Doctoral Dissertation

Multiple Indicators of School Effectiveness in Rural Malawi:

A Multilevel Event History Analysis

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CHAPTER SIX: FACTORS INFLUENCING INDICATORS

ABBREVIATIONS

CTT = classical test theory

EFA = education for all

GER = gross enrollment ratio

IRT = item response theory

JCE = Junior Certificate Examination

MIE = Malawi Institute of Education

MoEST = Ministry of Education, Science and Technology

MSCE = Malawi School Certificate Examination

NER = net enrollment ratio

PASEC = Program for the Analysis of Education Systems (Programme d'Analyse des Systèmes Educatifs de la CONFEMEN)

PIRLS = Progress in International Reading Literacy Study

PSLCE = Primary School Leaving Certificate Examination

PTA = parent-teacher association

SACMEQ = Southern and Eastern Africa Consortium for Monitoring Educational Quality

SER = school effectiveness research

SMC = school management committee

TIMSS = Trends in International Mathematics and Science Study

UNESCO = United Nations Educational, Scientific and Cultural Organization

EXECUTIVE SUMMARY

School effectiveness research (SER) has been conducted in both developed and developing countries since the report by Coleman et al. (1966). In general, SER focuses on student achievement as an output indicator of school effectiveness. However, as well as low student achievement, high repetition rates, dropout rates, and transfer rates are significant issues in most developing countries. Accordingly, the present study considered using achievement growth, repetition rates, dropout rates, and transfer rates in conjunction with achievement as indicators of school effectiveness. Employing data from rural Malawi, this study aimed to examine the relationships among those indicators.

Objective

The purpose of the present study was to examine the relationships among multiple indicators of school effectiveness at the primary school level in rural Malawi: achievement, achievement growth, repetition rates, dropout rates, and transfer rates.

Research Questions

1. What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates?
2. What school-level factors predict the indicators after controlling for student-level factors? In addition, are the factors that influence achievement the same as those that influence the other factors?

Methodology

Conceptual Framework

Figure 1 presents the conceptual framework of the present study. It was developed by the researcher with reference to Scheerens (1990).

