

# Teacher Factors and Mathematics Achievement of Cambodian Urban Primary School Pupils

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## Abstract

The government of Cambodia has made considerable efforts to improve the educational standard especially in the primary level since the rebirth of education system in 1979. To date, teacher development is one of the intervention priorities to achieve this goal. However, data that can serve as a guide to achieve this goal are lacking. In this study, an attempt was made to examine the effects of selected teacher factors on the achievement of urban primary school pupils in Cambodia. Data for this study were gathered from 92 fourth grade teachers and 997 fourth grade pupils by means of questionnaires and an achievement test. The results of the stepwise regression analysis reveal that teachers' economic status, their years of teaching experience and job satisfaction have statistically significant relationships with the achievement of the pupils whose economic status had been held constant. However, this three teachers' variables explain only about 20 per cent of the variance in the pupil learning achievement.

## 1. Introduction

Over the past decades, educational planners, policy makers and administrators all over the world have become increasingly concerned about the quality of education provided by the school system. They have come to realize that many meaningful improvements in the quality of education that pupils receive are highly dependent on the quality of teachers (Anderson, 1991). This situation is especially true in the developing countries where teachers are usually the only adults who transact educational inputs to the pupils.

In performing their teaching tasks and the resulting pupil learning outcome, however, are affected by a number of factors. According to previous research, these factors include level of educational attainment of teachers, number of years of teaching experience, participation in in-service training programs, degree of job satisfaction, motivation and salary (for instance, Murnane & Phillips, 1981; Fuller, 1987, 1990; Greenwald, Hedges & Laine, 1996; Bambico, 2001, 2002; Noriega, Lavin & Martinez, 1996; Kaiming, 1996; Jordan, Mendro & Weesinghee, 1997; Reynolds, 2000; Darling-Hammond, 2000). Subject matter knowledge is a variable that is generally thought to have a linear relationship with pupil perfor-

mance. Although there is no consensus objective measurement of how the teacher's knowledge of subject matter should be measured, level of educational attainment is generally considered as an indication of teacher's knowledge of subject matter. While there is some support for the assumption that there is a relationship between knowledge of subject matter and pupil achievement, the findings are not as strong and consistent as one might suppose in the developed countries (Darling-Hammond, 2000). Studies in American schools found no consistent relationships between teacher's subject matter knowledge and teacher performance as measured by pupil outcome or supervisory ratings (Andrew, Blackmon & Mackey, 1980; Haney, Madaus & Kreitzer, 1987). Previous studies in the developing countries also showed inconsistent relationship between the level of educational attainment of teachers and pupil outcome. Govinda and Varghese (1996) found that the educational attainment of teachers positively influenced pupils in all localities in India. However, in urban area, the effects of qualification would be significant only if teachers possessed a graduate or postgraduate degree. Noriega, Lavin & Martinez (1996) obtained similar results in Mexican primary schools. They found that teachers' years of schooling had a non-significant negative relationship with pupil achievement in urban and marginal urban primary schools. The study found that teachers' schooling had a significant effect in less developed zones. However, the results were opposite. In other words, pupils who studied with teachers who had more years of schooling in the indigenous zone obtained better results; while in the rural primary schools, pupils of teachers with more years of schooling obtained poorer results. In the case of China, no clear relationship was established between the level of educational attainment of teachers and their pupil outcome (Kai-ming, 1996).

Other studies on teacher effectiveness have found a relationship between the length of teaching experience and pupil achievement in the developed countries (Murnane & Phillips, 1981; Noriega, Lavin & Martinez, (1996). In America, according to Hanushek (1996), teachers' years of teaching experience were more consistently related to pupil achievement than their educational quality, although some studies failed to establish the relationship. As for in the developing countries, research studies also found inconsistent results in this aspect. Some studies showed a positive relationship between teacher experience and pupil achievement (Heyneman & Loxley, 1983), others showed no relationship (Schiefelbein, & Simmons, 1981). In his review of 23 school effectiveness research studies, Fuller (1987) found that only 10 studies confirmed the hypothesis of significant relationship between teachers' years of teaching experience and pupil outcome.

