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Uncovered Truths of Pupils' Academic Achievement in Rural Cambodian Primary Schools

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Abstract

With attempts to understand the effect of school level and family level on academic achievement as well as to discover factors affecting pupils' academic achievement, this study employed a 2-level Hierarchy Linear Model (HLM) for its analysis using the data from 1,131 Cambodian fourth graders and their families from 30 rural primary schools. Mathematics test scores was used as an outcome variable. Interview-guided questionnaire was used to collect data from these group of pupils due to limited knowledge to read and understand some concepts of questions. This study revealed that the effect of school was larger than that of the family like previous findings in other developing countries. Firs ever, using home-school book were claimed to have positive relation with the academic achievement. Child labor was found to be one of the determinants decreased the pupils' test scores. However, if children helped parents with in-home housework showed modestly positive association with improving test scores with a threshold of three hours. However, socioeconomic status had no statistically significant contribution towards predicting the academic achievement in this study. Absenteeism of teachers and school principals had negative association with the test scores. This current study, additionally, recalled for more attention from any educational stakeholders to the rural schools in order to ensure the realization of national curriculum goals and national goals by 2030.

Keywords: Achievement predictors, Cambodia, HLM, Primary education, Student performance

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Introduction

Cambodia aims to grow herself to upper middle-income country by 2030 and to industrial one by 2050. To realize these, Cambodia has been committing towards achieving Sustainable Development Goals (SDGs) and involved in many international development programs. In this regard, education quality is prioritized as an important endeavor for Cambodia towards achieving its national goals. Students' academic achievement, also, became ones of the topics for a discussion among relevant stakeholders. Ministry of Education Youth and Sport (MoEYS) has increased more foci on understanding challenges and factors impacting students' academic achievement at the basic education level through Cambodian Education Sector Support Project (CESSP) as well as implementing the Education Strategic Plan (ESP) 2014-2018, which responds to the National Strategic Development Plan 2014-2018.

In an alignment with the universal concepts of Education for All (EFA), which were introduced in the 1990Jometient world conference and the 2000Darka world forum, the Royal Government of Cambodia (RGC) prioritized education as one of the main pillars in its National Rectangular Strategy for capacity building and human resource development by implementing four main strategies. One of which was to strengthen quality of education by increasing the number of schools and teachers as well as the enrollment rates at all levels of basic education, especially in the rural and remote areas (RGC, 2014, p.66). Additionally, a nine-year basic education was introduced according to Article 68 of the national constitution: *"the state shall provide free primary and secondary education to all citizens in public schools. Citizen shall receive education for at least nine years"* (p.13). By this token, RGC cooperated with Non-Government Organizations (NGOs) and International Organizations (IOs) strengthened and enlarged school access for all children and introduced Pro-poor policy and school fee abolishment in 2001 (Keng, 2009). Furthermore, other programs were launched nationwide like remedial class, scholarship grant (providing breakfast or lunch at school, giving a bicycle to poor children etc.), child-friendly program and in-service training to retain school-aged children at schools to complete the basic education.

World Bank (2005) and Overseas Development Institute [ODI] (2011) pointed out several challenges at school levels such as low access to basic education among poor families, children living in rural areas and girls as well as high dropout rate at the second circle (4^{th} to 6^{th} grade) of the primary education including high rate of repetition, teachers' poor working condition, low payment, lack of opportunities and students' low academic achievement. However, RGC committed itself to towards EFA goals by 2015. As a result, the net enrollment rates for primary education sharply increased from 87% in 2001 to 97.9% in the academic year 2014-15. The repletion rates at the last grade

(3rd grade) of the first circle at primary education remarkably decreased within the period of 14 years from 8.1% and 2.1% in 2000, and from 4.9% and 1.6% at the last grade (6th grade) of second circle of primary education within the same period (UNESCO, 2015). However, Keng (2009) highlighted that these attempts could not boost the quality of education and schools faced several hinderances in their operations.

To promote the quality of education at basic education level, CESSP conducted nationwide student assessment on Khmer literacy and Mathematics with 3rd, 6th and 9th graders started from 2006 to 2010 respectively. Overall, students had many challenges in obtaining better achievement in those tests as it was stated in the policy for curriculum development 2005-2009 (MoEYS, 2004; 2016). Again, in school year 2013-14, MoEYS conducted national assessment for policy develop and evaluation with eight graders. As overall results, about 50% of 8th graders could pass Khmer literacy, Mathematics and Physics tests (MoEYS, 2017).This poor quality may become one of the key challenges for Cambodia to achieve its national vision by 2030 since education is seen as a backbone for all development prospects. Therefore, insightful understanding about determinants affecting students' academic achievement will be able to assist the nation to heal the challenges on time and to ensure the 2030 national vision.

