal teaching method.

B. Primary School Teachers

Before 1990, most of primary school teachers and, probably, even all of them had been trained in primary school teacher training schools and had been exposed to use a formal teaching method as their teaching method for years. More crucially, the trainers of those primary school teachers were trained in universities/institutes not for the purpose of training the candidates of primary school teachers but they were trained for the purpose of teaching junior and senior high school pupils. Therefore, these conditions had caused a crucial dilemma for primary school teachers teaching in primary schools. Although from 1990 onwards, the candidates of primary school teachers started being trained in universities/institutes for two and a half years, the same problem arises because the university/institute teachers professionally have no background for teaching the candidates of primary school teachers. These university/institute teachers were trained in order that they can train the candidates of junior and senior high school teachers.

Having looked at the primary school teachers' education backgrounds and a dramatic change from a traditional method to a child-centred one, inevitably these conditions have led the

Indonesian government to face a serious problem. The problem is training primary school teachers all over Indonesia in order that they can use a child-centred method instead of a teacher-centred one as their teaching method. Besides, the number of primary school teachers, by 1992, is 1,058,815 (Ministry of Education and Culture, 1993). This number also faces the Indonesian government to a problem, that is how to train all these teachers and for how long.

C. Cost of Implementation

Firstly, changing a traditional method to a child-centred one will inevitably change the primary school curriculum. This is because whatever the teachers teach in their classrooms should be based on the curriculum. The child-centred method is on the basis of the curriculum in the form of the sum-total of integrated learning experiences, but the traditional one is not. In the context of Indonesian primary schools, the curriculum is based on a subject oriented curriculum with rigidly specified allocation of time. A subject oriented curriculum means that a curriculum where each subject has its own descriptions which are different from other subjects. The descriptions cover the description, functions, aims, teaching areas, general guidelines, general instructional objectives and areas of teaching materials of the subject. A rigidly specified allocation of time means that each subject has its own allocated time and the duration of teaching time varies from one subject to another. This curriculum condition requires the teachers to teach each subject independently and/or separately. Therefore, in order that the teacher can use a child-centred method, first of all, the curriculum should be revised. Revising the curriculum is very costly. Besides, it also takes a certain period of time while the education itself cannot be postponed.

Secondly, due to the primary school teachers have been using the traditional method (a formal teaching method) for years, they have probably been fossilised towards this method. Therefore, they do need special trainings in order that they can use the child-centred method properly. This condition leads to the financial problem - very costly - because the number of primary school teachers as I have already described earlier is very big.

Finally, the child-centred method, unlike the traditional one, requires well-supported learning facilities. Providing these well-supported facilities will of course require a very large amount of money. This is because the vast number of primary schools in Indonesia, that is 137,487 primary schools (Ministry of Education and Culture, 1993).

Having described the aims and curriculum of Indonesian primary schools and some Indonesian government's attempts as well as their problems to improve the quality of primary schools in Indonesia, I would like to contribute a piece of solution towards the quality improvement of Indonesian primary schools. It is an attempt to help primary school pupils in order that they can learn, hopefully, in a better way and achieve the aims of Indonesian primary schools more successfully.

Due to the limited finance and time as well as the requirement of a Ph.D. thesis in Child Development and Learning, Institute of Education, University of London, I decided to conduct a research through carrying out an intervention in the teaching method on one of the Indonesian primary school subjects, Mathematics. This intervention does not necessarily require any changes towards the existing primary school aims and curriculum as well as the coursebooks, but it requires an adjustment to the existing teaching method.

4.2.2 Description of the Intervention

Having borne in mind the above background of intervention and looking back closely at the description of Indonesian primary schools in Chapter 1, one of the aims of Indonesian primary schools is to prepare the pupils to proceed to junior high schools, there is a strong tendency that the Indonesian primary schools refer to, as already described in Chapter 3, the preparatory tradition - it is mainly conceived in terms of preparation for the later stages of education (Blyth, 1965), elementary education - it is concerned with the inculcation of essential knowledge into passive pupils (Golby, 1982) or educational conservation - it stresses the importance of continuity with the past and views curriculum as a repository of worthwhile cultural elements which need transmitting from one generation to another (Richards, 1982). More specifically, it can refer to the traditional primary education - it is associated with 'formal' teaching, stresses the importance of continuity with the past and the transmission of worthwhile cultural elements, does not assume pupils to be active learners, are believed to require extrinsic motivation (Richards, 1979). However, in terms of the other aim of Indonesian primary schools (to provide the pupils basic abilities in order that they can develop themselves as individuals, members of society and citizens), it can also, to some extent, refer to the child-centred primary education - it takes a view of the nature of children as self-active, self developing human beings who naturally seek to understand themselves and the world around them in their own terms and through their own unique individuality (Richards, 1979). Furthermore, if we look at the Indonesian primary schools from a point of view of the Indonesian educational system (compulsory nine-year basic education for all Indonesian school-aged children - six years for primary school and three years for junior high school), Indonesian primary school curriculum (subject oriented curriculum), and teaching and learning activities (the use of a formal teaching

method and pupils sit in rows), there is a stronger tendency that the Indonesian primary schools refer to a traditional primary education to a child-centred one.

Traditional primary education, to some extent, is good and acceptable for Indonesian primary schools in relation to fulfilling the requirements of the curriculum. This is because the Indonesian primary school curriculum requires the teachers to direct their pupils to a certain direction on the basis of the curriculum target. This condition leads the primary school teachers to use a formal teaching method in teaching their pupils. It means that the teachers are the masters of knowledge and skills in the classes and the pupils consequently have to learn everything from their teachers.

The use of a formal teaching method is very effective in achieving the first aim of the Indonesian primary school curriculum (as already described under Whole-Class Grouping section in Chapter 3). However, in terms of achieving the other aim, the use of a formal teaching method is still questionable. It is because by using a formal teaching method, the pupils have to study individually. Therefore, there is no or very little interaction among the pupils. Interactions among the pupils may offer special opportunities for practising social skills (Hatch, 1984). Besides, the use of formal teaching method tends to make the teacher pitch the work in the middle level of ability. This condition leads to the understimulating the high-ability pupils and placing the low-ability pupils in a situation where they cannot succeed (Alexander, Rose and Woodhead, 1992).

Therefore, the implementation of a formal teaching method should be adjusted in order that the whole aims of Indonesian primary schools can fully be achieved and the pupil progress can be improved. Due to the attainment of the second aim of Indonesian primary schools and the improvement of pupil progress can be done

through an implementation of small groups (as the advantages of the use of small groups in the classrooms already described under the Small Group section in Chapter 3), therefore, the use of small groups in Indonesian primary schools should be taken into account.

In small groups, the pupils can practice the skills of listening, questioning, challenging, helping and providing explanations to others. The pupils can only practice all of these skills in a classroom if they are given opportunities to interact among themselves. The interaction involving all group members is more likely in the small groups than in large ones (Bossert, Barnett and Filby, 1984; and Nastasi and Clements, 1991). All these skills are necessary and useful in relation to reaching the second aim of the Indonesian primary schools. Besides, in small groups, the pupils have opportunities to help each other, especially when the group consists of mixed-ability pupils. It is because groups function best when they are of mixed ability and include pupils from the highest ability group within the class (Kutnick and Rogers, 1994). In this kind of group, the more knowledgeable pupils can help the less able pupils in order that the less able pupils can proceed well, as Vygotsky (1978) proposes the zone of proximal development - it refers to the gap that exists for an individual (child or adult) between what he is able to do alone what he can achieve with help from one more knowledgeable or skilled than himself. Therefore, through implementing small groups in the classrooms of Indonesian primary schools, the pupil progress can be improved by asking and encouraging the pupils to help each other.

The implementation of small groups in the classrooms of Indonesian primary schools can be established if the implementation of a formal teaching method is adjusted. The adjustment of the implementation of a formal teaching method will be done at the stage where the pupils do their exercises. In the implementation of a formal teaching

method, the pupils do their exercises individually, but by doing this adjustment, the pupils will do their exercises in small groups. This adjustment will consequently bring about the adjustments of the teacher and the pupils' roles in the teaching and learning process. The roles of the teacher and the pupils will be more active in the implementation of a formal teaching method and small groups compared to the implementation of a formal teaching method only. In the implementation of a formal teaching method and small groups, the main roles of the teacher are not only for instructing her pupils but also for supporting and encouraging the pupils to work in small groups. Besides, the roles of the pupils will not be passive, theirs will be active because they have opportunities to interact in their small groups.

In reference to the classification of different grouping arrangements proposed by Galton and Williamson (1992), the implementation of small groups in Indonesian primary school classrooms is slightly similar to working groups. The difference is when the children do their exercises in the expected small groups, the pupils will help each other but in the working groups proposed by Galton and Williamson, the pupils do their exercises individually. The following table shows the expected small groups that will be implemented in Indonesian primary school classrooms in comparison to grouping arrangements proposed by Galton and Williamson.

Table 4.1:

Intervention Groups in Comparison to the Classification of Different Grouping Arraignments Proposed by Galton and Williamson (1992)

Type	Task Demand	Intended Outcome
Seating Groups	each pupil has a separate task	different outcomes: each pupil completes a different assignment
Working Groups	each pupil has the same task	same outcome: each pupil completes the same assignment independently
Co-operative Groups	each pupil has separate but related task	joint outcome: each pupil has a different assignment

Collaborative Groups	each pupil has the same task	joint outcome: all pupils share the same assignment
Intervention Groups	*each pupil has the same task*	*same outcome: each pupil completes the same assignment by helping each other*

Furthermore, in line with a continuum of teacher-centred method and pupil-centred method proposed by Brady (1985), the implementation of formal teaching method and small groups (a mixed teaching method) in Indonesian primary schools can be described as follows:

Firstly, the mixed teaching method views learning as acquisition of knowledge and intellectual development. This means that the method emphasises a transfer of curriculum-based knowledge and skills from the teachers to their pupils. This is because the 1994 Indonesian primary school curriculum requires the teachers to direct and help their pupils to master the knowledge and skills on the basis of this curriculum and therefore the teachers should direct them to achieve these targets.

Secondly, The main functions of the teachers under this method are to instruct as well as to evoke the pupils. Instructing the pupils means that the teachers should transfer the curriculum-based knowledge as well as skills to their pupils. In the process of transferring these knowledge and skills, the method emphasises the teachers as judges and censors in order that the teachers can really direct their pupils to certain targets on the basis of the curriculum. For example, in the explanation stage, the teachers explain the materials to be learned by their pupils. At this stage, the method encourages the teachers to use the teacher-pupil interaction in order that the transfer of knowledge and skills from the teachers to their pupils can be done smoothly. Evoking the pupils means that the teachers should encourage the pupils to interact and help each other in small groups while they are doing their exercises. At this stage,

the teachers under this method are encouraged to allow the pupil-pupil interaction occur in order that the pupils have opportunities to help each other in doing their exercises. At this stage, the method emphasises the roles of the teachers as facilitators and supporters of learning.

Finally, the teacher is responsible to carry out an evaluation. This responsibility is demanded to suit the requirements of evaluation system in Indonesian primary schools. That is the teacher should carry out the formative as well summative tests.

In short, the implementation of a mixed teaching method in line with a continuum of teacher-centred method and pupil-centred method proposed by Brady (1985) can be seen in the following table:

Table 4.2:

A Mixed Teaching Method in the continuum of Teacher-Centred Method and Pupil-Centred Method (Brady, 1985)

Teacher-Centred Method	Mixed teaching method	Pupil-Centred Method
a. views learning as acquisition of knowledge; intellectual development	a. *views learning as acquisition of knowledge; intellectual development*	a. views learning as acquisition of experience, affective development
b. teacher's main function is to instruct	b. *teacher's main functions are to instruct and to evoke (in the*	b. teacher's main function is to evoke

	sense of encouraging pupils to help each other	
c. emphasises teacher as judge, censor	*c. emphasises teacher as judge and censor as well as facilitator and supporter*	c. emphasises teacher as facilitator, supporter
d. teacher selects learning experiences	*d. teacher selects learning experiences*	d. pupils contribute to selection of learning experiences
e. encourages teacher-pupil interaction	*e. encourages teacher-pupil interaction as well as pupil-pupil interaction*	e. encourages pupil-pupil interaction
f. emphasis on tests and grades	*f. emphasis on tests and grades*	f. emphasis on less traditional evaluation
g. does not encourage group work	*g. encourages group work*	g. encourages the use of groups
h. evaluation is a teacher responsibility	*h. evaluation is a teacher responsibility*	h. evaluation is jointly determined
i. emphasises teacher control	*i. emphasises teacher control and pupil interaction*	i. emphasises pupil interaction

Having done the implementation of a formal teaching method and small groups, it is expected that it can improve the pupil progress and the whole aims of Indonesian primary schools can also be achieved more successfully. In a sense that the pupil progress can be improved because the pupils in the small groups can help each other - the more capable or knowledgeable pupils help the less capable or knowledgeable ones. This condition may lead to the increase of pupil learning outcome because a large body of evidence suggests that peers can be a valuable resource for encouraging cognitive development and academic attainment. Furthermore, in a sense that the whole aims of Indonesian primary schools can be achieved more successfully because in the small groups, as well as the pupils have better progress, they can also have opportunities to practice social skills (skills of listening, questioning, challenging, helping and providing explanations to others). The pupils need these skills as individuals, members of society and citizens. In other words, having implemented the implementation of formal teaching method and small groups in Indonesian primary schools, the whole aims of Indonesian primary schools can be achieved more successfully - the

pupils will have better pupil progress means that they have a better preparation to proceed to junior high schools, and they also have opportunities to practice social skills means that they have better basics skills as individuals, members of society and citizens.

This combination of formal teaching method and small groups may offer a solution towards overcoming the problems encountered by the Indonesian primary schools because the weaknesses of formal teaching method (the use of whole-class grouping) can be decreased as minimum as possible by the existence of the small groups. The combination of formal method and small groups in Indonesian primary schools becomes the focus for intervention. Due to many classes and subjects in primary schools, one of the classes and subjects was selected. In this study, the intervention was done in year-three classes for improving the teaching of Mathematics. The main reason of selecting year-three class pupils is because only year-three class pupils among six classes (grades) in Indonesian primary schools have fully learned Mathematics as well as other subjects on the basis of the 1994 Indonesian primary school curriculum since their first year of primary schooling.

In the intervention, the pupils will be grouped on the basis of their prior Mathematics attainment scores. Each group will have one or two pupils who have high prior Mathematics attainment scores, one or two pupils who have moderate prior Mathematics attainment scores, and one or two pupils who have low prior Mathematics attainment scores. This type of groups is intended to provide opportunities for the more capable pupils (in the sense of more knowledgeable on Mathematics) to help the less capable ones. Besides, it is not common for the pupils with different sexes sit together in Indonesia. So, the way of grouping the pupils will also be based on their gender: males and females.

Therefore, this study is aimed to (1) investigate possible differences in Mathematics attainments between the year-three primary school pupils who study Mathematics under a combination of formal teaching method and small mixed prior Mathematics attainment groups and those who study Mathematics individually under a whole-class teaching method, and (2) evaluate how effective the implementation of the intervention is. This study is directed to find out the answers towards the following research questions:

1) Are there any differences in Mathematics attainments between the year-three Indonesian primary school pupils who study Mathematics under a combination of whole-class teaching method and small mixed prior Mathematics attainment groups (intervention group) and those who study Mathematics under a whole-class teaching method (comparison group)?

2) What are the effects of pupil characteristics (e.g. gender) in pupils' learning outcome?

Mathematics subject is taught in five teaching sessions every week for each term in a year-three class of Indonesian primary school. Each teaching session consists of two teaching hours. For the purpose of this study, this condition remains the same for a comparison group but for an intervention group, these five teaching sessions will be made into four teaching sessions every week. Each of the first three teaching sessions consists of three teaching hours and the other teaching session consists of one teaching hour. The revision is aimed to cope with the intervention conditions. In every three-hour teaching session, the teacher and the pupils hopefully have enough time to carry out a combination of formal method and small mixed prior Mathematics attainment groups. In every one-hour teaching session, the teacher is expected to give some exercises for the purpose of monitoring and evaluating the pupils' progress in a week.

The following are the descriptions of the intervention:

A. For every three-teaching hour session:

At the beginning of every Mathematics lesson, the teachers are expected to teach and treat their pupils as they normally did (the teachers still stand in the front of the classes and use a formal teaching method as their teaching method in teaching Mathematics and the pupils still sit in rows as shown in figure 4.1. But, when the time comes for the pupils to do the Mathematics exercise, of course, after every pupil has got a clear idea about what to do and how to do it from their teachers, then the teachers ask their pupils to sit in small mixed prior Mathematics attainment groups as shown in figures 4.2 and/or 4.3. These groups are set up at the beginning of the term right after the pupils have done the pre-test.

The grouping is done on the basis of the pupils' prior Mathematics attainment scores. First of all, each of intervention classes is blocked into two groups, males and females. Then, each of these two group members is arranged on the basis of their prior Mathematics attainment scores, starting from the highest score and ending up with the lowest one. After that, each group is blocked into three sub-groups - the first sub-group consists of one-third of the group members who have high scores, the second sub-group consists of one-third of the group members who have moderate scores, and the last sub-group consists of one-third of the group members who have low scores. Finally, small mixed prior Mathematics attainment groups are set up. Each small mixed prior Mathematics attainment group consists of one or two pupils from each of the three sub-groups members. So, each group in each intervention class has pupils from the sub-groups of high, moderate and low prior Mathematics attainment scores, and consists of not less than 4 and not more than 6 pupils, and has the same gender. In short, the pupils are grouped

into small mixed prior Mathematics attainment groups on the basis their Mathematics pre-test scores and gender.

In each group, the pupils firstly do their Mathematics exercise individually. However, if, let us say, one of the group members has a Mathematics problem in doing his Mathematics exercise, he can ask his peers in his own group how to solve the problem. The more capable peer(s) or the peer(s) who know(s) how to solve the problem is(are) expected to tell him the way(s) how to solve the problem, but not to tell him the answer of the problem. This feature continues until all groups have completed their Mathematics exercise.

If all groups have completed their Mathematics exercise, they are still sitting in their own groups, the teacher would then give the feedback, discuss the answers together with all groups. When the time is up and the next lesson will begin, the teacher will ask the pupils to sit back in rows again. The real intervention features can be seen in Appendix 4.1.

Figure 4.1:
Typical Seating Arrangement in the Indonesian Primary School
Classrooms
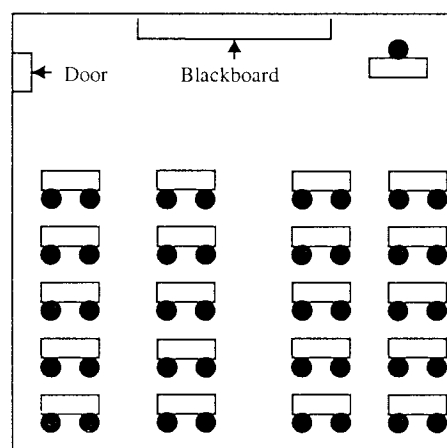
Figures 4.2 and 4.3 :

Alternative Seating Arrangements in the Intervention Classes
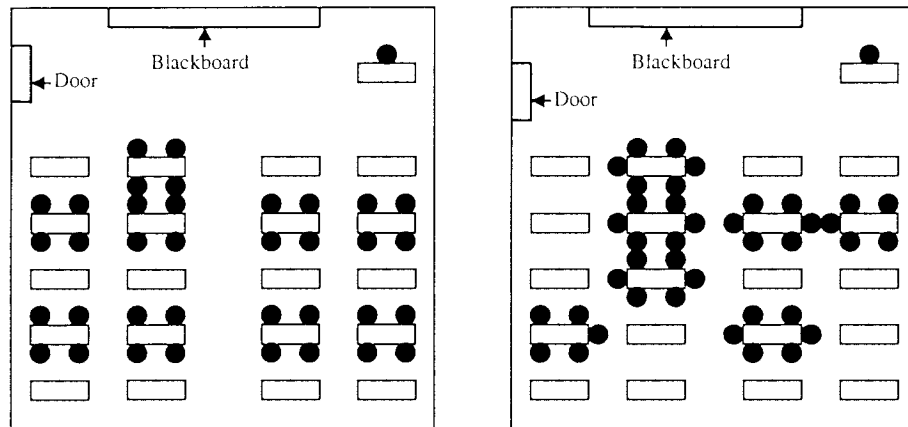
B. For every one-hour teaching session:

The teachers are expected to give some Mathematics exercises on what they have already taught to their pupils for a week. The pupils do the Mathematics exercises individually and sit in rows (the typical seating arrangement in Indonesian primary schools). After all the pupils have done their Mathematics exercise and if the time is still available, the teachers discuss the answers of the exercises with their pupils. But, if after all pupils have done their Mathematics exercise and there is no more time left, the teachers collect their pupils' work and give the feedback later on. In short, this session is used primarily as a monitoring and evaluating session for each of the individual pupils for every week during the intervention.

Due to the fact that some aspects of the intervention were still new to the teachers, and given the teachers' educational backgrounds noted earlier, and the condition of Indonesian primary schools, it was considered necessary to provide the teachers with some theoretical and practical knowledge related to the implementation of the intervention. The best way to give this was through training. This

training aimed to equip all of the intervention group teachers with the theoretical and practical knowledge needed in implementing the project. The 'theoretical' knowledge covered models of primary education, grouping and Indonesian primary schools. The 'practical' knowledge included knowledge about how to do the intervention in the classrooms.

4.3 Research Design

To implement the study, the researcher selected a research design that suited the purposes of the research questions and one which could be applied in the existing condition of Indonesian public primary schools in Palembang, Indonesia. The intervention was in the form of experiment; and by experiment we refer to that type of research design in which variables are manipulated and their effects upon other variables observed (Campbell and Stanley, 1963). Therefore, the researcher had to select among 16 the existing experimental designs proposed by Campbell and Stanley (1963). See Appendix 4.2 for these 16 designs.

The non-equivalent control group design was chosen because (1) the researcher was required to use intact classrooms in ordinary schools, i.e., he could not assign pupils randomly to experimental conditions, and (2) this design requires two parallel classes to be as similar as possible, and the existing condition of public primary schools in Palembang, Indonesia allows this requirement to be satisfied. Many public primary schools in Palembang are different from each other in terms of study sessions (morning and afternoon), Mathematics textbooks, teachers' educational backgrounds and genders, and school conditions. Therefore, this variety makes it impossible to use Design 4 (the pretest-posttest control group design), Design 5 (the solomon four-group design), or Design 6 (the posttest-only control group design) as a research design for this study. Each of these last three designs requires a basic prerequisite, that children should be randomly assigned, therefore they cannot be used. However,

Campbell and Stanley (1963) claim that the non-equivalent control group design should be recognised as well worth using in the many instances in which designs 4, 5 and 6 were impossible.

The non-equivalent control group design, according to Campbell and Stanley (1963:47) and Cohen and Manion (1995:167) can be presented as:

Experimental	O_1	X	O_2
Control	O_3		O_4

The dashed line separating the parallel rows in the diagram of the non-equivalent control group indicates that the experimental and control groups have not been equated by randomisation, O refers to the process of observation or measurement, and X represents the exposure of a group to an experimental variable or event, the effects of which are to be measured.

Since the non-equivalent control group design is an established design in experimental research, then it is useful to examine the procedures for experimental research in general. These are:

> (1) identify and define the research problem(s) as precisely as possible, always supposing that the problem(s) is/are amenable to experimental methods, (2) formulate hypothesis(es) that will be tested, (3) select appropriate levels at which to test the independent variables, (4) take account of the population to which you wish to generalise the results, (5) select instruments, choose tests and decide upon appropriate methods of analysis, (6) pilot test the experimental procedures to identify possible snags in connection with any aspect of the investigation, and (7) endeavour to follow tested and agreed-on procedures to the letter (Cohen and Manion, 1995:172-174).

The non-equivalent control group design, like other experimental designs, must have internai validity and external validity. According to Cohen and Manion (1995), internal validity concerns the question "Do the experimental designs, in fact, make a difference in the specific experiments under scrutiny?" and external validity asks the question

"Given these demonstrable effects, to what populations or settings can they be generalised?". Campbell and Stanley (1963) in Gage (1971) also argue that internal validity is the basic minimum without which any experimental treatment is uninterpretable. Therefore, in the non-equivalent control group design, like other experimental designs, without internal validity an experiment cannot possibly be externally valid, but the converse does not necessarily follow; an internally valid experiment may or may not have external validity (Cohen and Manion, 1995).

Furthermore, in relation to internal validity and external validity of non-equivalent control group design, Campbell and Stanley (1963) in Gage (1971:175) say that there are eight factors may jeopardise internal validity:

> "(1) history - the specific events occurring between the first and second measurement in addition to the experimental variable, (2) maturation - processes within the respondents operating as a function of the passage of time per se, including growing older, growing more tired, and the like, (3) testing - the effects of taking a test upon the scores of a second testing, (4) instrumentation - in which changes in the calibration of a measuring instrument or changes in the observers or scorers used may produce changes in the obtained measurements, (5) statistical regression - operating where groups have been selected on the basis of their extreme scores, (6) biases resulting in differential selection of respondents for the comparison groups, (7) experimental mortality - the differential loss of respondents from the comparison groups, and (8) selection-maturation interaction, etc. - which in certain of the multiple-group quasi-experimental designs, such as Design 10, is confounded with, i.e., might be mistaken for, the effect of the experimental variable"

Furthermore, there are three factors that may jeopardise external validity:

> "(1) the reactive or interaction effect of testing - in which a pre-test might increase or decrease the respondent's sensitivity or responsiveness to the experimental variable, (2) the interaction effects of selection biases and the experimental variable, and (3) reactive effects of experimental arrangements - which would preclude generalisation about the effect of the experimental variable upon persons being exposed to it in nonexperimental settings". (*op cit*)

All these factors should be controlled in order that the non-equivalent control group design can be internally and externally valid.

The study intervened in the teaching of Mathematics in year-three classes, therefore, the term 'intervention' was considered more relevant than 'experiment'. As it was impossible to fully 'control' the non- intervention class, it was also considered more relevant to use the term 'comparison' than 'control'. Therefore, in this study, the class in which the intervention on teaching consequently the terminology given by Campbell and Stanley (1963), and Cohen and Manion (1995) have been adjusted to be more meaningful and relevant to the purpose of this study. The adjusted terminologies are as follows:

Intervention	O_1	X	O_2
Comparison	O_3		O_4

4.4 Development of Research Instruments

For the purposes of measuring the effects and of evaluating the implementation of intervention, this study requires two kinds of research instruments - a Mathematic test and questionnaires. The Mathematics test was used to provide base-line data and progress of the year-three pupils' Mathematics. The questionnaires were used to obtain year-three class teachers and pupils' views towards the implementation of intervention. Under this section, the developments of the Mathematics test and questionnaires will be described respectively.

4.4.1 Development of the Mathematics Test

Looking back at the purposes of measuring the effects of the intervention, both a Mathematics test was needed as a pre-test and post-test instrument of assessment. This Mathematics test was used to assess the pupils' Mathematics attainments at the beginning and the end of the intervention.

A Mathematics test as a research instrument has to be valid and reliable in order that the results can be interpretable. Validity is concerned with whether the test is measuring what it is supposed to measure (Rust and Golombok, 1989; and Hieronymus, Lindquist and France, 1988). Reliability is concerned with the extent to which test scores measure "true" variance and is expressed numerically in the form of a reliability coefficient ranging from 0 to 1 (Hieronymus, Lindquist and France, 1988).

In this study, the aim of the Mathematics test as a research instrument was to provide a base-line of each of year-three Indonesian primary school pupils' Mathematics attainment and also their progress on the basis of the first term of the 1994 Indonesian primary school curriculum for Mathematics subject. Therefore, the test had to be based on the first term content of Mathematics in the 1994 Indonesian primary school curriculum. It had to be written in standard Indonesian language, be based on the Indonesian context, suit the age of the pupils, and had to be able to differentiate the Mathematics attainments between the pupils who were in intervention classes and those who were in comparison ones.

According to Ridgway (1988), in the context of mathematical education, there are three common kinds of tests. They are (1) norm-referenced tests (they report where a pupil stands in comparison with other pupils who have taken the same test), (2) criterion-reference tests (they are set out to judge whether or not a pupil has been able to perform some well-defined task to an acceptable standard), and (3) diagnostic tests (they are set out to identify pupil conceptions and misconceptions so that appropriate remedial action may be taken). Because the study required a Mathematics test which could measure each of the pupils' Mathematics attainment and differentiate the Mathematics attainments between the pupils who were in

intervention classes and those who were in comparison ones, the best kind of test for research purposes was the criterion-referenced test. Furthermore, Ridgway (1988) describes two of the main purposes of the criterion-referenced test are to specify the nature of what has and has not been attained by the pupils and to identify class strengths and weaknesses, to highlight topics which need more, and perhaps different, teaching effort. These aims are suited to the needs of this study.

At first the researcher tried to find a published standardised Mathematics test that could be used, but this proved impossible. In Indonesia, there was no available standardised Mathematics test that could be used. It was also decided that a Mathematics test made by a year-three class teacher didn't cover the whole of the teaching materials for the intended term. The test was also not valid and reliable and could not be used as a research instrument for this study. A standardised Mathematics test available in the UK was considered; the Richmond Test of Basic Skills. This test was basically a norm-referenced Mathematics test for UK samples and so again it was not suitable for this study. The UK standardised Mathematics tests that were available had some substantial differences in content compared to the Indonesian educational context, for example, the differences in cultural contexts, language and the Mathematics on the syllabus in Indonesia. All these differences urged the researcher not to use them as research instruments for this study.

The researcher finally decided to develop his own test. It was hoped that the test would suit the purpose of the study, be valid, reliable, in the form of a criterion-referenced test, based on the first-term areas of Mathematics in the 1994 Indonesian primary school curriculum, written in standard Indonesian language, based on the Indonesian context, suitable for the age of the pupils, and able to differentiate

the Mathematics attainments between the pupils who were in intervention classes and those who were in comparison ones.

In developing tests, slightly different steps are routinely taken. It is because different tests might require different prerequisites, e.g. developing a norm-referenced test might have different steps from developing a criterion-referenced test. In general, according to Walsh and Betz, test development should proceed with the following steps:

(1) begin with a careful, detailed definition of the attribute, construct or characteristics to be measured, (2) develop test items that are related to the content (i.e. definition), (3) administer the items to a preliminary sample of subjects - the subjects in this group should be representative of the population or subjects for whom the test itself is intended, (4) refine the items, refining the items means eliminating items that do not have the properties we had hoped for and selecting items that have particularly desirable properties, through item analysis (to find the item difficulty and item discrimination) and expert judgement (to get information on the appropriateness of test item (s), (5) administer the revised test to a new sample of subjects, and (6) examine the evidence for reliability and validity, and compute normative data (Walsh and Betz, 1995:72-78).

For the purpose of this study, the following steps were taken:

First, identifying and classifying the teaching objectives, content areas and sub-content areas of Mathematics subject on the basis of the 1994 Indonesian primary school curriculum (year three; term one). This was done through redescribing and reformulating the curriculum in order to get systematic classifications of teaching objectives, content areas, and sub-content areas (see Appendix 4.3).

Second, selecting and determining the test type on the basis of the purpose of the study. Looking back at the previous description of this section, the test was decided to be a criterion-referenced test.

Third, determining the total number of test items, the test length. This was done on the two bases: (1) the test should cover all Mathematics teaching areas under term one of year-three class, and (2) the usual time length of final term exam that the year-three pupils did.

Fourth, deciding the levels of cognitive domains and weighing the test items. Each level of cognitive domain and weight for each item was based on each of the description of sub-content areas.

Fifth, devising the test items. In devising each of the test items, there were some basic considerations were taken into account. Each of the test items had to be based on the first term of year-three class of 1994 Indonesian primary school curriculum, it needed to be written in standard Indonesian language, had to be based on the Indonesian context, had to suit the age of the year-three class pupils, and had to be able to differentiate the Mathematics attainments between the pupils who were in intervention classes and those who were in comparison ones.

Sixth, asking for the colleagues' judgements about the appropriateness and difficulty about the test items. Four colleagues who were doing their master degrees at the Institute of Education, University of London were asked to give their mathematical judgements about the appropriateness and difficulty levels to each of the test items. One was a Mathematics lecturer from Institute of Teacher Training and Education of Yogyakarta. One was a Mathematics lecturer from Indonesian Open University. Two were Mathematics lecturers from Institute of Teacher Training and Education of Padang. They provided an assessment of item appropriateness, and thus a form of content validity.

Seventh, revising the test items. Having got the colleagues' mathematical judgements, the "not-so-good" test items were revised in order to get better test items. Then the test was ready to be piloted.

Eighth, piloting the test to year-three class pupils of Indonesian public primary schools and asking for judgements about the levels of item appropriateness and difficulty from the year-three class teachers of these schools. The test was piloted to 268 pupils (127 boys and 141 girls) from seven Indonesian public primary schools in Palembang as shown in Table 4.3. The piloting was done on 9 and 11 March 1996. The length of time spent by the pupils completing the test in this piloting can be seen in Table 4.4. For the purpose of establishing the validity of the test, then, on 9 and 11 March 1996, ten year-three class teachers of Indonesian public primary schools in Palembang, Indonesia were asked to give their judgements about the levels of appropriateness and difficulty for each of the test items by filling in the questionnaire. The questionnaire can be seen in Appendix 4.4 (Indonesian version) and Appendix 4.5 (English version).

Table 4.3:

Data about Pilot Sample

Gender	Indonesian Public Primary School Numbers:							Total
	19	48	63	82	113	167	255	
Boys	19	22	59	17	18	20	12	127
Girls	21	15	21	16	23	17	28	141
Total	40	37	40	33	41	37	40	268

Ninth, analysing the results of pilot data in relation to obtaining the information on the proper length of test time, the difficulty index and discrimination index for each of the test items, and the reliability and validity of the test. Having looked at the time spent by the pupils in doing the test, see Table 4.4, 152 out of 268 or 56.7% could complete the test on time or 258 out of 268 or 96.3% could complete

the test not later than sixty minutes, therefore, it was considered that it was not necessary to decrease or increase the length of the test time - sixty minutes. The total correct and wrong answers and their percentages from 268 pupils as pilot samples, can be seen in Table 4.5. The distribution of correct answers in the form of histogram (it shows a normal distribution) can be seen in Figure 4.4.