To help teachers update their academic background and upgrade their teaching performance, teachers are provided with continuous opportunity for their professional development through in-service training programs. The academic and professional training of teachers after the embarkation of their teaching career has been found to have a direct and positive bearing on the quality of their teaching practices and pupil achievement subsequently (Burgess & Galloway, 1993; Noriega, Lavin & Martinez, 1996; Bambico, 2001, 2002).

In addition to the above characteristics of teachers' academic quality, their non-academic quality such as motivation and satisfaction were also found to affect pupil outcome in previous studies (Lockheed & Verspoor, 1994, Carron & Cháu, 1996; Kai-ming, 1996). The explanation given is that motivated and satisfied teachers appeared to have a better professional commitment for the benefits of their pupils (Sim, 1990; Hean & Garrett, 2001; Ma, 1999). These teachers are more willing to spend more time exploring knowledge with their pupils. On the other hand, poorly motivated and dissatisfied teachers make frequent absences, exhibit indifferent behaviors to their pupils and inappropriate classroom prac-

tices, impeding their ability to teach.

Although it abounds in the literature on relationship between teacher factors and pupil outcome worldwide, such scholarly work is rare in Cambodia (Ayres, 2000), a country in which formal education system was completely eradicated and about 75 per cent of educated people were killed during the auto-genocidal regime from 1975-1979. As a result of the shortage of scholarly books and articles addressing educational issue, the reform in education for quality improvement has been slow despite impressive quantitative expansion. The most unachieved goal of the first 5-year plan is to reduce the high rates of repetition in primary cycle. Data show that around 40% (41 %, 41.2 %, 40.9 % and 37.8 % in 1997, 1998, 1999 & 2000, respectively) of pupils enrolling in grade one were repeaters (Ministry of Education, Youth and Sports [MoEYS], 1997, 1998, 1999 & 2000) in Cambodian primary schools. Due to the lack of evaluation study of pupil performance, the progress of the pupils are assessed based on teacher-made tests conducted at the end of each month and semester as a proxy for pupil achievement in all grades in the primary cycle (MoEYS, 1999). In a promotion system based on the level of performance, as is the system in Cambodia, it is generally accepted that the high repetition rates attest to the low standard of the pupil performance.

In identifying the relationship between teacher factors and pupil outcome, several studies use a measure of pupil achievement as the main dependent variable for reliable measurement reason. According to Stemler (2001), within the construct of pupil achievement, however, there are several content areas that have been the focus including mathematics, science and reading achievements. In this study a mathematics achievement was measured. The choice of the mathematics subject was stimulated by the special intervention programs decided by the government and donor agencies to improve pupil outcome in two core subjects: language and mathematics. The programs involved the provision of remedial classes for the entire summer vacation to pupils who did not meet the promotion criteria at the end of the academic year.

## **2. Purpose of the study**

The qualitative improvement of Cambodian primary school pupils is still a questionable issue as attested in the high repetition rates that can be seen as a result of the promotion system, which is based on the pupil achievement, although the quantitative expansion in pupil enrollment has been impressive since the drastic educational reform in 1996. One of the reasons for the slow qualitative improvement is seen in the shortage of the scholarly work that is helpful for policy intervention. Although it is generally accepted in the literature that there are significant relationships between pupil achievement and teacher factors, different studies show different results depending on the countries and circumstances. Premised on these inconsistent results and the shortage of research in this field in Cambodia, this study was conducted to identifying the relationships between teacher factors and the achievement of Cambodian urban primary school pupils. While contributing to the body of knowledge on teacher effectiveness in Cambodia, the results of this study are particularly useful to the Cambodian Ministry of Education and non-governmental organizations involved in educational development as the results can serve as a guide in designing interventions intended to improve the quality of teacher performance and pupil achievement subsequently.