Literature Reviews

The 1966 Coleman report disclosed that family background has larger impacts on student academic achievement more than do the school resources. His disclosure urged a series of studies to explore factors influencing student academic achievement by investigating into the school effectiveness, socioeconomic status (SES), and racial and ethnic disparities and brought many controversial findings into this field (Gamoran & Long, 2006). The studies done in developing countries proved the opposite conclusions that school resources show larger impacts than family background on student academic achievement (i.e., Alexander, 2001; Buchmann, 2002; Fuller, 1987; Fuller & Clarke, 1994; Heyneman, 1976; Heyneman & Loxley, 1983; Willm & Somers, 2001). However this controversy is still being discussed in later studies of the field.

School Determinants

Common pronounced factors found having effects on student academic achievement in 60 developing countries were class size, teachers' teaching experience, teacher qualification (Fuller & Clarke, 1994), and textbook availability (Heyneman & Loxley, 1983). Hanushek and Luque (2003), in addition, explained that either improving teacher qualification or reducing the class size was important for student academic achievement. However, the limited number of classrooms for each grade at rural area was the main challenge for school principals in implementing this proposition. Significantly,

Hanushek and Lugue (2003) raised a new idea in the same study using the data from the Third International Mathematics and Science Study (TIMSS) that instead of focusing on the school resources, the effects of the school organization and incentives should be concentrated when discovering causes of academic achievement. Similarly, WöBmann (2000) echoed that educational environment of different schools is more significant than that of the resources in terms of improving academic achievement. This is referred to patterns of behaviors in using the school resources rather than the resource itself as well as how teachers and staff behave according to the given incentives. Not only do students but also teachers and principal, also, play vital roles in boosting student academic achievement.

Family Determinants

A study in Pakistan explained that parental education showed higher positive affect on academic achievement than their occupation, and family economy has positive relations with both mathematics and English (Farooq, et al. 2011). This study, additionally, revealed that girls outperformed boys. When parents are educated, they tend to create better home environment for their children to learn and involve in their children's learning like homework supports, following up their children's learning...etc. that assist children attain better academic achievement than their counterparts whose parents are not educated (Fantuzzo & Tighe, 2000; Krashen, 2005). However, regardless of educational attainment of parents, parental involvement was confirmed as a crucial factor generating better academic achievement at school (Barnard, 2004; Furstenberg & Hughes, 1995; Shumox & Lomax, 2001). Furthermore, Wang and Sheikh-Khalil (2014) found that when parents involved (i.e., home-based involvement, school-based involvement, and academic socialization) with their children, not only children's academic achievement, but also develop children's emotion were improved. Additionally, a longitudinal study attempted to investigate the association between family incomes, school attendance and academic achievement of children from K-level to 4th grade in Florida pointed that children's absenteeism and those who were with a poor household underperformed their peers (Morrissey et al. 2014).

Previous Findings in Cambodia

Achievement study attracted more attention from scholars and educational stakeholders in the 2000s when Cambodia was committed herself to achieve the EFA goals. However, its attention has been fading away after Cambodia announced her success in realizing EFA goals. Although the rates of enrollment and retention in primary education remained remarkably high after the 2015 EFA, academic achievement of the pupils especially in rural area started to become a topic to be discussed among educators (MoEYS, 2018a). In this regard, previous studies illustrated common predictors were

individuals and their families such as gender, repetition, absenteeism, child labor, homework, SES, and parental education, and etc. In spite of that the predictors from schools seemed to have little attention.

Gender disparity on achievement was significantly confirmed by previous studies such as CESSP (2006, 2008, 2010), Chhin (2003), and Prak (2005). They commonly found that boys performed better in Mathematics and girls outperformed boys in Khmer literacy. The boys were claimed to have more opportunities than girls in terms of parental supports, and chances to attend private tutoring. However, girls were required to help with house chores (Chhin, 2003). Additionally, CESSP (2010) claimed that boys had chance to experience in outside activities than the girls. These activities could positively contribute towards their inside school learning. Geographically, boys outperformed girls in rural area with high significant level in Mathematics but less in Khmer literacy (CESSP, 2009). However, girls performed better than boys after primary education since the girls who did not drop out during primary school were most likely from better income families (Cambodia Gender Assessment, 2004) and these families provided the girls with a better learning environment (Sakanashi, 2005). This clearly explained that SES had positive impact on academic achievement (CESSP, 2006; 2008; 2009; 2010; Prak, 2005); however, Chhin (2003) applying the same method of linear regression on household possessions claimed that there was insignificant relation between SES and academic achievement.