Table 4.4:

Data about Completing Time: The pupils, after a sixty-minute period, stopped working on their papers

Public Primary School Number	Duration in Minutes				Total
	50	55	60	> 60	
19	10	10	18	2	40
48	15	-	22	-	37
63	10	6	24	-	40
82	3	5	23	2	33
113	15	14	12	-	41
167	3	5	26	3	37
255	-	10	27	3	40
Total	56 (20.9%)	50 (18.7%)	152 (56.7%)	10 (3.7%)	268

Table 4.5:

Total Correct and Wrong Answers and Their Percentages

Test Items	Correct Answers	Wrong Answers	Test Items	Correct Answers	Wrong Answers
1.	193 (72.0%)	75 (28.0%)	26.	32 (11.9%)	236 (88.1%)
2.	178 (66.4%)	90 (33.6%)	27.	94 (35.1%)	174 (64.9%)
3.	145 (54.1%)	123 (45.9%)	28.	48 (17.9%)	220 (82.1%)
4.	129 (48.1%)	139 (51.9%)	29.	49 (18.3%)	219 (81.7%)
5.	98 (36.6%)	170 (63.4%)	30.	14 (5.2%)	254 (94.8%)
6.	100 (37.3%)	168 (62.7%)	31.	66 (24.6%)	202 (75.4%)
7.	125 (46.6%)	143 (53.4%)	32.	66 (24.6%)	202 (75.4%)
8.	43 (16.0%)	225 (84.0%)	33.	156 (82.5%)	112 (41.8%)
9.	79 (29.5%)	189 (70.5%)	34.	131 (48.9%)	137 (51.1%)
10.	220 (82.1%)	48 (17.9%)	35.	137 (51.1%)	131 (48.9%)
11.	176 (65.7%)	92 (34.3%)	36.	134 (50.0%)	134 (50.0%)
12.	214 (79.9%)	54 (20.1%)	37.	248 (92.5%)	20 (7.5%)
13.	196 (73.1%)	72 (26.9%)	38.	79 (29.5%)	189 (70.5%)
14.	201 (75.0%)	67 (25.0%)	39.	85 (31.7%)	183 (68.3%)
15.	218 (81.3%)	50 (18.7%)	40.	166 (61.9%)	102 (38.1%)
16.	235 (87.7%)	33 (12.3%)	41.	176 (65.7%)	92 (34.3%)
17.	184 (68.7%)	84 (31.3%)	42.	84 (31.3%)	184 (68.7%)
18.	205 (76.5%)	63 (23.5%)	43.	95 (35.4%)	173 (64.6%)
19.	143 (53.4%)	125 (46.6%)	44.	132 (49.3%)	136 (50.7%)
20.	161 (60.1%)	107 (39.9%)	45.	45 (16.8%)	223 (83.2%)
21.	132 (49.3%)	136 (50.7%)	46.	165 (61.6%)	103 (38.4%)

22.	137 (51.1%)	131 (48.9%)		47.	83 (31.0%)	185 (69.0%)
23.	147 (54.9%)	121 (45.1%)		48.	122 (45.5%)	146 (54.5%)
24.	63 (23.5%)	205 (76.5%)		49.	203 (75.7%)	65 (24.3%)
25.	79 (29.5%)	189 (70.5%)		50.	69 (25.7%)	199 (74.3%)

Figure 4.4:

The Distribution of Correct Answers

Std. Dev = 9.42
Mean = 24
N = 268.00

Total Correct Answers
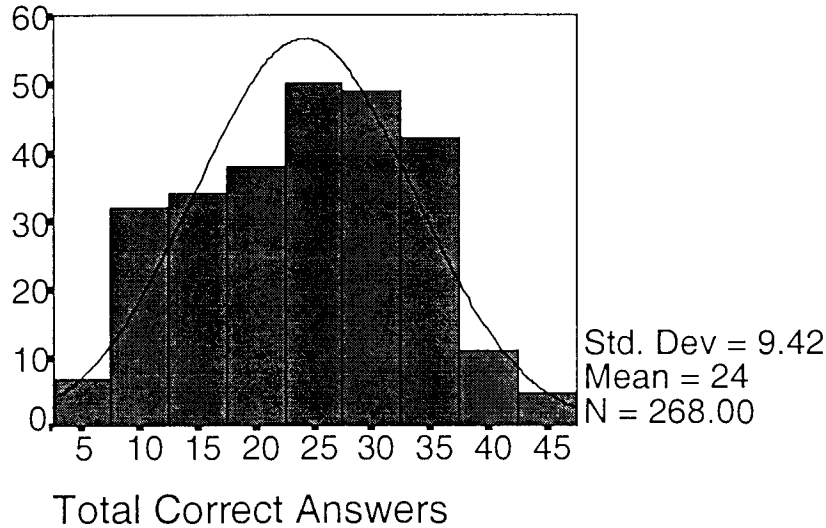
To determine the merit of any test, test results must be subjected to an item analysis (Downie and Heath, 1974). The analysis of test item leads to three kinds of information: (1) the difficulty of the item (p) - the proportion of individuals who answer an item correctly, (2) the discrimination index of the item (r) - a measure of how well the item separates two groups (good pupils and poor ones), and (3) the effectiveness of the distracters - how the incorrect responses in the multiple-choice item are working (Downie and Heath, 1974). Because the test for the purpose of this study is not in the form of multiple-choice items, therefore, only two kinds of information are necessary - the difficulty and the discrimination index of the item.

The difficulty of the item or difficulty index (p) and the discrimination index of the item or discrimination index (r) of the test were calculated by using Flanagan's method (Downie and Heath, 1974). Having calculated the difficulty and discrimination indexes for each of

the test items, it was found that the difficulty indexes of those 50 items range from 0.16 to 0.90 and the discrimination indexes range from 0.20 to 0.80. All of the test items were acceptable significantly at p<0.02 (r ≥ 0.2737), except for the item 8, because its r is less than 0.2737. That meant that all test items were suitable for the study, except item 8 which needed to be revised. The original test item 8 was "19 cm is about ... dm.", and the revised one is "The length of Marlius' envelope is 29 cm. It is about ... dm." The results of estimated item difficulty and item discrimination of the test items can be seen in Appendix 4.6.

According to Downie and Heath (1974), from the point of view of item difficulty, a well-made test starts with a few very easy items, continues to the items of increasing difficulty, and ends up with a few items which only a very few of the examinees will be able to answer correctly. Therefore, having calculated the difficulty index of each of the test items, the test items were rearranged, starting from the item which has the largest value of ρ and ending with the smallest ρ because the bigger value of ρ the easier the item is.

For the purpose of getting a reliability coefficient of the test, the Split-Half Method was adopted. The test was split on the basis of odd-numbered items and even-numbered items. Then, the reliability coefficient of the two versions were computed by using a Pearson product-moment correlation coefficient (Rust and Golombok, 1989). The result of Pearson product-moment correlation coefficient is 0.8687.

The reliability coefficient (0.8687) is the equivalent of one for a test of half of the size of the original test. This should be corrected, then the Spearman-Brown formula was used to compute the reliability of the original test (Rust and Golombok, 1989), that is:

$$r_{tt} = \frac{2r_{oe}}{1 + r_{oe}} = \frac{2\,(0.8687)}{1 + 0.8687} = 0.93$$

Note: r_{tt} : the reliability of the original test

r_{oe} : the reliability coefficient obtained by correlating the scores on the odd items with the scores of the even items

So, the reliability coefficient of the test is 0.93.

In order to investigate further the content validity of the test items, the judgements of experienced Indonesian educators were sought concerning the applicability of each individual item to the Mathematics syllabus. The scales for classifying the teachers' judgements about appropriateness and difficulty of test items can be seen in Table 4.6 and Table 4.7 respectively. The final results of the teachers' judgements for appropriateness levels of the test items is presented below (Table 4.8) and the teachers' judgements for difficulty levels of the test items follows (Table 4.9).

Table 4.6:

Scales for Levels of Item Appropriateness

No.	Level of Item Appropriateness	
	Scales	Categorisation
1.	≥ 5 at very appropriate	a very appropriate item
2.	≥ 5 at appropriate and very appropriate	an appropriate item
3.	≥ 5 moderate	a moderate item
4.	≥ 5 at inappropriate	an inappropriate item
5.	≥ 5 at very inappropriate	a very inappropriate item

Table 4.7:

Scales for Levels of Item Difficulty

No.	Level of Item Difficulty	
	Scales	Categorisation
1.	≥ 5 at very difficult	a very difficult item

2.	≥ 5 at difficult and very difficult	a difficult item
3.	≥ 5 moderate	a moderate item
4.	≥ 5 at easy	an easy item
5.	≥ 5 at very easy	a very easy item

Table 4.8:

Levels of Item Appropriateness

T	Levels of Difficulty					Description
	VD	D	M	E	VE	
1.		1		6	3	easy
2.				6	3	easy
3.	1		1	7	2	easy
4.			3	7		easy
5.		2	4	3		moderate
6.	2	1	5	2		difficult
7.		1	2	5	2	easy
8.	2	1	3	3	1	moderate
9.	2	1	3	3		moderate
10.			1	6	3	easy
11.		1	1	6	2	easy
12.			5	3	2	moderate
13.		1	3	4	2	easy
14.			4	4	2	easy
15.			1	4	5	easy
16.			1	4	5	easy
17.			1	5	4	easy
18.				7	3	easy
19.			3	3	4	easy
20.			3	4	3	easy
21.		1	2	4	3	easy
22.		3	4	2	2	moderate
23.		1	2	5	2	moderate
24.	1	1	4	4		moderate
25.	1	1	3	5		moderate
26.	1		6	3		moderate
27.		1	9			moderate
28.		7	2	1		moderate
29.	1	6	1	2		difficult
30.	3	1	3	3		difficult
31.		2	5	3		moderate
32.		3	4	3		moderate
33.		2	6	1	1	moderate
34.		3	6	1		moderate
35.		5	2	2		difficult
36.	2	2	5	1	1	moderate
37.				3	7	very easy
38.		3	4	2	1	moderate
39.		4	6			moderate
40.			3	6	1	easy
41.			1	7	2	easy
42.			4	5	1	easy
43.						moderate
44.		1	2	6	2	easy
45.			4	3		moderate
46.			4	6		easy
47.	3		6	3	1	moderate
48.	3		2	3	2	moderate
49.			5	4	1	moderate
50.	5		2	3		difficult

Notes:

VD: Very Difficult   E: Easy

D: Difficult   VE: Very Easy

M: Moderate   TI: Test Item

Table 4.9:

Levels of Item Difficulty

TI	VD	D	M	E	VE	Description
1.		1		6	3	easy
2.				6	3	easy
3.			1	7	2	easy
4.			3	7		easy
5.	2	1	4	3		moderate
6.	2	1	5	2		difficult
7.		1	2	5	2	easy
8.	2	1	3	3	1	moderate
9.	2	1	3	3		moderate
10.			1	6	3	easy
11.		1	1	6	2	easy
12.			5	3	2	moderate
13.		1	3	4	2	easy
14.			4	4	2	easy
15.			1	4	5	easy
16.			1	4	5	easy
17.			1	5	4	easy
18.				7	3	easy
19.			3	3	4	easy
20.			3	4	3	easy

TI	VD	D	M	E	VE	Description
21.			2	7	1	easy
22.		3	4	2	1	moderate
23.	1	1	2	5	1	moderate
24.	1	1	4	4		moderate
25.	1	1	3	5		moderate
26.	1		6	3		moderate
27.		1	9			moderate
28.		7	2	1		moderate
29.	1	6	1	2		difficult
30.	3	1	3	3		difficult
31.		2	5	3		moderate
32.		3	4	3		moderate
33.		2	6	1	1	moderate
34.		3	6	1		moderate
35.		5	2	2	1	difficult
36.	2	2	5	1		moderate
37.				3	7	very easy
38.		3	4	2	1	moderate
39.		4	6			moderate
40.			3	6	1	easy
41.			1	7	2	easy
42.			4	5	1	easy

TI	VD	D	M	E	VE	Description
43.		1	4	4	1	moderate
44.			2	6	2	easy
45.		1	6	3		moderate
46.			4	6		easy
47.			6	3	1	moderate
48.		3	2	3	2	moderate
49.			5	4	1	moderate
50.		5	2	3		difficult

Notes:
VD: Very Difficult
D: Difficult
M: Moderate
E: Easy
VE: Very Easy
TI: Test Item

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Having analysed the pilot data, the test was revised in order to get a valid and reliable test for the purpose of this study. The final version of the test can be seen in Appendix 4.7 (Indonesian version) and 4.8 (English version).

4.4.2 Development of Teacher and Pupil Questionnaires

In this study, the pupils' Mathematics attainment was the primary source of information. In addition to it, pupils' views as well as their teachers were obtained. The pupils and teachers' views were useful as a means to evaluate the implementation of the intervention, the views of the 'consumers' of the intervention. The researcher decided to use questionnaires as a means of finding out the views of the participants. One of his main considerations in deciding to use questionnaires for obtaining the pupils and teachers' views was time. The distribution of questionnaires to the pupils and teachers was an efficient use of time compared to, for example, carrying out interviews.

There were two questionnaires used in this study. The first questionnaire was used to obtain the intervention and comparison class teachers' views. The second one was used to obtain the intervention class pupils' views.

There were two steps taken in developing a questionnaire for the year-three class teachers: (1) determining the purposes of a questionnaire and (2) devising a questionnaire. The questionnaire had a dual purpose. Firstly, the questions on the teachers' personal details and experience were used to assess the effectiveness of the matching procedure. They enable the intervention group to be compared to the comparison group on a range of characteristics described in Chapter 7. Secondly, the questions on the use of formal teaching method and the implementation of the intervention were used to evaluate how effective the intervention was. Of the questionnaire were to obtain some information about (a) the teachers' personal data, (b) the teachers' teaching experiences, (c) the

teachers' acceptance towards the intervention, and (d) the teachers' opinions about the implementation of intervention towards reaching the curriculum objectives for Mathematics subject. A questionnaire was devised into two parts. The first part was devised for the purpose of obtaining information from the intervention and comparison class teachers, and the second part was only devised for the purpose of obtaining information from the intervention class teachers. This questionnaire was written in a standard Indonesian language. The sample of teacher questionnaire can be seen in Appendix 4.9 (Indonesian version) and Appendix 4.10 (English version).

The steps taken in developing a questionnaire for year-three intervention class pupils were the same as those in developing the questionnaire for their teachers: (1) determining the purposes of a questionnaire and (2) devising a questionnaire. The main purpose of the questionnaire was to obtain the pupils' views about the implementation of the intervention. The questionnaire was devised in the form of closed-questions and written in a standard Indonesian language. The sample of pupil questionnaire can be seen in Appendix 4.11 (Indonesian version) and Appendix 4.12 (English version).

4.5 Summary

This study is in the form of an intervention on teaching and learning Mathematics in year-three of ten Indonesian public primary schools in Palembang, Indonesia and an evaluation of that intervention. The aims have been to (1) investigate possible differences in Mathematics attainments between the year-three primary school pupils who study Mathematics under a combination of formal teaching and small mixed ability groups, and those who study Mathematics individually under a formal teaching method, and (2) to evaluate how effective the implementation was. The intervention was carried out in a three-month period, the first term of 1996/1997 academic year. This study utilised the non-equivalent control group design as a research design. The study

also used two kinds of research instruments: (1) a Mathematics test which was used to assess the pupils' Mathematics progress (pre-test and post-test) and (2) questionnaires which were used to obtain some information on the teachers' backgrounds and also the views towards the implementation of intervention of those who participated in it.

Chapter Five
Implementing the Intervention in the Field

5.1 Introduction

In implementing the intervention in the field, there were several procedures that should be taken. These procedures were based on (1) the requirements of the intervention and research design, and (2) the existing regulations in Ministry of Education and Culture (MOEC) in Indonesia. The requirements of the intervention and research design were (a) the size of sample, (b) the procedures to get the sample, (c) the procedures in carrying out the intervention in classrooms, and (d) the procedures of monitoring the intervention. There were two basic regulations under MOEC in doing a research, that is getting access to the study schools and reporting the results. Therefore, in this chapter, these procedures will be described one by one chronologically.

5.2 Sampling

In the following sub-sections, the sample size and sampling procedures which were taken in this study will be described.

5.2.1 Sample Size

The whole sample of this study was 700 year-three class pupils and 20 year-three class teachers from ten Indonesian public primary schools in Palembang, Indonesia. This sample specifically consisted of 352 boys and 348 girls of year-three class pupils or 184 boys and 181 girls of year-three intervention class pupils and 168 boys and 167 girls of year-three comparison class pupils, and 20 year-three class female teachers - ten intervention class teachers and ten comparison class teachers. The information about the sample size for year-three class pupils can be seen in Appendix 5.1 and the

sample size for year-three class teachers can be seen in Appendix 5.2.

5.2.2 Sampling Procedures

In the following sub-sections, the descriptions of how the schools, teachers and pupils in this study were selected will be described briefly.

5.2.2.1 Schools

Ten out of 132 public primary schools in Palembang, Indonesia which had two year-three parallel classes were taken as study schools. The ten study schools were selected on the basis of their similarities. The similarities were on class size, age of pupils, timing of lesson, physical school condition, Mathematics coursebook, total teaching time, and teachers' educational background, teaching experience and gender.

5.2.2.2 Teachers

For each study school, an alternating technique was used in assigning who would be an intervention class teacher and a comparison class one. It means that, for each of ten study schools, right after getting the teachers' names from its principal, the researcher assigned one of them to be a teacher who was going to teach in the intervention class and the other who was going to teach in the comparison one. In assigning these teachers, the researcher knew nothing about them, except some information from the principal's answers towards his questions (see Sub-section 5.3.1.2 of this chapter for the questions).

5.2.2.3 Pupils

Because the class teachers for each of the study schools had been selected as an intervention class teacher or a comparison class one, therefore, the year-three pupils for each study school were

automatically selected as intervention class pupils and comparison class ones.

5.3 Procedures

In general, the procedures of doing this research in the field can be classified into three stages, that is (1) preparation of intervention, (2) implementation of intervention, and (3) reporting the intervention results. In the following sub-sections, these procedures will be described chronologically.

5.3.1 Preparation

There were three steps taken in the preparation stage, that is (1) getting access to the study schools, (2) looking for public primary schools, and (3) training year-three intervention class teachers.

5.3.1.1 Getting Access to the Study Schools

In doing any research under MOEC in Indonesia, a researcher must follow its existing procedures, otherwise, research cannot be done. The procedures to get access to the study schools are in the form of an application letter for doing research and its proposal.

First of all, the researcher asked for recommendation letters from his supervisors and Head of Research Degrees and Associationships Section, Institute of Education, University of London. Having got these letters, he wrote a letter to Rector of Sriwijaya University (the university where the researcher has been teaching), to ask for a recommendation letter for the purpose of doing this research. This rector's recommendation letter was sent directly to Head of Primary School Section, Provincial Office of MOEC in Palembang, Indonesia. Then, the Head of Primary School Section wrote a recommendation letter to District Head of MOEC in Palembang to clarify that the researcher could do the research at ten public primary schools in Palembang. After that,

the District Head of MOEC in Palembang wrote recommendation letters to all eight Sub-district Heads of MOEC in Palembang to let the researcher do his research at public primary schools under their authorities. Finally, the Sub-district Heads of MOEC wrote recommendations letters to principals of ten selected public primary schools in order that they could allow and help the researcher do a research at their schools (These heads, four out of seven, wrote the recommendation letters to the principals of public primary schools after the researcher submitted the names of selected public primary schools under their authorities).

5.3.1.2 Looking for Schools

As soon as the researcher got a recommendation letter from the District Head of MOEC, he went to all seven sub-district offices of MOEC in Palembang (the offices of Ilir Timur I Sub-district and Sukarami Sub-district were combined into one office and headed by one person) to get information about the addresses of public primary schools in Palembang which had two parallel year-three classes and their principals' houses. Among 636 public primary schools in Palembang (Provincial Office of Ministry of Education and Culture, 1994), there were 132 schools which had two year-three parallel classes. The information of public primary schools which had two year-three parallel classes can be seen in Table 5.1 below.

Table 5.1:

Public primary schools which had two year-three parallel classes

No.	Districts	Public Primary School Number	Total
1.	Ilir Timur I	2, 24, **63**, **78**, **82**, 131, 166, 170, 255, 315, 316, 412, 413 and 452	14
2.	Ilir Timur II	14, 15, **97**, 107, 108, 132, 133, 147, 149, 150, 173, 176, 180, 262, 308, 428, 467 and 468	20
3.	Ilir Barat I	**1**, 4, **5**, 13, 18, 26, 64, 100, 124, 135, 191, 193, 195, 280, 303, 327, 329, 448 and 501	19
4.	Ilir Barat II	42, 44, 116, 127, 154, 196, 201, 204, 374, 441, 442, 443, 444, 445 and 472	15
5.	Sako	**249**, **250**, 326, 404, 405, 406, 407, 432, 433, 585, 586, 588, 593 and 598	14
6.	Sukarami	254, 314, 414, 576, 601, **604**, 609, 611, 613, 615, 629, 630, 633 and 636	14
7.	Seberang Ulu I	11, 33, 43, 67, 76, 87, 91, 92, 115, 122, 150, 164, 207, 208, 211, 213, 305, 385, 393, 448, 525 and 554	22
8.	Seberang Ulu II	30, 69, 102, 106, 161, 206, 222, 224, 304, 368, 370, 371, 395 and 411	14
T o t a l			132

Due to the holiday period, principals were contacted, where appropriate, through a phone and visiting the primary schools or their houses. The principals were asked the following questions:

1) *"Will your school have two year-three parallel classes in 1996/1997 academic year?"*

2) *"Will the year-three pupils study in the morning?"*

3) *"Will the year-three class teachers be females?"*

4) *"Do the year-three class teachers only graduate from senior high school for primary school teacher training?"*

5) *"Will the year-three class teachers and pupils use the Mathematics Coursebook published by the Ministry of Education and Culture?"*

Having visited and contacted all principals of these 132 public primary schools, there were ten public primary schools (1, 2, 5, 63, 78, 82, 97, 249, 250 and 604) which were very similar and

fulfilled the research requirements. In other words, these ten public primary schools were similar in terms of their physical conditions, year three class teachers' educational background, teaching experience and gender, class size, age of pupils, timing of lesson, Mathematics coursebook, and total teaching time. Besides, all of these ten public primary schools used a formal teaching method in non-Mathematics lessons.

5.3.1.3 Training the Intervention Class Teachers

Right after getting recommendation letters from the Heads of District Offices of MOEC in Palembang and selecting the ten public primary schools, the researcher contacted each of the intended intervention class teachers. There were two ways of contacting the teachers, namely (1) visiting their houses, for those who were at home during the holidays, and (2) through phone calls, for those who were out city on holidays. In each visit or call, the researcher let them know that they had already been selected as intervention class teachers for the purpose of this study and expected them to join a training for a week (from 8 to 13 July 1996 or a week before the school began, 15 July 1996) at University of Sriwijaya.

The training was aimed to provide the intervention class teachers with theoretical and practical knowledge related to the group-learning intervention in order that they could implement the new pedagogy in their classrooms. The training course was held in one of the rooms on the second floor of Centre for Administration Building, University of Sriwijaya, Palembang. The room was fully air-conditioned and was equipped with a white board, overhead projector, television and video set, wheeled tables and chairs, telephone, fax machine, photocopying machine, and other training utensils. All these facilities were aimed to provide the trainees a sense of comfort and security in order that they could fully

concentrate on what they were doing during the training. Besides, the training was carried out for about four hours on each training day, except for the first day (it was only about two hours) to avoid the trainees' boredom and tiredness towards the training. The training schedule and the detailed information on implementation of the training can be seen in Appendices 5.3 and 5.4 respectively.

5.3.2 Implementation

The classroom intervention was effectively implemented for the period of 10 weeks or 100 teaching hours. In implementing the intervention, the following research procedures were carried out: First, the pupils both from the intervention and comparison classes were given a pre-test, then the pupils' test papers were marked. After that, for each intervention class, the pupils were grouped into small groups on the basis of their prior Mathematics attainment scores. Next, the implementation of the intervention was carried out in each class of the intervention classes. While the intervention was going on for the period of one term, regular meetings between the researcher and the intervention class teachers were carried out fortnightly to monitor the implementation of the intervention. Besides, the researcher visited the schools in turns to monitor the intervention in each of the classrooms. At the end of the term, all pupils both from intervention and comparison classes were given a post-test, the same test as they took at the beginning of the term. Besides, the intervention class pupils, right after doing their work and after the researcher and the class teacher had collected their test papers, were asked to fill in the questionnaires. Furthermore, in this occasion, the teachers both from the intervention and comparison classes were also requested to fill the questionnaires. Finally, all pupils' test papers were marked. These research procedures will be described in detail in the following sub-sections.

5.3.2.1 Administrating the Pre-test and Scoring

In carrying out a pre-test for each class: first, the researcher directed the pupils in reading the front page of the test paper (at this stage, the pupils were not allowed to open the first page of the test or start doing their test), and then, after every pupil had understood how to do the test, the researcher instructed them to start doing the test. At the same time, the researcher took a note about the starting time of the test. While the test was going on, no pupil was allowed to leave the classroom, eventhough, there were a few of them could finish their work before the time was over, they were advised to recheck their work. Five minutes before the test was over, the researcher announced the pupils that the test time was five minutes left. When the test time was over, exactly one hour, the researcher instructed each of the pupils to stop doing their test and to put their test papers on their own tables. Then, the researcher collected the pupils' test papers. The implementation of the pre-test for each class was exactly the same as the procedures that were described above.

After all pupils had done their pre-test and then their test papers were marked. In marking each item for each of the pupils' test papers, there were only two possibilities, that is either it was a correct answer or wrong one. The correct answer was scored two and the wrong one was scored zero. Therefore, for example, if one of the pupils had 35 correct answers or correct items, he/she got 70 for his/her mark.

5.3.2.2 Grouping the Intervention Class Pupils

After marking all pupils' test papers, then, the pupils for each intervention class were grouped into several small groups. This grouping was done as follows: First, the pupils were split into two big groups on the basis of their genders, male group and female

one. Second, the pupils in each group were rearranged from the highest-score pupil to the lowest-score one. Third, the pupils in each gender group were blocked into three blocks: the first block consisted of one-third of the pupils who got high scores, the second block consisted of the pupils who got moderate scores, and the last block were the pupils who got the low scores. Fourth, small groups for each intervention class were set up, that is each small group consisted of one or two pupils from a high-score block, one or two pupils from a moderate-score block and one or two from a low-score block. In short, in each intervention class, the pupils were grouped into small groups on the basis of their genders and prior Mathematics attainment scores. Therefore, each small group consisted of the same gender and different/mixed prior Mathematics attainment scores.

5.3.2.3 The Implementation of Intervention

Having grouped the pupils for each intervention class into small groups, then, lists of small groups were distributed to the intervention class teachers. The distribution of these lists was done on 21 July 1996. The implementation of the intervention firstly began on Monday, 22 July 1996. The detailed description of how to implement the intervention in the classroom or the procedures of implementing the intervention can be seen in sub-section 4.2.2 of Chapter 4.

When the researcher visited the study schools to see the intervention, the researcher did not inform the intervention teachers when the researcher visited their classes (the researcher's visiting schedule was covered). In each visit, the researcher always sat in the classroom and helped the teacher - if she needed some help, and used a break session for an informal discussion to discuss things related to the implementation of the intervention in her class. This feature was going on during the first

term of 1996/1997 academic year or during the period of intervention.

5.3.2.4 Regular Meetings

Regular meetings between the researcher and intervention class teachers were aimed to monitor, evaluate and discuss the implementation of the intervention. In other words, these regular meetings were used as a means to make sure that the intervention could be implemented as it should be. These regular meetings were carried out fortnightly, except for the first meeting was carried out one week after the intervention began. The main reason for having these regular meetings fortnightly was to give the researcher chances to visit all of the schools to see what was really going on in the classroom for each primary school before having each of the meetings. Due to ten study schools that had to be visited and the researcher could only visit one school for one day, it meant that it took ten days for the researcher to visit all study schools. Therefore, the regular meetings were carried out fortnightly, except for the first regular meeting. The first regular meeting was carried out just a week after the implementation of the intervention began because the researcher wanted to make sure that the teachers did what they should really do in implementing the intervention in their classrooms. These regular meetings were held from 3:00 p.m. to 5:00 p.m. on Saturdays, 27 July , 10 and 24 August, and 7 and 21 September 1996.

In general, in each of these regular fortnightly meetings, each teacher briefly presented what they had done for the period of the past two weeks and the problems that they might have in implementing the intervention in their classrooms. After all of the teachers had presented their work (the ways they held the teaching and learning Mathematics in their classrooms on the basis of the intervention) and problems (the problems which were

related to the implementation of the intervention in their classrooms), then the researcher began directing them and solving their problems in order that they could implement the intervention on the basis of the intervention procedures. In this occasion, the researcher also told the teachers what he got from his visit to each intervention class.

In early meetings, some teachers said that they had problems in implementing the intervention in their classrooms, such as (1) it took time for the pupils to sit in their own groups, (2) the pupils made noise while they were looking for their groups, (3) some pupils did not want to help each other in their groups, (4) some teachers felt tired of carrying out the teaching and learning activities which were based on the intervention. But after a few meetings, these problems gradually disappeared and the teachers started enjoying the implementation of the intervention.

5.3.2.5 Administrating the Post-test, Distributing Questionnaires and Scoring

The post-test for all pupils from the ten primary schools was carried out on 1, 2, 3, and 4 October 1996 or a week before they had their first term final examination. The procedures in conducting the post-test for each class and in scoring the pupils' test papers were the same as the procedures in conducting and scoring the pre-test (see Sub-section 5.3.2.1 of this chapter). Then, for each study school, after the intervention class pupils had done their post-test, they were asked to fill in the questionnaires which sought their views. Besides, for each study school, on the post-test day, the intervention and comparison class teachers were also requested to fill in the questionnaires.

5.3.3 Reporting

Having carried out the post-test and delivered the questionnaires, the researcher wrote a report about the implementation and brief results of the intervention to (1) Rector of University of Sriwijaya, (2) Provincial Head of MOEC, (3) Head of Primary Education Section, Provincial Office of MOEC, (4) Head of City Office of MOEC, and (5) four Heads of District Offices of MOEC in Palembang. After writing this report, the whole process of implementing the intervention in year-three classes at ten Indonesian public primary schools in Palembang, Indonesia was completed.

5.4 Summary

The implementation of the intervention in the field involved 700 year-three class pupils and 20 year-three class teachers of ten Indonesian public primary schools in Palembang, Indonesia, and was effectively carried out for 100 teaching hours in the first term of the 1996/1997 academic year. The implementation of the intervention was carried out through three broad stages, that is (1) a preparation stage - (a) getting access to the study schools, (b) looking for schools and (c) training the intervention class teachers, (2) an implementation stage - (a) giving pre-test and scoring, (b) grouping the intervention class pupils, (c) implementing the intervention, (d) conducting regular meetings, and (e) giving post-test, distributing questionnaires and scoring, and (3) a reporting stage. One research instrument was used for the purpose of pre-test and post-test. Questionnaires for the purpose of obtaining teachers and pupils' views towards the implementation of intervention were also used.

Chapter Six

**The Interactive In-Service Programme to Introduce Groupwork
to Primary School Teachers: Implementation and Evaluation**

6.1 Introduction

This chapter firstly describes the interactive in-service programme in the form of a one-week training programme for primary school teachers who were involved in the implementation of the intervention. Then, it leads to the description of the teachers views on the use of formal teaching method (the method that they had been using for teaching Mathematics) as well as their colleagues'. Finally, it describes their views as well as their pupils' views on the implementation of intervention.

6.2 Training Primary School Teachers

While the teachers may have never been formally shown how to use groupwork in teaching their pupils in the classrooms, they might have already had some information on how to use groupwork from other sources. It was therefore decided that the teachers should be trained before they implemented the intervention. It was felt that some of the teachers might have been aware of the work done by the Active Learning through Professional Support (ALPS) project in some other Indonesian primary schools. The work carried out by the ALPS project was different to the intervention that was to be implemented. The normal practice of all of the teachers in the study had been formal and it was therefore felt that there was a strong need to equip the teachers with the required knowledge and skills in order that they could implement the intervention properly and successfully.

The training was aimed to provide the teachers with the required theoretical and practical knowledge and skills about the intervention in order that they could implement the intervention in their classrooms

properly and successfully. The following account provides details of how the training was conducted.

1st Day of Training - Monday, 8 July 1996:

The training began with an opening and introduction session where the researcher and trainees introduced each other. In the next session, the trainees watched a video about "traditional" and "progressive" teaching styles in British primary schools and at the same time, the researcher explained what was going on in the classroom (in the video). This session was aimed to give the trainees some ideas about how the "traditional" and "progressive" teaching styles were implemented in the British primary school classrooms. This session ended up with an informal discussion about the "traditional" and "progressive" teaching styles that they had just watched from the video. There were two general ideas came up from this informal discussion: (1) the implementation of "traditional" style as shown on video was considered too extreme compared to those implemented in Indonesian primary schools, and (2) the "progressive" style could possibly be implemented in Indonesian primary schools but it would require well-supported learning facilities. In the third session, the researcher explained the aims of the training, how long the training would take place, and how the training was to be carried out. Finally, in a questioning and informal discussion session, the researcher allowed each of the trainees to ask questions and to discuss what they had just gone through from the first session.

2nd Day of Training - Tuesday, 9 July 1996:

The first session of the second day was taken up with a brainstorming session where each of the trainees was asked to give their ideas about primary education. In the next session, a presentation on primary education, the researcher slowly and clearly presented what primary education was. The last session was in the form of a workshop session about primary schools in Indonesia. In this session,

the trainees were asked to sit in small groups. In each group, the trainees were asked to write what they already knew about primary schools in Indonesia, such as the aims, the curriculum, coursebooks, procedures of teaching and learning activities, evaluation systems, pupils, teachers, etc. All these pieces of information were written on the large-size hard paper and then this paper was attached on the wall in order that the other group members could read what they had done. Finally, after all the trainees had read the other groups' work, the researcher led them to discuss what they had written. The outcomes of the discussion were that all trainees agreed that (1) the aims of Indonesian primary schools had two main aims - to provide the pupils basic abilities in order that they can develop themselves as individuals, members of society and citizens, and to prepare the pupils to proceed to junior high schools, (2) the 1994 Indonesian primary school curriculum was based on a subject oriented curriculum and rigidly specified allocation of time for each subject, (3) there were many types of Mathematics coursebooks that were used for teaching Mathematics in year-three classes although there had already been one Mathematics coursebook as an official coursebook recommended by the Ministry of Education and Culture, (4) the year-three class teachers used a formal teaching method for their teaching purposes in their classrooms, (5) there were two types of assessment in assessing the pupils' progress: formative and summative tests, (6) all pupils sat in rows and study individually, and (7) there were two kinds of teachers teaching in primary schools: class teachers and subject ones.

3rd Day of Training - Wednesday, 10 July 1996:

The first session on the third training day was taken up in watching a video on Mathematics teaching that had been made in year-three classes at some of Indonesian public primary schools under the ALPS (Active Learning through Professional Support) Project. Before watching the video, the researcher explained what the ALPS Project

was and how the teaching and learning activities were carried out in the classrooms under that project. In the next session there was a presentation on Indonesian primary schools where the researcher explained the general features of Indonesian primary schools. The last session involved a discussion on the teaching and learning activities for Mathematics subject in Indonesian primary school classrooms. In this session, the trainees were asked to sit in small groups. Then, in each group, they were asked to discuss the current activities of teaching and learning Mathematics in the Indonesian primary school classrooms. The agreed activities were then written on the large-size hard paper. After all the trainees had finished and attached their work on the wall, the researcher led them into a follow-up discussion in order to come to some agreement regarding the current realities of teaching and learning Mathematics in Indonesia. The general outcomes of this follow-up discussion were that the teachers used a formal teaching method in teaching Mathematics and that the pupils sat in rows and did their Mathematics exercises individually.

4th Day of Training - Thursday, 11 July 1996:
The first session on day four involved a brainstorming session where each of the trainees was asked to give their own ideas about whole-class grouping and small groups. In the next session, which involved a presentation on whole-class grouping and small groups, the researcher explained what whole-class grouping and small groups were and how they were organised. The last session was a discussion session on the possibilities of implementing the combination of whole-class grouping and small groups in the context of Indonesian primary school classrooms. In this session, the trainees were again asked to sit in small groups. In each group, they were asked to discuss the possibilities of implementing the combination of whole-grouping and small groups in the context of Indonesian primary school classrooms for teaching Mathematics. The agreed possibilities were then written on the usual hard paper. After all the groups had completed their

discussion and written the agreed possibilities on the paper, they attached their work on the wall in order that other group members could read what they had written. After that, the researcher led them into a follow-up discussion to obtain a final consensus regarding the possibilities of implementing a combination of whole-class grouping and small groups in the context of Indonesian primary school classrooms for teaching Mathematics.

5th Day of Training - Friday, 12 July 1996:

The fifth day began with a brainstorming session where the trainees were asked to give their own ideas about the use of a combination of whole-group grouping and small groups. The researcher then provided a presentation covering all of the theoretical and practical issues related to the intervention. This session covered the aims of the intervention, the background, how to implement the intervention in the classrooms, etc. The last session was a discussion session where the trainees were again asked to sit in small groups. In each group, they were asked to discuss the advantages and disadvantages and/or strengths and weaknesses of the intervention. The outcomes of the discussion for each group were again written on the large-size hard paper and attached the paper on the wall. The researcher led the trainees to a follow-up discussion to clarify the theoretical and practical issues. Finally, before this session ended, the researcher asked for two trainees to be volunteers for the purpose of role-play that would be held on the next day. These two volunteers were given some ideas about what to do and how to carry out the role-play.

