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Effects of Principal's Leadership on Student Achievement at Cambodian Primary Schools: A Multi-level Model Analysis

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Effects of Principal's Leadership on Student Achievement at Cambodian Primary Schools: A Multi-level Model Analysis

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Abstract

This paper examines the effects of principal's leadership on the academic achievement of sixth-grade students at Cambodian public primary schools. The survey research study randomly selected 54 sixth-grade teachers from 38 primary schools in Phnom Penh of Cambodia. Teachers who participated in this study were asked to score the survey questionnaire items that reflected the principal's school leadership. The survey data were merged with students' test scores. The Multi-level Model (MLM) approach was utilized to address the issue of group similarity of variance created by the multi-stage random sampling selection because of the data's nested and hierarchical structure. When other factors are held constant, the study's findings show that the principal's leadership positively and substantially enhances the school's average student achievement in Cambodian primary schools. On the other hand, teacher education and experience, as school-level factors, do not affect student achievement. The findings provide empirical evidence for Cambodia's Ministry of Education, Youth and Sport to consider the importance of effective school leadership for school improvement and effectiveness. Policy implications and future research are discussed in light of the study's findings.

Keywords: Principal's Leadership, Student Achievement, Multi-level Model, Primary School, Cambodia

1. Introduction

Cambodia, one of the post-war countries, has experienced many socio-economic and political changes and reforms. The country has witnessed major improvement with steady economic growth, development, and social progress (Kheang et al. 2018: 114). Having seen these improvements, Cambodia's government has stepped from 'donorship' to 'partnership' and 'ownership' toward the progress of the education sector. Cambodia's MoEYS has committed to providing access to education to all children and the quality of learning at schools.

As one of the educational reform initiatives, school-based management was initially introduced by the World Bank in 1999 and formally approved in 2002 for implementation as the nationwide program (Kheang et al. 2018: 132). These reform initiatives promote school leadership and local community

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participation to enhance basic education quality. Devolving the power of decision-making to the local school administrations is a key strategy of school-based management to promote the decentralization in education to improve service delivery, promote good governance, and strengthen accountability and transparency (Kheang et al. 2018: 127).

Another school reform initiative to improve school leadership is the adoption of the SABER-Teacher Policy. This policy intends to strengthen the professional capacity of the principals to be instructional leaders who can attract and retain competent and qualified teachers to the system (Tandon and Fukao 2015: 133) and promote a positive school climate, which results in teacher satisfaction, effective instructional practices, and learning outcomes (Smith and Andrews 1989: 2).

The MoEYS of Cambodia introduced the school leadership training program in collaboration with UNESCO/UNDP for a small number of school principals in 1997. However, it lasted for a short period (Kheang et al. 2018: 134). From 2002, the MoEYS has mandated the management training program for school principals/deputy school principals after appointment as school leaders. The training program aimed to develop the professional capacity and competency which enable the school leaders to deal with a wide range of school leadership and management such as administration, management, leadership, planning, communication, and teaching and learning (Kheang et al. 2018: 134). In addition, in 2005, the MoEYS implemented the training program as one of the Cambodian Education Sector Support Project (CESSP) funded by the World Bank and covered from the central officials to school colleagues.

The current leadership for school improvement and effectiveness in Cambodia is the Teacher Policy and Teacher Policy Action Plan (MoEYS 2013: 7; MoEYS 2015: 19–20; Kheang et al. 2018: 135–136). These policy documents outline strategic plans to enhance the principals and teachers' capacity leadership, including (1) A baseline research on school principals, (2) School Director Standard, (3) School Management Handbook, (4) Training for School Directors, and (5) School Principal Association.

Although many education-related policies are in place, the capacity of school practitioners remains in question for bringing the reforms to succeed. Low educational qualification among educational practitioners is a challenge to speed up the reform progress. For instance, 5,996 of 7,119 school administrators, including the principals, have an education degree at or below the secondary school. As a result of inadequate educational qualification, it is challenging for school administrators, particularly principals, to utilize school resources effectively due to the lack of analytical, evaluative, and predictive skills and abilities (Chhinh and Dy 2009: 122). When transferring the legitimate power to the school level, institutional reform is needed. Therefore, key reform agents should be fully competent in making school reforms realistic, exercising school leadership on school-based management policy, and decentralizing education. The absence of professional and technical support for the school agents would lead to the failure of the reform initiatives (Chhinh and Dy 2009: 126–127).

The distributed leadership of the principals may exert direct or indirect contribution to student

learning achievement, which is the primary objective for school reforms. Therefore, this paper aims to investigate the empirical data analysis on a relationship between principal's leadership and student achievement at Cambodian primary schools using the multi-level model application.

The following sections will present literature reviews, research method, results, discussion, and conclusions.