Older students who repeated class several times and who enrolled school late underperformed their classmates although they had more experiences in learning the same curriculum than did their peers (CESSP, 2008; Chhin, 2003). Absence was commonly found to negatively influence on academic achievement (CESSP, 2006; 2008; 2010). Additionally, CESSP (2010) revealed pupils' absenteeism was caused by child labor, and this resulted in low achievement (CESSP, 2006). Homework variable had been ignored in the previous studies on academic achievement in Cambodian context until it was included in the last study of CESSP in 2010. As a result, students who reported to complete homework more often obtained higher scores in the MoEYS' standardized tests namely Mathematics and Khmer literacy.

Chhin (2003) revealed that parental education had no significant relation with the pupils' academic achievement. However, Nguon (2011) claimed that mother's education had positive impact on academic achievement. Mother's education was, additionally, highlighted to be a strong predictor in improving 9th graders' academic achievement (CESSP, 2009) whereas father's education was found to matter in primary levels. Children whose fathers attained lower secondary education performed better in Mathematics but those whose fathers obtained upper secondary education or university had better achievements in both subjects (CESSP, 2010).

Research Significance

As a matter of fact, the rapid expansion of educational access may shrink its quality in both developed and developing nations. During fast growth of the school system for last two decades, the educational partners have put their interests on the reasons of dropout, how to increase the number of enrollment in basic education and gender disparity in education rather than the achievement of children especially in rural areas. It is important to notice that there were other studies conducted to access student academic achievement in Cambodia, but those studies primarily focused on urban like Chhin (2002, 2003) and in some project-piloted areas like Save the Children Norway [SCN] (2008). Theymight not be able to generalize their results to other areas, particularly the rural areas where more than 80% of Cambodian people are living.

Later, rural area was included in the large-scale studies by CESSP (2006; 2008; 2009; 2010) and by Prak (2005) supported by UNESCO. However, they put their foci on curriculum evaluation, family and individual factors, but school related factors was neglected. Therefore, to deeply investigate into the academic achievement, school-related and family-related determinants must be included as suggested by studies in developing countries (i.e. Buchmann, 2002; Fuller, 1987; Fuller and Clarke, 1994; Heyneman, 1976; Heyneman and Loxley, 1983; Willm and Somers, 2001).

Until the late 1990s, several studies employed OLS model for their analysis. However, many studies applied Hierarchical Linear Models (HLM), which is so popular in health and psychology and a little attention from economists, for their analysis. Interestingly, in Cambodian context, HLM seemed to receive less intention from the previous researchers to use for observing the impacts from different levels on academic achievement. Therefore, this study attempted to employ HLM model for its analysis in order to understand clear influences of two observed factors on academic achievement that have been widely detected by large-scale studies in other contexts.

Purposes of the Study

The quality improvement of primary education in Cambodia is still a question to be asked due to the fact that several challenges (i.e., high rate of dropout and repetition) have been found by other educational development bodies. One of the causes of high rate of dropout can be the low achievement in learning (Bedi & Marshal, 2002; Finn, 1989; King et al. 2008; Maani & Kalb, 2005; MoEYS, 2008). Based on the shortage of scholarly work in this field in Cambodia, this study attempted to identify the significant factors affecting Cambodian students' academic achievement in rural areas. The findings would be able to shed light on for policy intervention to improve the Cambodian pupils' basic skills in literacy and numeracy as well as to reduce or prevent dropout rate in some extents by raising how much family and school factor impact on the achievement of students. Hence, the study aimed at answering these following questions:

1. What explain the academic achievement in rural Cambodian primary schools the most between school level and family level?
2. What factors influence the academic achievement of rural Cambodian pupils?

Methodology

With an attempt to investigate the quality of education of the first circle (1st to 3rd grade) at primary education, standardized tests of two foundation subjects – Khmer (native language) and Mathematics (MoEYS, 2004; 2016) was developed to assess the educational quality of this circle. Also, two sets of questionnaire were constructed to collect required data to answer to the research questions. There can be other ways to assess the quality of formal education; however, the most amendable indicator is how the pupils performed on the standardized test (Word Bank, 2003). Like the previous studies, standardized test was used in this current study with the same purpose while different foci for designing were taken into account to guarantee the high reliability of its results.

Data Collection

One set of questionnaires was done with 1,203 fourth graders from thirty rural Cambodian primary schools in three rural provinces. Due to the young age (9 to 12 years old) and limited knowledge in reading the questionnaire, the researcher and his team used questionnaire-guided interview to collect information from the individual participants separately. A cluster-random sampling method was employed to select these participants after schools were randomly chosen from a list of the selected districts in each province. Another set of questionnaire was sent to the children's parent after the questionnaire-guided stage in order to collect parents' information such as educational attainment, aspiration for children's education, socioeconomic status,… etc. CESSP (2006; 2008) criticized that informants at this young age could not to provide enough reliability of the parent-related information.