6th Day of Training - Saturday, 13 July 1996:

The first session on the last day was a brainstorming session where the trainees attempted to identify the advantages and disadvantages of the coming role-plays. In the role-play, one of the trainees acted as

a Mathematics teacher and the others acted as pupils. But, before the "teacher" started teaching, the researcher directed and helped the "teacher" and "pupils" in order that the fifteen-minute role-play could be carried out as expected. The intention was to provide an illustration of the practice to be adopted in it was the intervention, and the content material was taken from the first term area of the 1994 Indonesian primary school curriculum. After the role-play was over, the researcher opened a question-and-answer sub-session. In this sub-session, all the problems raised by the trainees were discussed and then the researcher led them to solutions that were consistent with the requirements of the intervention. After that, the second role-play session began. What the trainees and the researcher did in this session was more or less the same as they did in the first role-play session, but this time, the 'teacher' taught a different topic. The last session was a summary session. In this session, the researcher briefly highlighted the whole training and confirmed what the trainees should do during the intervention, and the researcher together with the trainees arranged the regular fortnightly meetings during the period of incoming intervention.

The training features can be seen in Appendix 6.1.

6.3 Teachers and Pupils' views on the Implementation of Intervention

The views of intervention and comparison group teachers and intervention group pupils were obtained from the questionnaires distributed right after the completion of intervention. The questionnaire consisted of two parts, one with questions about the use of formal teaching methods and their acceptance (or otherwise) of the collaborative learning model and the other with questions about the use of the mixed-teaching method. The intervention group teachers answered both parts of the questionnaire but the comparison group teachers answered the first part only. The detailed questionnaire can

be seen in Appendix 6.2 (Indonesian version) and Appendix 6.3 (English version).

A pupil questionnaire was designed to obtain the views of intervention group pupils towards the implementation of the intervention. There were five items in this questionnaire. Each item was in the form of closed-question and provided multiple choices where the pupils were asked to tick one of them to show their answers. The detailed questionnaire can be seen in Appendix 6.4 (Indonesian version) and Appendix 6.5 (English version). All teachers and pupils filled in the questionnaire successfully.

6.3.1 Views of Intervention and Comparison Group Teachers

The questionnaire data from both the intervention and comparison group teachers shows that the training was moderately successful. The findings will be discussed in three parts:

(a) *The teachers' views on the use of formal teaching method in relation to fulfilling the needs of their mixed-ability pupils*

Among the twenty intervention and comparison group teachers: four teachers (two teachers from each group) thought that a formal teaching method could fulfil the needs of all the pupils; fourteen teachers (seven teachers from each group) thought that it could fulfil most of their pupils' needs; and two teachers (one teacher from each group) thought that it could only fulfil a minority of their pupils' needs. It is interesting that the teachers' opinions on the use of formal teaching method varied although they had used the method for a relatively long period of time. It may be that these variations demonstarte the teachers general lack of regarding the appropriate teaching method to employ in fulfilling their pupils' needs in Mathematics. This is supported by the fact that some of the teachers confided to the researcher that they were often frustrated because they didn't always know how to

enhance the pupils' Mathematics learning although they had worked hard. As they said: "We have worked hard to help our pupils learn but the results are still poor". This suggests that the teachers wished to find a better way (teaching method) to help their pupils learn Mathematics because they had noticed many pupils struggling to understand the curriculum.

(b) *The teachers' level of satisfaction regarding the use of formal (whole class) approaches in their teaching*

The results show that one intervention group teacher was very satisfied, fourteen teachers (six intervention group teachers and nine comparison group teachers) were satisfied, and four teachers (three intervention group and one comparison group teachers) were moderately satisfied. In general, the teachers' opinions regarding the use of formal teaching methods may be considered ambiguous because they were not really happy with their pupils' Mathematics achievements. Most of the teachers said that they often faced two common problems in teaching Mathematics. The first problem appeared at the explanation stage and the second one was at the stage where their pupils were doing Mathematics exercises. At the explanation stage, some pupils (these might be the more able pupils) could easily understand what they explained but other pupils needed further explanation in order for them to understand (these might be the less able). At the stage where the pupils were doing Mathematics exercises, some pupils often finished their work earlier than the others. These two conditions, they suggested, were particularly problematic. The use of more formal whole class methods simplified the management of the class and ensured that all the pupils learnt at the same pace.

(c) *The teachers' opinions regarding the acceptance of collaborative learning if the method was shown to be better than the formal teaching methods*

All the intervention and comparison group teachers reported that they could accept a new and better teaching method in helping their pupils learn Mathematics. That means that all teachers in the study were still seeking a more effective teaching method. In other words, all the teachers in this study showed some dissatisfaction regarding the use of formal teaching methods in mathematics education. Some (particularly) the intervention and comparison group teachers suggested that a mixed-teaching method was better than a formal one because all the pupils were continuously motivated to do their exercises by helping each other in the small groups. One teacher voiced the opinion of many when she said: "No wonder the pupils have a better achievement!"

6.3.2 Views of Intervention Group Teachers

The views of the intervention group teachers can be summarised as follows: Firstly, all teachers said that their pupils learned more Mathematics if they used a mixed teaching method as their teaching method than a formal teaching one. Secondly, some teachers said that a mixed teaching method could fulfil all pupils' needs and most of them said that it could fulfil most of the pupils' needs in learning Mathematics in the classrooms. Thirdly, some and most of teachers respectively said that all of, or most of their pupils helped each other in their small groups while they were doing their exercises. Finally, a majority of teachers said that they would use a mixed teaching method as their teaching method for helping their pupils learn Mathematics in the classrooms and only one teacher said that she would not. The findings will be discussed further under four headings:

(a) *The teachers' opinions on how much their pupils learned when a mixed teaching method was used*

All the intervention group teachers thought that all of their pupils learned more Mathematics when they used a mixed teaching

method rather than a formal one. This means that all teachers in the study implicitly thought that a mixed teaching method was better than a formal teaching method in helping their pupils learn Mathematics in the classrooms. Most of the intervention group teachers felt happy with the results of pupils' Mathematics exercises because, as they said, the results were much better than when they used the formal teaching method. They were also very surprised when the researcher submitted the results of the post tests (see Chapter 7) and some of them even happily said: "They're amazing!"

(b) *The teachers' opinions on using a mixed teaching method to fulfil all of their pupils needs*

Among the ten intervention group teachers, three teachers said that it could fulfil all of their pupils' needs and seven teachers said that it could fulfil most of their pupils' needs in learning Mathematics.

(c) *The teachers' opinions on their pupils' ways of doing the Mathematics exercises in small mixed ability groups: the pupils help each other*

Three teachers thought that all pupils helped each other in doing their Mathematics exercises in their small mixed ability groups and seven teachers thought that most of the pupils helped each other in doing their Mathematics exercises in their small mixed ability groups. These opinions, in general, confirmed the teachers' belief that the intervention group pupils really helped each other in doing their exercises in the small groups. Furthermore, most teachers said to the researcher that many of their pupils met them in the break sessions and happily made positive statements about the groupwork, for example, "Miss, I helped my friends do their work and I enjoyed it". This expression also confirmed the teachers'

beliefs that their pupils really helped each other in their small groups and they were happy to do that.

(d) *The teachers' opinions on the future use of a mixed teaching method in their own classrooms*

Nine teachers said that they would adopt the new method in the future while only one teacher said that she would not. These teachers' views indirectly suggested they could accept a mixed teaching method because the method was better than a formal teaching method. In line with the above opinions, there were two general impressions about the intervention which were obtained from the informal conversations between the researcher and the teachers during the intervention.

The first anecdotal impression was that those who would use the new method in future said that they would do so because it improved their pupils achievement and it also changed their pupils attitudes towards Mathematics. They thought that the children were better motivated to learn Mathematics and were happier when they had a Mathematics lesson. These pupil attitudes were very different before the intervention was carried out in their classrooms where the pupils generally thought that Mathematics was a frightening lesson and this opinion led them to have a low motivation to learn Mathematics.

The second impression was concerned with the one teacher who did not favour the new method for teaching Mathematics. Although she believed that her pupils learned more Mathematics and had a higher motivation as well being happier when she used a mixed teaching method, she still preferred using a formal teaching method. The main reason, she reported was; "I'm tired". This statement might mean that she preferred a teaching method which did not require her to do 'many things' in the classroom, e.g. plan

carefully for different groups. Furthermore, the expression might reflect that she did not care about her pupils' learning outcomes, she just taught them because 'it was her job'.

6.3.3 Views of Intervention Group Pupils

The pupils' views on working in small mixed-ability groups. 295 pupils (80.8%) really liked, 58 pupils (15.9%) liked, 10 pupils (2.7%) slightly liked, and 2 pupils (0.5%) did not like working in small mixed abilitygroups. In general, this means that most pupils (353 pupils or 96.8%) liked doing Mathematics exercises in the small groups where they could help each other. Furthermore, from observations carried out by the researcher during his regular visits in all classrooms, the pupils always did their Mathematics exercises in the small groups enthusiastically. This confirmed that the pupils liked working in the small groups. Figure 6.1 presents a summary of the pupils' views.

Figure 6.1:

Intervention Class Pupils' Views on Levels of Interest of Working in Small Prior Mathematics Attainment Groups
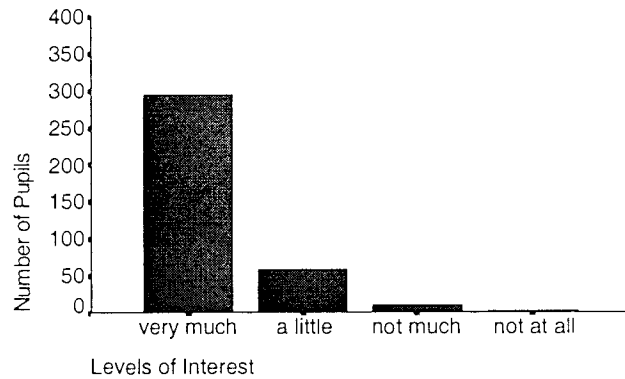
When asked their views on helping each other in the small groups, 264 pupils (72.3%) really liked, 79 pupils (21.6%) liked, 10 pupils (2.7%) slightly liked, and 12 pupils (3.3%) did not like to help each other in the small groups. In general, this means that most pupils (343 pupils or 94%) liked to help each other in their Mathematics exercises in the small groups. In addition to these pupils' views, sub-section 6.3.2 also confirms that the pupils liked to help each other in the small groups. The pupils felt happy if they could help their peers. Figure 6.2 presents the summary of the pupils' views.

Figure 6.2:

Intervention Class Pupils' Views on the Idea of Helping Each Other in Small Mixed Prior Mathematics Attainment Groups
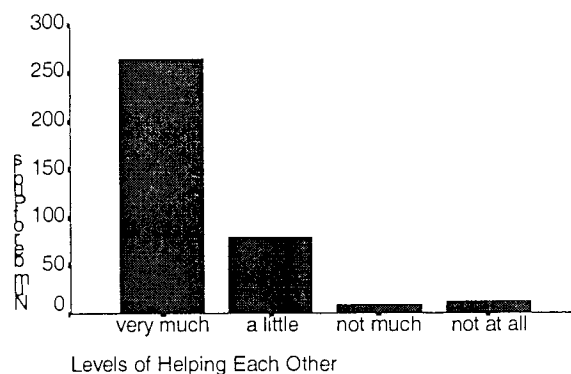
320 pupils (87.7%) preferred and 45 pupils (12.3%) did not prefer working in small groups. That means that most pupils would support the implementation of the intervention in their classes and only some pupils would not. Furthermore, the observations carried out by the researcher through his regular visits to the classrooms revealed that

the pupils were enthusiastic in their Mathematics exercises. This atmosphere suggests that they preferred working in the small groups to individually. Furthermore, in his regular visits to the classrooms, some pupils even asked the researcher questions on how to solve the Mathematics problems (while their teacher was helping the other group members). For example: "Sir, could you tell us how to do .... (e.g. question five)". Figure 6.3 presents the summary of the pupils' views.

Figure 6.3:

Intervention Class Pupils' Views on Their Preference of Working in Small Mixed Prior Mathematics Attainment Groups to Individually

Prefer Working in the Small Groups
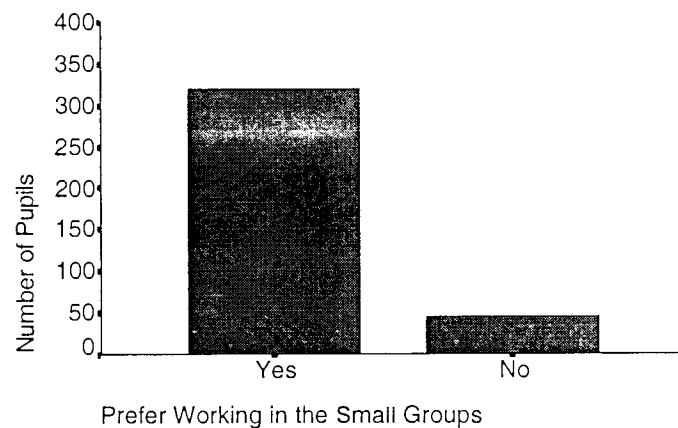
313 pupils (85.8%) thought that they learned more Mathematics when working in the small mixed ability groups and 52 pupils (14.2%) did not. This means that more of the pupils felt that they learned more Mathematics through doing their exercises in the small groups. From the researcher's observations in the classrooms, he found many signals which suggest that the pupils had learned more Mathematics in the small groups. The pupils often expressed themselves clearly by saying: "Oh, I see what I was doing wrong", "Oh, I see.", "Okay, I've got it.". The expressions indicate that pupils were actively learning Mathematics through their groupwork and they

themselves recognised increased skills or conceptual clarity. Figure 6.4 presents the summary of the pupils' views.

Figure 6.4:

Intervention Class Pupils' Opinions on the Quantity Levels of Learning Mathematics in Small Mixed-Prior Mathematics Attainment Groups

Learning more Mathematics Through Working in the Small Grou
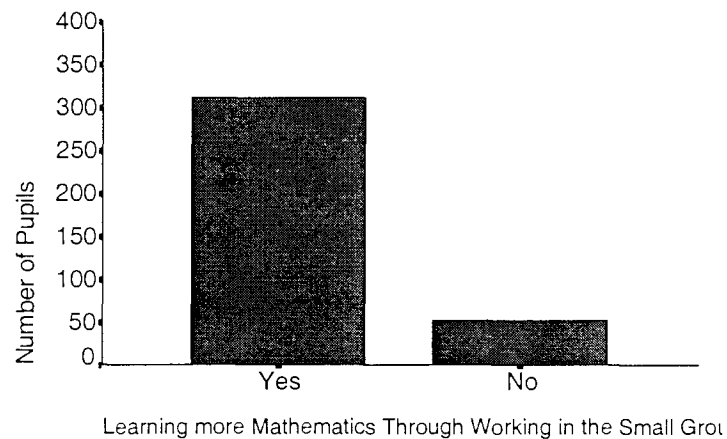
According to the survey 201 pupils (55.1%) felt they were really helped, 98 pupils (26.8%) felt they were helped, 19 pupils (5.2%) that they were slightly helped, and 47 pupils (12.9%) felt they were not helped by their peers in doing their Mathematics exercises in the small groups. This means that most pupils (318 pupils or 87.1%) were helped by their peers in doing their exercises in the small groups. In addition, in the researcher's regular visits to the classrooms, he sometimes asked the pupils about their opinions on the idea of helping each other in the small groups. Many pupils said that they were happy that could help their peers when their peers asked for help. In the classroom, there was also evidence of the pupils asking for help from their peers. Pupils were heard saying, for example; "How to do this?" (his/her finger pointed to one of the items); or; "How do you do the item....?". After these kinds of questions, the researcher observed other pupils providing simple replies and/or explanations. Usually, after their peers' replies and/or

explanations, some expressions came from the pupils who asked the questions, such as "Thank you", "Oh, I see.", and "Okay, I've got it." Figure 6.5 presents the summary of the pupils' views.

Intervention Class Pupils' Views on the Idea of Being Helped by Other Peers in Doing Their Mathematics Exercises in Small Mixed Prior Mathematics Attainment Groups

Levels of Being Helped by Peers
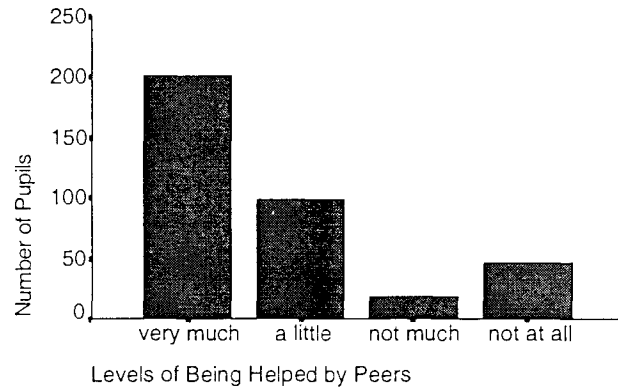
The results of the pupil questionnaire can be summarised as revealing that a majority of the intervention group pupils in this study liked working in the small groups (363 pupils or 99.5%), liked to help each other in doing their Mathematics exercises in the small groups (353 pupils or 96.7%), preferred doing Mathematics exercises in the small groups to individually (320 pupils or 87.7%), learned more Mathematics through doing their exercises in the small groups than individually (313 pupils or 85.8%), and were helped by their peers in doing their Mathematics exercises in the small groups (318 pupils or 87.1%).

Results of the Pupil Attainment Tests

7.1 Introduction

This chapter describes and analyses the test outcomes of the classroom intervention. It includes a brief discussion of the findings although a detailed discussion will be found in chapter eight. The outcome of the intervention was measured by attainment scores from a fifty-item Mathematics test. The scores were collected from 700 pupils in ten public primary schools. The teacher responses to the new pedagogy and pupil views on it have already been reported in Chapter 6.

Before turning to the test results, further information about the teachers and classrooms will be presented to ensure that the two groups (intervention and comparison) were similar. If this can be established, then any differences in test scores between the two groups can be attributed to the educational intervention. The information about teachers presented below was obtained on the same questionnaires on which they reported their views on pedagogy.

7.2 Ensuring that the Teachers and Classes were similar in the Two Groups: Intervention and Comparison

The intervention and comparison groups in this study were similar in terms of class size, age of pupils, timing of lesson, physical school condition, Mathematics coursebook, total teaching time, teachers' gender and a teaching method in non-Mathematics lessons. Table 7.1 presents the similar features between the two groups.

Table 7.1

The Similarities between the Intervention and Comparison Groups

	Description
Class size	Enrolment ranged from 29 to 42 pupils, mean enrolment in intervention group was 36.5 and in comparison group was 33.8. The result of t-test on class size was not significant (t=0.14, p=0.84)
Age of pupils	Mean for each group was 8.3 - eight years three months
Timing of lesson	Morning session
Physical school condition	Semi-permanent or permanent buildings with typical Indonesian primary school classrooms
Mathematics coursebook	A Mathematics coursebook officially published by the Ministry of Education and Culture
Total teaching time	Ten teaching hours per week
Teachers' gender	All females
Teaching method in non-Mathematics lessons	A formal teaching method

The teachers' educational backgrounds, ages, teaching experience and length of using a formal teaching method were compared to test for the possible differences between the intervention and comparison group teachers which might confound the results.

In terms of educational backgrounds, all intervention group teachers and nine comparison group teachers were the graduates of primary school teacher training schools. One comparison teacher held a bachelor degree in guidance and counselling. The result of the chi-square test on the teachers' educational backgrounds shows that the X^2 and p-value to be 1.05 and 0.31 respectively, showing no difference between the intervention and comparison group teachers' educational backgrounds. The data are presented in tabular form in Appendix 5.2.

To test for possible differences between groups in terms of ages, years of service, and of exposure to a formal teaching method, a t-test was carried out. A t-test assumes that the data have been derived from normal distributions with equal variance, that the samples are not

too small, do not contain outliers (atypical scores), and are of equal or nearly equal size. Therefore, a preliminary exploration of the background information on teachers was carried out.

Figures 7.1, 7.2 and 7.3 show the distributions of intervention and comparison group teachers' ages and teaching experiences and exposures towards a formal teaching method respectively.

Figure 7.1

Histogram of Intervention and Comparison Class Teachers' Ages

Std. Dev = 4.09
Mean = 36
N = 20.00

Teacher Age

Figure 7.2

Std. Dev = 2.43
Mean = 14
N = 20.00

Teaching Experience
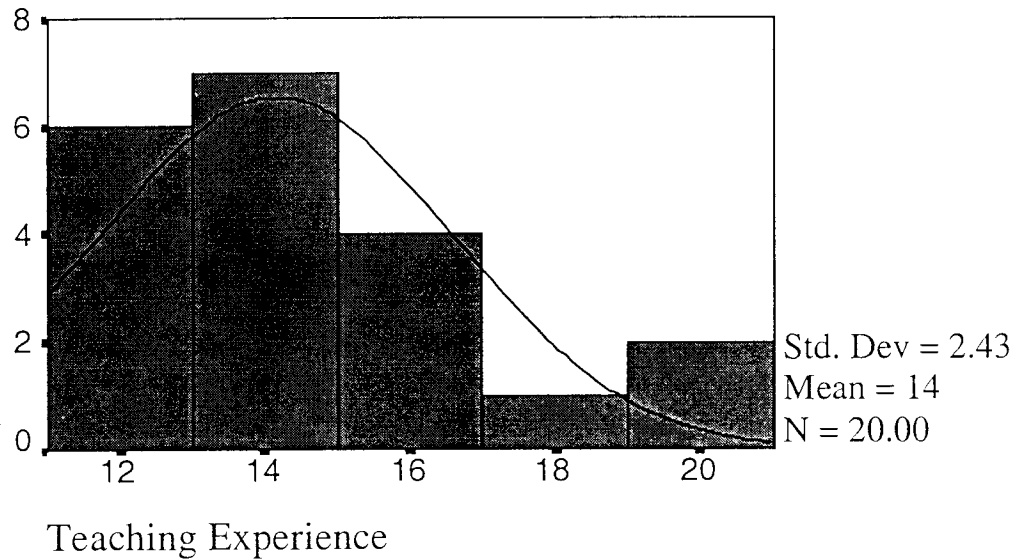
Figure 7.3

Histogram of Length of Using a Formal Teaching Method by Intervention and Comparison Group Teachers

Std. Dev = 3.38
Mean = 12.4
N = 20.00

Length of Using a Formal Teaching Method
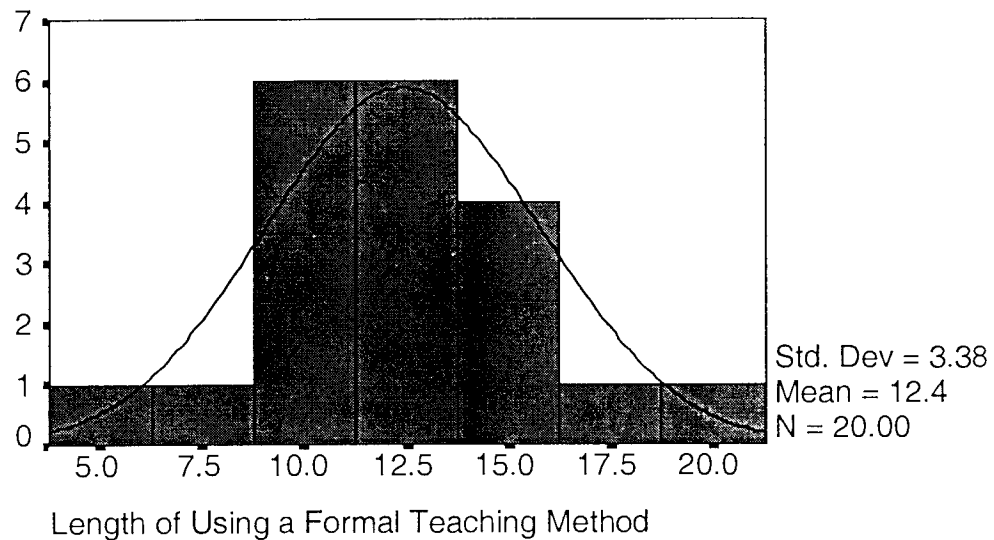
The distributions of teachers' ages, years of service and of exposures towards a formal teaching method are approximately normal as

presented in Figures 7.1, 7.2 and 7.3 respectively. The sample of twenty is adequate for t-test analysis on two groups of ten teachers each. The results of t-test on the teachers' ages, years of service, and exposures towards a formal teaching method do not show significant differences, t=0.26, p=0.79; t=0.74, p=0.47; and t=1.35, p=0.20 respectively.

7.3 Statistical Strategy for Analysis of Pupil Test Results

First the means, standard deviation and range of scores of each group are presented, followed by a t-test to examine more closely the group differences, and finally a multiple regression will be carried out to explore other possible factors that may affect the outcome of the intervention.

Table 7.2 presents the descriptive statistics and includes the range of scores.

Table 7.2

Means, Standard Deviations and Range of Scores for Mathematics Test by Pre- and Post-Test

	Means	S.D.	Range
Pre-test	30.90	14.00	0 - 78
Post-test	53.41	18.74	2 - 90

Table 7.3 presents means, standard deviation and range of scores of post-test for both groups: intervention and comparison. A t-test for independent samples found the difference in post-test scores between the two groups to be not significant (t=1.73, p < 0.08).

Table 7.3

Means, Standard Deviations and Range of Post-test Scores for Mathematics Test by Groups

Groups	Means of Post-test	S.D. of Post-test	Range of Post-test
Intervention	54.59	19.30	6 - 90
Comparison	52.13	18.03	2 - 90

One possible explanation for the failure to find a difference at post-test is the variation between the two groups at pre-test. Means, standard deviation and range of scores of pre-test for the two groups are presented in Table 7.4. A t-test for independent samples found the difference in pre-test scores between the intervention and comparison groups to be significant (t=3.38 and p < 0.001). This initial difference in scores could be cancelling out the effects of the intervention.

Table 7.4

Means, Standard Deviations and Range of Pre-test Scores for Mathematics Test by Groups

Groups	Means of Pre-test	S.D. of Pre-test	Range of Pre-test
Intervention	29.19	14.01	0 - 78
Comparison	32.76	13.78	2 - 72

To take into account the initial difference in Mathematics attainment, a multiple regression will be carried out. This will explore the effects on outcome test scores of the pre-test along with other factors which might contribute to children's progress. A multiple regression analysis is an analytic technique for assessing relationships among variables: one response and two or more explanatory variables. Thus, multiple regression analysis is expected to show the relationships between the Mathematics test outcome (response variable) and pre-test, intervention/comparison group, individual school and gender (explanatory variables) in this study.

Before analysing the data using multiple regression, there are some steps that should be done to fit an appropriate model of analysis:

firstly, deciding a form of the model to be used on the basis of an educational theory; secondly, exploring and plotting the data to check, for example, the distributions and outliers; thirdly, using a statistical package to fit and estimate the chosen model and to examine the residuals - at this step, the model may need to be re-formulated to fit the analysis; finally, interpreting the results of analysis in light of the original theory.

The following procedures were taken in applying multiple regression in this study:

Firstly, this study hypothesised that the pupils in the intervention group would demonstrate better Mathematics achievement than their peers in the comparison one. This is because not only the teachers' knowledge and skills were used to enhance the pupils' achievement, like those in the comparison group, but also the pupils' knowledge and skills as well. The hypothesis was based on the theoretical and empirical literature on small group - teaching and learning.

Secondly, the study data were presented graphically to check, for example, the distributions of the data and the possible outliers in the data. The following histograms, boxplots and scatterplot in Figures 7.4, 7.5, 7.6, 7.7 and 7.8 show the distributions of prior and post Mathematics attainment scores for intervention and comparison groups, post Mathematics attainment scores by pupil sexes from the two groups, post Mathematics attainment scores by the groups, and post Mathematics attainment scores by prior Mathematics attainment scores for the two groups respectively.

Figure 7.4:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups

Pre-test
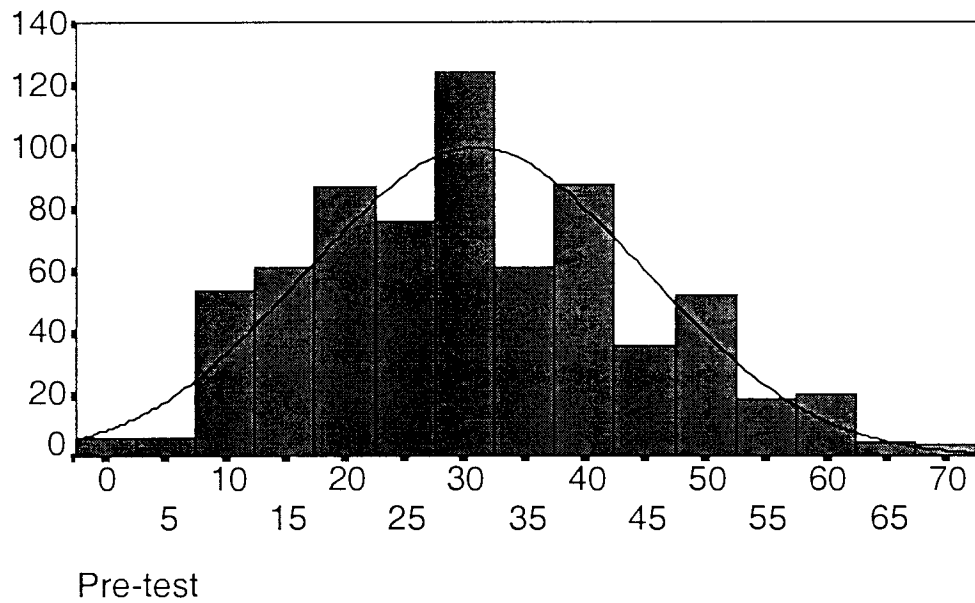
Figure 7.5:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups

Post-test
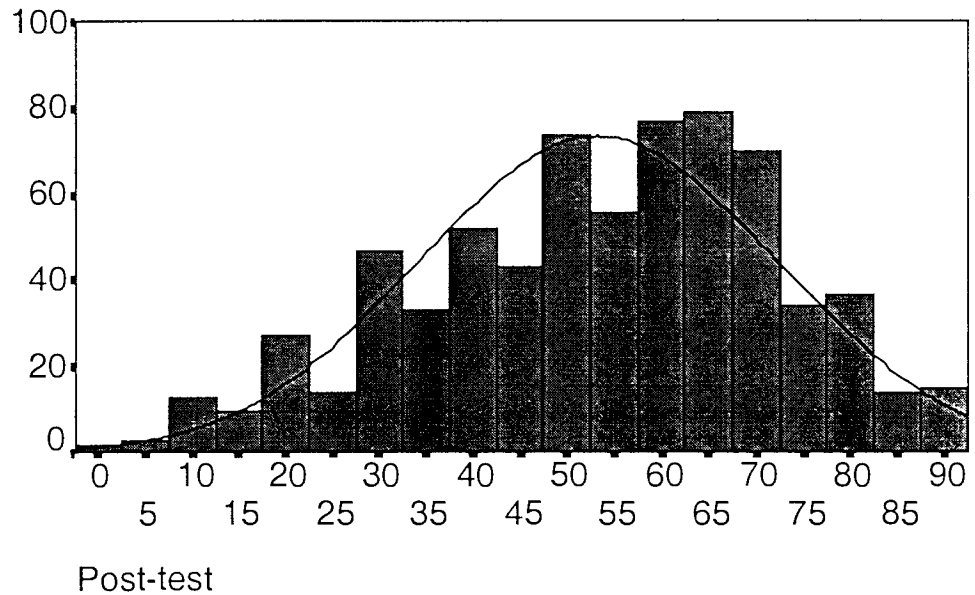
Figure 7.6:

Boxplot of Post Mathematics Attainment Scores by Sexes of Pupils from Intervention and Comparison Groups

Sex of Pupils
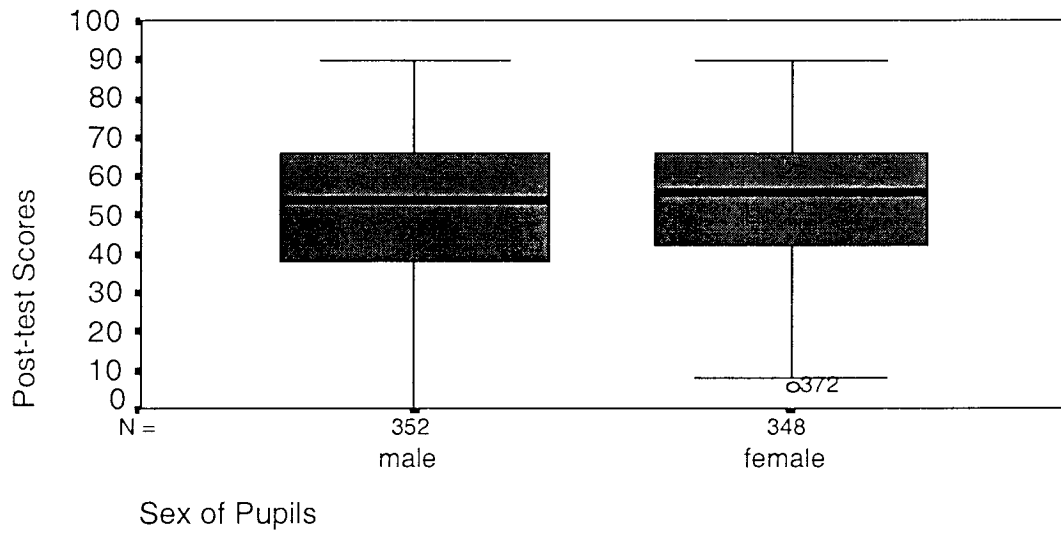
Figure 7.7:

Boxplot of Post Mathematics Attainment Scores by Groups

Comparison and Intervention Classes
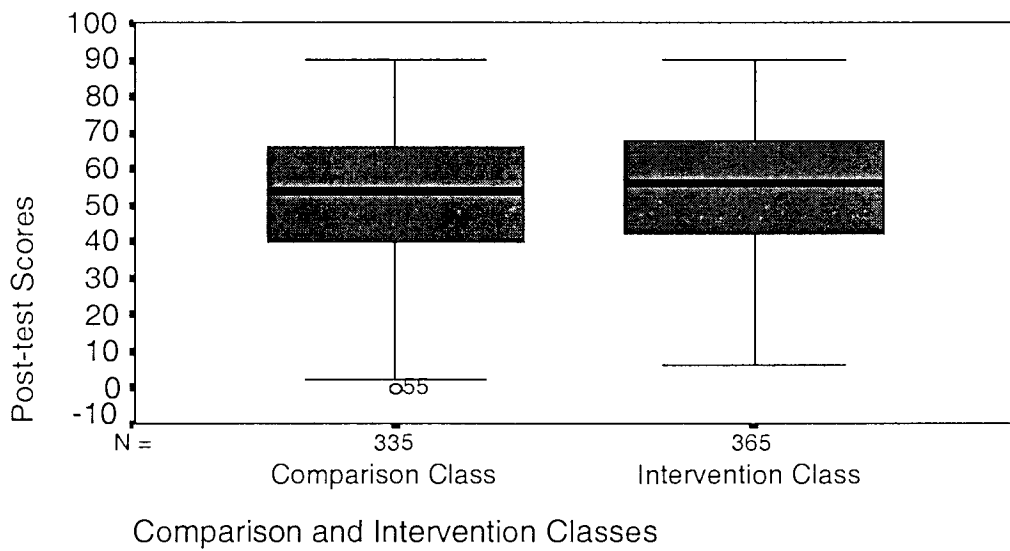
Figure 7.8:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils
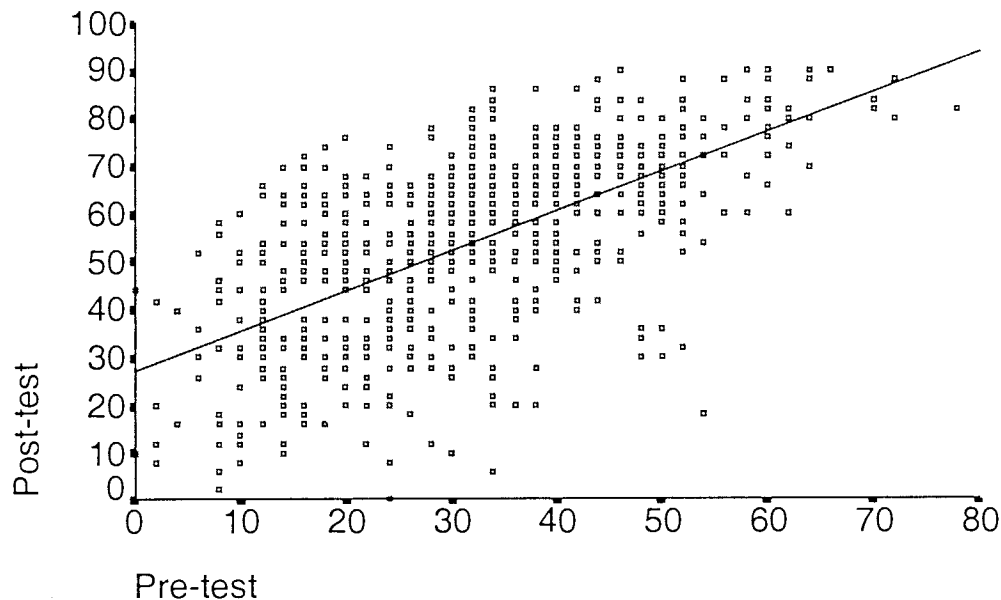
The histograms, boxplots and scatterplot show that (a) the distributions of prior and post Mathematics attainment scores are approximately normal (Figures 7.4 and 7.5), (b) the girls have slightly higher scores than the boys in post Mathematics attainment scores and there is an outlier (case 55) found in the boxplot of post Mathematics attainment scores by the sex (Figure 7.6), (c) the intervention group has higher scores of post Mathematics attainment than the comparison one and there is one outlier (case 55) found in the boxplot of post Mathematics attainment scores by groups (Figure 7.7), and (d) the post Mathematics attainment scores and prior Mathematics attainment scores are linearly correlated. The scatterplot of post Mathematics attainment scores by prior Mathematics attainment scores shows three outliers - cases 45, 55 and 372 (Figure 7.8).