2. Literature Reviews

2.1 Characteristics of Principal's Leadership

School leadership has been broadly defined in various educational contexts. Traditionally, school leaders refer to the people whose roles motivate, inspire, influence, and guide others to align with the targeted goals by setting clear and realistic visions, involving other school members in school development plans, and establishing positive school culture (Gulcan 2012: 625). School principals who are professionally trained to become professional workers with positive attitudes towards their working conditions tend to be more productive than those who are not (Smith and Andrews 1989: 2). Two ways that characterize the effective leadership of the instructional leaders are task behaviors and relationship behaviors. The former is about how leaders relate between each member's task and the job responsibilities that target school missions and goals. The latter enhances the school members' motivation and instructions (Gulcan 2012: 627).

The principals, as instructional leaders, are expected to make different contributions to school outcomes and school differences (Louis et al. 2010: 316), a tremendous impact on the school's instructional programs and success (Gurr et al. 2005: 548), and assert their leadership roles in strengthening the school disciplines and ensuring the evaluation of learning achievement as a school priority (Edmonds, as cited in Hallinger et al. 2015: 4).

School leaders are expected to have a high ability on the content-based curriculum and provide constructive feedback for teachers to improve the teaching quality at the formal school contexts (Louis et al. 2010: 317). In addition, to understand the curriculum-based instructions, school leaders should support the instructional process for better quality and seek ways to stimulate teaching behaviors for innovative teaching and learning in the classroom (Louis et al. 2010: 317). More importantly, school principals should understand and exercise their responsibilities to promote instructional practices by supervising and tracing teaching and learning (Harris et al. 2017: 207).

The roles of leaders are critical and powerful to influence the overall quality of the organizations and professional work quality. By reviewing most previous research studies on leadership roles in learning and teaching improvement, four leadership dimensions have emerged: leadership focus, beliefs and values, contexts for leadership, and sharing leadership (Hallinger 2011: 125). In addition, school principals are characterized by four core principles, including resource provider, instructional

resource, communicators, and visible presence. These characteristics are essential and interactive through the relationship between teachers and the principals in which the consequence is linked to the improvement of student achievements (Andrew et al. 1991: 98; Smith and Andrews 1989: 9).

2.2 Professional Preparation and Development for School Leaders

To improve school development and student learning outcomes, it matters to consider the quality of school leadership (Bush 2009: 375). When discussing the principal's leadership, it is not uncommon to mention the professional development and preparation before the appointment to be in school leadership positions. Typically, school principals in underdeveloped countries often lack pre-service professional leadership and management training (Kheang et al. 2018: 59). However, due to the lack of formal preparation, principals were promoted from teachers to technical group leaders and deputy school principals based on the evaluation criteria such as excellent teaching record, the number of years in teaching experience, and political connection (Kheang et al. 2018: 59–60). In addition, school principals who are newly appointed did not receive adequate professional development opportunities, which hindered the quality and effectiveness of school outcomes caused by the unprepared for the responsibilities (Kheang et al. 2018: 61).

The formal preparation and training for school leaders are essential for effective and efficient leadership. Four following reasons clearly explained why it is crucial for school leadership preparation, including (1) the expansion of the role of the school principal, (2) the increasing complexity of school contexts, (3) recognition that preparation is a moral obligation, and (4) recognition that effective preparation and development make a difference (Bush 2009: 376–378).

2.3 Principal's Leadership and Student Achievements

The studies in developed and developing countries on the relationship between principal's leadership and student achievement were inconsistent. School leadership is one of the characteristics of high-achievement schools that is indirectly associated with student achievement through school process, instructional climate and practices, professional interactions, and beliefs, thus gaining more trust and cooperation (Liu and Werblow 2019: 41). Principals assumed the instructional leadership behaviors to raise student achievement (O'donnell & White 2005: 56).

Timperley (2005: 16–17) studied the instructional leadership challenges in how student achievement data may improve the instructions. With the technical assistance from the consultants and school colleagues, teachers are motivated to use the achievement information to refine the school instructional programs for better instructional practices and achievement but require developing the capacity of individuals and school organizations (Timperley 2005: 16–17).

Principal's leadership positively impacted students' academic achievement in primary education (Kythreotis et al. 2010: 218; Louis et al. 2010: 315). The capacity development of individuals would

be necessary for good teaching practices via the mutual reinforcement among the school members as a professional learning community to foster the shared values, student learning, collaboration on curriculum and instruction (Louis et al. 2010: 318–319). However, Louis et al. (2010: 323–325) examined the effects of three attributes of leadership behaviors (sharing of leadership with teachers, development of trust relationships among professionals, and support for instructional improvement) of student achievement. The results revealed that the professional community, teachers' trust in the principal, and focused instruction statistically affected the student achievement, but principal behaviors did not.