Only 72 questionnaires among 1,203 questionnaires accounting for about only 6%were not returned. Thus, the total samples in this study were trimmed accordingly. The data collection was done after the first month of the first semester of their fourth grade. It should be noted that during first month of each academic year it is known as a revision period before the new grade's curriculum is taught after a two-month school vacation. Therefore, it is the best period for assigning the pupils' academic achievement of the first circle of primary education because the previous curricular were already revised.

Standardized-test Construction

Unlike the previous studies, the format and test contents of the standardized tests in this study prioritized on the familiarity of the test takers rather than that of national format. Therefore, the classroom teachers were invited to participate in the designing process. Without involving the teachers into test design is an unfairness to draw a conclusion of the pupils' academic achievement as criticized by local studies (i.e., CESSP, 2003; 2006; 2010; Prak, 2005; SCN, 2008).

It is not wise to say that standardized tests, which were made by experts from Pedagogical Research Department (PRD), Inspectorate, and Primary Education Department, were inappropriate or unacceptable. However, CESSP (2006) admitted that *"teachers may not be answering correctly, perhaps because they fear being reprimanded for not having covered the curriculum"* (p.89). Thus, this clearly shows that the implemented curriculum did not match with the intended curriculum of MoEYS. Another consequence to be considered was teachers usually test their students as the way they teach (CESSP, 2010). Therefore, the format of the assessment should be designed to minimize the variation of teachers or school in each area. For instance, achievement of third graders was very low in the national assessment as a result of the unfamiliarity with the multiple-choice format in the standardized test (CESSP, 2003). Again, in 2010, CESSP illustrated that *"when students have had practice with this format, their scores are higher in both assessment test subjects"* (p. 38). Consistently, Prak (2005) concluded that *"many students have never exposed to the standard items, so when they exposed to them their performance was poor"* (p. 21). Hence, it is not fair to conclude that rural pupils' academic achievement was poor owing to unfamiliar test item and format.

Additionally, SCN (2008) pointed out that the quality of their tests was questionable because the tests were designed by the staff of District Office of Education (DoE) with PRD support who did not know about how and what were taught in the classrooms.

> *The DoE staff may not have recent experience as classroom teachers and as a result may not be best able to develop appropriate test items based on what have been taught. Teachers of grade 3 and 6 may be more appropriate test developers as they are more knowledgeable of the subject taught* (P: 39)

Therefore, to increase generalizability of the test results, the familiarity of pupils with the test format and the test items at the real classroom setting were taken into account while making the tests. Additionally, involvement of the classroom teachers in the test design was included in this study.

In this current study, tests were designed based on two main perspectives: *(a)* the purpose of the national curriculum of the first circle of primary education: to ensure that every child has a strong foundation in Khmer literacy and numeracy (MoEYS, 2004; 2016), and *(b)* the familiarity of the students towards the test format and test items. Hence, to gain close understanding the real classroom setting, researcher spent his time on observing the classroom teaching, interviewing with some teachers, checking the implemented curriculum and collecting test papers from some classrooms of the selected areas. Then the test was designed accordingly, and meeting with classroom teachers by province was done to verify the test contents and format. Next, some parts of the test were adjusted based on the suggestions of classroom teachers before the tests were piloted in two rural schools in one different rural province. This current study's standardized test covered the curricular of the entire first circle of primary education. In piloting stage, reliability of the two tests were high (Khmer literacy (α=.918); Mathematics test (α=.869). However, some instructions and items were simplified due to the comments from classroom teachers. The Khmer literacy test items were ranged from simple gap filling to critical reading texts, and Mathematics test started from simple calculations to word problems.

Data Analysis

To response to research questions, a 2-level Hierarchical Linear Model (HLM) was employed for data analysis in this paper because *"this model takes the hierarchical structure into account and makes it possible to incorporate variable from all levels"* (Raudenbush & Bryk, 2002, p. 21). Additionally, it allows the use of individual factors and school factors at an appropriate level of analysis and in different levels; this model permits to estimate a between-school variation (Ibid.).

Student background characteristics such as information of individuals and their families were put in level 1, while school-related factors were in level 2. Outcome variable in this study was only a test score of Mathematics (α=.863) because the correlation of these two test scores was at .682. Similarly, father and mother educational attainment have high collinearity (.572), so only the mother of education was put into the model. Totally, there were 17 variables (α=.929) in level 1 model, while four were in level 2 (α=.849) such as teacher teaching-experience, teacher absenteeism, principal absenteeism, and home-school book. Every Cambodian primary school is encouraged to use the home-school book in order to keep parents informed about their child's achievement and performance at school each month. This is known as one of effective ways to get parents involved in children's learning process both at home and school.