Before doing a multiple regression analysis, all identified outliers as presented in Table 7.5 were deleted because the outliers show that the post-test scores for these three cases were lower than the pre-test scores. This might be caused by the poor conditions of pupils, for example, they might have been ill on the day of post-test.

Table 7.5:

List of Identified Outliers

No.	Case	Pupils ID	Primary School No.	Class	Gender	Pre-test Score	Post-test Score
1.	45	87	1	Obs.	Male	54	18
2.	55	97	1	Obs.	Male	24	0
3.	372	716	82	Int.	Female	34	6

The following histograms, boxplots and scatterplot show the data after the identified outliers have been deleted.

Figure 7.9:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups Without Outliers

Pre-test
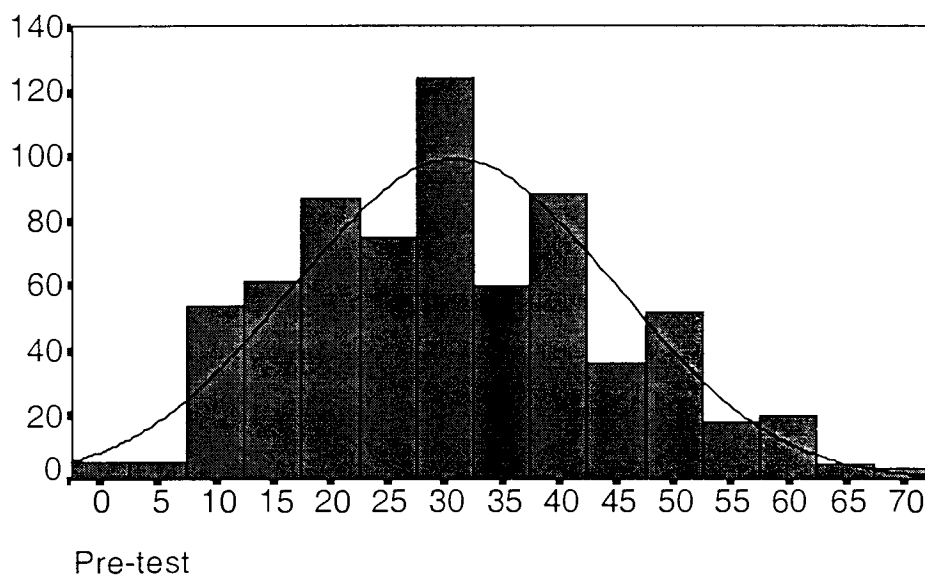
Figure 7.10:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups Without Outliers

Post-test
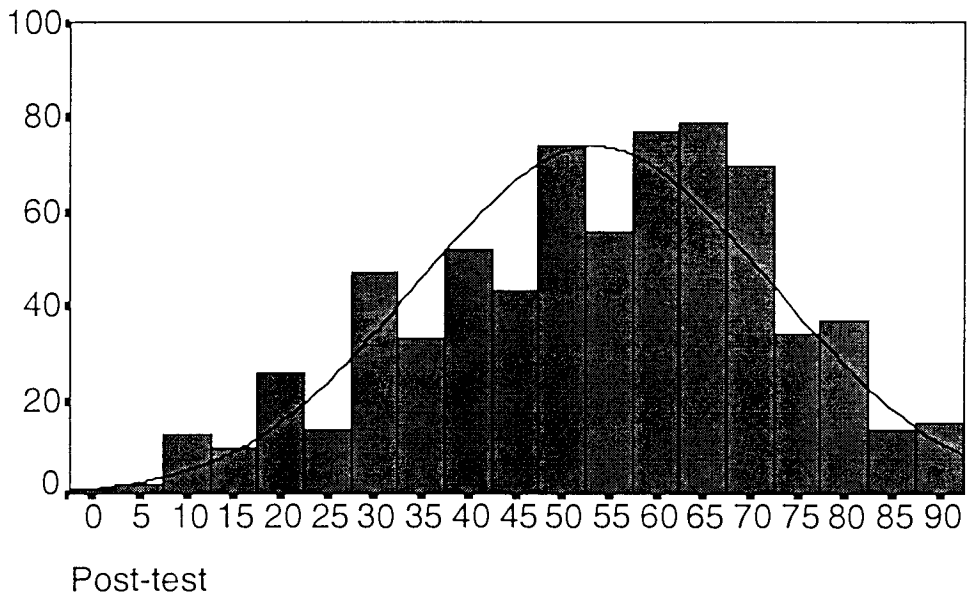
Figure 7.11:

Boxplot of Post Mathematics Attainment Scores by Sexes of Pupils for Intervention and Comparison Groups Without an Outlier

Sex of Pupils
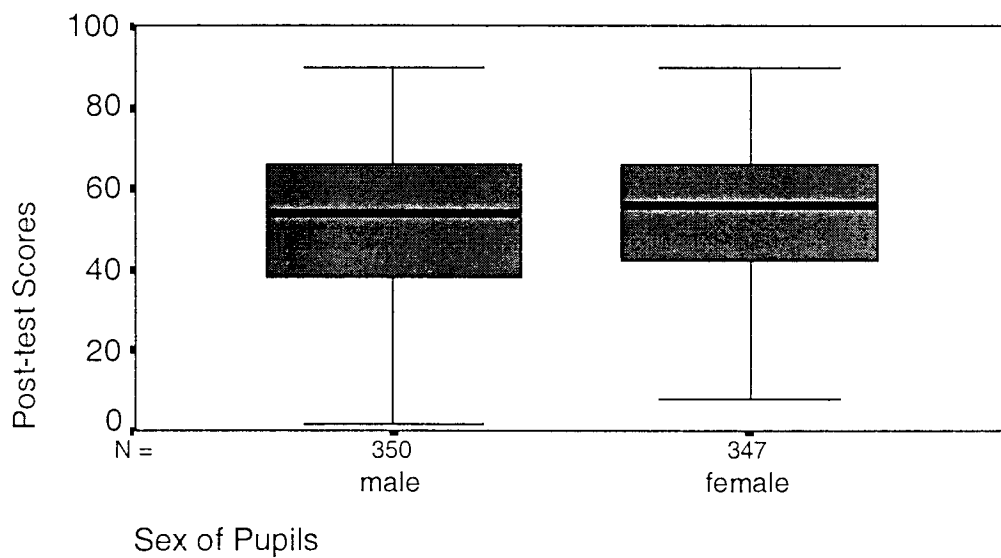
Figure 7.12:

Boxplot of Post Mathematics Attainment Scores by Groups Without an Outlier

Comparison and Intervention Groups
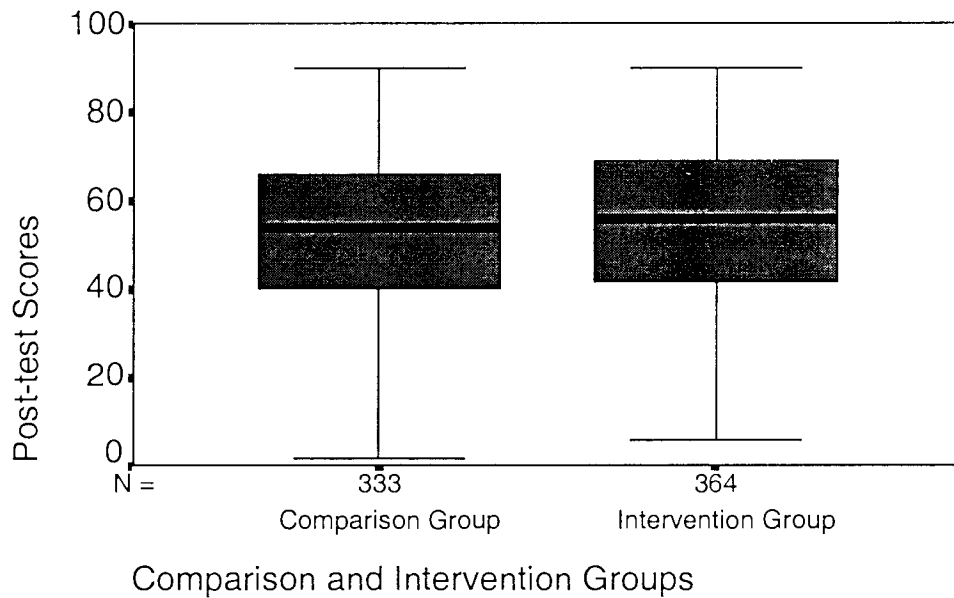
Figure 7.13:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores of Intervention and Comparison Group Pupils Without Outliers

Pre-test
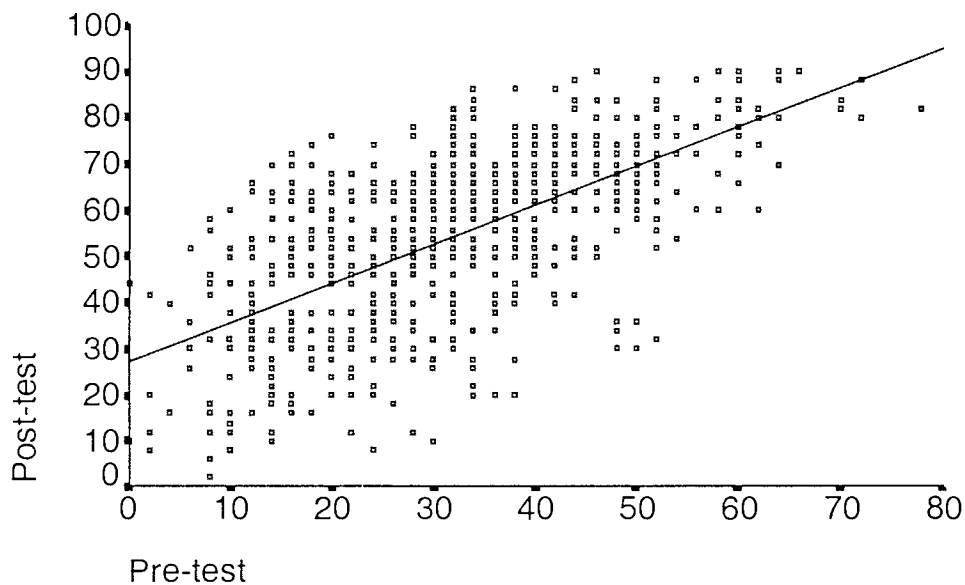
Thirdly, the contribution to post Mathematics attainment scores of prior Mathematics attainment scores, intervention/comparison group, individual school and gender will be explored using multiple regression. Table 7.6 presents the results of the statistical analysis.

Information on the residuals on this analysis can be seen in Appendix 7.1.

Table 7.6:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Groups, Gender and Schools

Predictor Variables	B	Error of B	T	Effect Size	p
Pretest	0.84	.04	21.79	0.63	<0.0001
Group[1]	5.76	1.03	5.59	0.32	<0.0001
Gender[2]	0.71	1.03	0.68	n.s.	0.49
School A[3]	4.25	2.18	1.95	0.24	0.05
School B[3]	5.17	2.29	2.26	0.29	0.02
School C[3]	10.71	2.33	4.59	0.60	<0.0001
School D[3]	12.80	2.34	5.47	0.71	<0.0001
School E[3]	2.44	2.26	1.08	n.s.	0.28
School F[3]	6.21	2.24	2.77	0.35	0.01
School G[3]	17.57	2.21	7.95	0.98	<0.0001
School H[3]	7.27	2.18	3.33	0.41	0.0009
School I[3]	11.28	2.23	5.05	0.63	<0.0001

df = 12, Intercept = 16.42, R^2 = 0.49, F= 55.14, p = <0.0001

Notes:

N (pre-test and post-test) = 697

[1] Comparison Group = 0, Intervention Group = 1

[2] Boys = 0, Girls = 1

[3] Consists of ten schools, nine created as dummy variables

The results of multiple regression analysis can be summarised as follows:

The prior Mathematics attainment score is a highly significant predictor of post Mathematics attainment scores (p < 0.0001). This means that as prior Mathematics attainment score increases by one point, the post Mathematics attainment score will increase by 0.84 if the other variables in the equation are constant.

Group is a highly significant predictor of post Mathematics attainment scores (p < 0.0001). This result means the pupils in the intervention

group have 5.76 higher raw scores than those in the comparison group if the other variables in the equation are constant.

Despite the appearance of a small advantage to girls, gender is not significantly associated with the Mathematics test scores (p=0.49).

There are significant school effects. Pupils in schools C, D, G, H and I made significantly greater progress, those in schools A, B and F were in a middle band, and those in school E made lower progress.

Taken together prior Mathematics attainment scores, intervention/comparison group, individual school and gender explain about 49% of the post Mathematics attainment scores (R^2 = 0.49). As in all studies of this kind, there will be some unexplained variance due to individual circumstances in families, communities, children's unique histories and health.

Furthermore, if we look at the effects on attainment at post-test of individual study schools, we find some variation amongst schools.

Table 7.7 presents means, standard deviation, range of scores of pre-test and post-test, and the results of t-tests for each of the individual schools. A t-test for independent samples for each of the individual schools found four schools with significant differences – Primary School Numbers 2, 63, 249 and 250. The variations among the t-test results for these ten individual study schools might be caused by variations in the pre-test scores. Therefore, it will be wise to look at another analysis in which the pre-test scores can be taken into account. A suitable statistical analysis is multiple regression and these analyses are reported next.

Table 7.7:

Mean of Pre-test, Mean of Post-test, SD of Pre-test, SD of Post-test, Range of Pre-test, Range of Post-test for Intervention and Comparison Classes, and T-test Results of Post-test Scores Between Intervention and Comparison Classes: Primary Schools 1, 2, 5, 63, 78, 82, 97, 249, 250 and 604

Primary School	Class	Mean of Pre-test	Mean of Post-test	SD of Pre-test	SD of Post-test	Range of Pre-test	Range of Post-test	T-test Results
a	b	c	d	e	f	g	h	i
1	Inter.	27.71	49.14	11.35	20.44	2 – 54	8 – 80	t=1.33
	Comp.	36.11	41.51	11.40	18.47	16 – 56	0 – 66	p=0.19
2	Inter.	20.52	39.76	9.96	21.05	0 – 40	6 – 78	t=-2.09
	Comp.	26.72	48.76	12.32	14.33	10 - 60	20 - 88	p=0.04
5	Inter.	29.29	51.47	11.22	19.29	8 – 58	6 – 88	t=-0.30
	Comp.	35.60	52.87	12.62	17.06	10 - 60	14 - 82	p=0.76
63	Inter.	42.67	70.40	14.30	15.78	6 – 64	42 –90	t=2.31
	Comp.	40.44	60.50	15.66	17.85	10 – 72	22 –90	p=0.02
78	Inter.	28.80	55.27	12.18	17.34	8 – 60	12 – 80	t=-1.88
	Comp.	25.17	62.90	9.46	13.59	14 – 52	28 – 86	p=0.07
82	Inter.	34.15	48.36	19.11	19.16	8 – 78	6 – 82	t=0.75
	Comp.	25.17	46.00	12.47	19.89	4 – 50	8 – 70	p=0.46
97	Inter.	28.97	54.11	12.99	16.25	0 – 60	16 – 88	t=1.48
	Comp.	30.44	47.56	13.87	20.53	2 – 54	2 – 84	p=0.14
249	Inter.	28.00	66.81	11.81	13.42	4 – 46	36 – 90	t=1.99
	Comp.	34.06	59.83	16.47	16.28	10 – 70	24 – 88	p=0.05
250	Inter.	30.95	63.37	13.63	13.36	10 – 56	18 – 88	t=5.60
	Comp.	33.18	44.62	11.54	15.88	8 – 60	12 – 76	p=0.00
604	Inter.	24.39	51.50	11.99	15.98	6 – 52	26 – 84	t=-1.71
	Comp.	31.94	58.00	15.56	15.78	8 – 72	12 – 90	p=0.09

Tables 7.8, 7.9, 7.10, 7.11, 7.12, 7.13, 7.14, 7.15, 7.16 and 7.17 show the results of multiple regression analyses for each of the study schools. For all study schools, the prior Mathematics attainment scores are significant predictors of post Mathematics attainment scores ($p < 0.0001$). This means that as prior Mathematics attainment score increases by one point, the post Mathematics attainment score will increase by 0.10, 1.16, 1.15, 0.38, 0.86, 0.75, 0.77, 0.71, 0.76 and 0.80 for Primary School Numbers 1, 2, 5, 63, 78, 82, 97, 249, 250 and

604 respectively if the other variables in each of the equation are constant. Among ten study schools, only five schools show that class (intervention or comparison) is a significant predictor (Primary School Numbers 1, 63, 97, 249 and 250) and only one school shows that gender is a significant predictor (Primary School Number 1). These differences among the ten schools might be caused by the different levels of seriousness and involvement among the teachers in these schools. In the researcher's informal observations during his visits to these schools he found that the teachers in Primary School Numbers 1, 63, 97, 249 and 250 tended to be more serious and totally involved in the implementation of the intervention. On the other hand, non-significant p values might be brought about by the small n's in the schools.

To directly answer the research questions set up at the beginning of this study, the analysis of all the study schools will be taken into consideration. In other words, the results of individual study schools will be neglected, while the results of the combined sample will be described further.

Table 7.8:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 1

Predictor Variables	B	Error of B	T	Effect Size	p

Pre-test	0.10	0.16	6.39	0.61	<0.0001
Class[1]	14.86	3.80	3.91	0.38	0.0002
Gender[2]	7.73	3.67	2.11	0.19	0.04

df = 3, Intercept = 1.23, R^2 = 0.40, F=16.73, p = <0.0001, N=77

Table 7.9:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 2

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	1.06	0.14	7.40	0.66	<0.0001
Class[1]	-1.80	3.29	-0.05	n.s.	0.58
Gender[2]	1.31	3.18	0.41	n.s.	0.68

df = 3, Intercept = 19.33, R^2 = 0.45, F= 20.68, p = <0.0001, N=80

Table 7.10:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 5

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	1.15	0.13	8.54	0.77	<0.0001
Class[1]	5.90	3.24	1.82	n.s.	0.07
Gender[2]	-1.61	3.19	-0.51	n.s.	0.62

df = 3, Intercept = 12.69, R^2 = 0.55, F= 24.51, p = <0.0001, N=64

Table 7.11:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 63

Predictor	B	Error of B	T	Effect Size	p

Variables					
Pre-test	0.83	0.10	8.77	0.71	<0.0001
Class[1]	7.90	2.81	2.82	0.23	0.01
Gender[2]	-4.80	2.82	-1.70	n.s.	0.09

df = 3, Intercept = 29.50, R^2 = 0.62, F= 31.90, p = <0.0001, N=62

Table 7.12:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 78

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	0.86	0.15	5.58	0.61	<0.0001
Class[1]	-2.82	3.42	-0.83	n.s.	0.41
Gender[2]	-1.47	3.36	-4.44	n.s.	0.66

df = 3, Intercept = 33.90, R^2 = 0.39, F= 12.15, p = <0.0001, N=59

Table 7.13:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 82

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	0.75	0.11	7.14	0.69	<0.0001
Class[1]	-3.37	3.69	-0.92	n.s.	0.36
Gender[2]	-0.42	3.55	-0.12	n.s.	0.91

df = 3, Intercept = 27.25, R^2 = 0.45, F= 17.41, p = <0.0001, N=67

Table 7.14:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 97

Predictor Variables	B	Error of B	T	Effect Size	p

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	0.77	0.14	5.55	0.56	<0.0001
Class[1]	7.57	3.69	2.05	0.21	0.04
Gender[2]	2.67	3.69	0.72	n.s.	0.47

df = 3, Intercept = 22.70, R^2 = 0.35, F= 11.78, p = <0.0001, N=69

Table 7.15:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 249

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	0.71	0.09	7.72	0.68	<0.0001
Class[1]	11.28	2.65	4.26	0.37	<0.0001
Gender[2]	0.74	2.61	0.28	n.s.	0.78

df = 3, Intercept = 22.70, R^2 = 0.35, F= 11.78, p = <0.0001, N=72

Table 7.16:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 250

Predictor Variables	B	Error of B	T	Effect Size	p
Pre-test	0.76	0.11	6.96	0.55	<0.0001
Class[1]	20.54	2.54	8.09	0.60	<0.0001
Gender[2]	1.45	2.74	0.53	n.s.	0.09

df = 3, Intercept = 18.90, R^2 = 0.61, F= 37.95, p = <0.0001, N=77

Table 7.17:

Multiple Regression Analysis of Pupils' Attainment on Pre-test, Classes and Gender: Primary School Number 604

Predictor Variables	B	Error of B	T	Effect Size	p

Pre-test	0.80	0.11	7.32	0.71	<0.0001
Class[1]	-0.54	2.88	-0.19	n.s.	0.85
Gender[2]	0.90	2.97	0.30	n.s.	0.76

df = 3, Intercept = 32.14, R^2 = 0.52, F= 23.68, p = <0.0001, N=70

Notes for Tables 7.8 – 7.17:

[1]Comparison Class = 0, Intervention Class = 1

[2]Boys = 0, Girls = 1

Histograms of pre-test and post-test Mathematics scores for intervention and comparison groups, and scatterplot of post Mathematics attainment scores by prior Mathematics attainment scores for intervention and comparison groups for each of the ten schools can be seen in Appendix 7.2.

Finally, the results of analysis will be interpreted. Having controlled the pre-test as a baseline, the following conclusions can be drawn:

The intervention group pupils significantly out-performed their peers in the comparison one (p < 0.0001). Having ensured the class size, age of pupils, timing of lesson, physical school condition, Mathematics coursebook, total teaching time, and teachers' gender, educational backgrounds, teaching experience, age and teaching method in non-Mathematics lessons between the two groups were similar, there is a strong case for claiming that this different attainment is caused by the different teaching styles. The difference between the two groups was that the pupils in the intervention group did their Mathematics exercises in small mixed ability groups by helping each other, their peers in the comparison groups did their exercises individually.

The literature review suggested that intervention group pupils who did their exercises under such condition would enjoy some advantages, where their peers in the comparison group would not, such as they could share ideas (Galton and Williamson, 1992), make meanings

clearer to themselves by having to explain something to others, and gain some opportunities to teach as well as to learn (Bennett and Dunne, 1992). Under such conditions, the intervention group pupils learned more than their peers in the comparison group. Vygotsky (1978) confirms this view by saying that the children who cannot do their work alone can make better progress if they are helped by the more capable or knowledgeable ones.

There were no significant gender differences, despite what appeared at first a slight advantage to girls.

There were some significant school effects on the post-test scores. The pupils in primary schools 63, 78, 249, 250 and 604 made more progress than others. Those in primary schools 2, 5 and 97 made slightly more progress and those in primary school 82 and school 1 made the least progress.

Up to 49% of the variance of the pupils' post attainment score was accounted for by the explanatory variables. As in all research of this kind, the remaining variance could be due to all kinds of individual circumstances or community factors. Because the explanatory variables in this study can be shown to account for about half the variation in post-test scores, a satisfactory Mathematics model for explaining Mathematics progress has been established.

Chapter Eight

Discussion

8.1 Introduction

This chapter will firstly discuss the findings of the study. Then, it will describe the generalisations of the study. After that, it will describe the implications of the study for the educational practice in Indonesia. Furthermore, it will describe future research avenues that may be undertaken in relation to the findings of the study. Finally, it will draw the conclusions of this study.

8.2 The Findings in Light of the Literature

In this section the findings of the study will be discussed on the basis of published literature. The implementation of the intervention will also be evaluated and discussed in relation to the current needs of Indonesian primary schools.

8.2.1 Results of Intervention

There are two conclusions that can be drawn from the findings on the outcomes of the intervention. Firstly, the intervention group pupils demonstrated higher Mathematics gains than the comparison group. Secondly, there were variations in the effects of the school on Mathematics attainment.

These results are subjected to the conditions under the selected research design (a non-equivalent control group design) and to the research instrument (a fifty-item Mathematics test). Now, let us discuss the results of the study in connection with these two factors.

The design was a non-equivalent equivalent control group design, therefore, the results of this study are subjected to its internal and external validities. In terms of internal validity, there are eight threats

to validity in the design - history, maturation, testing, instrumentation, regression, selection, mortality, and interaction of selection and maturation. Furthermore, in terms of external validity, there are three sources of possible invalidity of the design - interaction of testing and intervention condition, interaction of selection and intervention condition, and reactive arrangements.

In this study, all sources of internal invalidity of the research design were controlled. History: There was no particular and significant events happened during the period of intervention that might influence the results of the study. Maturation: All pupils in this study were more or less at the same age because an age criteria (six years old) was the only pre-requisite of entering primary schools in Indonesia. Testing: The pupils were used to taking the test because the current evaluation system required the primary school teachers to carry out one summative test and at least three formative tests (it was even commonly carried out weekly) in one term (a three-month period). Instrumentation, the way of scoring the pupils' papers was done exactly the same for the pre-test and post-test and by the researcher himself. Regression: The way of selecting pupils for intervention and comparison groups of this study was done on the basis of a selection of their teachers. Selection: The pupils were learning under the same conditions. Mortality: There was no single pupil dismissed from any school in the study. Interaction of selection and maturation: The samples started their first year of primary schooling on the basis of their age (six years old), therefore, the interaction of selection and maturation was the same for pupils in the experimental and comparison groups.

In terms of threats to external validity of the design, the following explanations can be described: The interaction of testing and intervention condition: The Indonesian primary school pupils were used to taking the test as part of their primary schooling

requirements. <u>The interaction of selection and intervention condition</u>: As a single criteria for children to enter the Indonesian primary schools was age criteria (six years old), therefore, the interaction of selection and intervention condition could always be established in all Indonesian primary schools. <u>The reactive arrangements</u>: As the intervention was carried out on the basis of matching on class size, age of pupils, timing of lesson, physical school condition, Mathematics coursebook, total teaching time, and teachers' gender, educational backgrounds, teaching experience, age as well as teaching method in non-Mathematics lessons, it is unlikely that reactive arrangements might preclude generalisation about the effects of the intervention.

Under the condition of the research instrument, the results of this study are reliable because the reliability coefficient of the research instrument (a fifty-item Mathematics test) is 0.93. The results of this study are also valid because the Mathematics test used in this study consists of the items which in the judgement of professionals ranged from 'very appropriate' items to 'moderate appropriate' ones, and from 'easy' items to 'difficult' ones. Besides, the piloting results also show that the distribution of answers is normal. Under all these conditions, it is assumed that the results of the study from a research instrument point of view are both reliable and valid.

In short, the results of the study can be considered internally and externally valid on the basis of research design, and reliable and valid on the basis of the research instrument.

The following are the discussions of the results of intervention:

The intervention group pupils significantly attained higher post Mathematics attainment scores than the comparison group pupils.

The intervention and comparison groups were similar in class size, age of pupils, timing of lesson, physical school condition, Mathematics coursebook, total teaching time, and teachers' gender, educational backgrounds, teaching experience, age as well as teaching method in non-Mathematics lessons. Having ensured these similarities, the different attainment might only be caused by the different teaching methods used by the intervention and comparison group teachers. The intervention group teachers used a combination of formal teaching method and small group teaching, whereas the comparison group teachers only used formal teaching methods. These different teaching methods caused different ways of doing the Mathematics exercises between the pupils in the two groups. The pupils in the intervention group did their Mathematics exercises in small mixed ability groups by interacting and helping each other while the pupils in the comparison groups did their exercises individually.

The research literature suggests a number of reasons why the intervention might have been successful. For example, the pupils could share ideas (Galton and Williamson, 1992), make meanings clearer to themselves by having to explain something to others, and gain some opportunities to teach as well as to learn (Bennett and Dunne, 1992). Furthermore, in such small groups the pupils could help each other - the more capable or knowledgeable pupils helped the less capable or knowledgeable ones. According to theories of pedagogy, these conditions should lead the intervention group pupils to better progress than their peers in the comparison group. Vygotsky (1978) confirms these ideas by saying that the children who cannot do their work alone can make better progress if they are helped by the more capable or knowledgeable ones.

Furthermore, results of this study are at odds with the study done by Bennett (1976) which was later re-analysed by Aitken, Bennett and Hesketh (1981) on teaching styles. Bennett and his colleagues found that the pupils taught Mathematics under the formal and informal styles had substantially higher Mathematics attainment than those taught under the mixed style. In contrast, this study in Indonesia indicates that the mixed style (a combination of formal teaching method and the use of small mixed ability groups) is superior to the formal style.

There were variations of school effects on post Mathematics attainment scores.

In general, school effects on attainment scores were found. One of the schools where pupils made the least progress (see Table 7.6) was the primary school teacher whose teacher did not adhere to the pedagogy of the intervention. The teacher in this class only properly implemented the intervention when the researcher was in her classroom. Information about the consistency and inconsistency of implementing the intervention was obtained from the pupils by asking informal questions. The difference in consistency of implementing the intervention might cause the difference in pupil progress found between this school and others. However, other 'school effects' found in this study might be explained by factors such as management, facilities, locality, etc.

8.2.2 Implementation of Intervention

The future implementation of groupwork will be discussed on the basis of the current context of Indonesian primary schools, primary school teachers' educational backgrounds as well as primary school teacher education in Indonesia. This discussion is contextualised against the back-drop of trends of primary education in Asia and the Pacific region.

In Indonesian education, primary schooling ultimately aims to prepare pupils to proceed to junior high school and to provide the pupils with basic abilities in order that they can develop themselves as individuals, members of society and citizens. The implementation of the group-teaching intervention has some major advantages over the teaching and learning practices that are currently employed. The advantages are that the pupils can share ideas, make meanings clearer to themselves by having to explain something to others, gaining some opportunities to teach as well as to learn, and can help each other in doing their exercises; the more capable pupils helping the less capable. This study proves that pupils under these conditions can make better progress (achieve greater Mathematics attainment) than those under a more formal teaching and learning practice. Generally, this may therefore be considered a better preparation for the pupils to proceed to junior high school (reaching the first aim of Indonesian primary schools). In addition, the pupils under these conditions can practice the social skills they will ultimately need as individuals, members of society and citizens. The pupils who learned in groups can be seen as having enjoyed better opportunities to reach the second aim of Indonesian primary schools.

Most of Indonesia's primary school teachers graduated from teacher training schools where they were exposed to a formal teaching method which they have dutifully used in teaching their pupils for many years. Despite their educational backgrounds, the teachers in this study found that the implementation of group work only brought about a small adjustment to their teaching method. They also found that and this adjustment led to greater learning. This adjustment may therefore be easily adopted by Indonesian primary school teachers because it does not require other adjustments to their practice or to their classroom conditions or materials. The teachers need only a short training in order that they can fully implement the teaching method as it has been implemented in the intervention. This training

does not take much time and is not necessarily costly. Therefore, the teaching method used here is considered to be easily adopted in terms of the Indonesian primary school teachers' educational backgrounds.

In terms of primary school teacher education in Indonesia, the concepts and teaching methods used in this study can be valuable resources if introduced into pre-service and in-service training. For example, they can be taught under subjects on basic education (e.g. Basic Theories on Primary Education, Classroom Management, and Teaching and Learning Strategies). Having introduced the concepts and teaching method as used in this research, it is then hoped that the quality of primary school teachers can be improved.

Looking at Indonesian primary schools more globally - as schools belonging to the Asia-Pacific region, the schools need a qualitative improvement. The Indonesian government has not yet found an appropriate teaching model that can be widely implemented and beneficial to increase pupil progress as well as to reach the whole aims of Indonesian primary schools. The teaching method as used in this research may provide an valuable alternative to current practice in Mathematics teaching. This intervention provided better pupil progress (in terms of Mathematics attainment) as well as providing more opportunities for the pupils to practice their social skills. These two advantages may lead to reaching the whole aims of Indonesian primary schools better than the current teaching and learning practice. However, it is important to note that, so far, its superiority has been demonstrated only in Mathematics and only in grade three.

Furthermore, in line with the qualitative trend of primary education in Asia and Pacific countries particularly for the countries belong to categories B and C, the teaching method used in this study might become an alternative model for teaching Mathematics, especially

for those primary schools where their teachers use the typical formal teaching method and have the same teaching and learning conditions as in Palembang.

If we look at the teachers' views in this study, there is a strong tendency for increased confidence on using informal group work in helping their pupils learn Mathematics. They expected that the new teaching method would help their pupils learn Mathematics in the classrooms. Once they had implemented the intervention in their classrooms, teachers recognised that their pupils learned more Mathematics in the classrooms when they used a mixed teaching method (a combination of a formal teaching method and small mixed ability groups) than when they used a formal teaching method. Therefore, a majority of them would use a mixed teaching method as their teaching method for teaching Mathematics in the future.

Furthermore, if we also look at the pupils' views in this study, a majority of the intervention group pupils liked working and helping each other in their small groups. They also claimed that they learned more Mathematics when they did their Mathematics exercises in the small mixed ability groups than individually. Therefore, most of them preferred doing their Mathematics exercises in the small groups than individually.

These pupils' reactions to working and helping each other in small groups might also be influenced by their cultural backgrounds. Culturally, primary-school-aged children in Indonesia in general tend to play together in small groups (the same gender) with their peers either in their school (break sessions) or in their neighbourhood (after school). They play, for example, marbles, picture cards, balls, etc. In particular, they also tend to work together in small groups to do their homework, for example. They do their homework in their peers' houses by visiting each other. It is common for these children to do,

for example, their Mathematics homework in small groups. The children naturally, in doing their Mathematics, consist of different levels of knowledge and/or ability in Mathematics. In the groups, they help each other in solving Mathematics problems or answering the Mathematics questions. This situation has happened in Indonesia from a long time ago and it still continues until the present time. In addition, working together in small groups out of school time is not done by primary-school-aged children but also done by junior and senior high school students and even by the university students. This situation shows that working in small groups has culturally been a common event for Indonesian people. This life is popularly known in Indonesia as a "cooperative society".

In short, the teaching method used in the intervention has been shown to be more effective than the common teaching and learning practice in the current context of Indonesian primary schools. The method led to better pupil progress than the common teaching and learning practice, and also provided opportunities for the pupils to practice social skills. These conditions may ultimately lead to reaching the whole aims of Indonesian primary schools. Besides, the teaching method used in implementation of this intervention can easily be adopted by the primary school teachers. Furthermore, it might also be adopted in other subjects in the primary school and in primary teacher training programmes. In addition, the teaching method used in the intervention can be an alternative teaching model in line with improving the quality of primary schools in Indonesia. Finally, the teaching method used in this study may also be an alternative model for teaching Mathematics in primary schools in Asia and Pacific countries that belong to categories B and C where the teachers' knowledge and skills as well as the teaching and learning conditions are similar to those in Palembang, Indonesia.