3. Methods

3.1 Research Design, Sampling, and Samples

Phnom Penh was chosen as the research area for the current study's investigation. Due to urbanization and industrialization, the migration of people has become more complicated. This complex picture of social and economic development may affect the educational development of the country. Education becomes challenging and competitive among students who live and migrate to the city. The households' socio-economic development in this city has changed considerably, resulting in a gap in learning opportunities and the investment in their children's education. Therefore, these changes may also affect educational development, especially primary education. Diverse students from various backgrounds reflect the complex picture of school operation that explains student learning achievement. In the meantime, the MoEYS of Cambodia has invested more in school education reforms for improving school outcomes.

In Phnom Penh, there were 164 primary schools under the educational administration of the 12 districts. (MoEYS 2017: 1–4). The characteristics of the primary schools in this city vary, and so do the leadership practices of each school. This study aimed to survey teacher perception of their principal's leadership concerning the academic achievement of sixth-grade students. Therefore, a multi-stage random selection method was employed to select primary schools that represent the school population. This sampling design enabled the researcher to capture the diversity of school characteristics from the sample schools more precisely. Sample schools were drawn using the Probability Proportionate to Population Size by calculating each district's school proportion against the total school population (Network Afrobarometer 2017: 30). As a result, the sample schools were chosen using the district's school proportion as a starting point. At random, two sixth-grade classes from each school were chosen. Schools with only one sixth-grade class, on the other hand, were automatically chosen. As a result, the sixth-grade primary school students and teachers from 38 public schools out of 164 participated in the survey (MoEYS 2017a: 1–4).

The detailed procedures of the random sample selection can be seen in Table 1.

Table 1 Results of Two-stages Random Sampling Selection

No.	District	Schools in each district	No. of selected schools	Sixth-grade classes from each school	Teachers participated	Students participated
			1st stage	2nd stage		
1	7 Makara	4	1	1	1	26
2	Chamka Mon	13	3	5	5	116
3	Chba Ampov	20	5	6	6	282
4	Chroy Changva	17	4	5	5	154
5	Dangkor	25	6	7	7	326
6	Daun Penh	8	2	4	4	160
7	Mean Chey	9	2	4	4	189
8	Po Sen Chey	30	7	8	8	319
9	Prek Phneuv	13	3	5	5	187
10	Reusey Keo	7	1	1	1	45
11	Sen Sok	10	2	4	4	125
12	Tuol Kok	8	2	4	4	120
Total		**164**	**38**	**54**	**54**	**2049**

Source: Author's Calculation.

The survey was conducted from February 26 to March 14, 2020. A total of 54 sixth-grade teachers participated in the survey. Among the 54 teachers, 44.4% (N＝25) were female, and 55.6% (N＝29) were male. In addition, students who presented on the days of data collection were invited to participate in the study. Both teachers and students were asked to complete the survey questionnaire.

3.2 Data and Variables

3.2.1 Academic Achievement

Academic achievement is important for measuring students' cognitive ability, reflecting what students had learned and were taught from classroom teaching based on the national curriculum. In this study, the researcher collected the monthly test scores of the students whose teachers participated during the survey data collection. The classroom teachers conducted these monthly test assessments to monitor the learning progress over time. These test results covered four key subjects of the national curriculum, including Khmer language, Math, Social studies, and Science. The test score is a continuous variable and was used as the dependent variable for the current study. The average test scores ranged between 3.3 to 9.7 (N＝1891; M＝6.69; Std＝1.272). These monthly test scores were standardized to provide a solid basis for comparing the student's academic achievement among the sample schools.

3.2.2 Principal's Leadership (PL) Scale

The relationship between principal's leadership and student achievement has been extensively examined in both developed and developing countries. The existing literature studies found both direct and indirect relationships between principal's leadership and student achievement. However, these findings are inconsistent.

The following literature provides a background understanding of the overall trends of school leadership. Those characteristics of school leadership may lead to various outcomes of school development, in particular for student achievement. Leadership characteristics and behaviors can be influential factors that empower school principals to be responsible for school outcomes. The principals may employ various leadership styles to deal with the educational issues at different school contexts. Principals may affect teachers' work motivation and quality of the instructions, thus raising student learning and achievement. For instance, Hallinger and Murphy (1985: 218) proposed the leadership that focuses on the instructional management behaviors of the school principals in managing the curriculum and instructions, namely 'Instructional Leadership.' Leithwood and Jantzi (2000: 113) emphasized the roles of school leaders to inspire other school members to achieve the shared vision of change and develop professional competencies. In addition, Louis et al. (2010: 318–319) emphasized that shared leadership, trust, teacher leadership, and professional community are the key aspects of leadership at school, which have a significant influence on successful sharing practices among school members.