To check absenteeism of teachers and students, previous studies employed various ways such as 'unannounced multiple visits' (e.g., Beneveniste et al. 2008; Chaudhury et al.2006; Narayan & Mooij, 2010), teacher self-rated absenteeism or check the school's teacher attendance record book that teachers are required to sign as well as check pupil attendance recode book marked by their homeroom (CESSP, 2006; 2008; 2009; 2010). These methods may not obtain accurate information since teachers might just sign the entire month at one time due to the shortage of accountability from school administrators or their close relationship. However, this study employed a different method to check the absenteeism of pupils and their teachers. Typically, Cambodian pupils are required to write the date for each lesson every day. Therefore, counting the dates written in Khmer and Mathematics books to compare to the school calendar in order to mark absenteeism of both pupils and teachers would avoid those concerned bias. It would create more reliability and validity regarding to the matter of absenteeism. Similarly, principal absenteeism was rated by their pupils and teachers using four rating scales *(3= almost always, 2= often, 1=seldom, 0= never)* based on her/his visible presence: How often do you see you principal in the school?

Results

Table 1 clearly showed the unconditional model with no any slope statistically fits to be used for the analysis in this study with high reliability coefficient (α=.915). The unconditional model is vital to understand whether or not the analysis is good to be used for the analysis and to understand the effect of variance explained within and between group in each level before a final (2-level) model is employed.

Table 1
Fixed effect of unconditional model (with robust standard errors)

Fixed Effect	ß	S.E	d.f	t-ratio
For Intercept 1, $ß_0$				
Intercept 2, y_{oo}	7.517	.499	29	15.060 (<.001)***

Findings for the first research question

To understand the prediction of variance explained, Intraclass Correlation (ICC) was calculated by looking at the school means (τ_{00} or u_o) of unconditional model and the residual (σ^2 or r) with an equation:

$$ICC = \tau_{00} / (\tau_{00} + \sigma^2)$$

$$= 7.076 / (7.076 + 23.179)$$

$$= 0.23 (23\%)$$

This exactly disclosed that estimated variance explained by level-1 (between school) is 23% while the rest 77% is expected to explain by level-2 (within school). Then the variance explained (VE) by the mixed model (2-level model) was performed by using the following equations:

$$\textit{VE within school} = (\sigma^2_{\text{uncondi}} - \sigma^2_{\text{final}})/\sigma^2_{\text{uncondi}}$$

$$= (23.179 - 19.450)/23.179$$

$$= 0.16\ (16\%)$$

$$\textit{VE between school} = (\tau_{00\text{uncondi}} - \tau_{00\text{final}})/\tau_{00\text{uncondi}}$$

$$= (7.076 - 3.788)/7.076$$

$$= 0.46\ (46\%)$$

Table 2
Final estimation of variance components

Unconditional model				*2-level model*			
Random Effect	Variance Com.	df	*p*	Random Effect	Variance Com.	df	*p*
School mean, u_o	7.076	29	.000***	School mean, u_o	3.788	25	.000***
Level-1 effect, *r*	23.179			Level-1 effect, *r*	19.450		

Thus, the 2-level model in this study revealed that family factor has less impact on the pupils' academic achievement than do the school factors. This model showed that the predictors in level-1 could only explain 16% while level-2's predictors explained another 46%. Additionally, with predicted percentage of variance explained in unconditional and that of the final model, this can lead to calculate the total percentage of variable explained (V.ex) and that of variable unexplained (V.unex) as following:

$$\textit{V.ex within school} = \sigma^2_{\text{uncon}} \text{x } \sigma^2_{\text{final}}$$

$$= 0.77 \text{ x } 0.16$$

$$= 0.12\ (12\%)$$

$$\textit{V.unex school} = \tau_{00\text{uncon}} \text{x } \tau_{00\text{final}}$$

$$= 0.23 \text{ x } 0.46$$

$$= 0.11\ (11\%)$$

Hence, total variable explained by the model is totally 23% while another 77% is remained unexplained. This proposed that further study should consider some other predictors, which this current study failed to include into its model for generalizability of its results. However, this study can be counted as the first study in its context that employed HLM2 for its analysis, so its results can be set as a baseline for later scholarly works on pupils' academic achievement in Cambodian context.

Findings for the second research question

The final model or 2-level model (α=.873) of this study revealed that teacher absenteeism and principal absenteeism have negatively significant effect on the pupils' academic achievement. However, schools that used home-school book as the guided by the MoEYS, its pupils' academic achievement statistically improved by 2.67. Unlike expectation, this study found no statistical relation between the teachers' teaching experience and pupils' achievement unlike Greenwald et al. (1996) and Kaya and Rice (2010).