8.3 Generalisations from the Study

It is important to note that the limitations of this form of study: The findings may only be relevant to Indonesian primary schools that have the same characteristics as the schools in the study. The samples of this study were only taken in public primary schools in Palembang (it is one of 27 provincial cities in Indonesia), and it is considered that this has some weaknesses if the results of study are to be generalised to other Indonesian primary schools in other areas of Indonesia. There might be some other factors that should be considered as the total of primary schools in Indonesia is 137,487.

It is also important to print out that the intervention training of teachers was carried out by one lone researcher (the author). Another teacher trainer might have had a different influence on pedagogy, or even none. This is a further limitation in generalising the results.

8.4 Implications for Educational Practice in Indonesia

Indonesia is a country which keeps trying to improve the quality of its primary schools through trying out some innovations on school improvement, including the teaching method. This study has demonstrated an alternative teaching model that can be implemented for teaching Mathematics in ordinary Indonesian primary school classrooms.

In relation to improving Indonesian primary schools in general, and the teaching method in particular, the findings of this study can be introduced into primary school teacher education through pre-service and in-service trainings. In pre-service trainings, the findings of this study can be implemented through inserting the findings in some subjects under a D-II Pre-service Primary School Teacher Training Programme. For example, they can be introduced under the subjects on basic education (e.g. Basic Theories on Primary Education, Classroom Management, and Teaching and Learning Strategies). In in-service trainings, these findings can also be introduced into the

same subjects as those in the pre-service trainings as well as in seminars, workshops, etc.

Having introduced the findings of this study in the pre-service and in-service primary school teacher training programmes, it is expected that the pedagogy of this study can then be implemented in all Indonesian primary schools.

8.5 Future Research

This study is as an embryo for larger studies for the purpose of seeking a more appropriate and applicable teaching method of Mathematics in the Indonesian primary school classrooms. Future research might provide one strategy for achieving the current aims of Indonesian primary schools. But this study still needs to be improved in the sense of the research design and the sample in order that it can be more generalisable and representative towards the whole of Indonesian primary schools. Therefore, future research needs to be carried out on a larger and more diverse sample of pupils, researchers and trainers. Having done this follow-up study, it is suggested that pupils be re-tested 1 and 2 years later to explore long-term effects.

It is also possible that a future study could be designed to look at other levels of Indonesian primary school pupils in Mathematics and at the effects of group work on pupil attainment in other subjects.

A further line of future research would explore different styles of intervention to maximise possible benefits and cost effectiveness. Could the teacher training be carried out using 'distance education' methods? Would videos of effective pedagogy increase the impact of the training? Research could be carried out on the relationship between the intensity (and cost) of teacher training and the magnitude and longevity of pupil gains.

To summarise, one strand of future research would involve extending the current design to larger and more diverse samples of pupils, teachers and teacher educators. The other strand would involve investigating the effects of varying forms of teacher education and classroom pedagogy.

In addition, it may be beneficial for future research to look at what kind of language goes on in small groups between the teacher and pupil, and the pupil - pupil interaction in the classrooms. Indonesia is a multilingual country where there are one national language (Indonesian language) as the medium of instruction and many local languages. In classrooms, the teachers use the Indonesian language for presenting the teaching materials and explaining the problems to the whole class or the small group. However, the pupils may not always use Indonesian, they can use their local language as a means of communication with their peers in small groups, for example, in giving explanations. These different languages used by the teacher and pupils may lead to different levels of pupil understanding of materials, as Noddings (1985) says when pupils share similar language, they can translate different languages between the teacher and pupils may possibly cause different levels of understanding, with pupils understanding more in small groups.

It may also be beneficial for future research to look at the interaction between the teacher and her pupils in small groups – the ways the teacher helps her pupils solve their Mathematical problems. What needs to be explored further are, for example, to what extent the teacher's knowledge may influence the pupils' learning outcome, and how the teacher's knowledge relates to her pupils' Mathematics achievement because as Vygotsky (1962 and 1978) claims the children who cannot do their work alone may make better progress if they are helped by more knowledgeable ones. In the classrooms, particularly in small groups, if all pupils in one particular small group

cannot solve the mathematical problems, they will ask for a help from the teachers.

8.6 Conclusions

There are three conclusions that can be drawn from this study.

- From point of view of the current context of Indonesian primary schools, the teaching method used in this study is an alternative teaching model for teaching Mathematics in Indonesian primary school classrooms. This is because it has been demonstrated increases in pupil learning (Mathematics attainment) compared to traditional methods. Therefore, the teaching model in this study proves to be a better teaching model for reaching the first aim of Indonesian primary school (to prepare the pupils to proceed to junior high schools). Besides, the teaching model in this study also offers a better opportunity towards reaching the second aim of Indonesian primary schools (to provide the pupils basic abilities in order than they can develop themselves as individuals, members of society and citizens). This is because the teaching model used in this study provides the pupils with opportunities to interact and help each other in their own groups. This provides a good means of practising skills of listening, questioning, challenging, helping and providing explanation to others. All these skills are necessary in order to reach this second aim. In addition, the teaching model used in this study can easily be adopted to the current context of Indonesian primary school classrooms as it does not require any significant changes from the current conditions and situations of Indonesian classrooms. Therefore, the teaching model in this study can be considered more appropriate and beneficial than the teaching method that has been used for years in primary schools in relation to raising the pupils' Mathematics attainment in particular and achieving the all-embracing aims of Indonesian primary schools in general.

- From point of view of primary school teacher education in Indonesia, this study offers an innovation as it enriches the teaching method. The teaching model in this study can easily be adapted to the context of primary school teacher education in Indonesia because it only needs minor adjustment to the existing teaching method (a formal teaching method) that has been used for years in primary school teacher education in Indonesia. Besides, the teaching model in this study can easily be implemented in the pre-service and in-service of primary school teacher training programmes. This is because the pre-service and in-service of primary school teacher training programmes have subjects which allow the teaching method as well as its concepts used in this study to be introduced, for example, Basic Theories on Primary Education, Classroom Management, Teaching and Learning Strategies, etc.

- From the point of view of trends of primary education in the Asia and Pacific region where most of its countries have been trying to improve their primary education quantitatively and qualitatively, the teaching model in this study may offer an alternative pedagogy for Mathematics teaching in relation to improving the quality of primary education. Indonesia, for example, as a country which has reached more than 99 per cent of net enrolment of primary school aged-children needs to improve the quality of its primary schools. This study, therefore, may offer improvement in the form of teaching method as an alternative teaching model which has been proved to be a better teaching model than the one that has been used for years in teaching Mathematics in Indonesian primary schools. Furthermore, the teaching method used in this study may also be an alternative teaching model for teaching Mathematics in primary schools in Asia and Pacific countries where the teaching and

learning conditions as well as the teachers' knowledge and skills are still similar to those in Indonesia.

References:

Aitken, M., Bennett, S.N. and Hesketh, J. (1981) Teaching Styles and Pupil Progress: A Re-analysis. *The British Journal of Educational Psychology.* Vol. 51, pp. 170 - 186.

Alexander, R. (1984) *Primary Teaching.* London: Cassell.

Alexander, Rose and Woodhead (1992) Curriculum Organisation and Classroom Practice in Primary Schools: A Discussion Paper in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Arends, R.I. (1997) *Classroom Instruction and Management.* New York: The McGraw-Hill Companies, Inc.

Balitbang (1990) *Master Plan of 1994 Curriculum Development.* Jakarta: Balitbang.

Bennett, N. (1994) Co-operative Learning in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Bennett, N. and Dunne, E. (1990) Implementing Co-operative Groupwork and Participation in Galton, M. and Williamson, J. (1992) *Group Work in the Primary Classroom.* London: Routledge.

Bennett, N., Jordan, J., Long, G. and Wade, B. (1976) *Teaching Styles and Pupil Progress.* London: Open Books Publishing Limited.

Biott, C. (1987) Co-operative Group Work: Pupils and Teachers' Membership and Participation in Galton, M. and Williamson, J. (1992) *Group Work in the Primary Classroom.* London: Routledge.

Blyth, W.A.L (1965) English Primary Education in Corner, C. and Lofthouse, B.

(Eds.) (1990) *The Study of Primary Education: A Source Book Volume I - Perspective.* London: The Falmer Press.

Bossert, S. Barnett, B. and Filby, N. (1984) Grouping and Instructional Organisation. in Peterson, P., Wilkinson, L. and Hallinan, M. (Eds.) *The Social Context of Instruction.* Orlando: Academic Press.

Brady, L. (1985) *Models and Methods of Teaching.* Sydney: Prentice-Hall of Australia Pty. Ltd.

Brown, R. (1988) Group Processes: Dynamics Within and Between Groups. in Galton, M. and Williamson, J. (1992) *Group Work in the Primary Classroom.* London: Routledge.

Campbell, D.T. and Stanley, J.C. (1963). *Experimental and Quasi-Experimental Designs for Research.* Chicago: Rand McNally College Publishing Company.

Campbell, D.T. and Stanley, J.C. (1963). Experimental and Quasi-Experimental Designs for Research. in Gage, N.L. (1971) *Handbook of Research of Teaching.* Chicago: Rand McNally and Company.

Clegg, D. and Billington, S. (1994) *The Effective Primary Classroom.* London: David Fulton Publishers Ltd.

Cohen, L. and Manion, L. (1995) Research Methods in Education. London: Routledge.

Corner, C. and Lofthouse, B. (Eds.) (1990) *The Study of Primary Education: A Source Book Volume I - Perspectives.* London: The Falmer Press.

Damon, W. (1984) Peer Education: The Untapped Potential in Foot, H.C., Morgan, M.J. and Shute, R.H. (Eds.) (1990) *Children Helping Children.*

West Sussex: John Wiley and Sons Ltd.

Dean, J. (1992) *Organising Learning in the Primary School Classroom.* London: Routledge.

Decree of Minister of Education and Culture, No. 0847/U/1992 about Primary Schools, Chapter VII, Article 2, Item 1. Jakarta: Ministry of Education and Culture.

Downie, N.M. and Heath, R.W. (1974) *Basic Statistical Method.* London: Harper and Row Publishers.

Doyle, W. (1986) Classroom Organisation and Management in Wittrock, ME. (Ed.) (1986) *Handbook of Research on Teaching.* London: Collier Macmillan Publishers.

Dreedan, R. (1984) First-Grade Reading Groups: Their Formation and Change in Kutnick, P. and Rogers, C. (Eds.) (1994) *Groups in Schools.* London: Cassell.

Evertson, C.E., Emmer, E.T., Clements, B.S., Sanford, J.P. and Worsham, M.E. (1989) *Classroom Management for Elementary Teachers.* New Jersey: Prentice Hall.

Foot, H.C., Morgan, M.J. and Shute, R.H. (Eds.) (1990) *Children Helping Children.* West Sussex: John Wiley and Sons Ltd.

Galton, M. (1982) Strategies and Tactics in Junior School Classrooms in Dadds, M. and Lofthouse, B. (1990) *The Study of Primary Education: A Source Book Volume 4 - Classroom and Teaching Studies.* London: The Falmer Press.

Galton, M. and Simon, B. (1980) Progress and Performance in the Primary

Classroom in Dadds, M. and Lofthouse, B. (1990) *The Study of Primary Education: A Source Book Volume 4 - Classroom and Teaching Studies.* London: The Falmer Press.

Galton, M. and Williamson, J. (1992) *Group Work In the Primary Classroom.* London: Routledge.

Golby, M. (1982) Microcomputers in the Primary Curriculum in Corner, C. and Lofthouse, B. (Eds.) (1990) *The Study of Primary Education: A Source Book Volume 1 - Perspective.* London: Cassell.

Gamoran, A. (1987) Organization, Instruction, and the Effects of Ability Grouping: Comment on Slavin's "Best-Evidence Synthesis" in Grouws, D.A. (Ed.) (1992) *Handbook of Research on Mathematics Teaching and Learning: A Project of the National Council of Teachers of Mathematics.* New York: Macmillan Publishing Company.

Good, T. and Marshall, S. (1984) Do Students Learn More in Heterogeneous or Homogenous Groups in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Hastings, N., Schwieso, J. and Wheldall, K. (1996) A Place for Learning in Croll, P. and Hastings, N. (Eds.) (1996) *Effective Primary Teaching: Research-Based Classroom Strategies.* London: David Fulton Publishers.

Hatch, J.A. (1984) The Social Goals of Children: A Naturalistic Study of Child-to-Child Interaction in a Kindergarten in Foot, H.C., Morgan, M.J. and Shute, R.H. (Eds.) (1990) *Children Helping Children.* West Sussex: John Wiley and Sons Ltd.

Hiebert, E. (1987) A Context of Instruction and Student Learning: An Examination of Slavin's Assumptions in Grouws, D.A. (Ed.) (1992)

Handbook of Research on Mathematics Teaching and Learning: A Project of the National Council of Teachers of Mathematics. New York: Macmillan Publishing Company.

Hieronymus, A.N., Lindquist, and France. (1988) Richmond Test of Basic Skills: Administration Manual. Berkshire: The NFER-NELSON Publishing Company Ltd.

Hopkins, D. and Wideen, M. (1984) Alternative Perspectives on School Improvement. London: The Falmer Press.

Jacinta, S.M. and Regina, S.M. (1986) Primary Methods Handbook. London: Hodder and Stoughton.

Jasin, A. (1987) Innovations of Primary School Curriculum. Jakarta: Balai Pustaka.

Johnson, D. and Johnson, R. (1985) The Internal Dynamics of Co-operative Learning Groups in Kutnick, P. and Rogers, C. (Eds.) (1994) Groups in Schools. London: Cassell.

Kasambira, K.P. (1993) Lesson Planning and Class Management. Essex: Longman Group Limited.

Kerry, T. and Sands, M. (1982) Handling Classroom Groups in Galton, M. and Williamson, J. (1992) Group Work in the Primary Classroom. London: Routledge.

Kutnick, P. and Rogers, C. (1994) Groups in Schools. London: Cassell.

Laws of Republic of Indonesia, Number 2, Year 1989 about National Educational System. Jakarta: Ministry of Education and Culture.

Lemlech, J.K. (1979) *Classroom Management.* London: Harper and Row Publishers.

Little, A. (1994) The Jomtiem Conference and the Implementation of Primary Education Projects in Little, A., Hoppers, W. and Gardner, R. (Eds.) (1994) *Beyond Jomtiem: Implementing Primary Education for All.* London: The Macmillan Press Ltd.

Medland, M. and Vitale, M. (1984) *Management of Classroom.* New York: Holt, Rinehart and Winston.

Merrett, F. (1994) Whole-Class and Individualised Approaches in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Ministry of Education and Culture (1989) *Guidelines for Primary School Administration.* Jakarta: Supervision Project for Primary School.

Ministry of Education and Culture (1990) *The Development of Primary School Teacher Education: 1945 - 1989.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1991) *Developmental Foundations, Developmental History and Curriculum Problems.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1992) *Laws of Republic of Indonesia Number 2 Year 1989 about National Education System and Government Decrees Numbers 27, 28, 29 and 30 Year 1990 about Kindergarten Education, Primary Education, Secondary Education, Higher Education, and their Operating Procedures.* Jakarta: Balai Pustaka.

Ministry of Education and Culture (1992a) *Guidelines for Running a D-II*

Primary School Teacher Education: In-service Training. Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1992b) *Guidelines for Running a D-II Primary School Teacher Education: Pre-service Training.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1993) *The Summary of Schooling Statistics 1991/1992.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1993a) *1994 Curriculum: Primary Schools and Secondary Schools.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1993b) *Curriculum of Basic Education: Foundations, programmes and development.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1994) *Guidelines for Implementation of Evaluation at Primary Schools.* Jakarta: Ministry of Education and Culture.

Ministry of Education and Culture (1995) *1995 Curriculum of D-II Programme for Primary School Teacher Education.* Jakarta: Ministry of Education and Culture.

Mumford, A. (1982) Learning Styles and Learning Skills. *Journal of Management Development*, 1 (2), 55-65.

Nastasi, B. and Clements, D. (1991) Research on Co-operative Learning: Implicating for Practice in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Noddings, N. (1985) Small Groups as a Setting for Research on Mathematical Problem Solving in Webb, N.M. (1991) Task-Related Verbal Interaction and Mathematics Learning in Small Groups. *Journal for Research in Mathematics Education*, 22 (5), 366-389.

Provincial Office of Ministry of Education and Culture (1994) *The Roles of Local Government in Recruiting and Distributing the Primary School Teachers.* Palembang: Provincial Office of Ministry of Education and Culture.

Richards, C. (1979) Primary Education: Belief, Myth and Practice in Bloomer, M. and Shaw, K.E. (Eds.) (1979) *The Challenge of Educational Change: Limitation and Potentialities.* Oxford: Pergamon Press Ltd.

Richards, C. (1982) Primary Education 1974 - 80 in Richards, C. (Ed.) (1982) *New Directions in Primary Education.* Sussex: The Falmer Press.

Ridgway, J. (1988) *Assessing Mathematical Attainment.* Berkshire: the NFER Nelson Publishing Company Ltd.

Rust, J. and Golombok, S. (1989) *Modern Psychometrics: The Science of Psychological Assessment.* London: Routledge.

Shute, R.H. and Paton, D. (1990) Childhood Illness - The Child as Helper in Foot, H.C., Morgan, M.J. and Shute, R.H. (Eds.) (1990) *Children Helping Children.* West Sussex: John Wiley and Sons Ltd.

Slavin, R. (1987) Ability Grouping and Student Achievement in Elementary Schools: A Best-Evidence Synthesis Grouws, D.A. (Ed.) (1992) *Handbook of Research on Mathematics Teaching and Learning: A Project of the National Council of Teachers of Mathematics.* New York: Macmillan Publishing Company.

Stoll, S. and Fink, D. (1996) *Changing Our Schools: Linking School*

Effectiveness and School Improvement. Buckingham: Open University Press.

Tangyong, A.F., Wahyudi, Garner, R., Hawes, H. (1989) *Quality Through Support for Teachers.* Jakarta: CV Kurnia.

Tann, S. (1981) Grouping and Group Work. in Pollard, A. and Tann, S. (1994) *Reflective Teaching in the Primary School: A Handbook for the Classroom.* London: Cassell.

Tharp, R. and Gallimore, R. (1991) A Theory of Teaching as Assisted Performance in Light, P., Sheldon, S. and Woodhead, M. (Eds.) (1991) *Learning to Think.* London: Rourledge.

Unesco (1984) Ninth Regional Consultation Meeting on the Asian Programme of Educational Innovation for Development: Final Report. Bangkok: Unesco Regional Office for Education in Asian and the Pacific.

Unesco (1985) Fifth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and the Pacific: Final Report. Paris: Unesco.

Unesco (1990) Education for All. Bangkok: Unesco Principal Regional Office for Asia and the Pacific.

Unesco (1992) *Aftermath of the World Conference on Education for All.* Bangkok: Unesco Principal Regional Office for Asia and the Pacific.

Unesco (1993) Sixth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and the Pacific: Education for Development - Responding to New Challenges. Paris: Unesco.

Unesco (1993a) *Final Regional Workshop on the Preparation of National Plans of Action for Education for All.* Bangkok: Unesco Principal Regional Office for Asia and the Pacific.

Velzen, W.G.V., Miles, M.B., Ekholm, M. Hameyer, U. and Robin, D. (1985) *Making School Improvement Work: A Conceptual Guide to Practice.* Leuven: Acco.

Vygotsky, L.S. (1962) Thought and Language in Wood, D. (1988) *How Children Think and Learn.* Oxford: Basil Blackwell Inc.

Vygotsky, L.S. (1978) Mind in Society in Foot, H.C., Morgan, M.J. and Shute, R.H. (Eds.) (1990) *Children helping children.* West Sussex: John Wiley and Sons Ltd.

Walsh, W.B. and Betz, N.E. (1995) *Test and Assessment.* New Jersey: Prentice-Hall, Inc.

Webb, N.M. (1985) Student Interaction and Learning in Small Groups: A Research Summary in Slavin, R. et. al. (Eds.) (1985) *Learning to Cooperate, Cooperating to* Learn. New York: Plenum Press.

Webb, N.M. (1991) Task-Related Verbal Interaction and Mathematics Learning in Small Groups. *Journal for Research in Mathematics Education*, 22 (5), 366-389.

Yeoman, A. (1983) Collaborative Group Work in Primary and Secondary Schools: Britain and USA in Galton, M. and Williamson, J. (1992) *Group Work in the Primary Classroom.* London: Routledge.

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1947 Lesson Plan of Indonesian Primary Schools

1. Morning Primary Schools:
(Local Language as a Medium of Instruction up to Year Three)

	Subjects	Years					
		I	II	III	IV	V	VI
1.	Indonesian language	-	-	8	8	8	8
2.	Local Language	10	10	6	4	4	4
3.	Arithmetic	6	6	7	7	7	7
4.	Physics	-	-	-	-	1	1
5.	Biology	-	-	-	2	2	2
6.	Geography	-	-	1	1	2	2
7.	History	-	-	-	1	2	2
8.	Drawing	-	-	-	-	2	2
9.	Writing	4	4	3	3	-	-
10.	Music	2	2	2	2	2	2
11.	Hand Craft	1	1	2	2	2	2
12.	Special Skills*	-	-	-	(1)	(2)	(2)
13.	Physical Education	3	3	3	3	3	3
14.	Health	1	1	1	1	1	1
15.	Normative Education	1	1	2	2	2	3
16.	Religious Education	-	-	-	2	2	2
	Total Teaching Hours	28	28	35	38	40	41

(Indonesian as a Medium of Instruction from Year 1 to Year 6)

	Subjects	Years					
		I	II	III	IV	V	VI
1.	Indonesian language	10	10	8	8	8	8
2.	Arithmetic	6	6	8	7	7	7
3.	Physics	-	-	-	-	1	1
4.	Biology	-	-	-	2	2	2
5.	Geography	-	-	1	1	2	2
6.	History	-	-	-	1	2	2
7.	Drawing	-	-	-	-	2	2
8.	Writing	4	4	4	4	-	-
9.	Music	2	2	3	3	3	3
10.	Hand Craft	1	1	3	3	3	3
11.	Special Skills*	-	-	-	(1)	(2)	(2)
12.	Physical Education	3	3	3	3	3	3
13.	Health	1	1	1	1	1	1
14.	Normative Education	1	1	2	2	2	2
15.	Religious Education	-	-	-	2	2	2
	Total Teaching Hours	28	28	33	37	38	38

Notes:
* only for girls
One teaching hour for years 1, 2 and 3 is 30 minutes and one teaching hour for years 4, 5 and 6 is 40 minutes

Source:
Jasin, A. (1987) *Innovations of Primary School Curriculum*. Jakarta: Balai Pustaka. pp. 151 & 152.

2. Afternoon Primary Schools:

	Subjects	Years							
		I		II		III		IV	
		A	B	A	B	A	B	A	B
1.	Indonesian Language	7	-	7	-	8	8	8	8
2.	Local Language	-	7	-	7	-	6	-	4
3.	Arithmetic	5	5	5	5	9	8	8	7
4.	Physics	-	-	-	-	-	-	-	-
5.	Biology	-	-	-	-	-	-	1	1
6.	Geography	-	-	-	1	1	1	1	1
7.	History	-	-	-	-	-	-	1	1
8.	Drawing	3	3	3	3	4	3	4	3
9.	Writing	-	-	-	-	-	-	-	-
10.	Music	2	2	2	2	3	2	2	2
11.	Hand Craft	1	1	1	1	3	2	2	2
12.	Special Skills*	-	-	-	-	-	-	1	1
13.	Physical Education	3	3	3	3	4	3	4	3
14.	Health	1	1	1	1	1	1	1	1
15.	Normative Education	1	1	1	1	2	1	2	2
16.	Religious Education	-	-	-	-	-	-	2	2
	Total Teaching Hours	23	23	23	24	35	35	36	38

Notes:
* only for girls
A   : For those primary schools which used Indonesian language as a
          medium of instruction starting from year 1.
B   : For those primary schools which used a local language as a medium
          of instruction up to year 3.
One teaching hour is 35 minutes

Source:
Jasin, A. (1987) *Innovations of Primary School Curriculum*. Jakarta: Balai Pustaka. p. 154.

1964 Educational Plan of Indonesian Primary Schools

(Local Language as a Medium of Instruction up to Year Three)

	Subjects	Years					
		I	II	III	IV	V	VI
I.	Moral Development						
	1. Community Education	1	2	3	3	3	3
	2. Religious Education	1	2	2	2	2	2
II.	Intelligence Development						
	3. Local Language	9	8	5	3	3	3
	4. Indonesian Language	-	-	6	8	8	8
	5. Arithmetic	6	6	6	6	6	6
	6. Science	1	1	2	2	2	2
III.	Emotional and Artistical Development						
	7. Music	2	2	4	4	4	4
IV.	Practical Skills Development 8. Practical Skills Education	2	2	5	5	5	5
VI.	Physical Development						
	9. Physical Education	3	3	4	4	4	4
	Total Teaching Hours	25	26	34	36	36	36

Note:
One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 30 minutes

(Indonesian Language as a Medium of Instruction from Year 1 to Year 6)

	Subjects	Years					
		I	II	III	IV	V	VI
I.	Moral Development						
	1. Community Education	1	2	4	4	4	4
	2. Religious Education	1	2	2	2	2	2
II.	Intelligence Development						
	3. Indonesian Language	9	8	9	9	9	9
	4. Arithmetic	6	6	6	6	6	6
	5. Science	1	1	2	2	2	2
III.	Emotional and Artistical Development						
	7. Music	2	2	4	4	4	4
IV.	Practical Skills Development 8. Practical Skills Education	2	2	5	5	5	5
VI.	Physical Development						
	9. Physical Education	3	3	4	4	4	4
	Total Teaching Hours	25	26	36	36	36	36

Note:
One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 40 minutes

Jasin, A. (1987) *Innovations of Primary School Curriculum.* Jakarta: Balai Pustaka. pp. 158 & 159.

1968 Indonesian Primary School Curriculum

(Local Language as a Medium of Instruction)

	Subjects	Years					
		I	II	III	IV	V	VI
I.	Moral Education of Pancasila						
	1. Religious Education	2	2	3	4	4	4
	2. Civics Education	2	2	4	4	4	4
	3. Indonesian Language	-	-	6	6	6	6
	4. Local Language	8	8	2	2	2	2
	5. Physical Education	2	2	3	3	3	3
II.	Basic Skills Education						
	6. Arithmetic	7	7	7	6	6	6
	7. Science	2	2	4	4	4	4
	8. Music	2	2	4	4	4	4
	9. Family-Related Education	1	1	2	2	2	2
III.	Specific Skills Education 10. Applied Specific Skills	2	2	5	5	5	5
	Total Teaching Hours	28	28	40	40	40	40

(Indonesian Language as a Medium of Instruction)

	Subjects	Years					
		I	II	III	IV	V	VI
I.	Moral Education of Pancasila						
	1. Religious Education	2	2	3	4	4	4
	2. Civics Education	2	2	4	4	4	4
	3. Indonesian Language	8	8	8	8	8	8
	4. Physical Education	2	2	3	3	3	3
II.	Basic Skills Education						
	6. Arithmetic	7	7	7	7	7	7
	7. Science	2	2	4	4	4	4
	8. Music	2	2	4	4	4	4
	9. Family-Related Education	1	1	2	2	2	2
III.	Specific Skills Education 10. Applied Specific Skills	2	2	5	5	5	5
	Total Teaching Hours	28	28	40	40	40	40

Note:
One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 40 minutes

Jasin, A. (1987) *Innovations of Primary School Curriculum.* Jakarta: Balai Pustaka. pp. 163 & 164.

1975 Indonesian Primary School Curriculum

	Subjects	Years					
		I	II	III	IV	V	VI
1.	Religious Education	2	2	2	3	3	3
2.	Moral Education of Pancasila	2	2	2	2	2	2
3.	Indonesian Language	8	8	8	8	8	8
4.	Social Sciences	-	-	2	2	2	2
5.	Mathematics	6	6	6	6	6	6
6.	Sciences	2	2	3	4	4	4
7.	Physical Education	2	2	3	3	3	3
8.	Music	2	2	3	4	4	4
9.	Specific Skills	2	2	4	4	4	4
	Total Teaching Hours	26	26	33	36	36	36

Note:
One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 40 minutes.

Source: Jasin, A. (1987) *Innovations of Primary School Curriculum*. Jakarta: Balai Pustaka. p. 166.

1984 Indonesian Primary School Curriculum

Subjects		Years					
		I	II	III	IV	V	VI
1.	Religious Education	2	2	2	2	2	2
2.	Moral Education of Pancasila	2	2	2	2	2	2
3.	History*	1	1	1	1	1	1
4.	Indonesian Language**	8/7	8/7	8/7	8/7	8/7	8/7
5.	Social Sciences	-	-	2	3	3	3
6.	Mathematics	6	6	6	6	6	6
7.	Sciences	2	2	3	4	4	4
8.	Physical Education	2	2	3	3	3	3
9.	Music	2	2	3	4	4	4
10.	Specific Skills	2	2	4	4	4	4
11.	Local Language***	(2)	(2)	(2)	(2)	(2)	(2)
	Total Teaching Hours	26 (28)	26 (28)	33 (35)	36 (38)	36 (38)	36 (38)

Note:

* it was taught in the third term only.

** It was taught for eight teaching hours per week in the first and second terms and seven teaching hours per week in the third term.

*** for those regions or primary schools which taught local languages

One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 40 minutes.

Source:
Ministry of Education and Culture (1989) *Guidelines for Primary School Administration.* Jakarta: Supervision Project for Primary Shools. p. 1.

1994 Indonesian Primary School Curriculum

	Subjects	Years					
		I	II	III	IV	V	VI
1.	Moral Education of Pancasila and Civics	2	2	2	2	2	2
2.	Religious Education	2	2	2	2	2	2
3.	Indonesian Language	10	10	10	8	8	8
4.	Mathematics	10	10	10	8	8	8
5.	Sciences	-	-	3	6	6	6
6.	Social Sciences	-	-	3	5	5	5
7.	Hand Craft and Arts	2	2	2	2	2	2
8.	Physical Education and Health	2	2	2	2	2	2
9.	Local Materials	2	2	4	5	7	7
	Total Teaching Hours	30	30	38	40	42	42

Note:
One teaching hour for years 1 and 2 is 30 minutes and one teaching hour for years 3, 4, 5 and 6 is 40 minutes.

Source:
Ministry of Education and Culture (1993) *Curriculum for Basic Education: Foundations, Programmes and Development.* Jakarta: Ministry of Education and Culture. p. 32.

1984 Curriculum of Primary School Teacher Training School

Programme	Subjects	Weight						Total
		Year		Year		Year		
		Semester		Semester		Semester		
General	1. Religious Education	2	2	2	2	2	2	12
	2. Moral Education of Pancasila	2	2	2	2	2	2	12
	3. History Education	2	-	2	-	2	-	6
	4. Indonesian Language	2	2	2	2	2	2	12
	5. Sciences	3	3	3	3	-	-	12
	6. Physical Education	2	2	2	2	2	-	10
	7. Arts Education	2	2	-	-	-	-	4
	8. Education on Specific Skills	2	2	-	-	-	-	4
	9. Mathematics	4	4	2	-	-	-	10
	10. Social Sciences	4	4	-	-	-	-	8
	11. English	4	4	-	-	-	-	8
Basic Education	12. Theories of Education	6	8	4	2	-	-	20
	13. Psychology	3	3	2	4	-	-	12
	14. Basic Education for Handicap Children	2	2	-	-	-	-	4
Teaching	15. Materials, Methods and Evaluation Techniques of Moral Education of Pancasila and History Education	-	-	3	4	3	5	12
	16. Materials, Methods and Evaluation Techniques of Indonesian Language	-	-	4	3	3	5	15
	17. Materials, Methods and Evaluation Techniques of Social Sciences	-	-	3	3	3	5	14
	18. Materials, Methods and Evaluation Techniques of Sciences	-	-	4	4	3	4	15
	19. Materials, Methods and Evaluation Techniques of Mathematics	-	-	2	4	4	4	15
	20. Materials, Methods and Evaluation Techniques of Specific Skills	-	-	3	3	4	5	15
	21. Materials, Methods and Evaluation Techniques of Local Language*	(2)	(2)	(2)	(2)	(2)	(2)	(12)
	22. Micro-Teaching and Teaching Practice	-	-	-	2	10	6	18
Total		40 (42)	40 (42)	40 (42)	40 (42)	40 (42)	40 (42)	240 (252)

Note: *For those primary schools which taught a local language only.

Source: Ministry of Education and Culture (1990) *Development of Teacher Education: 1945 - 1989.* Jakarta: Ministry of Education and Culture. pp. 46 & 47.

1990 Curriculum of D-II Programme for Primary School Teacher
Education

No.	S u b j e c t s	Weight
I	General Basic Subjects	
	1. Moral Education of Pancasila	2
	2. Religious Education	4
	3. Demography	2
II	Subjects on Basic Education	
	1. Basic Theories on Education	2
	2. Guidance and Councelling	2
	3. Educational Psychology	2
	4. Educational Administration	2
III	Subjects on Primary School subjects-related	
	1. Moral Education of Pancasila 1	2
	2. Moral Education of Pancasila 2	2
	3. Indonesian Language 1	3
	4. Indonesian Language 2	3
	5. Education of Indonesian Language	4
	6. Mathematics 1	3
	7. Mathematics 2	3
	8. Education of Mathematics	4
	9. Science 1	3
	10. Science 2	3
	11. Education of Science	3
	12. Social Sciences 1	2
	13. Social Sciences 2	2
	14. Education of Social Sciences	3
	15. Physical Education	3
	16. Education of Arts (Music) 1	2
	17. Education of Arts (Hand Craft) 2	2
	18. Education on Specific Skills	3
	19. Developmental Psychology	2
	20. Teaching and Learning Strategies	2
	21. Teaching Media	2
	22. Evaluation	2
	23. Teaching Plan	2
	24. Curriculum Development and Innovation	2
	25. Micro Teaching and Teaching Practice	4
	T o t a l	66

Source: Ministry of Education and Culture (1992) *Guidelines for Conducting a D-II Pre-service Primary School Teacher Training Programme.* Jakarta: Ministry of Education and Culture. pp. 5 & 6.

1995 Curriculum of D-II Programme for Primary School Teacher Education

No.	S u b j e c t s	Weight
I.	General Basic Subjects	
	1. Moral Education of Pancasila	2
	2. Religious Education	4
	3. Demography	2
II.	Subjects on Basic Education	
	4. Basic Theories on Primary Education	3
	5. Pupil Learning and Development	3
	6. Classroom Management	3
	7. Evaluation	2
	8. Guidance in Primary schools	2
	9. Teaching and Learning Strategies	4
III.	Subjects on Primary School Related-Subjects	
	10. Moral Education of Pancasila 1	3
	11. Basic Concepts of Social Sciences	3
	12. Education of Social Sciences for Primary Schooling	3
	13. Global Perspectives	2
	14. Basic Concepts of Sciences	4
	15. Education of Sciences for Primary Schooling	4
	16. Mathematics	3
	17. Education of Mathematics 1	3
	18. Education of Mathematics 2	3
	19. Education of language Skills	3
	20. Education of Indonesian Language and Literature for Lower Primary Education	3
	21. Education of Indonesian Language and Literature for Upper Primary Education	3
	22. Education of Hand Craft	3
	23. Education of Music	2
	24. Education of Dancing and Drama	2
	25. Physical Education	3
IV.	Integrated Learning	2
V.	Micro-Teaching and Teaching Practice	5
	T o t a l	78

Source: Ministry of Education and Culture (1995) *1995 Curriculum of D-II Programme for Primary School Education.* Jakarta: Ministry of Education and Culture. p. 14.