As a result, six-item variables (Table 2) were developed based on the literature mentioned above to measure the school leadership of the Cambodian primary school context.

Therefore, 54 sixth-grade teachers from 38 sample schools were asked to participate in the survey.

Table 2 Descriptive Statistics of the Principal's Leadership Scale Items

Statement	M	Std	Min.	Max.	Cronbach Alpha
1. Principal has clear plans and a vision for enhancing the quality of teaching and learning.	3.51	.637	1	4	.965
2. Principal allows teachers to take part in planning and evaluating the professional development activities.	3.48	.637	1	4	
3. Principal is highly involved in the instructional process.	3.33	.613	1	4	
4. Principal assumes leadership for improving the instructional program.	3.36	.622	1	4	
5. Principal's leadership and ways of managing the school inspire the teachers.	3.33	.649	1	4	
6. Principal has high initiatives on school activities that respond to student learning and achievement.	3.32	.634	1	4	

Source: Six-item variables were developed by the author.

The instrument was translated to Khmer language and piloted with six public primary school teachers in Phnom Penh before the official data collection to ensure the validity and reliability of the scales. The six-item variables were designed in a four-point Likert scale format (1＝Strongly Disagree; 4＝Strongly Agree). These variables were merged with student achievement and then aggregated the average score at the school level before proceeding with the analysis. The Cronbach's alpha of the scale in this study is .965.

3.2.3 Student-level Covariates

Student characteristic variables used for this study included age, gender, repetition, and parental education. These variables were reviewed to have a significant impact on the academic achievement of the students. For instance, gender disparity is not a common problem in basic education among Cambodian children; however, achievement reports among male and female students in the assessments are inconsistent (Song 2012: 81). According to the results of the National Assessment in Grade 6, it indicated that female students tended to outperform in the test assessment compared to their male counterparts, in particular for Khmer language (MoEYS 2017b: 19). Late school enrolment and multigrade repetition are typical in primary education of many developing countries like Cambodia, which lead to experience negatively on student performance and achievements at the later stage of education (MoEYS 2017b: 19–21; Song 2012: 84). In addition, parental education was a variable used to represent a family's socio-economic status characteristics which are highly correlated with the incomes (Sirin 2005: 419). Parental education is an element of the student characteristics that reflects the family's attitudes and beliefs towards the schooling, which affect student achievement (Ma and Klinger 2000: 51).

3.2.4 School-level Covariates

School characteristics consist of many variables. Teacher quality refers to teacher education, teaching experience, professional development, and self-efficacy (Nilsen and Gustafsson 2016: 5). These variables of teacher quality are not always measured in one single study. In addition, there is no clear relationship between teacher quality and student achievement in various school contexts.

Hence, this study included two variables of teacher quality for the analysis as covariates of school characteristics. Teacher education is measured as the last education degree that teachers obtained from accredited educational institutions. In contrast, teacher experience refers to the number of years teachers stay in a teaching position at a particular primary school.

3.2.5 Correlation Matrix

Table 3 shows the estimated correlation of the study variables. Student-level variables such as age, gender, repetition, and parental education are significantly associated with student achievement. Three

Table 3 Correlation Matrix of the Variables

	Measures/Variables	1	2	3	4	5	6	7	8
1	Student Achievement	1							
2	Age of student	−.225**	1						
3	Gender of student	−.277**	.182**	1					
4	Repetition	−.177**	.253**	.140**	1				
5	Parental Education	.092**	−.146**	.022	−.069*	1			
6	PL	.074**	−.003	−.028	−.056*	−.062*	1		
7	T_Exp	−.068**	.035	−.029	.018	−.082**	.217**	1	
8	T_Edu	.060**	−.054*	−.021	−.007	−.012	.163**	.051*	1

Notes: **p＝.01; *p＝.05
Source: Author's Calculation.

Table 4 Key Descriptive Variables of the Study

Measures/Variables	Description	*N*	*Min*	*Max*	Mean	SD
Academic Achievement	Standardized test scores	1891	−2.66	2.41	.000	1.000
Student Characteristics						
--Age	In year	1875	10	17	12.54	.986
--Gender	1＝Male; 0＝Female	1891	0	1	.47	.499
--Repetition	1＝Repetition in any grade; 0＝No	1891	0	1	.19	.389
--Parental Education[1]		1335	1	8	3.83	1.945
School Characteristics						
--Principal's Leadership (PL)	Teacher perception ofleadership behaviors of the principals (6 items)	1891	1	4	2.92	.502
--Teacher Education (TEdu)	1＝College experience; 0＝Others	1891	1	0	.382	.487
--Teacher Experience (TExp)	Length of teaching experience in year	1891	1	36	16.43	10.356

Source: Author's Calculation.

school-level variables, such as teacher education, teaching experience, and principal's leadership, are significantly correlated with student achievement.