To make an ease, the predictors in Level-1 were purposively divided into four sub-categories. This Level-1 HLM results presented that *(a) individual-related factors* such as repetition and student absenteeism showed negative association with the academic achievement. However, frequency of homework completion, self-educational aspiration, and self-esteem avowed positive effects on the pupils' test scores. Furthermore, one of the *(b) learning-interaction factors*, namely teacher-student interaction, had a positive significance with pupils' achievement, while student-student interaction showed no relevance to the achievement in this study. Although *(c) child labor* has been prohibited for a certain age in Cambodia, it is still the issues in this country. In Cambodia, World Bank (2003) divided types of work into two: domestic work and productive work. However, the domestic work was divided into two in this study – out-home-work and in-home work based on the study of Heady (2003) including the amount of time children spent working per-day. This model revealed that working hours negatively influences the achievement in this study. Surprisingly, pupils who reported to assist their parents in housework such as taking care of siblings, home business and working in kitchen outperformed their peers. Moreover, regarding *(d) parent-related factors*, pupils whose parents attained education until higher level as well as whose parents had higher educational aspiration performed better in this test than did their peers whose parents had low education. However, SES shows no significant relationship in predicting pupils' achievement in this study.

Table 3
Fixed effect of two-level model (with robust standard errors)

Fixed Effect	*ß*	*S.E*	*t-ratio*
For Intercept 1, $ß_0$			
Intercept 2, y_{00}	7.502	.347	21.621 (<.001)***
Teachers' Teaching experience, y_{01}	.188	.099	1.900 (.069)
Teachers' absenteeism, y_{02}	-.233	.064	-3.625 (.001)**
Principal absenteeism, y_{03}	-3.190	1.212	-2.632 (.014)*
Home-school book, y_{04}	2.674	.710	3.767 (<.001)***
Gender, $ß_1$	-.244	.331	-.739 (.460)

Kindergarten experience, $ß_2$	-.281	.255	-1.099 (.272)
Repetition, $ß_3$	-.447	.209	-2.137 (.033)*
Pupil absenteeism, $ß_4$	-.376	.131	-2.877 (.004)**
Homework completion, $ß_5$	.653	.147	4.438 (<.001)***
Academic support at home in homework, $ß_6$	.197	.132	1.492 (.136)
Pupil educational aspiration, $ß_7$	.511	.207	2.464 (.014)*
Pupil's self-esteem, $ß_8$	.713	.257	2.775 (.006)**
Teacher-student interaction, $ß_9$	.660	.205	3.217 (.001)**
Pupil-pupil interaction, $ß_{10}$	-.237	.196	-1.210 (.227)
Child-labor: working hours, $ß_{11}$	-.316	.091	-3.460 (<.001)***
Child-labor: out-home works, $ß_{12}$	-.218	.184	-1.188 (.235)
Child-labor: in-home works, $ß_{13}$	.434	.193	2.243 (.025)*
Child-labor: productive works, $ß_{14}$	-.578	.375	-1.543 (.123)
Mother's education levels, $ß_{15}$	.480	.133	3.610 (<.001)***
Parents' educational aspiration for child, $ß_{16}$	.439	.139	3.154 (.002)**
Socioeconomic status, $ß_{17}$	.096	.206	.468 (.640)

*Significant level: ***<.001, **<.01, *<.05*

Discussions

Unlike the studies in developed countries including the 1966 Coleman's report, this current study disclosed that school variables had larger effect on the academic achievement of rural Cambodian pupils while the individual factors had mild affects like the previous studies in other developing countries (i.e. Heyneman, 1976; Heyneman & Loxley, 1983; Fuller, 1987; Fuller & Clarke, 1994; Willm& Somers, 2001; Buchmann, 2002). School plays important role in helping pupils in learning because parents at rural Cambodian areas were likely to pay much attention on generating family income rather than caring for their children's performance at school. The school may be viewed as one safety place in which parents keep their children while they were away from home to collect food, harvest crops or make income.

School predictors

In school level, teacher absenteeism had negative impact on the pupils' test scores in this study. Its finding echoed the previous studies in the region (i.e., Clotfelter et al. 2009; Johnstone and Jiyono, 1983, World Bank, 2003) and in Cambodia (i.e., CESSP, 2006; 2008: 2009). This result revealed the fact that when pupils were in a class which a teacher was frequently absent, they may show less interest in study (Bruno, 2007) and may not view the importance of coming to school regularly (Clotfelter et al. 2009), so they ended up with low achievement. Contextually, to avoid being blame on being unable to complete the syllabus, teachers may skip or teach lessons very fast although they realized that it was not comprehensive enough for their pupils (CESSP, 2006). Uniquely,

this study discovered that principal absenteeism decreased the pupils' academic achievement in rural Cambodian primary schools although some studies had put less attention on the linkage of this issue and academic achievement (Horng et al., 2010), and had controversial finding on its effect in some countries (Hallinger et al. 1996).