The Intervention Features

One of study school buildings
(Sample: Primary School No. 63)

The teacher is explaining
Mathematics to her pupils
(Sample: Primary School No. 1)

The pupils are changing sitting
positions from individual seating
to small groups
(Sample: Primary School No. 1)

193

The pupils are working in small
Groups
(Sample: Primary School No. 249)

The teacher is helping one of the
groups
(Sample: Primary School No. 97)

The teacher is discussing the
answers of Mathematics
questions with the pupils
(Sample: Primary School No. 5)

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Experimental Designs:

A Three Pre-Experimental Designs

      1. The One-Shot Case Study

      2. The One-Group Pre-test and Post-test Design

      3. The Static-Group Comparison

B. Three True Experimental Designs

      4. The Pre-test and Post-test Control Group Design

      5. The Solomon Four-Group Design

      6. The Post-test Only Control Group Design

C. Ten Quasi-Experimental Designs

      7. The Time-Series Experiment

      8. The Equivalent Time-Samples Design

      9. The Equivalent Materials Design

      10. The Non-Equivalent Control Group Design

      11. Counterbalanced Design

      12. The Separate-Sample Pre-test and Post-test Design

      13. The Separate-Sample Pre-test and Post-test Control Group Design

      14. The Multiple Time-Series Design

      15. The Recurrent Institutional Cycle Design: A "Patched-Up" Design

      16. The Regression-Discontinuity Analysis

Source: Campbell, D.T. & Stanley, J.C. (1963) *Experimental and Quasi-Experimental Designs for Research*. Chicago: Rand McNally College Publishing Company. pp. 6 - 61

No.	Objectives	Content Areas	Sub-Content Areas	Cognitive Domains			Total of Test Items	No. of Test Items	%
				Knowledge (22%)	Comprehension (68%)	Application (10%)			
1.	The pupils are able to do additions and subtractions with the numbers between 1,001 and 5,000, multiplications with the total not bigger than 81, and divisions with the numerator not bigger than 81.	1.1 Numbers and their notations	1.1.1 Be familiar with the numbers between 1,001 and 5,000	1	0	0	1	5	64.28
		1.2 Place value	1.2.1 Be familiar with the places of value: thousands, hundreds, tens and ones	1	0	0	1	15	
		1.3 Addition with the total up to 5,000	1.3.1 Add 2 numbers without carrying	0	1	0	1	4	
			1.3.2 Add 2 numbers with one carrying	0	2	0	2	18/14	
			1.3.3 Add 2 numbers with two carryings	0	2	0	2	23/21	
			1.3.4 Add 3 numbers	0	1	0	1	20	
		1.4 Subtraction with the subtracted number not bigger than 5,000	1.4.1 Subtract 2 numbers without carrying	0	2	0	2	9/7	
			1.4.2 Subtract 2 numbers with one carrying	0	2	0	2	41/37	
			1.4.3 Subtract 2 numbers with two carryings	0	1	0	1	49	
			1.4.4 Subtract 3 numbers	0	1	0	1	50	
		1.5 Addition and subtraction	1.5.1 Add and subtract 3 numbers	0	2	0	2	40/38	
			1.5.2 Simple problem solving question	0	0	1	1	8	
		1.6 multiplication with the maximum total 81	1.6.1 Multiply 2 numbers	0	2	0	2	3/2	
			1.6.2 Know the table of multiplication	0	2	0	2	46/47	
			1.6.3 Multiply 3 numbers	0	1	0	1	38	
			1.6.4 Simple problem solving question	0	0	1	1	17	
		1.7 Division with the numerator not bigger than 81	1.7.1 Divide 2 numbers	0	2	0	2	12/10	
			1.7.2 Divide 3 numbers	0	1	0	1	30	
			1.7.3 Simple problem solving question	0	0	1	1	44	
		1.8 Multiplication and division	1.8.1 know the relationships between multiplication and division	0	1	0	1	42	
			1.8.2 Simple problem solving question	0	0	1	1	48	
		1.9 Integrated arithmatical operations	1.9.1 Do the exercises which have, at least, 2 out 4 - addition, subtraction, multiplication and division	0	2	0	2	24/25	
			1.9.2 Simple problem solving question	0	0	1	1	31	
							32		

No.	The pupils are able to	Topic	Specific objective					Item no.	%
2.	use the number line to determine the number pattern.	2.1 Number line	2.1.1 Be familiar with the number line	1	1	0	0	19	7.14
			2.1.2 Be familiar with even and odd numbers	1	1	0	0	28	
			2.1.3 Find out the pattern of addition, subtraction, multiplication and division for even and/or odd numbers	0	1	1	0	32	
			2.1.4 Find out the number pattern in addition with 2, 3 or more sets of numbers continuously	0	1	1	0	$\frac{1}{4}$	1
3.	compare two numbers.	3.1 Non-equal symbols	3.1.1 Be familiar with the symbols: > (bigger than), < (smaller than) and = (not equal to)	2	2	0	0	2	29/33	7.14
			3.1.2 Compare 2 numbers or the results of addition, subtraction, multiplication and division	0	0	2	0	$\frac{2}{4}$	43/39	
4.	do additions and subtractions with fractions of one-third and one-sixth.	4.1 Fractions	4.1.1 Know the meanings and positions of 1/3 and 1/6	0	0	1	0	26	7.14
			4.1.2 Compare 2 fractions	0	0	1	0	36	
			4.1.3 Add 2 or 3 fractions with the same denominator	0	0	1	0	16	
			4.1.4 Subtract 2 fractions with the same denominator	0	0	1	0	$\frac{1}{4}$	11
5.	determine the time and measure the length.	5.1 Time	5.1.1 Be familiar with the names of and relationships among days, weeks and months	1	1	0	0	6	14.29
			5.1.2 Be familiar with hours	1	1	0	0	13	
			5.1.3 Determine the time before and/or after the specific identified time	0	0	1	0	45	
		5.2 Length	5.2.1 Know the standard measurements (m, dm, dam and cm)	1	1	0	0	27	
			5.2.2 Measure the length with the accuracy towards the closest dm	1	1	0	0	35	
			5.2.3 Predict and measure the length with the accuracy towards the closest cm	1	1	0	0	$\frac{1}{6}$	34
		14	Total 39	11	34	5		50		100

Petunjuk:

Berilah komentar dan saran tentang tingkat kesesuaian dan tingkat kesulitan masing-masing soal untuk 50 soal Matematika terlampir berdasarkan Kurikulum Sekolah Dasar Tahun 1994, Kelas III, caturwulan pertama (juga terlampir) dengan melingkari *angka 1, 2, 3, 4 atau 5 untuk tingkat kesesuaian soal* dan *a, b, c, d atau e untuk tingkat kesulitan soal.*

Keterangan:

1. sangat sesuai	a. sangat sulit
2. sesuai	b. sulit
3. sedang	c. sedang
4. tidak sesuai	d. mudah
5. sangat tidak sesuai	e. sangat mudah

Contoh:
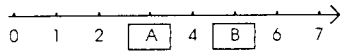
Nomor Soal	Soal Ujian	Pilih dan Lingkari Salah Satu				
1.	2.000 1.000 + ...	① 2 3 4 5 a b c d ⓔ				
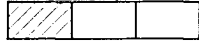
Penjelasan:
Soal nomor 1 di atas dikategorikan **sangat sesuai**, maka angka **1** diberi tanda kurung (misalnya: ①) dan juga soal nomor **1** ini dikategorikan **sangat mudah**, maka huruf **e** diberi tanda kurung (misalnya: ⓔ).

Data Guru:

Nama   :

Jenis Kelamin   :

Tempat & Tgl. Lahir   :

Pendidikan Terakhir / Tahun   :

Guru Kelas III SD Neg. Nomor   :

Mulai Mengajar di SD Tahun   :

Nomor Soal	Soal Ujian	Pilih dan Lingkari Salah Satu				
1.	Tuliskan dengan angka bilangan berikut ini: *Tiga ribu dua ratus lima puluh* = ...	1 a	2 b	3 c	4 d	5 e
2.	2.725 = ... ribuan + ... ratusan + ... puluhan + ... satuan.	1 a	2 b	3 c	4 d	5 e
3.	Bilangan dalam kotak A dan B masing-masing adalah ... dan	1 a	2 b	3 c	4 d	5 e
4.	3, 4, 5, 6, 7 Diantara bilangan-bilangan di atas, bilangan genapnya adalah	1 a	2 b	3 c	4 d	5 e
5.	"*Lebih besar dari* " dilambangkan dengan tanda	1 a	2 b	3 c	4 d	5 e
6.	Lambang ' ≠ 'berarti	1 a	2 b	3 c	4 d	5 e
7.	1m = ... cm	1 a	2 b	3 c	4 d	5 e
8.	19 cm kira-kira panjangnya sama dengan ... dm.	1 a	2 b	3 c	4 d	5 e
9.	Panjang pensil Tia adalah 79 mm. Kira-kira panjang pensil Tia sama dengan ... cm.	1 a	2 b	3 c	4 d	5 e
10.	Satu minggu sama dengan ... hari.	1 a	2 b	3 c	4 d	5 e
11.	Jam di atas menunjukkan pukul ... lebih ... menit.	1 a	2 b	3 c	4 d	5 e
12.	2.200 1.525 + ...	1 a	2 b	3 c	4 d	5 e
13.	4.888 325 -	1 a	2 b	3 c	4 d	5 e
14.	3.895 2.652 -	1 a	2 b	3 c	4 d	5 e
15.	6 x 7 = ...	1 a	2 b	3 c	4 d	5 e
16.	9 x 5 = ...	1 a	2 b	3 c	4 d	5 e
17.	6 : 6 = ...	1 a	2 b	3 c	4 d	5 e
18.	15 : 5 = ...	1 a	2 b	3 c	4 d	5 e
19.	254 19 + ...	1 a	2 b	3 c	4 d	5 e
20.	565 126 + ...	1 a	2 b	3 c	4 d	5 e

No.	Soal					
21.	465 156 + . . .	1 a	2 b	3 c	4 d	5 e
22.	1.275 2.135 + ...	1 a	2 b	3 c	4 d	5 e
23.	1.235 321 15 + ...	1 a	2 b	3 c	4 d	5 e
24.	2.345 126 -	1 a	2 b	3 c	4 d	5 e
25.	4.434 2.217 -	1 a	2 b	3 c	4 d	5 e
26.	3.225 1.148 -	1 a	2 b	3 c	4 d	5 e

27.

+	1	2	3	4	...	9
1	2	3	4	5	...	10
2	3	4	5	A	...	11
3	4	5	6	7	...	12

Nilai Huruf A yang ada dalam kotak di atas adalah ....

1   2   3   4   5
a   b   c   d   e

28.

X	1	2	3	....	9
6	6	12	A	....	54
7	7	14	21	....	63

Nilai huruf A yang ada di dalam kotak di atas adalah ....

1   2   3   4   5
a   b   c   d   e

29.

X	1	2	3	....	9
8	8	16	24	....	72
9	9	A	27	....	81

Nilai huruf A yang ada di dalam kotak di atas adalah ....

1   2   3   4   5
a   b   c   d   e

No.	Soal					
30.	2.252 - 136 - 29 = ...	1 a	2 b	3 c	4 d	5 e
31.	1.123 + 224 - 32 = ...	1 a	2 b	3 c	4 d	5 e
32.	2.245 + 246 - 75 = ...	1 a	2 b	3 c	4 d	5 e
33.	2 x 4 x 5 = ...	1 a	2 b	3 c	4 d	5 e
34.	(50 : 10) : 5 = ...	1 a	2 b	3 c	4 d	5 e
35.	(15 : 3) x 2 = ...	1 a	2 b	3 c	4 d	5 e
36.	(8 x 5) : 10 = ...	1 a	2 b	3 c	4 d	5 e
37.	4 + 5 = ... 5 + 6 = ... 6 + 7 = ... 7 + 8 = ... 8 + 9 = ...	1 a	2 b	3 c	4 d	5 e

38.	$2 \times 5 = 20 : \dots$	1	2	3	4	5
		a	b	c	d	e
39.	Isilah titi-titik berikut dengan lambang *"lebih besar dari"* atau *"lebih kecil dari"*: $\frac{1}{4} \dots \frac{1}{6}$	1	2	3	4	5
		a	b	c	d	e
40.	$\frac{1}{3} + \frac{1}{3} = \dots$	1	2	3	4	5
		a	b	c	d	e
41.	$\frac{3}{6} - \frac{1}{6} = \dots$	1	2	3	4	5
		a	b	c	d	e
42.	Isilah titik-titik berikut dengan lambang *"lebih besar dari"* atau *"lebih kecil dari"*: $4 + 11 \dots 7 + 9$	1	2	3	4	5
		a	b	c	d	e
43.	Isilah titik-titik berikut dengan lambang *"lebih besar dari"* atau *"lebih kecil dari"*: $11 - 5 \dots 9 - 4$	1	2	3	4	5
		a	b	c	d	e
44.	Daerah yang diarsir di atas menunjukkan pecahan	1	2	3	4	5
		a	b	c	d	e
45.	Tia dan Karina sudah bermain selama 1 jam. Kalau sekarang pukul 10:15, maka mereka mulai bermain pada pukul	1	2	3	4	5
		a	b	c	d	e
46.	Rian mempunyai 3 kotak kelereng. Jika satu kotak berisi 9 kelereng, maka jumlah kelereng Rian adalah ... buah.	1	2	3	4	5
		a	b	c	d	e
47.	Prima mempunyai 4 kotak kelereng. Jumlah kelereng seluruhnya adalah 16. Jika jumlah kelereng setiap kotaknya sama, maka jumlah kelereng dalam satu kotak adalah ... buah.	1	2	3	4	5
		a	b	c	d	e
48.	Nia mempunyai 25 gelang. Kemudian Bibinya memberi dia 15 gelang. Setelah itu, Nia membagikan semua gelangnya kepada Lia, Novi, Karina dan Tia. Jika setiap anak menerima sama banyaknya, maka setiap anak menerima ... gelang.	1	2	3	4	5
		a	b	c	d	e
49.	Novi diberi uang oleh pamannya Rp.1.000 dan ayahnya Rp.500. Kemudian, dia membeli sebuah buku seharga Rp. 1.400. Maka sisa uang Novi adalah Rp.	1	2	3	4	5
		a	b	c	d	e
50.	Hendra mempunyai 4 kotak kelereng. Masing-masing kotak berisi 6 kelereng. Jika Dia membagikan seluruh kelerengnya kepada Tia, Novi dan Lia dengan jumlah yang sama, maka masing-masing mendapat ... kelereng.	1	2	3	4	5
		a	b	c	d	e

T E R I M A   K A S I H

Directions:

Please give your comments and suggestions about the levels of appropriateness and difficulty for each of the following 50 Mathematics test items on the basis of the 1994 Indonesian primary school curriculum, year-three class, first term by putting a circle around the number *1, 2, 3, 4 or 5 to show the level of appropriateness* dan the letter *a, b, c, d or e to show the level of difficulty.*

Notes:

1. very appropriate	a. very difficult
2. appropriate	b. difficult
3. moderate	c. moderate
4. inappropriate	d. easy
5. very inappropriate	e. very easy

For Example:
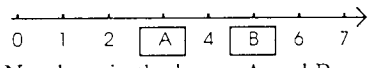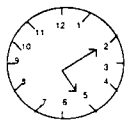
No.	Test Item	Put a circle around the number and letter to show your choice				
1.	2.000 1.000 + ...	① 2 3 4 5 a b c d Ⓔ				
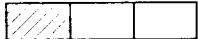
Explanation:
The above test item is categorized 'very appropriate', therefore, we put a circle around **number 1** (e.g. ①) and it is also categorized 'very easy', then, we put a circle around **letter e** (e.g. Ⓔ).

Teacher's Data:

Name :

Sex :

Place and Date of Birth :

Current Education / Year :

Class Teacher at   Primary School No. :

Starting Teaching at Primary School :

No.	Test Items	Put a circle around the number and letter to show your choice				
1.	Write the following number: *Three thousand two hunder and fifty* = ...	1 a	2 b	3 c	4 d	5 e
2.	2.725 = ... thousands + ... hundreds + ... tens + ... ones	1 a	2 b	3 c	4 d	5 e
3.	0 1 2 [A] 4 [B] 6 7 Numbers in the boxes A and B are ... and ...	1 a	2 b	3 c	4 d	5 e
4.	3, 4, 5, 6, 7 Among the above numbers, the even numbers are	1 a	2 b	3 c	4 d	5 e
5.	*"bigger than "* is symbolised with the sing	1 a	2 b	3 c	4 d	5 e
6.	The sign ' ≠ ' means	1 a	2 b	3 c	4 d	5 e
7.	1m = ... cm	1 a	2 b	3 c	4 d	5 e
8.	19 cm is about ... dm.	1 a	2 b	3 c	4 d	5 e
9.	The length of Tia's pencil is 79 mm. It is about ... cm.	1 a	2 b	3 c	4 d	5 e
10.	One week equals to ... days.	1 a	2 b	3 c	4 d	5 e
11.	 The above clock shows that it is ... minutes past	1 a	2 b	3 c	4 d	5 e
12.	2.200 1.525 + ...	1 a	2 b	3 c	4 d	5 e
13.	4.888 325 -	1 a	2 b	3 c	4 d	5 e
14.	3.895 2.652 -	1 a	2 b	3 c	4 d	5 e
15.	6 x 7 = ...	1 a	2 b	3 c	4 d	5 e
16.	9 x 5 = ...	1 a	2 b	3 c	4 d	5 e
17.	6 : 6 = ...	1 a	2 b	3 c	4 d	5 e
18.	15 : 5 = ...	1 a	2 b	3 c	4 d	5 e
19.	254 19 + . . .	1 a	2 b	3 c	4 d	5 e
20.	565 126 + . . .	1 a	2 b	3 c	4 d	5 e

No.	Problem					
21.	465 156 + ...	1	2	3	4	5
		a	b	c	d	e
22.	1.275 2.135 + ...	1	2	3	4	5
		a	b	c	d	e
23.	1.235 321 15 + ...	1	2	3	4	5
		a	b	c	d	e
24.	2.345 126 -	1	2	3	4	5
		a	b	c	d	e
25.	4.434 2.217 -	1	2	3	4	5
		a	b	c	d	e
26.	3.225 1.148 -	1	2	3	4	5
		a	b	c	d	e
27.	(table) The value of letter A in the box is	1	2	3	4	5
		a	b	c	d	e
28.	(table) The value of letter A in the box is	1	2	3	4	5
		a	b	c	d	e
29.	(table) The value of letter A in the box is	1	2	3	4	5
		a	b	c	d	e
30.	2.252 136 - . . . . 29 -	1	2	3	4	5
		a	b	c	d	e
31.	1.123 224 + ... 32 -	1	2	3	4	5
		a	b	c	d	e
32.	2.245 246 + ... 75 -	1	2	3	4	5
		a	b	c	d	e
33.	2 x 4 x 5 = ...	1	2	3	4	5
		a	b	c	d	e
34.	(50 : 10) : 5 = ...	1	2	3	4	5
		a	b	c	d	e

Item 27:

+	1	2	3	4	...	9
1	2	3	4	5	...	10
2	3	4	5	A	...	11
3	4	5	6	7	...	12

The value of letter A in the box is ....

Item 28:

X	1	2	3	....	9
6	6	12	A	....	54
7	7	14	21	....	63

The value of letter A in the box is ....

Item 29:

X	1	2	3	....	9
8	8	16	24	....	72
9	9	A	27	....	81

The value of letter A in the box is ....

35.	$(15 : 3) \times 2 = ...$	1	2	3	4	5
		a	b	c	d	e
36.	$(8 \times 5) : 10 = ...$	1	2	3	4	5
		a	b	c	d	e
37.	$4 + 6 = 8 + ...$	1	2	3	4	5
		a	b	c	d	e
38.	$2 \times 5 = 20 : ....$	1	2	3	4	5
		a	b	c	d	e
39.	Fill in the blank space with the sign *"bigger than"* or *"smaller than"*: $\frac{1}{4} .... \frac{1}{6}$	1	2	3	4	5
		a	b	c	d	e
40.	$\frac{1}{3} + \frac{1}{3} = ...$	1	2	3	4	5
		a	b	c	d	e
41.	$\frac{3}{6} - \frac{1}{6} = ...$	1	2	3	4	5
		a	b	c	d	e
42.	Fill in the blank space with the sign *"biggern than"* or *"small than"*: $4 + 11 ... 7 + 9$	1	2	3	4	5
		a	b	c	d	e
43.	Fill in the blank space with the sign *"bigger than"* or *"smaller than"*: $11 - 5 ... 9 - 4$	1	2	3	4	5
		a	b	c	d	e
44.	The darkened area shows the fraction	1	2	3	4	5
		a	b	c	d	e
45.	Tia and Karina have been playing for one hour. If the time now is at 10:15, therefore, they started playing at	1	2	3	4	5
		a	b	c	d	e
46.	Rian has 3 boxes of marbles. If one box contains 9 marbles, so Rian has ... marbles.	1	2	3	4	5
		a	b	c	d	e
47.	Prima has 4 boxes of marbles. The total of his marbles is 16. If each box contains equal number of marbles, so there are ... marbles in each box.	1	2	3	4	5
		a	b	c	d	e
48.	Nia had Rp.5,000. Then she bought a Mathematics book that cost her Rp.1,400 and a children story book at Rp.1,200. After buying those two books, she had Rp.	1	2	3	4	5
		a	b	c	d	e
49.	Novi received Rp.1,000 from her uncle and Rp.500 from her father. Then, she bought a book that cost her Rp. 1,400. Now, she still has Rp.	1	2	3	4	5
		a	b	c	d	e
50.	Hendra has 4 boxes of marbles. Each box contains 6 marbles. If he gives all of his marbles to Tia, Novi and Lia with the same number of marbles. So, each person receives ... marbles.	1	2	3	4	5
		a	b	c	d	e

T h a n k   y o u

Item Difficulty and Item Discrimination of the Test

Test Item	Upper 27% Correct	Lower 27% Correct	Difficulty (ρ)	Discrimination (r)
1.	0.93	0.58	0.76	0.43
2.	0.87	0.33	0.60	0.58
3.	0.79	0.26	0.53	0.55
4.	0.68	0.17	0.43	0.50
5.	0.67	0.19	0.42	0.50
6.	0.68	0.07	0.38	0.30
7.	0.57	0.29	0.43	0.30
8.	**0.21**	**0.10**	**0.16**	**0.20**
9.	0.56	0.14	0.35	0.45
10.	0.93	0.51	0.72	0.53
11.	0.88	0.32	0.61	0.60
12.	0.89	0.65	0.77	0.35
13.	0.94	0.46	0.70	0.55
14.	0.89	0.54	0.72	0.40
15	0.94	0.69	0.82	0.40
16.	0.96	0.78	0.87	0.40
17.	0.92	0.36	0.64	0.62
18.	0.93	0.44	0.69	0.55

19.	0.90	0.17	0.54	0.72
20.	0.96	0.22	0.60	0.75
21.	0.82	0.15	0.49	0.65
22.	0.86	0.15	0.51	0.71
23.	0.93	0.13	0.53	0.80
24.	0.58	0.04	0.31	0.67
25.	0.65	0.03	0.34	0.75
26.	0.33	0.00	0.17	0.62
27.	0.69	0.08	0.39	0.65
28.	0.50	0.00	0.25	0.72
29.	0.50	0.00	0.25	0.72
30.	0.18	0.00	0.09	0.52
31.	0.58	0.03	0.31	0.70
32.	0.64	0.01	0.33	0.75
33.	0.79	0.21	0.50	0.58
34.	0.72	0.11	0.42	0.58
35.	0.74	0.19	0.47	0.55
36.	0.75	0.14	0.45	0.60

37.	0.97	0.82	0.90	0.40
38.	0.43	0.13	0.28	0.40
39.	0.60	0.07	0.34	0.60
40.	0.74	0.44	0.59	0.30
41.	0.93	0.36	0.65	0.62
42.	0.46	0.10	0.28	0.45
43.	0.56	0.08	0.32	0.58
44.	0.71	0.19	0.45	0.52
45.	0.44	0.08	0.26	0.45
46.	0.85	0.26	0.56	0.60
47.	0.50	0.04	0.27	0.60
48.	0.63	0.17	0.40	0.50
49.	0.93	0.50	0.72	0.55
50.	0.34	0.04	0.19	0.50

Note: N = 72 (27 % out of 268)

MATEMATIKA

Petunjuk:

1. Tuliskan nama lengkap, jenis kelamin, nomor SD, hari dan tanggal ujian di bagian bawah halaman ini.

2. Waktu ujian selama 60 (enam puluh) menit.

3. Selama ujian dilarang bertanya kepada teman dan kalau ada soal yang tidak jelas, tanyakan kepada Ibu Guru.

4. Usahakan kerjakan semua soal dengan baik dan benar.

5. Tuliskan jawabanmu di bagian yang telah disediakan untuk masing-masing soal.

Nama Lengkap : ....

Jenis Kelamin : ☐ Laki-laki / ☐ Perempuan

Kelas / Catur Wulan : Tiga / Pertama

Sekolah Dasar Negeri Nomor : ....

Hari dan Tanggal Ujian : ....

Tahun Ajaran : 1996/1997

1.   4 + 5 = ...
       5 + 6 = ...
       6 + 7 = ...
       7 + 8 = ...
       8 + 9 = ...

2.   9 x 5 = ...

3.   6 x 7 = ...

4.   2.200
       1.525 +
       . . . .

5. Tuliskan dengan angka bilangan berikut ini:
   Tiga ribu dua ratus lima puluh = ...

6. Satu minggu sama dengan ... hari.

7.   3.895
       2.652 -
       . . . .

8. Novi diberi uang oleh pamannya Rp.1.000 dan ayahnya Rp.500. Kemudian, dia membeli sebuah buku seharga Rp. 1.400. Maka sisa uang Novi adalah Rp. ....

9.   4.888
       325 -
       . . . .

10. 15 : 5 = ...

11. $\dfrac{3}{6} - \dfrac{1}{6}$ = ...

12.   6 : 6 = ...

13.

Jam di atas menunjukkan pukul ... lebih ... menit.

14.   565
       126 +
       . . .

15.   2.725 = ... ribuan + ... ratusan + ... puluhan + ... satuan

16. $\dfrac{1}{3} + \dfrac{1}{3}$ = ...

17. Rian mempunyai 3 kotak kelereng. Jika satu kotak berisi 9 kelereng, maka jumlah kelereng Rian adalah ... buah.

18.   254
       19 +
       . . .

19.
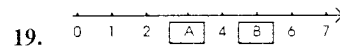
Bilangan dalam kotak A dan B masing-masing adalah ... dan ....

20.   1.235
       321
       15 +
       . . . .

21.   1.275
       2.135 +
       . . . .

22.   2 x 4 x 5 = ...

23.   465
       156 +
       . . .

24. (15 : 3) x 2 = ...

25. (8 x 5) : 10 = ...

26.

Daerah yang diarsir di atas menunjukkan pecahan ....

27.   1m = ... cm

28.   3, 4, 5, 6, 7
Diantara bilangan-bilangan di atas, bilangan genapnya adalah ....

29. "*Lebih besar dari* " dilambangkan dengan tanda ....

30. (50 : 10) : 5 = ...

31. Nia mempunyai 25 gelang. Kemudian Bibinya memberi dia 15 gelang. Setelah itu, Nia membagikan semua gelangnya kepada Lia, Novi, Karina dan Tia. Jika setiap anak menerima sama banyaknya, maka setiap anak menerima ... gelang.

32.

+	1	2	3	4	...	9
1	2	3	4	5	...	10
2	3	4	5	A	...	11
3	4	5	6	7	...	12

Nilai Huruf A yang ada dalam kotak di atas adalah ....

33. Lambang ' ≠ 'berarti ....

34. Panjang pensil Tia adalah 79 mm.
Kira-kira panjang pensil Tia sama dengan
.... cm.

35. Panjang amplop Marlius adalah 29 cm. Kira-kira panjang amplop Marlius sama dengan ... dm.

36. Isilah titi-titik berikut dengan lambang
"lebih besar dari" atau *"lebih kecil dari"*:
$$\frac{1}{4} \cdots \frac{1}{6}$$

37.
$$4.434$$
$$2.217 -$$
$$. . . .$$

38. $2.245 + 246 - 75 = ...$

39. Isilah titik-titik berikut dengan lambang *"lebih besar dari"* atau *"lebih kecil dari"*:
$11 - 5 \ ... \ 9 - 4$

40. $1.123 + 224 - 32 = ...$

41.
$$2.345$$
$$126 -$$
$$. . . .$$

42. $2 \times 5 = 20 : ....$

43. Isilah titik-titik berikut dengan lambang
"lebih besar dari" atau *"lebih kecil dari"*:
$4 + 11 \ ... \ 7 + 9$

44. Prima mempunyai 4 kotak kelereng. Jumlah kelereng seluruhnya adalah 16. Jika jumlah kelereng setiap kotaknya sama, maka jumlah kelereng dalam satu kotak adalah ... buah.

45. Tia dan Karina sudah bermain selama 1 jam. Kalau sekarang pukul 10:15, maka mereka mulai bermain pada pukul ....

46.

X	1	2	3	...	9
6	6	12	A	...	54
7	7	14	21	...	63

Nilai huruf A yang ada di dalam kotak di atas adalah ....

47.

X	1	2	3	...	9
8	8	16	24	...	72
9	9	A	27	...	81

Nilai huruf A yang ada di dalam kotak di atas adalah ....

48. Hendra mempunyai 4 kotak kelereng. Masing-masing kotak berisi 6 kelereng. Jika dia membagikan seluruh kelerengnya kepada Tia, Novi dan Lia dengan jumlah yang sama, maka masing-masing mendapat ... kelereng.

49.
$$3.225$$
$$1.148 -$$
$$. . . .$$

50. $2.252 - 136 - 29 = ...$

--- S E L E S A I ---

MATHEMATICS

Directions:

1. Write your full name, sex, number of primary school, day and date at the bottom of this page.

2. The time is 60 (sixty) minutes.

3. You are not allowed to ask your classmate and if you have a problem, ask your teacher.

4. Try to answer all questions correctly.

5. Write your answers in the space provided for each question.

Full Name   : ....

Sex   : ☐ Boy / ☐ Girl

Class / Term   : Year Three / One

Primary School Number   : ....

Day and Date   : ....

Academic Year   : 1996/1997

1. 4 + 5 = ...
    5 + 6 = ...
    6 + 7 = ...
    7 + 8 = ...
    8 + 9 = ...

2. 9 x 5 = ...

3. 6 x 7 = ...

4.   2,200
        1,525 +
        . . . .

5. Write the following number :
    Three thousand two hundred and fifty = ...

6. One week equals to ... days.

7.   3,895
        2,652 -
        . . . .

8. Novi received Rp.1.000 from her uncle and
    Rp.500 from her father. Then, she bought a
    book that cost her Rp. 1.400. Now, she still
    has Rp. ....

9.   4,888
         325 -
        . . . .

10. 15 : 5 = ...

11. $\frac{3}{6}$ - $\frac{1}{6}$ = ...

12. 6 : 6 = ...

13.

The above clock shows that it is ...
minutes past ....

14.   565
        126 +
        . . .

15. 2,725 = ... thousands + ... hundreds +
    ... tens + ... ones

16. $\frac{1}{3}$ + $\frac{1}{3}$ = ...

17. Rian has 3 boxes of marbles. If one box
    contains 9 marbles, so Rian has ... marbles

18.   254
        19 +
        . . .

19.

Numbers in the boxes A and B are ... and ....

20.   1,235 + 321 + 15 = ...

21. 1,275
    2,135 +
    . . . .

22.   2 x 4 x 5 = ...

23.   465
        156 +
        . . .

24. (15 : 3) x 2 = ...

25. (8 x 5) : 10 = ...

26.

The darkened area shows the fraction ....

27.   1m = ... cm

28.   3, 4, 5, 6, 7
        Among the above numbers, the even
        numbers are ....

29. " bigger than " is symbolized with the sign
    ....

30. (50 : 10) : 5 = ...

31. Nia had 25 bracelets. then her aunt gave her
    15 bracelets. After that, Nia gave all bracelets
    to Lia, Novi, Karina and Tia. If every person
    received the same number of bracelets, so
    each person received ... bracelets.

32.

+	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	A	7
3	4	5	6	7	8

The value of letter A in the box is ....

33. The sign ' ≠ ' means ....

34. The length of Tia's pencil is 79 mm.
    It is about ... cm.

35. The length of Marlius' envelope is 29 cm.
    It is about ... dm.

36. Fill in the blank space with the sign "bigger
    than" or "smaller than":
    $\frac{1}{4}$ ... $\frac{1}{6}$

37.
```
    4,434
    2,217 -
    . . . .
```

38.   2,245 + 246 - 75 = ...

39. Fill in the blank space with the sign "bigger than" or "smaller than":
11 - 5 ... 9 - 4

40.   1,123 + 224 - 32 = ...

41.
```
    2,345
     126 -
    . . . .
```

42.   2 X 5 = 20 : ....

43. Fill in the blank space with the sign "bigger than" or "smaller than":
4 + 11 ... 7 + 9

44. Prima has 4 boxes of marbles. The total of his marbles is 16. if each box contains equal number of marbles, so each box contains ... marbles.

45. Tia and Karina have been playing for one hour. If the time now is at 10:15, therefore, they started playing at ....

46.

X	1	2	3	...	9
6	6	12	A	...	54
7	7	14	21	...	63

The value of letter A in the box is ....

47.

X	1	2	3	...	9
8	8	16	24	...	72
9	9	A	27		81

The value of letter A in the box is ....

48. Hendra has 4 boxes of marbles. Each box contains 6 marbles. If he gives all of his marbles to Tia, Novi dan Lia , so every person has ... marbles.

49.
```
    3,225
    1,148 -
    . . . .
```

50.   2,252 - 136 - 29 = ...

---- G O O D L U C K ----

ANGKET
(Indonesian Version)

Nama Lengkap   : ....

Tempat dan Tanggal Lahir : ...., ...

Jenis Kelamin   : ❏ Laki-laki   ❏ Perempuan

Pendidikan Terakhir/Tahun   : ...., 19 ...

Pengalaman Mengajar di SD   : .... years

Petunjuk: Jawablah pertanyaan berikut dengan memberi tanda silang (X) di dalam kotak yang telah disediakan untuk masing-masing soal, kecuali pertanyaan nomor 1.

> **Bagian A: Guru-guru dari kelas intervensi dan kelas kontrol**

1. Sudah berapa lamakah Anda menggunakan metode pengajaran formal?

   ..... tahun

2. Apakah menurut Anda metode pengajaran formal dapat memenuhi kebutuhan anak-anak didik dalam satu kelas yang terdiri dari berbagai tingkat kemampuan?

   ❏ Ya, secara keseluruhan

   ❏ Ya, sebagian besar

   ❏ Ya, sebagian kecil

   ❏ Tidak sama sekali

3. Apakah Anda merasa puas dengan menggunakan metode pengajaran formal sebagai metode pengajaran Anda dalam membantu anak-anak didik belajar?

   ❏ sangat puas

   ❏ puas

   ❏ cukup

   ❏ tidak puas

   ❏ sangat tidak puas

4. Apakah Anda akan menerima metode pengajaran baru sebagai metode pengajaran Anda apabila ada metode pengajaran yang lebih baik dalam membantu anak-anak didik belajar di sekolah dasar?

   ❏ Ya   ❏ Tidak

> **Bagian B: Guru-guru dari kelas intervensi**

Catatan: Metode pengajaran campuran adalah metode pengajaran yang menggabungkan metode pengajaran formal dan kelompok-kelompok kecil berdasarkan Nilai Matematika berbeda.