Table 4 provides detailed descriptions of the measured variables for this study.

3.3 Identification Strategy

The current study employed a Multi-level Model (MLM) approach to address the nested and hierarchical structure of the data caused by the random sampling selections. This approach is the most applicable and prominent to model the nonindependence of observation directly; for example, students are selected from classes or schools. In contrast, using the OLS procedure for the nested data may not

be appropriate, which results in misleading and incorrect substantive assumptions (Flora 2018: 164–165). Before proceeding with the analysis, the school-level inputs were merged with the student's test scores and other information related to their background characteristics. In addition, school inputs were aggregated at the school level

The following models were developed to examine the variance of student achievement explained by student-level variables and school-level variables. First, the Null/Unconditional model was developed to estimate student achievement variances at individual and school levels (Level 1 and Level 2). Intra-class Correlation Coefficient (ICC) is used to calculate the extent to which cluster variances exist in this hierarchically structured data. The more the variance estimation of ICC, the more it increases the necessity to use multi-level modeling (Meyers, Gamst, and Guarind 2013: 226). The current study used student achievement as the outcome variable to examine the functions of groups or cluster variations at between-students and between-schools when there is no predictor variable. Below is the equation of the Null model.

$$Y_{ij} = \beta_{0j} + \varepsilon_{ij} \quad (1)$$

$$\beta_{0j} = \gamma_{00} + \delta_{0j}$$

Y_{ij} represents the academic achievement of student i in school j; β_{0j} refers to the intercept for students in school j; γ_{00} represents the grand mean intercept of student achievement; δ_{0j} and ε_{ij} represent the school-level random effect and student-level random effect, respectively.

Model 1 was developed to observe the changes in the variance of student achievement after adding the student-level predictors as Level 1 covariates. Those individual student variables include age, gender, repetition, and parental education with the following equations.

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{Age})_{ij} + \beta_{2j}(\text{Gender})_{ij} + \beta_{3j}(\text{Repetition})_{ij} + \beta_{4j}(\text{P\_Edu})_{ij} + \varepsilon_{ij} \quad (2)$$

$$\beta_{0j} = \gamma_{00} + \delta_{0j}$$

Y_{ij} represents the academic achievement of student i in school j; γ_{00} represents the grand mean intercept of student achievement. $\beta_{1j} - \beta_{4j}$represent the constant coefficient for predictors (student's age, gender, repetition, and parental education). δ_{0j} represents the school-level random effect. ε_{ij} represents the student-level random effect.

Model 2 was estimated the influence of Level 2 parameters on the outcome variable when there is no Level 1 variable. Therefore, this model aims to determine how student achievement varies as a function of the Level 2 variables (Principal's Leadership, Teacher Education, and Teaching Experience). This model is called a means-as-outcomes model, of which the cluster means are being regressed by Level 2 variables (Flora 2018: 186). The model is shown in the following equations.

$$Y_{ij} = \beta_{0j} + \varepsilon_{ij} \quad (3)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{PL})_j + \gamma_{02}(\text{TEdu})_j + \gamma_{03}(\text{TExp})_j + \delta_{0j}$$

Y_{ij} represents the academic achievement of student i in school j; γ_{00} represents the predicted intercept for a cluster with Level 2 variables equal 0. $\gamma_{01} - \gamma_{03}$ are the parameters indicating the

predicted change in β_{0j} for an increase of a unit of the Level 2 variables. δ_{0j} represents the school-level random effect. ε_{ij} represents the student-level random effect.

The final model was developed by incorporating Level 1 and Level 2 predictors simultaneously because the combination between Level 1 and Level 2 predictors may give theoretical importance in understanding the research context. Therefore, this model determined whether the relationship between Level 2 predictors and student achievement exists over and above the effect of Level 1 variables. The model is shown in the equation below.

$$Y_{ij}=\beta_{0j}+\beta_{1j}(\text{Age})_{ij}+\beta_{2j}(\text{Gender})_{ij}+\beta_{3j}(\text{Repetition})_{ij}+\beta_{4j}(\text{P\_Edu})_{ij}+\varepsilon_{ij} \quad (4)$$

$$\beta_{0j}=\gamma_{00}+\gamma_{01}(\text{PL})_j+\gamma_{02}(\text{TEdu})_j+\gamma_{03}(\text{TExp})_j+\delta_{0j}$$

Y_{ij} represents the academic achievement of student i in school j; γ_{00} represents the predicted intercept for a cluster with Level 2 variables equal 0. $\gamma_{01-}\gamma_{03}$ are the parameters indicating the predicted change in β_{0j} for a unit increase of Level 2 variables. $\beta_{1j}-\beta_{4j}$ represent the constant coefficient for the Level 1 predictors (student's age, gender, repetition, and parental education). δ_{0j} represents the school-level random effect. ε_{ij} represents the student-level random effect.