Since this study failed to obtain data related to instructional leadership of principals as suggested by Hallinger et al. (1996), it can be understood that visible presence of the school principal in the school may inspire teachers to work dynamically with the pupils in classroom . Furthermore, it may inspire teachers to come to teach more fequently. Generally understanding, principal is a role model in a school for both teachers and students, so her/his daily presence may help reduce absenteeism in the school to some extent. As expectation, pupils in schools that used home-school book performed better in the academic achievement. Home-school book is the only communication channel between school and parents in this contextsince parents may have no time to visit school to discuss on their child's learning. Therefore, it may function as a means for teachers to learn about their students' situation at home. This is the first study ever that aimed at investigating into the effect of this kind of book on the academic achievement after it was introduced for decades in Cambodian schools. Therefore, this finding may attract more attention from parents/guardians on the benefits of using home-school books.

Family Predictors

Individual-related factors

In family level, the relationship between grade repetition and academic achievement is a controversial finding in this field of study. Pervious studies done by Allensworth (2004), Hong and Raudenbush (2005), and Karweit (1999) illustrated that grade repetition provided pupils with benefits and being well prepared for learning and tests. However, this current study confirmed other studies' findings (i.e., Amadio, 1996; Eisemon, 1997; Hong & Yu, 2007; Varghese, 1999), and that of some local studies (i.e., CESSP, 2006; 2008) that pupils who repeated their grade underperformed their counterparts who did not. Although they experienced with that curriculum more than once, they cannot do better, yet they may have limited basic skills that require more care from their teachers in order to catch up with their classmates. Teachers may not able to teach more than one curriculum at one time owing to different circumstances such as time constrain to completing the intended contents and class size that may limit teachers to provide more interaction and care to those who may need. From the policy point of view pupils are not allowed to repeat one grade more than two years, so they will be passed to another grade although they are not good enough (MoEYS, 2018b).

This study ascertained that pupils' absenteeism had significantly declined their achievement like local studies by CESSP (2006, 2008, 2010) and Morrissey et al. (2014). This statistically proves that students who reported to frequently miss their class obtained lower scores in the test compared to their peers who missed class less or who never missed at all. It is true that when they missed classes, they would be behind their peers who came to class. Thus, it would affect their academic achievement to so extent.

O'Rourke-Ferrara (1998) disclosed that homework was a tool that assists learners to be smarter. However, it was viewed as a disturbance of learners' time in engaging themselves with other activities which assisted them to learn more important lessons than what the school can provide (Cooper, 2001). This different viewpoint was judged by this current study that pupils who reported to completed homework more frequently outperformed their peers like the result of a 3-level HLM study in South Australia (Yuan & Keeves, 2011). Naturally, those who work on homework gained more chances to practice what have learned at school. Hence, they tend to be better in those contents than their counterparts who practiced less or ignored homework. Although the academic support at home by relative in completing homework appears statistically insignificant, its trend is able to reveal that those pupils who reported to complete homework by themselves tend to preform better in this standardized test than their peers who received support from relatives while doing homework. When they are trying to do it on their own, they gradually improve their thinking or understanding which may help them perform better in the tests. It is not wise enough to reject that getting academic support from relatives is bad; however, a question to be addressed is whether their relatives teach them or tell them the answers.

Pupils with high educational aspiration and high self-esteem overtook their classmates in academic achievement. Modestly, with an attempt to obtain further education may psychologically inspire them to work harder in order to realize their dream. However, clearer explanation cannot be provided about educational aspiration in this study unless family and school environment can be observed as suggested by Cothran and Ennis (2000). Therefore, further study is encouraged to detect on these in order to draw a clear image for this predictor. Having high self-esteem means to have capable ability to cope with academic tasks in order to achieve the goal set by seeking for any effective ways to deal with challenges and by actively participating in learning activities (Crocker et al. 2003). Thus, this can be assumed that high self-esteem leads them to be better learners.