5. Apakah anak-anak didik Anda belajar lebih baik di dalam kelas jika Anda menggunakan metode pengajaran campuran dari pada metode pengajaran formal?
   ❑ Ya   ❑ Tidak

6. Apakah metode pengajaan campuran dapat memenuhi kebutuhan belajar anak-anak didik dalam satu kelas yang terdiri dari berbagai tingkat kemampuan?
   ❑ Ya, secara keseluruhan
   ❑ Ya, sebagian besar
   ❑ Ya, sebagian kecil
   ❑ Tidak sama sekali

7. Apakah anak-anak didik Anda saling bantu-membantu dalam belajar di kelompok mereka masing-masing?
   ❑ Ya, semuanya
   ❑ Ya, sebagian besar
   ❑ Ya, sebagian kecil
   ❑ Tidak

8. Apakah Anda akan menggunakan metode pengajaran campuran sebagai metode pengajaran Anda di masa datang?
   ❑ Ya   ❑ Tidak

======= TERIMA KASIH =======

QUESTIONNAIRE
(English Version)

Full Name   : ....
Place and Date of Birth   : ...., ...
Gender   : ❑ Male   ❑ Female
Current Education/Year   : ...., 19 ...
Teaching Experience at Primary School : .... years

Directions: Please answer the following question by inserting (X) in the
            provided box for each question, except for question 1.

| Part A: Teachers from Intervention and Control Classes |

1. How Long have you been using a formal teaching method as your
   teaching method in teaching your pupils at primary school?
   ...... years

2. Do you think that a formal teaching method can fulfill the pupils' needs
   in learning Mathematics in a classroom which consists of different levels
   of ability?
   ❑ Yes, all
   ❑ Yes, most of them
   ❑ Yes, a little
   ❑ Not at all

3. Are you satisfied of using a formal teaching method as your teaching
   method in helping your pupils learn Mathematics?
   ❑ very satisfied
   ❑ satisfied
   ❑ moderate
   ❑ dissatisfied
   ❑ very dissatisfied

4. Will you accept a new teaching method as your teaching method if the
   method is a better method in helping pupils learn Mathematics in
   primary schools?
   ❑ Yes   ❑ No

Notes: A mixed-teaching method is a method which combines a formal teaching method and small groups which are set up on the basis of the mixed prior Mathematics attainment pupils.

5. Do you think that your pupils learn Mathematics better if you use a mixed-teaching method than a formal teaching method?
   ❏ Yes   ❏ No

6. Do you think that a mixed-teaching method can fulfill the mixed-ability pupils' learning needs in learning Mathematics in the classroom?
   ❏ Yes, all
   ❏ Yes, most of them
   ❏ Yes, a little
   ❏ Not at all

7. Did your pupils help each others in their own groups while they were learning Mathematics in your class?
   ❏ Yes, all
   ❏ Yes, most of them
   ❏ Yes, a little
   ❏ No

8. Will you use a mixed-teaching method as your teaching method in helping your pupils learn Mathematics in the future?
   ❏ Yes   ❏ No

======= THANK YOU =======

ANGKET
(Indonesian Version)

Nama Lengkap   : ....
Jenis Kelamin   : ....
SD Negeri Nomor   : ....

Petunjuk: Jawablah pertanyaan-pertanyaan berikut dengan memberi tanda (X) di dalam kotak yang telah disediakan untuk masing-masing pertanyaan.

1. Seberapa banyak kamu senang belajar di dalam kelompok kecil?
   ☐ sangat banyak
   ☐ cukup banyak
   ☐ sedikit
   ☐ tidak senang sama sekali

2. Seberapa banyak kamu senang saling membantu di dalam kelompok?
   ☐ sangat banyak
   ☐ cukup banyak
   ☐ sedikit
   ☐ tidak senang sama sekali

3. Apakah kamu lebih senang mengerjakan latihan Matematika di dalam kelompok dari pada mengerjakan latihan Matematika sendirian?
   ☐ Ya
   ☐ Tidak

4. Apakah kamu lebih mengerti Matematika apabila kamu mengerjakan latihan Matematika di dalam kelompok kecil?
   ☐ Ya
   ☐ Tidak

5. Seberapa banyak temanmu membantu kamu belajar Matematika di dalam kelompokmu?
   ☐ sangat banyak
   ☐ cukup banyak
   ☐ sedikit
   ☐ tidak sama sekali

======= TERIMA KASIH =======

QUESTIONNAIRE
(English Version)

Full Name   : ....
Gender   : ....
Primary School No. : ....

Directions: Answer each of the following questions by putting (X) in the
appropriate box.

1. How much do you like working in small mixed prior Mathematics
attainment groups?
   ❐ very much
   ❐ a little
   ❐ not much
   ❐ not at all

2. How much do you like to help each other in your group?
   ❐ very much
   ❐ a little
   ❐ not much
   ❐ not at all

3. Do you prefer working in small mixed prior Mathematics attainment
groups to individually?
   ❐ Yes
   ❐ No

4. Do you think you learn more Mathematics when working in small mixed
prior Mathematics attainment groups?
   ❐ Yes
   ❐ No

5. How much do other people help you in the small mixed prior
Mathematics attainment group?
   ❐ very much
   ❐ a little
   ❐ not much
   ❐ not at all

======= THANK YOU =======

Appendix 5.1

Information about Research Sample - Pupils

Gender		Primary School Number																				Total	
		1		2		5		63		78		82		97		249		250		604			
		Class		Class		Class		Class		Class		Class		Class		Class		Class		Class		Class	
		I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O
Boys		13	17	25	19	19	18	14	14	17	17	23	12	17	16	16	16	23	21	17	18	184	168
Girls		29	20	17	19	15	12	16	18	13	12	16	17	20	16	21	19	15	18	19	16	181	167
Total		42	37	42	38	34	30	30	32	30	29	39	29	37	32	37	35	38	39	36	34	365	335

Notes: I   = Intervention Class

O   = Observation Class

Appendix 5.2

Information about Research Sample - Teachers

		1		2		5		63		78		82		97		249		250		604	
		Class		Class		Class		Class		Class		Class		Class		Class		Class		Class	
		I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O	I	O
G		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
A		40	37	33	47	37	34	32	33	33	44	40	32	35	32	37	33	36	39	36	35
TE		19	15	12	13	16	13	12	12	13	13	20	12	12	12	18	13	15	14	14	15
CE		PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	S1*	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS	PST TS
CCY		1977	1980	1983	1969	1980	1981	1984	1983	1982	1971	1976	1995	1983	1983	1977	1983	1980	1977	1981	1980

Primary School Number

Notes:

I	:	Intervention class
G	:	Gender
TE	:	Teaching Experience at primary school (in years)
CCY	:	Completed Current Education
S1*	:	Bachelor degree (she completed her PSTTS in 1984, and completed her S1 in 1995)

O	:	Observation class
A	:	Age (in years)
CE	:	Current Education
PSTTS:		Primary School Teacher Training School

—

Training Schedule

Days / Dates	Time	Agenda
Monday 8 July 1996	08:00 - 08:15	Opening session and introduction
	08:15 - 09:00	Watching video on 'traditional' and 'progressive' teaching styles in British primary schools
	09:00 - 09:15	----- b r e a k -----
	09:15 - 09:45	Explanation about the training
	09:45 - 10:15	Question session and informal discussion
Tuesday 9 July 1996	08:00 - 08:15	Brainstorming about basic education
	08:15 - 10:00	Explanation about basic education
	10:00 - 10:15	----- b r e a k -----
	10:15 - 12:15	Workshop on Indonesian primary schools
Wednesday 10 July 1996	08:00 - 10:00	Watching video on teaching Mathematics in year-three class of Indonesian primary schools held by ALPS Project
	10:00 - 10:15	----- b r e a k -----
	10:15 - 10:45	Explanation about primary schooling in Indonesia
	10:45 - 12:15	Discussion on teaching and learning activities in Indonesian primary school classrooms
Thursday 11 July 1996	08:00 - 08:30	Brainstorming about small groups
	08:30 - 10:00	Explanation about teaching and learning activities by using whole-class grouping and small groups
	10:00 - 10:15	----- b r e a k -----
	10:15 - 12:15	Discussion on the possibilities of implementing the whole-class grouping in combination with small groups in Indonesian primary school classrooms
Friday 12 July 1996	08:00 - 08:15	Brainstorming
	08:15 - 10:00	Explanation about the intervention program
	10:00 - 10:15	----- b r e a k -----
	10:15 - 12:15	Discussion on issues related to the intervention
Saturday 13 July 1996	08:00 - 08:15	Brainstorming
	08:15 - 09:45	Role-play 1
	09:45 - 10:00	----- b r e a k -----
	10:00 - 11:45	Role-play 2
	11:45 - 12:15	Summary on the intervention program and closing session

Training Package for Year-Three Intervention Class Teachers
of Ten Public Primary Schools in Palembang, Indonesia

Written by

S o f e n d i

Child Development and Learning

Institute of Education

University of London

1996

I. Aim of Training

This training is aimed to provide the primary school teachers clear theoretical and practical knowledge about the intervention programme.

II. Training Duration

This is a twenty-two-hour training package. This package consists of six sessions.

III. Training Venue

The training will be carried out in one of the rooms on the second floor of Centre for Administration Building, Sriwijaya University, Srijaya Negara Street, Palembang - 30139, Indonesia

IV. Description of Training Sessions

Day 1 (a two-hour session)
Lesson Topic 1: Opening and Introduction (08:00 - 08:15)
Objective: The trainer and trainees are able to recognize each other.
Content: The trainer and trainees= information on educational backgrounds
          and job descriptions.
Procedures: 1) The trainer opens the training.
            2) The trainer introduces himself to all trainees.
            3) Each of the trainees, one by one, introduces herself to the
               others in turn.
Resources/Materials: -
Evaluation: Observation

Lesson Topic 2: Watching video on >traditional= and >progressive= styles
               of teaching in U.K. (08:15 - 09:00)
Objective: The trainees are able to get general features on the practice of
           >traditional= and >progressive= styles of teaching in U.K.
Content: The information on how the >traditional= and >progressive= styles
         of teaching was/is implemented in U.K.
Procedures: 1) The trainer explains the >traditional= and >progressive=
               styles of teaching briefly.
            2) The trainees as well as the trainer watch video (the video
               will be paused several times to allow the trainer
               explains what it is all about in Indonesian, and the only
               relevant parts of the video will be shown to the trainees).

3) The trainer carries out a question session (The questions will be about the >traditional= and >progressive= styles of teaching from the trainees= perspectives and on the basis of Indonesian context).

Resources/Materials: TV set, video player, video cassette, OHP and transparencies

Evaluation: Observation and oral questions

---------------------- Tea Break (09:00 - 09:15) -------------------------------------

Lesson Topic 3: Presentation about the training (09:15 - 09:45)

Objective: The trainees are able to identify what they are going to do during the training and what they will be expected to do after the training.

Content: See Training Materials (day 1).

Procedure: 1) The trainer presents all aspects related to the training, e.g. aim, schedule, procedures, etc.

Resources/Materials: OHP, transparencies and handouts

Evaluation: Observation and oral questions

Lesson Topic 4: Question session and informal discussion (09:45 - 10:15)

Objective: The trainees are able to get clear ideas on what the training is all about, why the training should be carried out, and how the training is held.

Content: See the content of lesson topic 3.

Procedures: 1) The trainer gives the trainees a few questions related to the presentation.

2) The trainees are also expected to provide a few questions related to the presentation.

3) The trainees discuss all questions in small groups (3 or 4 trainees in each group) in order that they can get negotiable answers.

4) The trainer and all trainees discuss all the problems that might make the trainees unclear about the training.

Resources/Materials: -

Evaluation: Observation and oral questions (see the 4th step of the procedures)

Day 2 (a four-hour session)

Lesson Topic 1: Brainstorming (08:00 - 08:15)

Objective: The trainees are able to re-identify what they did on the first day of the training and classify the ideas, types or systems of primary education on the basis of their previous knowledge.

Content: All lesson topics on the first day, especially lesson topics 2 and 3.

Procedure: 1) The trainer carries out a brief question-and-answer session. All relevant issues raised by the trainees in this session will be written on the white board.

Resources/Materials: -
Evaluation: Observation

Lesson Topic 2: Presentation on primary education (08:15 - 10:00)
Objective: The trainees are able to identify the main characteristics of primary
education.
Content: See the training materials (day 2).
Procedures: 1) The trainer presents the issues related to the primary
education.
2) The trainer carries out a question session on the basis of the
presentation.
Resources/Materials: OHP, transparencies and handouts
Evaluation: Observation and oral questions

---------------------- Tea Break (10:00 - 10:15) -------------------------------------

Lesson Topic 3: Workshop (10:15 - 12:15)
Objective: The trainees able to classify the Indonesian primary schools on
the basis of the main characteristics of primary education.
Content: See the content of lesson topic 2.
Procedures: 1) The trainer groups the trainees into three (each of the first two
groups consists of 3 trainees and the other one consists of 4
trainees).
2) The trainer asks the trainees in their own groups to classify
the Indonesian primary schools on the basis of the
presented primary education under lesson topic 2. Their
opinions are then written on a piece of large-size hard
paper.
3) After each group has finished their work, the trainer carries
out a follow-up discussion session. All similar and relevant
issues raised by the trainees are written on the white board.
Resources/Materials: large-size hard paper, colour paper, colour markers,
glue, pairs of scissors
Evaluation: Observation

Day 3 (a four-hour session)
Lesson Topic 1: Watching video on Mathematics teaching under the ALPS
Project (08:00 - 10:00)
Objective: The trainees are able to identify the last attempt of Indonesian
government in improving the quality of primary schools
- Mathematics teaching.
Content: The information on how Mathematics teaching was held in one of
Indonesian primary schools under the ALPS Project.
Procedures: 1) The trainer briefly explains what the ALPS Project is and how
the teaching and learning Mathematics was carried out

in the classrooms under the ALPS Project.

    2) The trainees as well as the trainer watch the video - the teaching and learning Mathematics in one of the Indonesian primary schools under the ALPS Project.

    3) The trainer carries out a question session. The questions will be about the relevance of the teaching and learning Mathematics under the ALPS Project in the context of Indonesian primary schools.

Resources/Materials: TV set, video player, video cassette, overhead projector and transparencies

Evaluation: Observation and oral questions (see the 3rd step of the procedures)

---------------------- Tea Break (10:00 - 10:15) ---------------------------------

Lesson Topic 2: Presentation on Indonesian primary schools (10:15 - 10:45)

Objective: The trainees are able to get clearer features about Indonesian primary schools.

Content: See the Training Materials (day 3)

Procedure: 1) The trainer presents the general features of Indonesian primary schools.

Resources/Materials: overhead projector, transparencies and handouts

Evaluation: Observation and oral questions

Lesson Topic 3: Discussion on teaching and learning activities (10:45 - 12:15)

Objective: The trainees are able to get clear ideas on practical and typical activities of teaching and learning Mathematics in Indonesian primary school classrooms.

Content: The trainees= previous teaching experiences and knowledge, and previously covered training materials

Procedures: 1) The trainer asks the trainees to sit in small groups (3 or 4 trainees in each group).

    2) In each group, the trainees discuss the current activities of teaching and learning Mathematics in the Indonesian primary school classrooms. The agreed activities are then written on the large-size hard paper.

    3) The trainer, right after all trainees have done their work, then leads the follow-up discussion for the whole of the trainees in order to get the agreed current activities of teaching and learning Mathematics in the Indonesian primary school classrooms.

Resources/materials: large-size hard paper and colour markers

Evaluation: Observation and oral questions (see the 3rd step of the procedures)

Day 4 (a four-hour session)

Lesson Topic 1: Brainstorming (08:00 - 08:30)
Objective: The trainees are able to identify their opinions and knowledge on the whole-class grouping and small groups.
Content: The previous training materials and the trainees= previous teaching experiences and knowledge
Procedure: 1) The trainer carries out a question-and-answer session. All relevant issues raised by the trainees in this session will be written on the white board.
Resources/Materials: -
Evaluation: Observation

Lesson Topic 2: Presentation on whole-class grouping and small groups (08:30 - 10:00)
Objective: The trainees are able to get clear ideas about the whole-class grouping and small groups.
Content: See the Training Materials (day 4)
Procedures: 1) The trainer presents the issues related to the whole-class grouping and small groups in primary schools.
2) The trainer carries out a question session on the basis of the presentation.
Resources/Materials: overhead projector, transparencies and handouts
Evaluation: Observation and oral questions (see the 2nd step of the procedures)

----------------------- Tea Break (10:00 - 10:15) -------------------------------------

Lesson Topic 3: Discussion on the possibilities of implementing the combination of whole-class grouping and small groups in the context of Indonesian primary school classrooms (10:15 - 12:15)
Objective: The trainees are able to identify the possibilities of implementing the combination of whole-class grouping and small groups in the context of Indonesian primary school classrooms.
Content: The content of Lesson Topic 1, the previous training materials and the trainees= previous teaching experiences and knowledge
Procedures: 1) The trainer asks the trainees to sit in small groups (3 or 4 trainees in each group).
2) The trainees, in each group, discuss the possibilities of implementing the combination of whole-class grouping and small groups in the context of Indonesian primary school classrooms. The agreed possibilities are then written on a piece of paper.

3) The trainer, right after all groups have completed their discussions, leads all trainees to a follow-up discussion in order to get all agreed possibilities.

Resources/materials: -

Evaluation: Observation and oral questions

Day 5 (a four-hour session)

Lesson Topic 1: Brainstorming (08:00 - 08:15)

Objective: The trainees are able to identify what they have got from the latest discussion held on the fourth day and add other possibilities of implementing the combination of whole-grouping and small groups in the context of Indonesian primary school classrooms.

Content: See the content of Lesson Topic 2 on day 4

Procedure: 1) The trainer carries out a brief question-and-answer session and all relevant issues raised by the trainees in this session will be written on the white board.

Resources/Materials: -

Evaluation: Observation

Lesson Topic 2: Presentation on the proposed intervention programme (08:15 - 10:00)

Objective: The trainees are able to get clear understanding about the intervention programme.

Content: See the Training Materials (day 5)

Procedures: 1) The trainer presents the theoretical and practical issues related to the intervention programme.
2) The trainer carries out a question-and-answer session on the basis of the presentation.

Resources/Materials: overhead projector, transparencies and handouts

Evaluation: Observation and oral questions (see the 2nd step of the procedures)

----------------------- Tea Break (10:00 - 10:15) -------------------------------------

Lesson Topic 3: Discussion on the proposed intervention programme (10:15 - 12:15)

Objective: The trainees are able to get clearer theoretical and practical issues related to the proposed intervention programme.

Content: All previous training materials, especially the training materials covered under lesson topics 2 and 3 on day 4, and lesson topic 2 on this day (day 5)

Procedures: 1) The trainer asks the trainees to sit in small groups (3 or 4 trainees in each group).
2) In each group, the trainees discuss the advantages and

disadvantages and/or strengths and weaknesses of the proposed intervention programme. The agreed outcomes are written on a piece of paper.

    3) Having completed the discussions in small groups, the trainer leads all trainees to a follow-up discussion in order to get clearer theoretical and practical issues on the proposed intervention programme.

Resources/Materials: overhead projector and transparencies

Evaluation: Observation and oral questions

Day 6 (a four-hour session)

Lesson Topic 1: Brainstorming (08:00 - 08:15)

Objective: The trainees are able to identify the advantages and disadvantages of the coming role-plays.

Content: The previous training materials and the trainees= teaching experiences and knowledge

Procedure: 1) The trainer carries out a question-and-answer session and all relevant issues raised by the trainees in this session are written on the white board.

Resources/Materials: -

Evaluation: Observation

Lesson Topic 2: Role-play 1 on the basis of the proposed intervention programme (08:15 - 09:45)

Objective: The trainees are able to do the role-play on the basis of the proposed intervention programme and acquire the needed teaching skills on the basis of the proposed intervention programme.

Content: The first term Mathematics areas of the 1994 Indonesian primary school curriculum

Procedures: 1) The trainer directs and helps the trainees set the setting and condition for the purpose of role-play.

    2) One of the trainees who acts as a teacher teaches the other trainees who act as pupils.

    3) After she has finished teaching, a question-and-answer session is held. In this session, all possible problems are discussed and then the trainer leads all the trainees to the appropriate solutions.

Resources/Materials: Overhead projector, transparencies, markers, white board, Mathematics course book, pieces of blank paper, pens, pencils and rulers

Evaluation: Observation and oral questions (see the 2nd step of the procedures)

---------------------- Tea Break (09:45 - 10:00) -------------------------------

Lesson Topic 3: Role-play 2 on the basis of the proposed intervention programme (10:00 - 11:45)

Objective: The trainees are able to do the role-play on the basis of the proposed intervention programme and acquire the needed teaching skills on the basis of the proposed intervention programme.

Content: The first term Mathematics areas of the 1994 Indonesian primary school curriculum

Procedures: 1) The trainer directs and helps the trainees set the setting and condition for the purpose of role-play.

2) One of the trainees who acts as a teacher teaches the other trainees who act as pupils.

3) After she has finished teaching, a question-and-answer session is held. In this session, all possible problems are discussed and then the trainer leads all the trainees to the appropriate solutions.

Resources/Materials: Overhead projector, transparencies, markers, white board, Mathematics course book, pieces of blank paper, pens, pencils and rulers

Evaluation: Observation and oral questions (see the 2nd step of the procedures)

Lesson Topic 4: The proposed intervention programme and closing (11:45 - 12:15)

Objective: The trainees are able to get firm and clear theoretical and practical knowledge about the proposed intervention programme.

Content: The whole training materials

Procedures: 1) The trainer briefly highlights the whole training and confirms what the trainees should do during the coming intervention programme.

2) The trainer closes the training.

Note: The format of this training description is a revised format taken from format 1 proposed by Peter John (1993) in his book entitled ALesson Planning for Teachers≡ page 39 published in London by Cassell Educational Limited.

V. Training Materials

1. <u>Day One (a two-hour session)</u>

Introduction

As an introduction session, this session is aimed to provide the teachers clear understanding about the training package, that is about the aim of the training (see Aim of Training), what will be covered during the training (see Training Materials) and how the training will be carried out (see Description of Training Sessions).

2. <u>Day Two (a Four-hour session)</u>

Primary Education

The term 'primary education' tends to have an endless and open definition. It means that it is very difficult to define a precise definition that can fully be accepted by everybody. For example, Alexander (1984) can only characterise what a primary education is but not to define it. He characterises a primary education from three aspects - pupils, teaching system, and teachers. The pupils in primary education are children aged between 5 and 11. The teaching system which is used at the primary education is a class teacher system: one teacher for all or most of the child's schooling for a period of one year and often for longer. This class teacher system can be used as a signal to differentiate primary education from secondary one. In secondary school, for example, the teaching system used is a subject teacher system: one teacher teaches one subject. In terms of the teachers in primary education, they have two main functions that can be different from those at the secondary education. Those two main functions are the teachers in primary education have to be able to develop a comprehensive, rounded view of each child, and to conceive, plan and implement the whole curriculum to be experienced by each child during the period of a year or more. Conversely, in secondary school one teacher provides the pupils with knowledge and skills of one subject that he/she teaches, and only conceives,

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plans and implements of that subject among other subjects in the curriculum to be experienced by the pupils during a certain period of time - not necessarily a year or more.

Furthermore, Corner, C. and Lofthouse, B. (1990) say that primary education does not refer to a clearly specified set of beliefs, and associated practices held by all teachers and influencing all primary-aged children, but to a dynamic variety of competing views as to what the enterprise is all about and how it might be conducted. This condition consequently leads to a variety of views about primary education itself and influences the patterns of relationships established between teacher and children, the form of the curriculum undertaken, and the way schools or classes are organised (Conner, C and Lofthouse, B., 1990).

If we look at the primary education from its educational ideologies - consisting of different clusters of beliefs, values, principles, sentiments and understanding, attempting to give meaning and direction to the complex and diverse practical enterprise of teaching, and employing their own ideas and metaphors which give their adherents sense of what is right for children in schools (Conner, C and Lofthouse, B., 1990) -, there have been at least three writers who have attempted to examine primary education from this perspective.

The first writer is W. Blyth (1965) in Conner, C. and Lofthouse, B. (1990). He distinguishes primary education from its traditions. According to Blyth, there are three traditions underlie the primary education, they are (1) elementary tradition - one can have both elementary schools and secondary schools, but one cannot have both elementary schools and primary schools: elementary schools are a whole educational process in themselves and one which is by definition limited and by implication inferior; a low plateau, rather than the foothills of a complete education, (2) preparatory tradition - the education of

younger children is mainly to be conceived in terms of preparation for the later stages of education rather than as a stage in its own right, and (3) developmental tradition - its principles are based on those of child development, and it is bound neither by the limitations of an education felt or intended to be cheap and inferior nor by the demands imposed by its own sequel.

The second writer is M. Golby (1982) in Conner, C. and Lofthouse, B. (1990). He distinguishes the primary education into three traditions, namely (1) elementary education - it is concerned with the inculcation of essential knowledge into passive pupils, (2) progressive tradition - it celebrates self-expression, individual autonomy and personal growth, but lacks of an adequate theory of knowledge to help it define the primary curriculum, and (3) technological tradition - it stresses utilitarian values associated with the pursuit of science and technology.

Finally, the third writer is C. Richards (1982) in Conner, C, and Lofthouse, B. (1990). He identifies four main ideologies underlie the primary education. These four ideologies are (1) liberal romanticism - it starts from, and constantly refers back to, the individual child when developing educational principles, (2) educational conservation - it stresses the importance of continuity with the past and views the curriculum as a repository of worthwhile activities and values which learners need to be initiated in an orderly systematic way, (3) liberal pragmatism - it sees a school as providing a set of learning experiences, largely but not entirely structured and directed by the teacher, but respecting, to some degree, both the individuality of the child and the importance of continuity with the past, and (4) social democracy - it views education as one means towards realising social justice and sees a school as an agency concerned, not so much with enhancing the individuality of each child, but with helping to create social beings who can

work co-operatively to bring out change both in the immediate environment and in society generally.

Furthermore, Richards (1979) in Bloomer, M. and Shaw, K.E. (1979) distinguishes four major belief-systems in relation to primary education and their theories and resulting practises - child-centred primary education, pragmatic primary education, community-centred primary education, and traditional primary education. Each system has its own characteristics which differentiate one system from the others. The following are the characteristics from each of the four major belief-systems (Richards (1979) in Bloomer, M. and Shaw, K.E. (1979):

(1) Child-Centred Primary Education

    (a) celebrates the supremacy of the child in the teaching-learning situation, in other words, lies the child at the heart of the educational process,

    (b) takes a view of the nature of children as self-active, self-developing human beings who "naturally" seek to understand themselves and the world around them in their own terms and through their own self-chosen activities,

    (c) sees children as "naturally" curious, anxious to make discoveries and to seek opportunities to express their unique individuality,

    (d) sees a teacher as a facilitator, a catalyst and a manager of learning situations. It means that the teacher either responds to children's initiatives or prompts them into activities through the provision of a rich stimulating environment. Furthermore, the teacher also provides opportunities for pupils' growth, creativity, choice and discovery and works "alongside" children to foster their all-round development - socially, emotionally, intellectually, physically, morally and spiritually,

    (e) considers the curriculum not in terms of subjects to be taught or areas to be covered, but as the sum-total of learning experiences both offered to children and created by them as they interact with their

surroundings. In other words, it sees the curriculum as "integrated" rather than "differentiated", "whole" rather than "fragmented", "open" rather than "closed". The integration is provided by learners themselves as they range freely across "artificial" subject barriers and employ skills common to a variety of intellectual pursuits,

(f) sees the stance of itself towards the community and its culture is equivocal, and

(g) emphasises the involvement of children in first-hand experience both inside and outside the school and the understanding of individual children as fully as possible.

(2) Pragmatic Primary Education

(a) sees the schools that need to be responsive to the changing demands of the wider society as well as responsive to individuals: as society's agents they need to provide children with skills, knowledge and attitudes which they will need as future citizens and workers,

(b) considers a broad "balanced" grounding, not narrow vocational preparation nor training in the "3Rs" alone, is seen as appropriate at the primary stage. There is concern at the wastage of talent in traditional schools, and the identification and fostering of this talent is often stressed. Different levels of innate ability are accepted, but the importance of the school making the most of pupil potential is emphasised,

(c) does not view children as active "meaning makers" nor as passive "meaning makers",

(d) introduces children to at least some objective knowledge forms in a structured, sequential way,

(e) does not disregard children's own knowledge and experience, sometimes, uses them as a starting point but they need to be shaped and refined progressively along teacher-directed lines,

(f) views teachers as positive agent initiating most activities and structuring and sequencing their pursuits,

(g) views the local community (including parents) as an influence on children's learning which needs to be harnessed in support of the school's efforts,

(h) does not see the community as having an important viewpoint on what should be taught in schools, nor as having cultural resources on which schools can draw and to which they can contribute,

(I) usually considers the curriculum as totally integrated or as totally differentiated into separate elements or subjects,

(j) regards first-hand experience as valuable though not at the expense of vicarious experience,

(k) classes are virtually of mixed-ability partly because of the social benefits believed to accrue from this form of organisation and partly because of the fear that premature labelling of children plus attendant self-fulfilling prophecies may inhibit individual progress and the fostering of individual talent.

(3) Community-Centred Primary Education

(a) concerns with the promotion of social justice,

(b) sees schools as essential agencies in the creation of a fairer society through providing an education designed to produce active, thoughtful citizen,

(c) views all pupils as able to benefit from education; differences in learning ability are differences in degree, not in kind,

(d) fosters individual talent at least as much for the good of the community as for the individual himself,

(e) acknowledges children's natural curiosity and the importance of first-hand experience but these are to be harnessed not in the expression of individuality but in the creation of social beings who can work co-

operatively to bring about change both in the immediate environment and in society more generally,

(f) gives the teacher a very positive role in the planning and transaction of curricula which are related directly to the social experience of pupils,

(g) sees the local community as being the setting for much first-hand work, as having a culture of its own to contribute to children's education and as having a valid and important viewpoint on what should be taught in its schools, and

(h) sees the community as an active partner in the educational process, not the passive recipient of the educational system's benevolence.

(4) Traditional Primary Education

(a) is associated with "traditional" schools and "formal" teaching,

(b) has well-documented characteristics,

(c) claims that traditional approaches stress the importance of continuity with the past and the transmission of "worthwhile" cultural elements - at the primary stage these take the form of the "3Rs" along with an elementary. introduction to other established disciplines such as history and geography (though interestingly enough, not often science),

(d) sees schools as vital to the preservation of "standard" and "values" and to the stability of society; they exist to prepare pupils for society as it is rather than it might be,

(e) believes children be endowed with varying degrees of intellectual ability, this being subject to severe limits in some cases,

(f) believes that ability manifests itself as a result of the interaction between children's "innate potential" (the major factor) and environment,

(g) does not assume children to be active learners but are believed to require extrinsic motivation in order to "fulfil their potential",

(h) sees teaching as to initiate learners into "valuable" knowledge forms and skills in an orderly, systematic way,

(I) sees the teacher as the asker of questions and the processor of knowledge; the pupil as the respondent and the receiver,

(j) claims that classroom interaction involves the teacher in didactic instruction (as the major mode), in keeping discipline and in promoting extrinsic motivation so as to get the pupils learn,

(k) takes little regard of the cultural resources and expertise of the local community, and parents are regarded as passive consumers rather than active partners in the educational process,

(l) considers the practical reflections of the traditional belief-system include subject-dominated curricula, specified allocation of time to particular curricula area, streaming or setting, a predominance of class-teaching (as opposed to small group - or individual teaching), a reliance on "chalk and talk" and marked social distance between teachers and children and teachers and parents - in Berstein's terms the maintenance of strong boundaries of time, space, curriculum and social grouping.

3. Day Three (a four-hour session)

Indonesian Primary Schools

In Indonesia, education is run nationally and fundamentally based on the Constitution of Republic of Indonesia year 1945, article 31, points 1 and 2, that is every Indonesian citizen has a right to have an education, and Indonesian government attempts and runs a national education system that is based on the laws. These laws are, principally, based on the government laws of Republic of Indonesia, and, practically, based on the decrees of Minister of Education and Culture. These laws tend to be reviewed and revised, in the sense of quality and quantity improvements, in relation to

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coping with the current conditions of Indonesia and fulfilling the needs of general national development in Indonesia.

Nowadays, the aims of national education in Indonesia is to develop the whole person by enhancing devotion to God Almighty, developing intelligence and skills in individuals, ensuring that all pupils are physically and mentally healthy with well-adjusted personalities, promoting good moral conduct, patriotism and social development, so that the people will be able to develop themselves and take joint responsibility for the development of the nation (Government Laws of Republic of Indonesia, No. 2, Year 1989 about National Education System, Chapter II, Article 4). Consequently, any form of education in Indonesia should be led and aimed to reach these aims. Due to the aims of national education are still very broad and the education itself is graded into four levels. Therefore, it is very important to have specific aims of each level from those levels in order that (1) there is a clear-cut between one level and another, and (2) each level can, theoretically and practically, support each other - the lower level is aimed as a basis for the upper level.

In Indonesia, the national education system is graded into four levels - primary schools, junior high schools, senior high schools and higher education. In 1993, the Indonesian government launched the term "nine-year compulsory basic education" for Indonesian children and since then, it is compulsory for every Indonesian child to take the nine-year basic education. The nine-year compulsory basic education here means that the Indonesian government widely provides the opportunities for the school aged Indonesian children to do the basic education - six years for primary school and three years for junior high school (Ministry of Education and Culture, 1993a). This is supported by the decree of Minister of Education and Culture (1992), that is basic education is a nine-year education that consists of six years at the primary school and three years at the junior high school. Consequently, every Indonesian child has to do this basic education.

Basic education in Indonesia, in terms of its aims, can be regarded as one unit, that is to provide the pupils basic knowledge so that they can develop themselves as individuals, members of society, citizens and members of human beings, and to prepare the pupils to proceed to senior high schools (Government Decree of Republic of Indonesia, No. 28, Year 1990 about Primary Education, Chapter II, Article 3). But in terms of its organisation, it can be regarded as two separated units - primary school and junior high school. Each of these schools has its own aims. The aims of primary school are to provide the pupils basic abilities in order that they can develop themselves as individuals, members of society and citizens, and to prepare the pupils to proceed to junior high schools (Decree of Minister of Education and Culture, No. 0487/U/1992 about Primary Schools, Chapter II, Article 2, Point 1). Primary school, in Indonesia, is defined as a unit of primary education that consists of six years (Decree of Minister of Education and Culture, No. 0487/U/1992 about Primary Schools, Chapter I, Article 1, Point 1).

Now, I will generally describe the current primary schools in Indonesia in terms of their curriculum, evaluation system, teachers, pupils, and teaching and learning activities.

(1) Curriculum

The 1994 primary school curriculum is a subject-based curriculum (subject-oriented/dominated curriculum), it means that each subject is differentiated from the others - in terms of descriptions, functions, teaching objectives, teaching areas, guidelines and areas of teaching materials. This condition leads to the rigid time tabling, for example, one day the pupils have to learn, let us say, three subjects. Each of these subjects is allocated for two teaching hours. so, after every two teaching hours, the teacher has to switch from one subject to another. Besides, the curriculum can also be classified as a term-based curriculum, it means that the scopes of

materials have been blocked per term. In other words, the teachers have to teach their students all the materials in the term 1, if it is at the beginning of the academic year, and they cannot proceed teaching those in the second term, even though, let us say, they still have a plenty of spare time in the first term or their pupils could complete all of the materials in the first term earlier. The following is the distribution of subjects in the 1994 primary school curriculum (Ministry of Education and Culture, 1993):

		Indonesian Primary Schools					
		Years					
No.	Subjects	1	2	3	4	5	6
		Teaching Hours					
1.	Moral Education of Pancasila and Civics	2	2	2	2	2	2
2.	Religious Education	2	2	2	2	2	2
3.	Indonesian Language	10	10	10	8	8	8
4.	Mathematics	10	10	10	8	8	8
5.	Sciences	-	-	3	6	6	6
6.	Social Studies	-	-	3	5	5	5
7.	Hand Craft and Arts	2	2	2	2	2	2
8.	Physical Education and Health	2	2	2	2	2	2
9.	Local Materials	2	2	4	5	7	7
	Total Teaching Hours	30	30	38	40	42	42

The duration of one teaching hour for years 1 and 2 is 30 minutes and for years 3, 4, 5 and 6 is 40 minutes. Each subject in the curriculum contains : (1) Introduction: general description, general functions, teaching objectives, teaching areas and general guidelines, and (2) Teaching Programme: general instructional objectives and general guidelines and areas of teaching materials. For each year in one academic year, the guidelines have been classified into three separated terms - terms 1, 2 and 3.

(2) Evaluation System

The primary school teachers, for each term, are expected to use two types of test in evaluating their pupils' progress - formative test and summative test (Ministry of Education and Culture, 1994). The formative test is held at least three times in a term. This test is used to monitor the pupils' daily progress towards the school subjects. Whilst, the summative test is used by the teachers to evaluate their pupils' progress during one term and to report the pupils' progress to the pupils' parents. The summative test, if it is held at the end of the third term or the last term in the academic year, is used to decide whether or not the pupils can proceed to the higher grade.