### 3. Methods

#### 3.1. Instruments

This study was conducted to investigate the influence of the teacher factors on the mathematics achievement of pupils studying in Phnom Penh urban primary schools. To gather data on teacher factors, a questionnaire was used to obtain information about teacher gender, their age, level of educational attainment, years of teaching experience, participation in in-service training programs since 1996, economic status and satisfaction. Because the teachers' salary was too small to reflect their economic status, this variable was operationally defined in terms of their household material possessions. Teacher satisfaction was operationally defined as a combination of eight aspects related to the teaching job. In the satisfaction item, teachers were asked to choose a response in a 5 point-Likert scale (i.e., strongly dissatisfied, dissatisfied, neither satisfied nor satisfied, satisfied, strongly satisfied).

A pupil questionnaire was used to obtain information about pupils' economic status that could be used to control their poverty that has been found to be positively related with their academic outcome and is beyond the scope of this paper.

A mathematics achievement test was administered to the pupils in order to measure their level of performance at the end of the first semester in their fourth grade and to serve as a dependent variable for the analyses. The items in the mathematics test were based on the items in the Third International Mathematics and Science Study (TIMSS). Prior to the data gathering, a pretest was conducted. This was done by gathering feedback to the test items from five fourth grade teachers, two of them were trained by test specialists to develop mathematics and language tests for an educational project in the Ministry of Education, Youth and Sports. The pretest that was conducted through a discussion with the teachers aimed at modifying the test items and making them suitable to the Cambodian context in terms of difficulty and relevance. After the discussion with the teachers, the test was pilot tested with the pupils for modification and improvement. After conducting the pretest with pupils, the hardest and easiest items were deleted from the final test which consisted of 19 items ranging from a very simple calculation to difficult problem-solving and complex procedures.

Pupils' scores in the mathematics test were treated in the following ways. Firstly, a score of 1 was given to every item with correct answer and 0 to wrong answer and unanswered questions. With this application, the 19-item test produced the highest score of 19 and the lowest of 0 with a mean of 9.5. Secondly, individual pupil's score was computed. Finally, scores of all pupil participants in one class were added up and the mean scores obtained at the classroom level served as the dependent variable for the analyses in relation to the variables in the teacher factors. The mean score of the 92 classes ranged from 5.6-13.9 ( $M = 9.6$ ;  $SD = 1.7$ ).

#### 3.2. Participants

##### Teachers

Seven schools located in central Phnom Penh, the capital city of Cambodia were chosen with the intention to minimize the effect of school cultures, pupil backgrounds and the working conditions of the teachers. All fourth grade teachers in the seven schools, except those who took leaves, were included in the study. Aside from answering the questionnaires as participants, the teachers also assisted in administering mathematics achievement test and questionnaires to their pupils. Participants in this study were 92 fourth grade teachers. Demographic description of teacher data is presented in **Table 1**. In this table,

teachers' age, their years of teaching experience, participation in the in-service training programs and household material possessions were divided into four categories and teacher satisfaction was reduced from a 5-point scale to a 3-point scale (i.e., satisfied, neither satisfied nor dissatisfied and dissatisfied).

**Table 1.** Description of demographic data of the participants (N = 92)

<b>Variable</b>	<b>Number</b>	<b>Percent</b>
<b>Gender</b>		
Male	24	26.1
Female	68	73.9
<b>Age</b>		
< 30	31	33.7
30-39	33	35.9
40-49	24	26.1
> 49	4	4.3
<b>Level of educational attainment</b>		
Primary school certificate	9	9.8
Lower secondary school certificate	21	22.8
Upper secondary school certificate	60	65.2
University degree	2	2.2
<b>Years of teaching experience</b>		
< 6	31	33.7
6-10	32	34.8
11-15	15	16.3
> 15	14	15.2
<b>Participation in training programs</b>		
Once	27	29.3
Twice	21	22.8
Three times	15	16.3
Four times or more	29	31.5
<b>Overall satisfaction of the eight aspects</b>		
Satisfied	38	41.3
Neither dissatisfied nor satisfied	14	15.2
Dissatisfied	40	43.5
<b>Material possessions</b>		
0-5	2	2.2
6-10	23	25.0
10-15	54	58.7
16-20	13	14.1