Child labor

Although this study did not detect on why these concerned pupils were absent like CESSP (2010) did, this current study agreed that child labor might be one of the causes. Regardless of types of child labor, this study unambiguously confirmed that among of time (threshold was 3 hours per day) which children spent to help their parents negatively affected their academic achievement. On the one hand, this finding yields slight inconsistency to a study in Cambodian. Han (2008) found that there was no relationship between amount of time that Cambodian children worked and their academic achievement if they worked less than his threshold of 22 hours within five working days (3.10 hours per-day). On the other hand, this study's finding was aligned with Ray and Lancaster's (2004) study in developing countries including Cambodia. They ascertained that the effect was adversely pronounced although the children worked in limited amount of time. This phenomenon can be explained by the fact that when children spent more time working, they may feel exhausted and less interested in doing their academic works. Therefore, they may reduce their school attendance rates and appear in class with the lack of preparation. Finally, this will result in low achievement. In addition to this, this study's finding was consistent to Heady's (2003) result that assisting parents in-home works had positive association with their academic achievement. When children performed work at home, they may have some free time to revise their school lessons and do homework. Additionally, they may learn basic calculation repeatedly by calculating the price during helping family business like selling grocery. On the contrary, out-home works and productive works had no statistically significance in this context, yet the result showed a negative trend in the relationship with pupils' academic achievement.

Learning-interaction factors

Although only two out of three domains of teacher-student interaction suggested by (Curby et al. 2009), namely emotional and instructional domain, were investigated in this context, this study yielded the fact that high teacher-pupil interaction has strong relation with the academic achievement because sustained support from teachers will motivate and/or assist pupils to overcome their challenges which consistently better their achievement later (CESSP, 2006). Oppositely, low interaction between teacher and pupils will result in poor achievement due to the fact that it reduced the learning opportunity of the pupils in the same classroom. The rural pupils were expected to get more emotional and instructional supports at school than at home due to education level of their parents. Therefore, school has to provoke friendly-learning environment inside school campus and in the classroom. The fact is currently known that about 66% of parents in this study obtained primary education while only 1% experienced in higher education. Therefore, it can be predicted that majority are not able to support their kids at home especially in the tough subject like Mathematics.

Parent-related factors

Like the previous studies (i.e., Glewwe & Jacoby, 1994; Heyneman & Loxley, 1983; Kodippili, 2011; Lamb & Fullarton, 2002; OECD, 2001; Xin et al. 2004), mother's education had positive association with their children's academic achievement in this study. Contextually, many Cambodian mothers usually stay home to take care of their children while fathers are more likely to go out for food and make a living. Thus, mother who experienced in any level of education may have much time to follow up their children's learning although they cannot explain or offer academically support like teachers at school. Like Spera et al. (2009), pupils whose parents wanted them to obtain higher level of education tend to have better achievement. Although parents attained low level of education, they aspired their children to pursue higher level than what they had attained (Oketch et al. 2012) since they may oversee benefits of the education for their children's future.

Surprisingly, SES was found to have no relation with academic achievement in this study. This finding tends to reinforce the previous findings of Chhin (2003) and Heyneman (1976). In rural Cambodian context, the family economics is not much diverse from one family to another since the living standard of the majority is based on farming. Another possible explanation is that SES may have more impact on the students when they are in higher level since during that time, they may need more support from their parents in terms of transportation, paying for private class and others. To make clearer image of its impacts, the further studies should include the urban and remote areas into their scope of investigation.

Conclusions

With a commitment to grow herself towards upper middle-income country by 2030, Cambodia has been struggling to strengthen quality education and involved in many international programs as well as implement SDGs and EFA. Although Cambodia claimed to achieve EFA goals in 2015, many educational bodies started to question about the quality education and academic achievement especially for rural area students. By viewing the quality of first cycle of primary education as a concrete foundation for other educational levels, this current study intended to understand the effects of family factors and school factors as well as to discover determinants affecting pupils' academic achievement. This current study found that schools has larger effects on pupils' academic achievement in rural Cambodia. This clearly alters that improving school performance and environment are more likely to boost the pupils' academic achievement. Absenteeism of teachers and school principals were found to have negative impacts on academic achievement of their rural pupils. However, using a home-school book as a communication channel between family and school/teachers was found to boost academic

achievement in this context. Therefore, Provincial Office of Education (POE) as well as DOE with supervision from MoEYS should reinforce working regulations at school levels and to increase more school and class inspections in order to minimize the absenteeism rates. Furthermore, schools and teachers should be encouraged to continuously use home-school book and increase more actions to respond to parents' suggestions as well as complains.

Completing homework was found to be one of factors positively increased academic achievement. Therefore, parents should minimize the demand of child labor to spare more time for them to invest on self-study at home. However, if the demand could not be avoided, children should not work on any tasks outside home and they should work less than 3 hours inside home with any tasks that could contribute towards their learning activities. However, if they spend more time helping their parents, it may affect their learning at school due to tiredness, absenteeism, less concentration. Inside classroom, improving interaction between teacher and students should be provoked since the rural pupils seem to obtain less supports at home. Although this study employed new method for analysis and integrated some new variables that have never been used in its context, it could employ the limited number of school variables in its analysis. Thus, future studies should consider adding more variables to increase insightful understanding.

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