(3) Teachers

There are two kinds of teachers teaching at the primary schools, they are subject teachers (physical education teachers and religious teachers), and class teachers (Ministry of Education and Culture, 1993). Most of these teachers are the graduates of senior high schools for initial primary school teacher training and few of them, 1993 onwards, are the graduates of two-and-a-half year initial primary school teacher training at the universities or institutes. They were trained, when they were trainees, to be 'capable' perspective primary school teachers for all classes and/or grades.

(4) Pupils

The ages of the pupils at the primary school range from 6 to 11 years old because one can be accepted as a pupil at the primary school has to be at least 6 years old (Decree of Minister of Education and Culture, No. 0487/U/1992 about Primary Schools, Chapter VII, Article 2, Point 1). In other words, the current basis for accepting a pupil at the primary school in Indonesia, only the age criteria is used.

(5) Teaching and Learning Activities

Teaching and learning activities are normally held in the classrooms, except for Physical Education and Hand Craft and Arts Subjects that are often held outside the classrooms. The teaching and learning activities in the classroom are mostly or even wholly held through the teacher-centred approach, that is the teacher stands or sits in the front of the class closed to the blackboard and the pupils sit in rows in front of him/her. This condition leads the teacher to use the didactic instruction and to the formal teaching. The pupils usually and even always learn individually on the basis of pre-set individual exercises from the available course books. In short, the teacher in conducting the teaching and learning activities, it seems to me, has a strong idea that all pupils have the same level of ability and therefore, they have to learn the same 'thing' at the same time in order that, expectedly, all of them are able to require the curriculum-based knowledge and skills through the existing course books.

4. Day Four (a four-hour session)

Grouping

According to Brown (1988) in Galton and Williamson (1992), a group exists when two or more people define themselves as members of it and when its existence is recognised by at least one other. Classroom groupings of various sizes and compositions have been used for a variety of purposes and therefore the uses of groups will depend on many factors (Kutnick and Rogers, 1994). One of the factors indicates that groupings are often chosen to meet the needs of classroom organisation and physical structure rather than being designed to promote the instructional/learning capabilities of children - number and sizes of groups often being set by the numbers of tables and chairs around each table (Tann, 1981; Galton, 1992; Good and Marshal, 1984; Dreeden, 1984). In other words, groupings are often seen as

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a means for classroom and learning organisation (Kutnick and Rogers, 1994). But, if we want to use groups effectively, the groups themselves should not be used simply as organisational features of the classroom, they can also be used to provide the pupils security among themselves, ability to communicate effectively among themselves, teacher's approval of understanding of such behaviour. Besides, in groups, the pupils must have and use skills of listening, questioning, challenging, helping and providing explanation to others (Bennett and Dunne, 1990).

Group size should not be thought as limited to the small group (4 - 8 pupils) but should be seen as a continuum from individuals to the whole class (Kutnick and Rogers, 1994: 4), but according to the review of studies concerning classroom groups found that there are four distinct types of classroom groupings: small groups, pairs, individuals and whole class (Galton and Williamson, 1992).

(1) Whole-Class Grouping

Whole class grouping or the traditional/formal approach is relatively under research area (Kutnick and Rogers, 1994). The whole class grouping has, at least, the following characteristics: (a) the core of this type of teaching is that we have one person (the master) who instructs a large number of pupils (merrett, 1994), (b) the general pattern is that the teacher talks and instructs and then the pupils recite the material and learn it by heart and then they might be required to copy vast amount of material from a blackboard into their notebooks (Merrett, 1994), (c) the teacher talks, demonstrates and gives the pupils the chance to exercise and establish new skills (Merrett, 1994), (d) instruction models which view teachers as the only source of knowledge and skills (Bennett, 1994), and (e) it places the teacher in didactic control of knowledge and socialisation in the classroom (Kutnick and Rogers, 1994).

The whole class grouping has some advantages that the small ones do not, they are: (a) it is an efficient means of transmitting information to a large number of children simultaneously (Kutnick and Rogers, 1994), (2) it provides order, control, purpose and concentration (Kutnick and Rogers, 1994), (c) it makes the root learning tasks work effectively (Johnson and Johnson, 1985), (d) it provides each of pupils work individually, sitting in rows, without being interrupted by the others (Kutnick and Rogers, 1994), and (e) it provides better academic/educational results (Bennett, 1994). But, out of those advantages, the whole class grouping also has disadvantages, that is the teacher often 'pitches' work to the middle level of ability and this may understimulate high-ability pupils while placing low-ability pupils in a situation where they cannot succeed (Alexander, Rose and Woodhead, 1992), and therefore, it should not be surprising that the whole class groups display extremes of very high and very low in achievement scores (Good and Marshal, 1984), and it gives little chance to the pupils to interact among them.

(2) Small Group

According to Kutnick and Rogers (1994), a small group consists of 4 and 6 pupils together for sitting and/or learning purposes. In terms of grouping purposes, Galton and Williamson (1992) say that there are four purposes of grouping the pupils, that is (a) seating groups, (b) working groups, (c) co-operative groups and (d) collaborative groups. Seating groups, where pupils sit in the groups but do not work as a group. In other words, where children work on a similar theme or curricular area at their own pace. While working groups, where children work on the same task, because they are at approximately the same stage of learning, but they work as individuals with a minimum of co-operation. Co-operative groups, not like the two previous groups, the pupils do the task which is organised in such a way that individual pupils with the group contribute

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a joint outcome. Collaborative groups, when all pupils, in the group, contribute to a single outcome and often involve problem-solving activities, particularly in cases where the group has to debate a social or moral issue and produce an agreed solution or recommendations.

In short, Galton and Williamson (1992:10) summarise the classification of different grouping arrangements of pupils in the primary classroom as follows:

Type	Task Demand	Intended Outcome
1. Seating Groups	each pupil has a separate task	different outcomes: each pupil completes a different assignment
2. Working Groups	each pupil has the same task	some outcome: each pupil completes the same assignment independently
3. Co-operative Groups	each pupil has separate but related task	joint outcome: each pupils has a different assignment
4. Collaborative Groups	each pupil has the same task	joint outcome: all pupils share the same assignment

In terms of criteria for forming the groups, Kerry and Sands (1982) in Pollard and Tann (1994) say that there are four criteria by which groups may be formed. They are (a) age groups - there are occasionally used as a convenient way of grouping for some activities, (b) attainment - groups based on attainment levels are very useful for setting up specific and well-matched task, (c) interest groups - it is important to enable children with shared interests to work from time to time. There may be particular advantages for the social cohesion of the class when children are of different attainment, sex, race, social class, and (d) friendship groups - these are popular with children and provide opportunities for social development. Furthermore, Kutnick and Rogers (1994) say that groups can be formed by pupils' ability - homogeneous-ability and heterogeneous ability, gender, friendship, age and personality.

The small groups, like the whole class ones, have also advantages, that is the pupils can improve their self-image (Kerry and Sands, 1982; Yeomans, 1983; Biott, 1987), sitting the children in groups would seem to indicate a desire for children to share not only facilities but also ideas (Galton and Williamson, 1992). Furthermore, Bennett and Dunne (1992) identify some other advantages, such as: (1) it would help children get along together in strengths and weaknesses as well as those of others, (2) it could make their meanings clearer to themselves by having to explain something to others, (3) children could gain some opportunity to teach as well as to learn, and (4) it was hoped that apathetic children would be infected by enthusiasm of a group while able children would benefit by being caught up in the thrust and counter-thrust of conversation in a small group of children similar to themselves.

Out of the above advantages, there are also some weaknesses that have been identified, such as getting the children to work together is not an easy task (Galton and Williamson, 1992), how to distribute the range of pupil ability among groups (Kutnick and Rogers, 1994), although children sit in groups there is usually no specific demand for them to work together, and rarely there is a group given no opportunity to work on a group task (Bennet and Dunne, 1992), and pupils are seated around tables does not mean that they will or can work as a small group (Kutnick and Rogers, 1994).

5. Day Five (a four-hour session)

Intervention Programme
At the beginning of Mathematics lesson, the teachers will be expected to teach and treat their pupils as they normally do - like the control classes, the teachers still stand in the front of the classes and use a formal, whole-class teaching method as their teaching method in teaching Mathematics and the

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pupils still sit in rows as shown in figure 1. But, when the time comes for the pupils to do the Mathematics exercise, of course after every pupil has got a clear idea about what to do and how to do it from their teachers, then the teachers will ask their pupils to sit in small groups as shown in figures 2 and 3. These groups will be set up at the beginning of the term right after the pupils have done the pre-test. The grouping will be done on the basis of the pupils' pre-test scores. Each group has high ability, moderate ability and low ability pupils, and consists of not less than 4 and not more than 6 pupils, and has the same gender. In other words, the pupils will be grouped into small mixed-ability groups on the basis of their Mathematics abilities and gender. These groups remain the same for the whole of the term.

In each group, the pupils will firstly do their Mathematics exercise individually, but if, let us say, one of the group members has a Mathematics problem in doing his/her Mathematics exercise, he/she can ask his/her peers in his/her own group how to solve the problem. The more capable peer(s) or the peer(s) who know(s) how to solve the problem will be expected and encouraged to tell him/her how to solve the problem. If, for example, no one among the group members can solve the problem, then the group can ask for a help from their teacher. At this stage, the teacher is expected to tell the pupils (the group members) the way(s) how to solve the problem, but not to tell them the answer of the problem. This feature continues until all groups have completed their Mathematics exercise.

If all groups have completed their Mathematics exercise, they are still sitting in their own groups, the teacher will give the feedback, discuss the answers together with all groups. When the time is up and the next lesson will begin, the teacher will ask the pupils to sit back in rows again.
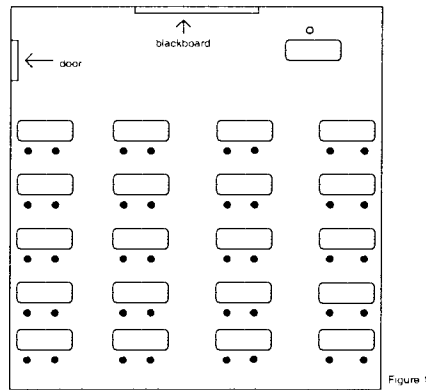
Figure 1
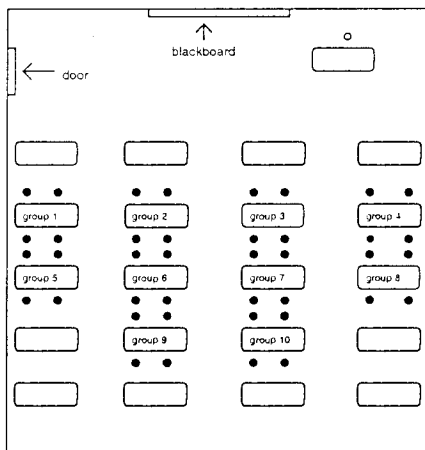
Figure 2
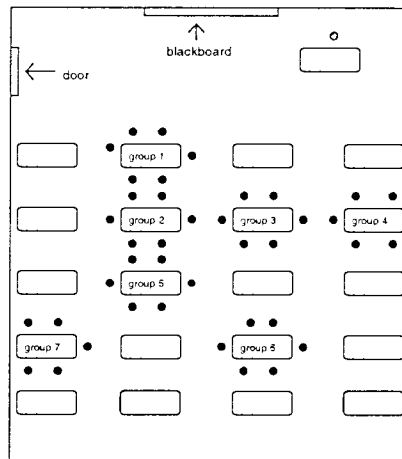
Figure 3

6. Day Six : (a four-hour session)

As a final session, this session is aimed to strengthen the teachers= theoretical and practical knowledge. Therefore, this session will be in the forms of role-playing and discussion. In the role-play, one or two teachers will be asked to practice teaching on the basis of the proposed intervention programme. The materials for the role-play will be taken from the first term of year three, the 1994 Indonesian primary school curriculum. Having completed the role-play, the question session will be held.

Dreedan, R. (1984) First-Grade Reading Groups: Their Formation and Change in Kutnick, P. and Rogers, C. (eds.) (1994) *Groups in Schools.* London: Cassell.

Galton, M. and Williamson, J. (1992). *Group Work in the Primary Classroom.* London: Routledge.

Golby, M. (1982) Microcomputers in the Primary Curriculum in Corner, C and Lofthouse, B (Eds.) (1990) *The Study of Primary Education: A Source Book Volume 1 - Perspectives.* London: The Falmer Press.

Good, T. and Marshall, S. (1984) Do Students Learn More in Heterogenous or Homogenous Groups in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Johnson, D. and Johnson, R. (1985) The Internal Dynamics of Co-operative Learning Groups in Kutnick, P. and Rogers, C. (Eds.) (1994) *Groups in Schools.* London: Cassell.

Kerry, T. and Sands, M. (1982) Handling Classroom Groups in Galton, M. and Williamson, J. (1992). *Group Work in the Primary Classroom.* London: Routledge.

Kutnick, P. and Rogers, C. (1994) Groups in Schools. London: Cassell.

Merrett, F. (1994) Whole-Class and Individualised Approaches in Kutnick, P. and Rogers, C. (1994) *Groups in Schools.* London: Cassell.

Richards, C (1982) Primary Education 1974 - 80 in Corner, C and Lofthouse, B (Eds.) (1990) *The Study of Primary Education: A Source Book Volume 1 - Perspectives.* London: The Falmer Press.

Richards, C. (1979) Primary Education: Belief, Myth and Practice in Bloomer, M. and Shaw, K.E. (Eds.) (1979) *The Challenge of Educational Change: Limitation and Potentialities.* Oxford: Pergamon Press Ltd.

Tann, S. (1981) Grouping and Group Work. in Pollard, A. and Tann, S. (1994). *Reflective Teaching in the Primary School: A Handbook for the Classroom.* London: Cassell.

Yeomans, A. (1983) Collaborative Group Work in Primary and Secondary Schools: Britain and USA in Galton, M. and Williamson, J. (1992). *Group Work in the Primary Classroom.* London: Routledge.

The Training Features

The teachers and the researcher are introducing each other

The teachers are working in small groups

The teachers and researcher are picturing together at the end of the training

UNIVERSITAS SRIWIJAYA

Information on the Residuals of the Analysis

Histogram of the Standardised Residuals:

Dependent Variable: Post-test Scores

Std. Dev = .99
Mean = 0.00
N = 697.00

Regression Standardized Residual
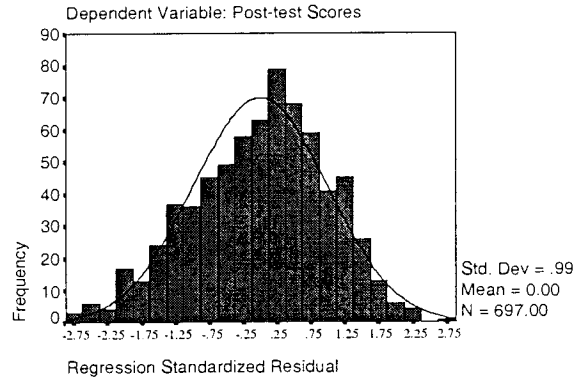
Commulative Probability Plot of Standardised Residuals:

Dependent Variable: Post-test Scores

Observed Cum Prob
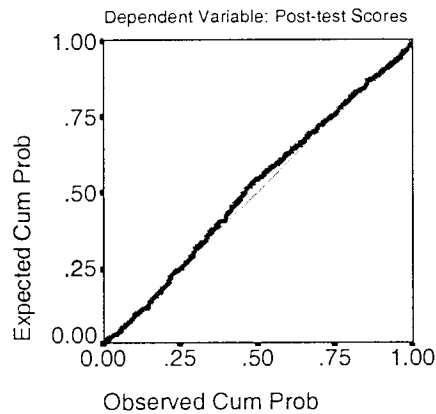
Scatterplot of Predicted Scores against Residuals:

Dependent Variable: Post-test Scores

Regression Standardized Predicted Value
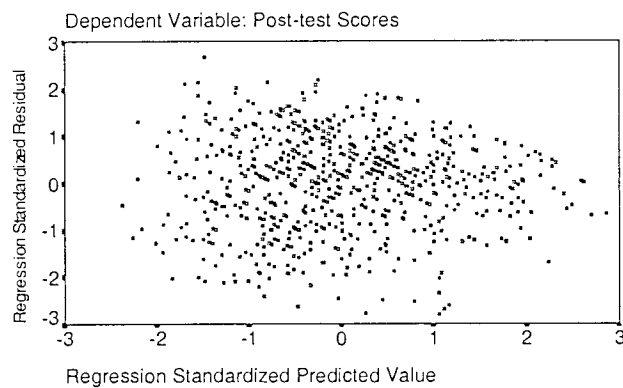
Residuals Statistics:

	Min	Max	Mean	Std Dev	N
Unstandardised Predicted Values	22.23	92.98	53.41	13.14	697
Unstandardised Residuals	-37.46	35.97	0.00	13.36	697
Standardised Predicted VAlues	-2.37	3.01	0.00	1.00	697
Standardised Residuals	-2.78	2.67	0.00	0.99	697

Figure 1:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 1
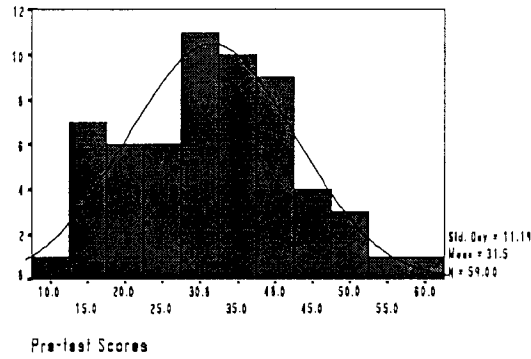

Pre-test Scores
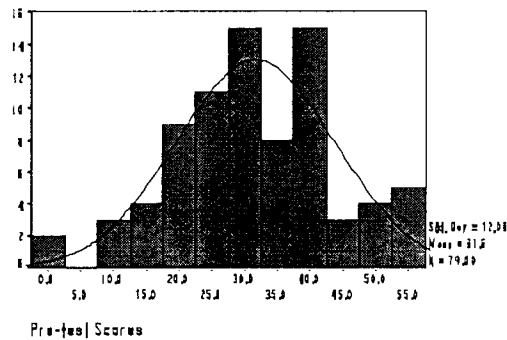
Figure 2:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 1
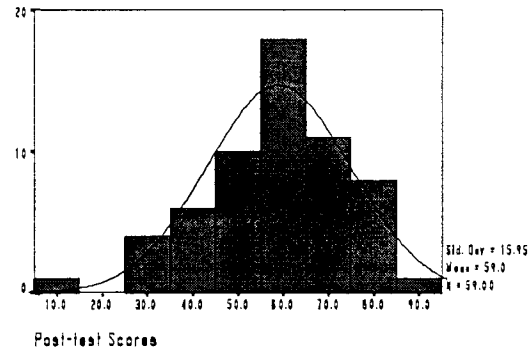

Post-test Scores
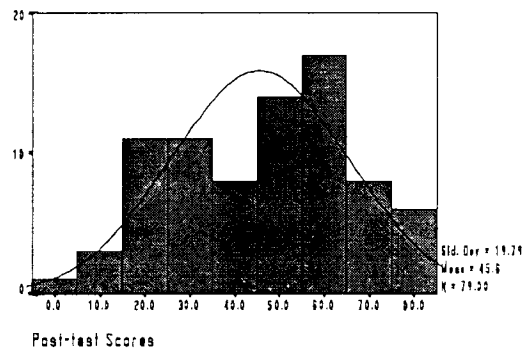
Figure 3:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 1
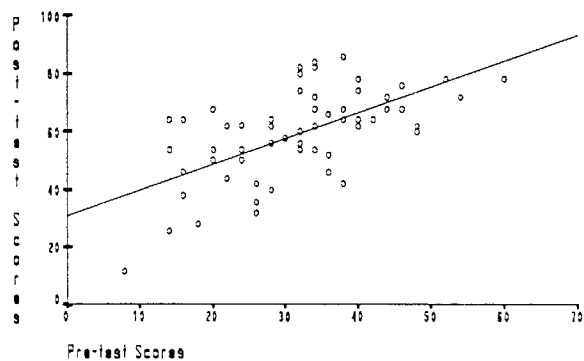

Pre-test Scores
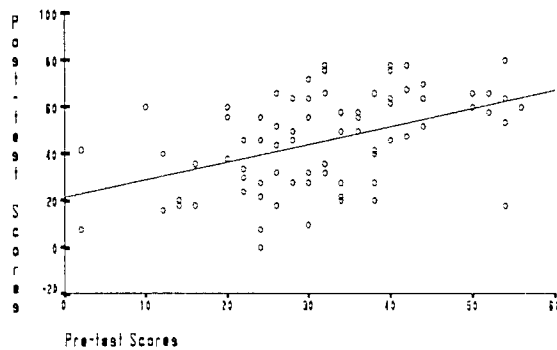
Figure 4:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 2
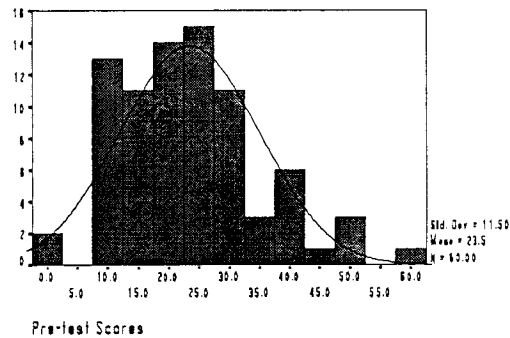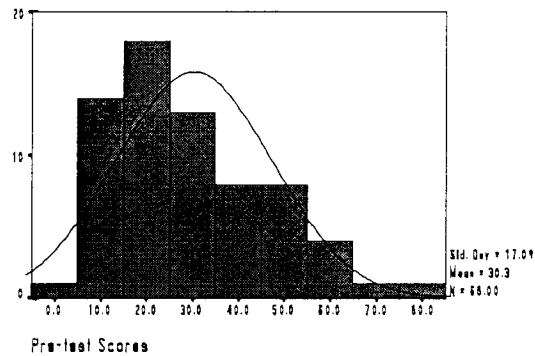

Figure 5:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 2
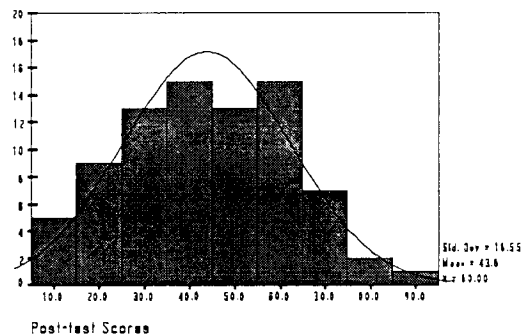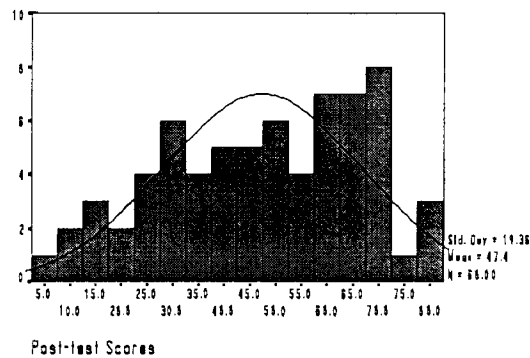

Figure 6:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 2
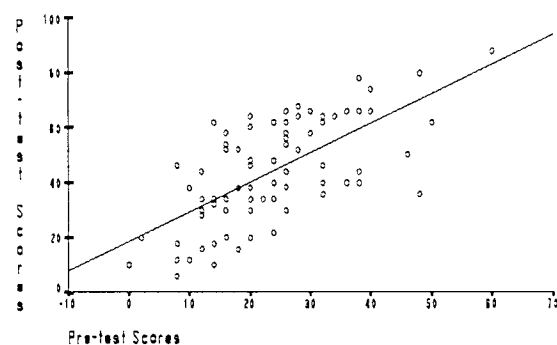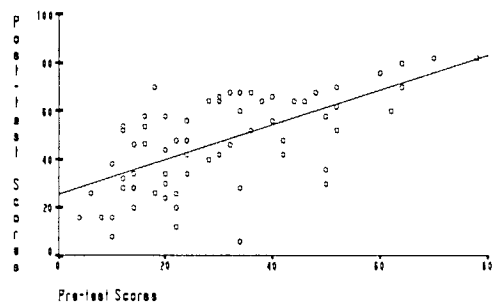
Figure 7:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 5
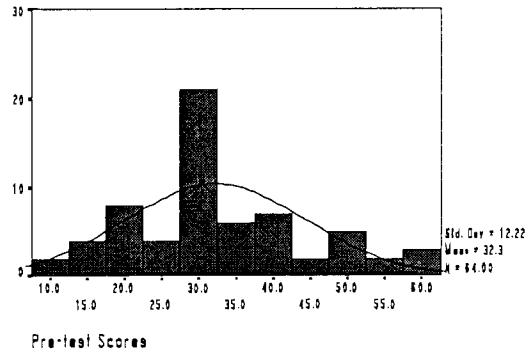
Figure 8:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 5
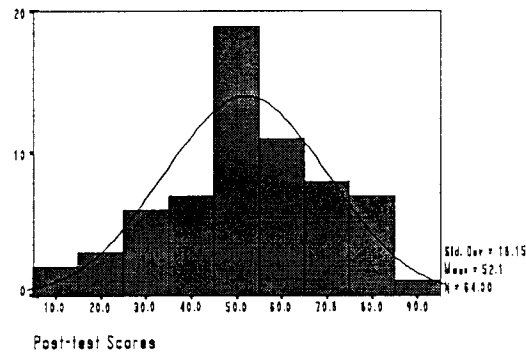
Figure 9:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 5
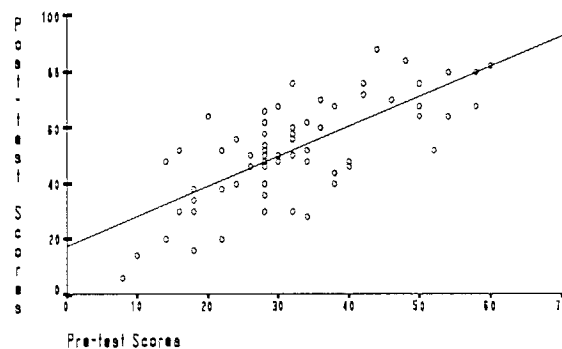
Figure 10:

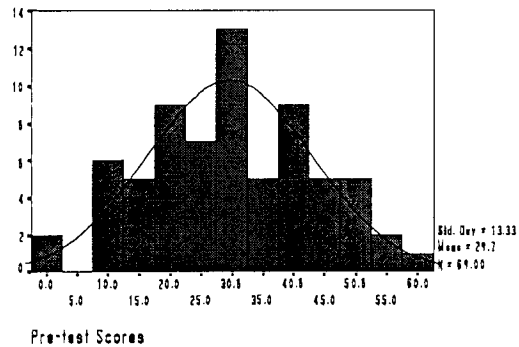Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 63

Pre-test Scores
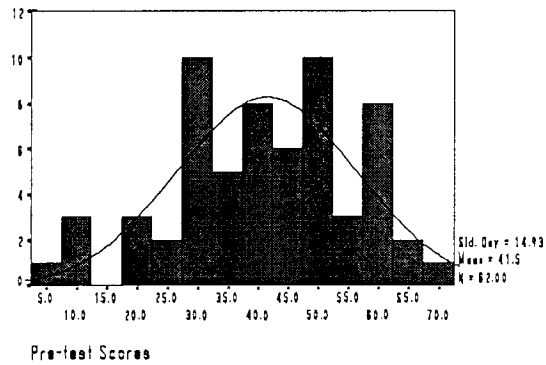
Figure 11:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 63
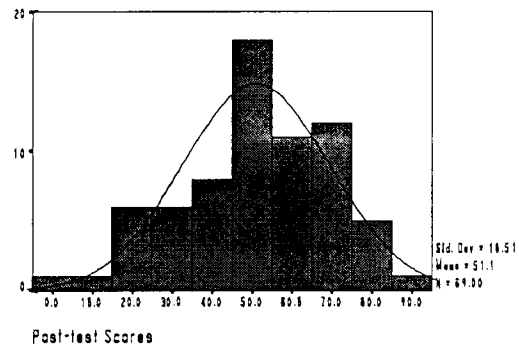

Post-test Scores
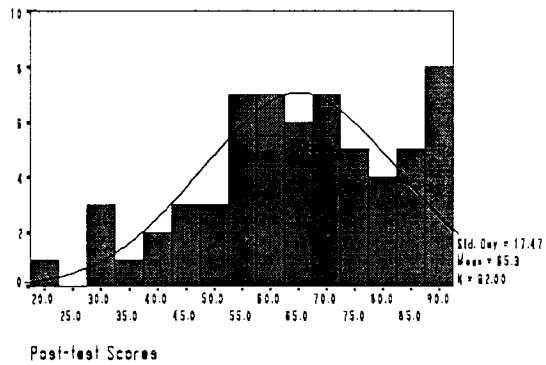
Figure 12:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 63
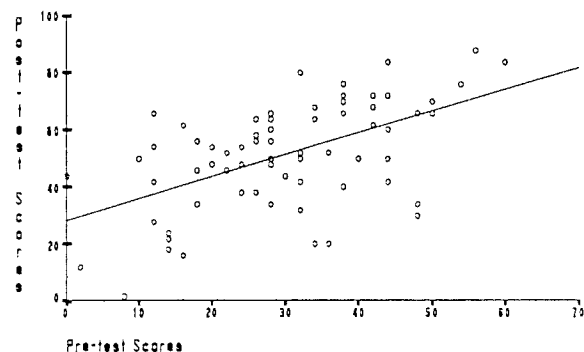

Pre-test Scores

256
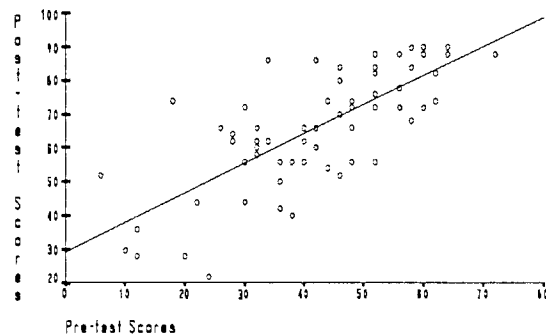
Figure 13:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 78

Pre-test Scores

Figure 14:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 78

Post-test Scores

Figure 15:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 78

Pre-test Scores

Figure 16:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 82
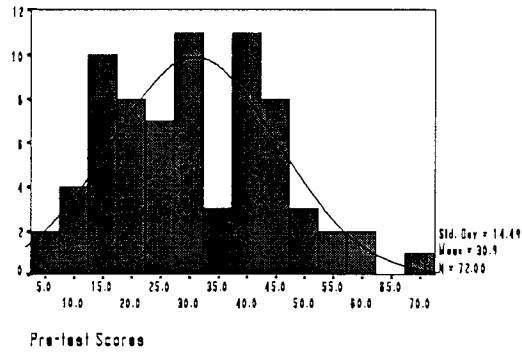

Pre-test Scores

Figure 17:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 82
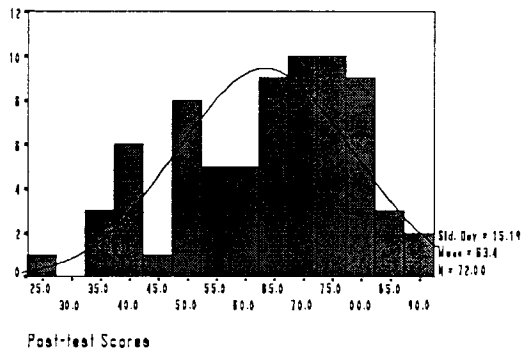

Post-test Scores

Figure 18:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 82
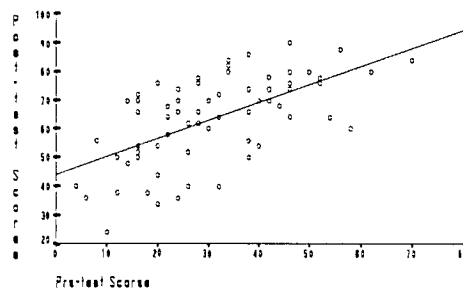

Pre-test Scores

Figure 19:

Histogram of Prior Mathematics Attainment Scores for Intervention and
Comparison Groups of Primary School Number 97

Pre-test Scores

Figure 20:

Histogram of Prior Mathematics Attainment Scores for Intervention and
Comparison Groups of Primary School Number 97

Post-test Scores

Figure 21:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics
Attainment Scores for Intervention and Comparison Group Pupils of
Primary School Number 97

Pre-test Scores

Figure 22:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 249

Figure 23:

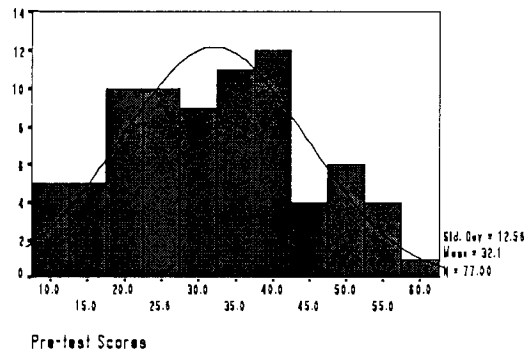Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 249
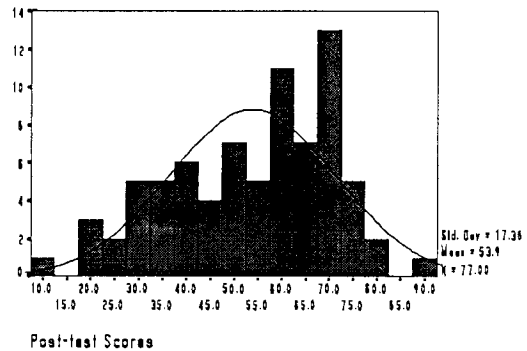

Figure 24:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 249
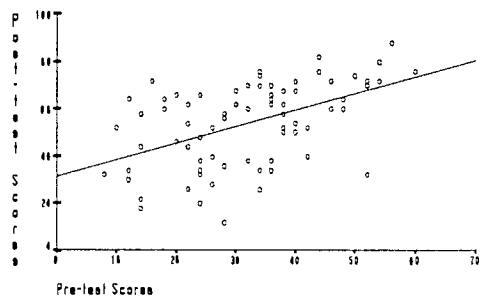
Figure 25:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 250
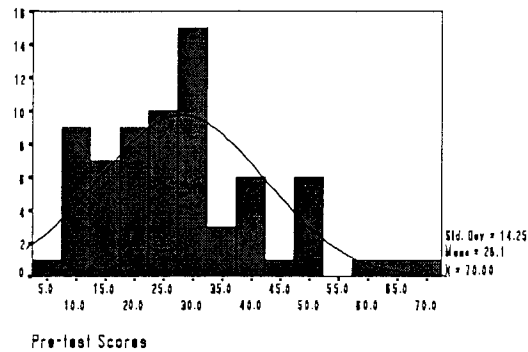

Pre-test Scores

Figure 26:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 250

Post-test Scores

Figure 27:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 250

Pre-test Scores

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Figure 28:

Histogram of Prior Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 604

Pre-test Scores

Figure 29:

Histogram of Post Mathematics Attainment Scores for Intervention and Comparison Groups of Primary School Number 604
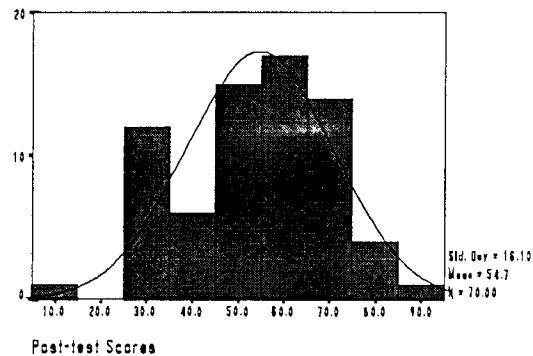

Post-test Scores

Figure 30:

Scatterplot of Post Mathematics Attainment Scores by Prior Mathematics Attainment Scores for Intervention and Comparison Group Pupils of Primary School Number 604

Pre-test Scores

262