### **Pupils**

Pupils were selected twice to participate in this study. Firstly, about 50 per cent of pupils in each class were randomly selected to participate in the study by answering the questionnaire designed to control their poverty. In other words, only pupils whose household material possessions ranged from 8-15 were

selected to participate in the second step of the study by taking the test of mathematics achievement. Random sampling procedure was performed again to choose only 12 pupils in classes with more than 12 pupils with material possessions between 8-15. Through these procedures, 997 were finally selected as participants in this study. Nine hundred and sixty-eight pupils gave valid responses to gender question. Out of these 968, 474 (49%) were boys, 494 (51%) were girls. The ages of these pupils ranged from 8-16 ( $M = 10.9$ ,  $SD = 1.6$ ). It is worth of notice that the participant percentage is an inversion of the actual gender percentage of Phnom Penh fourth grade pupils in academic year 2000-2001 which comprised 52.9 per cent of boys and 47.1 per cent of girls (MoEYS, 2001).

### 3.3. Procedures

Upon the request of the researcher, a letter of permission to conduct survey in the primary schools was issued by the Municipal Office of Education and distributed to school principals for cooperation. Upon their approval, the researcher distributed the questionnaires to both teachers and pupils during their regular class hours. Through observations and informal discussion with teachers, the researcher found that it was the first time for almost all teachers to participate in such a study and to fill in the questionnaire, and so did their pupils. Therefore, the researcher had to explain both the purposes of the research and how to fill in the questionnaire to all teachers and pupils. As the researcher personally collected the data, he was able to check the teachers' completeness of the answers in the questionnaires. To ensure accuracy of the pupils' data on socioeconomic background, pupils were requested to bring the questionnaires home and ask their parents or guardians to check their answers.

Only pupils who were finally selected were admitted to remain in the classes and take a mathematics test on one regular session. To make the classrooms conducive for the pupils who took the test, pupils who were not selected were asked to leave the classrooms and study in the library or play outside. As the test was administered during the first semester examination period, all pupil participants were told that the scores of the mathematics test would be used as the first semester examination scores so that they would do their best and that pupils who did not take the test with the researcher would take it with their classroom teacher on later day.

This study was conducted from early November 2001 to late January 2002.

### 3.4. Data analysis

As aforementioned, the purpose of the study was to examine the effects of teacher factors on pupil achievement in mathematics and data were gathered by questionnaires and a mathematics achievement test. Five variables of teacher factors (level of educational attainment of teachers, their years of teaching experience, participation in in-service training programs, job satisfaction and economic status) were analyzed, presented and discussed in relation to their pupil achievement. Teacher gender and age were excluded from the analyses due to their limited openness to the policy interventions. The five variables were treated as independent variables and scores of mathematics test were treated as a dependent variable. Data were analyzed using correlation and stepwise regression analyses. The correlation coefficient was used to determine the relationships between pupil achievement and each variable in the teacher factors. To determine the joint effects of the variables on pupil achievement, a stepwise regression analysis was conducted. In the analyses, years of teaching experience, the number of in-service training programs teachers have attended and material possessions were measured as interval variables and level of educational attainment of teachers and job satisfaction were measured as ordinal variables (Schwab, 1999).

## 4. Results

Examining the results of the correlation matrix presented in **Table 2** reveals that three out of the five variables are statistically significantly related to pupil achievement. However, the correlation coefficients shows a weak relationship between pupil achievement and teaching experience ( $r = .26, p < .05$ ) and their job satisfaction ( $r = .26, p < .05$ ), a fair relationship between pupil achievement and the economic status of teachers ( $r = .35, p < .01$ ). Teacher level of educational attainment appears to have a positive relationship with pupil outcome ( $r = .20, ns$ ) although it does not reach the predetermined alpha of 0.05. The number of in-service training programs that the teachers have attended since 1996 has no significant relationships with pupil achievement albeit it shows a negative effect ( $r = -.08, ns$ ).

To what extent, can the variance in pupil achievement be explained by each variable in the teacher factors? What factors contribute joint effects to pupil achievement? To answer these questions, a stepwise regression analysis was performed. In the analysis, only variables that showed significant relationships with pupil achievement in the correlation analysis were included. Those variables that did not reach the predetermined significant level of 0.05 were not entered in the analysis.