4. Results

Table 6 shows the analysis results of three models that build on the Null model to examine the student-and school-level factors on student achievement. The results of the Null model indicated that student achievement was explained by student-level factors with a large percentage of the variance at. 8994 (SE=.0297; p<.001) comparing to the variance at school-level random effect at. 1121 (SE=.0315; p<.001) (Table 5). The result of the ICC of the Null (unconditional) model showed that the proportion of the variation in student achievement lies between schools is about 11%, which is higher than.05. This indicates the substantial group observation within Level 2 units, which justified using the multi-level model technique. Consequently, the model included the school-level independent variables in Level 2 and the student-level independent variables in the Level 1 analysis.

Model 1 was developed by adding the student-level variables to observe the changes of the between-schools variance. The results showed that three out of four student-level variables negatively affected student achievement. Gender has the highest negative effect on student achievement

Table 5 Variability in Student Achievement

Unit of analysis	Variance Explained	Proportion of the Variance Explained %
Between-students (N=1870)	.8994	88.92
Between-schools (N=38)	.1121	11.08

Note: Proportion of the variance explained (Between-students)=.8994/(.8994+.1121);
Proportion of the variance explained (Between-schools)=.1121/(.8994+.1121)
Source: Author's Calculation.

Table 6 Results of Multi-level Models for the Student Achievement

Variables (Parameters)	Null model	Model 1	Model 2	Model 3
Fixed effect				
Intercept (γ_{00})	.017 (.059)	1.946 (.358)***	− .039 (.074)	1.898 (.360)***
Student-level variables				
--Age (γ_{10})		− .136 (.027)***		− .135 (.027)***
--Gender (γ_{20})		− .508 (.050)***		− .512 (.049)***
--Repetition (γ_{30})		− .277 (.065)***		− .270 (065)***
--Parental education (γ_{40})		.037 (.012)**		.038 (.012)***
School-level variables				
--Principal's leadership (γ_{01})			.234 (.087)**	.354 (.098)***
--Teacher education (γ_{02})			.151 (.074)*	.087 (.079)
--Teacher experience (γ_{03})			− .010 (.004)*	− .010 (.005)
Random effect				
--Between-students variance	.8994	.7546	.8877	.7407
	(.029)***	(.029)***	(.029)***	(.029)***
--Between-schools variance	.1121	.1442	.1618	.1934
	(.031)***	(.041)***	(.049)**	(.059)**
Model fit				
--ICC	.1108	.1604	.1541	.2070
--Deviance (− 2LL)	5182.586	3440.124	5182.406	3437.368
--χ^2		1742.462***	0.18***	1745.218***

Note: N (Schools = 38); Cell value (Regression coefficient and standard error in brackets); *p < .05; **p < .01; ***p < .001.
Source: Data collected, analyzed, and calculated by the author.

(β_{2j} = − .508, p < .001), which indicated that female students outperformed their male counterparts. In addition, the experience of repetition among sixth-grade students negatively affects student achievement (β_{3j} = − .277, p < .001). Finally, age also is a predictor that affects student achievement negatively (β_{1j} = − .136, p < .001). In contrast, parental education has a positive effect on student achievement (β_{4j} = .037, p < .01), suggesting that the higher the level of parental education, students tend to gain higher scores on the achievement, holding other variables constant. The variation between the Null model and Model 1 was significant (χ^2 = 1742.462, df = 4, p < .001).

Model 2 was estimated the coefficients as the cluster means that predict the changes in student achievement when a one-point increase in the Level 2 variables. The results showed that principal's leadership and teacher education positively affected the school's average student achievement (γ_{01} = .234, p < .01; γ_{02} = .151, p < .05). In contrast, teacher experience negatively affected the school's average student achievement but a subtle coefficient (γ_{03} = − .010, p < .05). The variation between the Null model and Model 2 was significant (χ^2 = .18, df = 3, p < .001).

Model 3 was mixed between all predictors from Level 1 and Level 2 covariates to predict student achievement. The result revealed that all Level 1 covariates are significant while holding Level 2

predictors constant. However, the principal's leadership was the only Level 2 variable that significantly predicted the school's average student achievement (γ_{01} = .354, p < .001) while controlling for Level 1 and Level 2 covariates. It means that for each one-point increase in principal's leadership rating by sixth-grade teachers, the average of student achievement is predicted to increase by .354. The results showed that when controlling for principal's leadership and Level 1 covariates, teacher education and teaching experience did not significantly affect student achievement. The variation between the Null model and Model 3 was significant (χ^2 = 1745.218, df = 7, p < .001).

5. Discussion

5.1 Relationship between Student's Age, Gender, Repetition, and Parental Education and Student Achievement

As mentioned earlier, this paper aims to investigate the empirical data analysis on whether or not a principal's leadership is the determinant of student achievement at the Cambodian primary schools holding other variables constant. The following subsections will discuss key findings of the study with extensive discussion and interpretation in the context of Cambodian primary schools, in particular grade 6.

This study found that student-level variables explained a large proportion of student achievement variances, which indicated that students' background characteristics are primarily associated with the student achievement levels. Gender remains a key challenge in Cambodian primary education, as suggested by this finding. In addition, female students outperformed their male counterparts in test achievement, although gender parity in the access to primary education was narrowed. This finding contrasts the study conducted by Marshall et al. (2012: 124), which showed that female students performed low compared to their male peers.

In addition, younger students performed higher in classroom test achievement than the older ones. Regarding the age of enrolment, students at the age of six are expected to enroll at the primary school. However, according to the National statistic on education, 7.3 percent of 11,435 students in Phnom Penh in 2018–2019 were identified as late enrolled children (MoEYS 2019: 21). The late entry to primary schools may cause severe problems among Cambodian primary school students in getting a good quality of learning but experience grade repetition and drop out of schools at early grades due to poor retention (Shuttleworth and Shuttleworth 2017: 8). Moreover, this finding confirmed that students who have experienced repetition get lower scores in achievement than those who have not. Marshall et al. (2012: 124) suggested age of students is needed to be interpreted carefully and should be related to school repetition, which negatively affects student achievement.

Finally, the findings showed that with an increase of one-point scales in parental education level, students also gained higher scores in student achievement. Parents may involve in student learning

by establishing a home-supportive environment and supervising them to improve learning habits, attitudes, and motivation, thus raising student learning achievement. In addition, high-educated parents tend to engage more in taking care of children than their lower education counterparts (Guryan et al. 2008: 23).

In conclusion, students' background characteristics significantly explained the student achievement, reflecting the equity issues among Cambodian primary school students. This study's findings are consistent with the results of the Cambodian national assessment at sixth grade in 2016.

5.2 Relationship between Principal's Leadership and Student Achievement

There is a scarcity of empirical studies examining the relationship between principals' leadership and student achievement in the Cambodian primary school context. This study found a significant positive association between principals' leadership and student achievement, which means that the leadership quality among the principals at Cambodian primary schools may determine the school learning outcomes. The following discussions discuss how the principal's leadership at the Cambodian primary schools affects the school's learning and achievement.

First, principals may exert their leadership through a shared school vision among school colleagues. Without a common goal, teachers and school leaders may not produce good school outcomes. The shared vision among school colleagues could be a source of inspiration and incentive for better education even though they are working under the shortage of school resources. For instance, Shuttleworth and Shuttleworth (2017: ix) highlighted that a lack of collaboration and mutual trust among school members could be a significant challenge to achieving the shared vision.

Secondly, principals may shape the instructional practices by sharing their professional teaching experiences and leading the educational organization. Before the appointment as a school leadership position, most principals at Cambodia's primary school used to work as classroom teachers, technical group leaders, or even deputy principals for several years. These promotions are based on the outstanding records in teaching and leadership performances as individuals, which were notified by other school members and the upper-level educational administrators (Kheang et al. 2018: 144). These qualities have led the current principals to be more effective in exercising their roles in leading the educational organization.

Thirdly, principals in Cambodian primary schools may assume a mentorship role in promoting the instructions and leading a professional learning community. As a senior in the teaching profession, principals are both leaders and mentors in scaffolding for teachers with little subject expertise or teaching skills. While the school-based in-service training exists, the principals play vital roles in leading these school-based training to enable teachers to leverage the pedagogical and professional knowledge and promote school collaboration in shaping the teaching practices and student outcomes (King 2017: 7). This mentorship support probably provides a good source of motivation for the

education system like Cambodia, where the in-service professional training for teachers is not considered effective and efficient (Bo et al. 2019: 30).

Finally, classroom observation and inspection by the principals may contribute to improving teaching practices at primary schools. School principals regularly work on classroom observations to provide technical support on teaching methods and classroom management. It is beneficial for teachers to get constructive feedback to improve teaching practices. Principals may have expertise, knowledge, and experience teaching as teachers or technical group leaders before appointing as school leadership positions. Moreover, school principals may provide more constructive feedback for further improving the instructions by explicitly pointing to the challenging issues for teachers and may also listen to what needs from teachers and students.