**Table 2.** Simple correlation between teacher factors and pupil achievement

Variables	Correlation Matrix					
	1	2	3	4	5	6
1. Pupil achievement	-					
2. Teacher's education	.20	-				
3. Teaching experience	.26*	-.09	-			
4. Participation in training	-.08	-.08	.14	-		
5. Material possessions	.35**	.16	.10	.13	-	
6. Satisfaction	.26*	.17	.02	-.04	.17	-

\*\* $p < .01$ , \* $p < .05$

The first variable entered was the material possessions of teachers. **Table 3a** shows that with an  $R^2$  of .123, amount of variance explained by this variable was only about .12 per cent. The regression equation in this case was:

$$\text{Pupil achievement} = 7.566 (\text{constant}) + .351 (\text{material possessions})$$

**Table 3a.** Stepwise regression analysis of the material possessions of teachers and pupil achievement

Variable	Standardized coefficients	Standard error	<i>t</i>	Sig.
Material possessions of teachers	.351	.047	3.555	.001
Constant	= 7.566			
Standard error of estimate	= 1.574			
$R^2$	= .123			

The next variable entered in the stepwise regression analysis was teachers' years of teaching experience. **Table 3b** indicates that with an  $R^2$  of .173, the amount of variation explained by this variable was only about 17 per cent. The new regression equation in this case, therefore, was:

Pupil achievement = to be aligned with 7.063 (constant) + .328 (material possessions) + .225 years of teaching experience

**Table 3b.** Stepwise regression analysis of material possessions of teachers and teaching experience and pupil achievement

Variable	Standardized coefficients	Standard error	<i>t</i>	Sig.
Material possessions of teachers	.328	.046	3.380	.001
Years of teaching experience	.325	.030	2.319	.023
Constant	= 7.063			
Standard error of estimate	= 1.537			
R <sup>2</sup>	= .173			

The variable entered in the stepwise regression analysis in the last model was teachers' job satisfaction. **Table 3c** reveals that with an R<sup>2</sup> of .213, only about 21 per cent of pupil variance could be explained by the three variables in the teacher factors. These three variables are economic status of teachers, their years of teaching experience and job satisfaction. The last regression equation in this case, therefore, was:

Pupil achievement = to be aligned with 5.551 (constant) + .294 (material possessions) + .223 (experience) + .201 (satisfaction)

**Table 3c.** Stepwise regression analysis of the material possessions of teachers, years of teaching experience and their job satisfaction and pupil achievement

Variable	Standardized coefficients	Standard error	<i>t</i>	Sig.
Material possessions of teachers	.294	.046	3.051	.003
Years of teaching experience	.223	.030	2.348	.021
Teachers' job satisfaction	.201	.033	2.099	.039
Constant	= 5.551			
Standard error of estimate	= 1.509			
R <sup>2</sup>	= .213			

The results of the regression analysis presented in **Tables 3a, 3b, 3c** show that the three variables from the correlation analysis remain significant contributors to the explanation of variance of about 21 per cent in pupil achievement in the stepwise regression analysis.

## 5. Discussion

This study found a significant positive relationship between teachers' economic status measured by the household material possessions and pupil achievement. General observations show that economic status of teachers is a serious factor affecting teacher's work and the subsequent achievement of their pupils. It is undeniable that Cambodian urban primary school teachers cannot live on their net salary provided by the government. As a consequence, teachers are forced to engage in second income-gener-



ating job to support themselves and their family (Bray, 1999; Ayres, 2000). Common observations and informal discussion with teachers reveal that sources of income of primary school teachers in Phnom Penh come from their pupils. Firstly, pupils are requested to pay their teachers 200 riels for their regular classes (Bray, 1999). Charging a tuition fee of 200 riels from each pupil except for some exceptions for extremely impoverished pupils, teacher can collect about US\$ two from a class of 40 pupils. This amount is small, however, it is twice as much as teachers' monthly salary of about US\$ 20, i.e., US\$ 1 per teaching day, regardless of pay scale (MoEYS, 2001). Secondly, teachers provide remedial classes with a higher fee attached in the afternoon when the teacher teaches in the morning and vice versa.

This study shows a significant positive relationship between teaching experience and pupil achievement. In general, teachers who have been in the teaching job for a longer period of time have gained significant impact on their performance and pupil achievement. This result is consistent with the findings in previous studies (for instance, Murnane & Phillips, 1981; Fuller, 1987, 1990; Greenwald, Hedges & Laine, 1996; Bambico, 2001; Fuller, 1987; Reynolds, 2000) showing that teachers become more effective when they have longer experience and that experienced teachers are typically more effective than their inexperienced counterparts. One reason could be that experienced teachers are able to use more effective instructional skills and help pupils achieve higher learning outcome. For Cambodian primary school teachers, longer teaching experience is a means for teaching material collection because teachers usually are requested to develop and keep their own materials that were found to have significant impacts on their teaching performance (Chhinh, 2002).

Regarding teacher satisfaction, data shows that responses appear to cluster around 3 (i.e., neither dissatisfied nor satisfied). However, the analysis reveals a significant relationship between teacher satisfaction and pupil achievement. This result confirms the findings in previous studies showing the significant relationships between pupil achievement and teachers' attitudes and behaviors, their professional stability, satisfaction and motivation. Poor motivation and professional satisfaction produces poor commitment towards their teaching job and poor attention and attitudes toward pupils (Lockheed & Verspoor, 1994; Carron & Ch au, 1996). In the literature, it is generally accepted that this non-instructional quality, to a large extent, determines the competence of the teachers. In their comparative study, for instance, Carron and Ch au (1996) found that classes in which the results were better than expected were invariably run by teachers who, for one reason or another, were more motivated than those elsewhere. This is because satisfaction is the eternal source and pleasure to perform. Satisfied teachers devote more mentally, physically and even materially to the development of their teaching. In fact, Chhinh (2002), in his related study about Cambodian urban primary school teachers, found a strong relationship between teacher's non-instructional quality and their instructional practices among the 40 first grade teachers.

The results show no significant relationship between level of educational attainment of teachers and pupil achievement. Similar findings were also found in previous studies (see for example, 1987; Fuller, 1987, 1990; Darling-Hammond, 2000; Bambico, 2001). According to Darling-Hammond (2000) teacher's knowledge of the materials to be taught is essential to good teaching, but the contribution of subject matter expertise would get smaller after reaching minimal essential level that exceed the demands of the curriculum being taught. The relationship between teacher subject matter knowledge and effective teaching are not as strong and consistent as expected; some show positive relationship, other shows negative relationship (Darling-Hammond, 2000). According to Lockheed and Verspoor (1994), in the circumstances where the resources are limited, the level of educational attainment of teachers could be qualified enough if it is one level higher than the pupils the teachers are assigned to teach.

Since the introduction of the new curriculum in 1996 in primary level, teachers have been given continuous opportunity to upgrade and update their performance through in-service training programs organized by the concerned institutions in the Ministry of Education in cooperation with a number of non-government organizations. Compared with other sectors in teacher development, it is seen that the most critical achievement of the last four years has been seen in teacher training (Renou, Mathews & Clement, 1999). In this study, an attempt was made to identify the relationship between teacher participation in in-service training programs since 1996 and pupil achievement. Although the number of in-service training programs attended by the 92 participants in this study was reported to be relatively high, there is no evidence of a relationship between this variable and pupil achievement. It seems possible to argue that the trainings do not create an impact on pupil achievement. The reason for this lack of impact could be in the manner by which the trainings are conducted. Based on documents, in-service training programs are conducted in regional teacher training centers, in schools based on cluster system and distance trainings. The problem is that the training programs were conducted in a cascade system, short, focused on many content areas and usually irrelevant to the real situations that the teachers encountered (Duggan, 1996; Renou, Mathews & Clement, 1999). Before the contents of the training reach the final trainees -teachers-, skills initially imparted from the experts become less effective, as they have to go through several trainers along the cascade system. For this reason, it is understandable that teachers find it hard to really get what they are expected to obtain from the training and use them in real classroom teaching. Another problem is that whatever is learnt from the trainings, teachers seldom apply in the classroom practices. Common observations show that teachers do their best to impart knowledge or use effective teaching approach only when they are informed that their classrooms are observed. In his uninformed classroom observation study with 40 first grade teachers, Chhinh (2002) found that teachers did not use skills they benefit from Thursday technical meeting or the materials even if they were in the cupboard inside their classrooms. The infrequent use of the pupil-centered approach is understandable because this approach by comparison with the old one requires teachers' efforts, time and money for visual material development.