Like many other developing countries, it is challenging for school leaders who work at under-resourced schools without full supports. The principals who indicate high leadership on the instructional quality may improve the classroom practices and thus minimize the instructional time loss (Song 2012: 85). Though these platforms exist at school, the school-based in-service training may be useless and impossible when a lack of principal's leadership initiatives.

5.3 Relationship between Teacher Quality and Student Achievement

This study found that teacher education was a predictor that positively and significantly affected the school's average academic achievement in Model 2 when the Level 2 variables were observed with no Level 1 covariate. But it was not significant in Model 3. This indicated that teachers who have a Higher Education certificate are likely to increase the school's average of student achievement. Teachers' instructional quality is relatively linked to higher levels of education, which results in better student achievement (Nilsen and Gustafsson 2016: 21). In addition, students in the education system with many high-quality teaching workforces tend to learn better and gain high achievement (Tandon and Fukao 2015: 2). More importantly, Clotfelter et al. (2007: 681) discussed teachers' subject and pedagogical content knowledge on student learning combined with high educational credentials. It matters for student achievement when schools are distributed with high-quality teaching workforces with a wide variety of academic certificates and experiences (Clotfelter et al. 2007: 681). However, the OECD (2014: 34) argued that teaching at the primary school level does not need specialized subject knowledge with certain higher education degrees but holistic professional development and education (OECD 2014: 34). The second school-level covariate is teacher experience. This study showed that teachers' years of teaching experience negatively predicted the school's average student achievement. This result may suggest that teachers who stay many years of teaching experience do not contribute to academic achievement but negatively affect the test scores. This seems to be contrasted to some previous studies. For instance, Buddin and Zamarro (2009: 103) found a positive and weak relationship between teachers' experience on student achievement, while Song (2012: 85) found the teacher

experience had a considerable effect on student achievement.

The majority of them have served the teaching profession for more than ten years. More extended years in the teaching profession with a lower level of education may not contribute much to teaching and learning quality. In addition, back to the teacher training scheme over the past two decades, the senior teachers were poorly trained by inadequate teacher training, which may have difficulties applying new pedagogical knowledge and a child-centered approach. Moreover, the newly updated curriculum and pedagogical approaches have been changing, requiring teachers to upgrade their educational qualifications to acquire new sets of knowledge, skills, and attitudes reflecting 21st-century goals of education. In the current educational reforms, the MoEYS of Cambodia has promoted the teacher's professional competencies by sending teachers to attend the teacher's upgrading programs and encouraging teaching staff to engage in the in-service training program at schools.

OECD (2014: 35) reviewed many research studies on the relationship between years of teaching experience and student achievement. The results indicated that those years of teaching experience could be crucial for teachers who have started their teaching careers within the first five years in the profession. The extended years in the teaching profession can be a good source for teaching and learning quality in some school contexts unless teachers are well trained, supported, and motivated. Without regular training, motivation, and support, years of teacher's teaching experience per se may not benefit learners to acquire the new sets of skills and knowledge.

6. Conclusions

According to recent results, the leadership of the principal is an essential contextual element impacting student progress in sample schools. Teachers appear to be satisfied with principals' leadership styles and behaviors in directing instructional programs to increase school results, as suggested by the findings of this study. Principals who demonstrate shared and effective leadership may demand high-quality instructions and learning compared to those who do not. These leadership qualities are probably key motivators and incentives for teaching colleagues to improve teaching practices to create a more effective learning environment. The finding may shed light on the systematic reforms aimed at improving the quality of school leadership, particularly among primary school administrators, in order to improve student success and educational quality. As a result, the findings of this study may provide compelling evidence for Cambodia's Ministry of Education, Youth and Sport to invest more in developing and educating school principals in the professional leadership skills and competencies required for effective school reforms.

Using teacher perception data to understand the principal's leadership is paramount because the data obtained from the teachers can be more reliable and accurate, reflecting the objectivity of the data on the leadership practices (Bellibas and Liu 2017: 63). Similar to other research, this study

consists of limitations. Firstly, the tool used for this study was limited to only six-item variables of school leadership, not specifically focusing on any particular dimensions of principal's leadership styles. Additionally, this paper only draws the association of the principal's leadership and student achievement using the quantitative statistical approach. Lastly, this study was limited to student achievement, which is the result of classroom-based assessment. Therefore, future research may include the qualitative inquiry approach for data collection and analysis to investigate how principals' leadership relates to other schools' learning outcomes and how teachers' instructional quality is shaped in the Cambodian primary school context.

Note

1 Parental education was measured with eight scales: 1＝Never attend school; 2＝Attended primary school; 3＝Completed primary school; 4＝Attended secondary school; 5＝Completed secondary school; 6＝Attended high school; 7＝Completed high school; 8＝Attended higher education.

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