## **6. Conclusion and Implication**

The finding of this study in conjunction with a number of other studies in recent years, reveals some noteworthy results. Among the five variables assessing the quality of teachers in this study, teachers' economic status measured by the possessions of the household materials, teaching experience and job satisfaction are significant positive predictors of pupil achievement in mathematics in the stepwise regression analysis. The level of educational attainment of teachers is positively related with pupil outcome; however, it does not reach the predetermined significant level of .05. Unlike most studies in other settings, this study found no indication of a relationship between the number of in-service training programs teachers attended and pupil achievement.

The results of this study, despite relatively small in scope, suggest a number of implications for policy intervention to improve the quality of teachers and pupil achievement subsequently and offer some suggestions for further study to delve into the problems related the low achievement of the Cambodian primary school pupils. Firstly, the results of the study alert that the quality of the primary school teachers measured by their pupil outcome in Cambodia does not cover only the level of knowledge of subject matter. Non-academic quality such as satisfaction is found in this study to be a very important issue in

determining teacher's commitment and pupil achievement subsequently. Similarly, the significant relationships between economic status of teachers and their professional satisfaction and pupil achievement suggest that any intervention programs designed to update and upgrade teachers should take these two aspects of non-instructional quality into consideration and implementation in a more formal and systematic manner. It is commonly observed in previous studies that sources of satisfaction (Ma, 1999; Hean & Garrett, 2001) of teachers teaching in a system where they are poorly paid could be maximized by the provision of monetary incentives. Without satisfied and committed teachers working in schools, the realization of quality improvement of Cambodian primary school pupils remains an unrealistic educational goal.

Secondly, the study failed to find the relationship between pupil achievement and the numbers of in-service training programs the teachers have attended since the introduction of the new curriculum in 1996. Investigation must be pursued to find out the mechanism underlining the issue. In-service training programs are seen as one of the most outstanding achievements in educational reforms since the middle of 1990. However, the payoff at the classroom level seems to be minimal. It is strongly recommended that a systematic observation be conducted to find out where the problems lie. As it is observed that the trainings programs are not systematic, short and irrelevant, the results of this study suggest an alternative way of conducting the programs. Continuous, more systematic, teachers' need-oriented strategies might be more effective interventions than the ones currently being provided. It is difficult to conclude whether the teachers learn what they are expected in the training programs or not as the programs are short, irrelevant, irregular and conducted in a cascade system. Another reason can be that teachers learn to some extent the new skills and knowledge, however, the skills are not applied in the classrooms just as the case of Thursday technical meeting due to the lack of the relevancy of the programs or the indifferent commitments of the teachers (Wheeler, 1998; Chhinh, 2002).

As in any other research using regression analysis, care must be taken into consideration due to its statistical power caused by insufficient sample size (Schwab, 1999). Due to this limitation, the results of this study can only serve as a stepping-stone for further study on teachers, teaching and pupil achievement in urban area. Only achievement test in mathematics subject was conducted in this study. Replication of the study covered bigger sample size and subject areas is strongly recommended before a conclusion can be drawn that teachers are the factor causing high rates of repetition prevailing in the documents issued by the Ministry of Education, Youth and Sports (1997, 1998, 1999, 2000). Furthermore, this study does not cover the teachers' instructional practices. Further study on the effects of teachers factors on pupil achievement is recommended to include instructional practices that have been found to have a direct effect on pupil outcome. With an R square of only .213, it indicates that there are many other factors that contribute to pupil achievement-these factors can rest with pupils, curriculum, material inputs etc. These remain open and worthy for further studies.

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