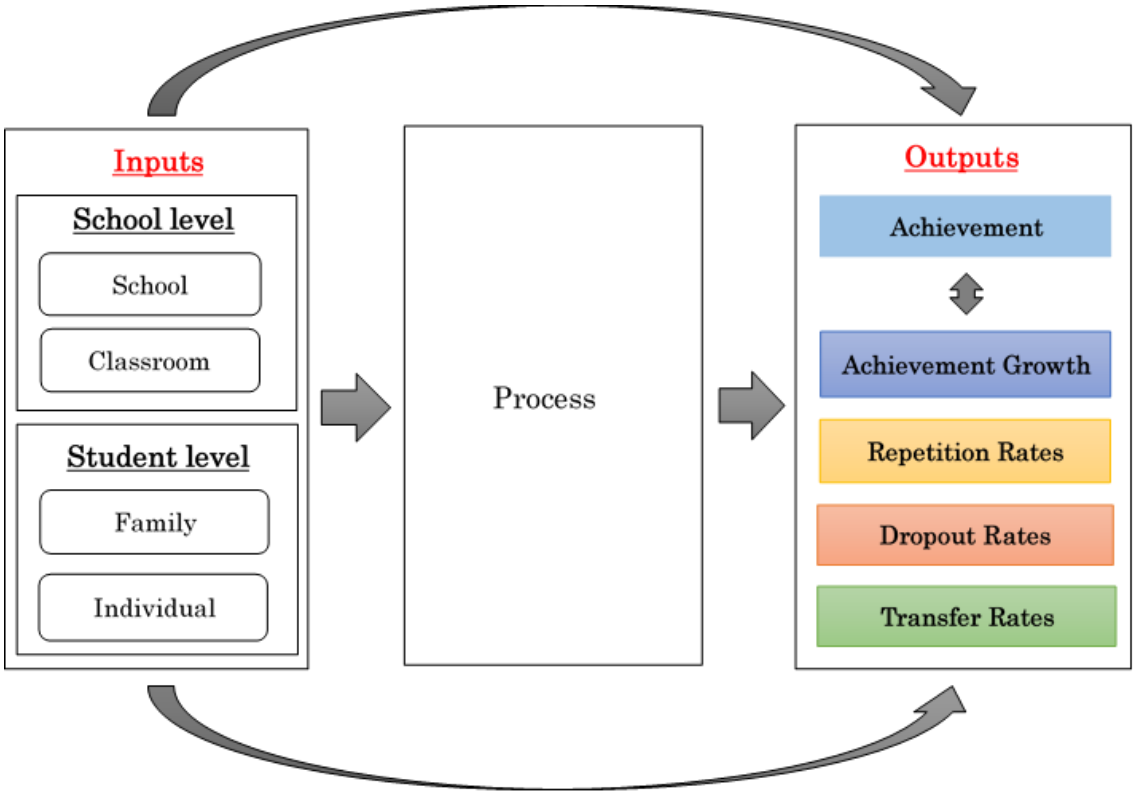

Figure 1. Conceptual framework

Source: Developed by the author based on Scheerens (1990)

Sample

Fieldwork data were obtained twice: January to March (2013, Phase 1) and during the same period (2014, Phase 2). In all, 30 public primary schools in the Nkhata Bay District were selected as the sample using clustering according to the pass rate in the national examination from 2010 to 2012. Over the 2-year period, the data of 1,449 grade 5 students and 1,294 grade 7 students were analyzed by means of an event history method. In this study, grade 5 students constituted Cohort

1, and grade 7 students Cohort 2. In Phase 1, the 1,449 grade 5 students and 1,294 grade 7 students took English and mathematics tests and completed questionnaires. In addition, 30 head teachers, 224 teachers, and 169 members of school management committees (SMCs) and parent-teacher associations (PTAs) filled in questionnaires. In Phase 2, 1,367 grade 6 and 1,308 grade 8 students (including students who were promoted to grade 6 in Cohort 1 and grade 8 in Cohort 2) took English and mathematics tests and completed questionnaires. Likewise, 30 head teachers, 224 teachers, and 153 members of SMCs and PTAs filled in questionnaires. Figures 2 and 3 show the transitions of Cohort 1 and 2 students from Phases 1 to 2. Figure 4 is a summary of the participating students.

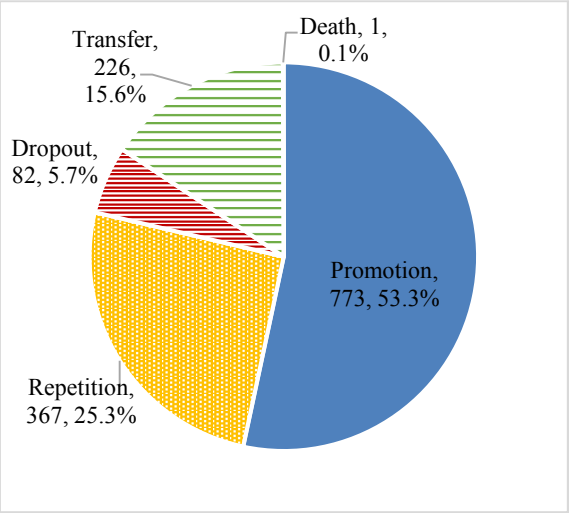

Figure 2. Transition in Cohort 1

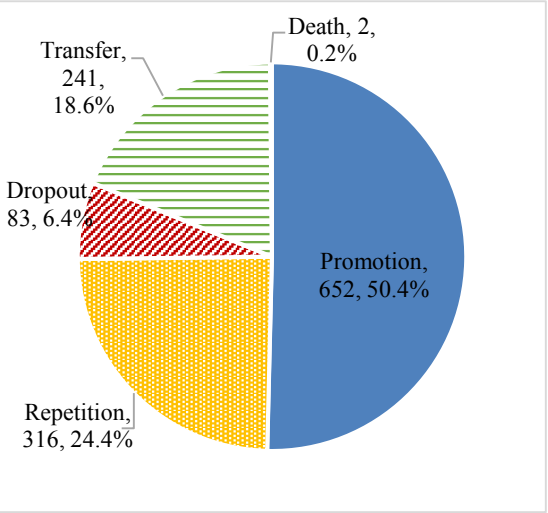

Figure 3. Transition in Cohort 2

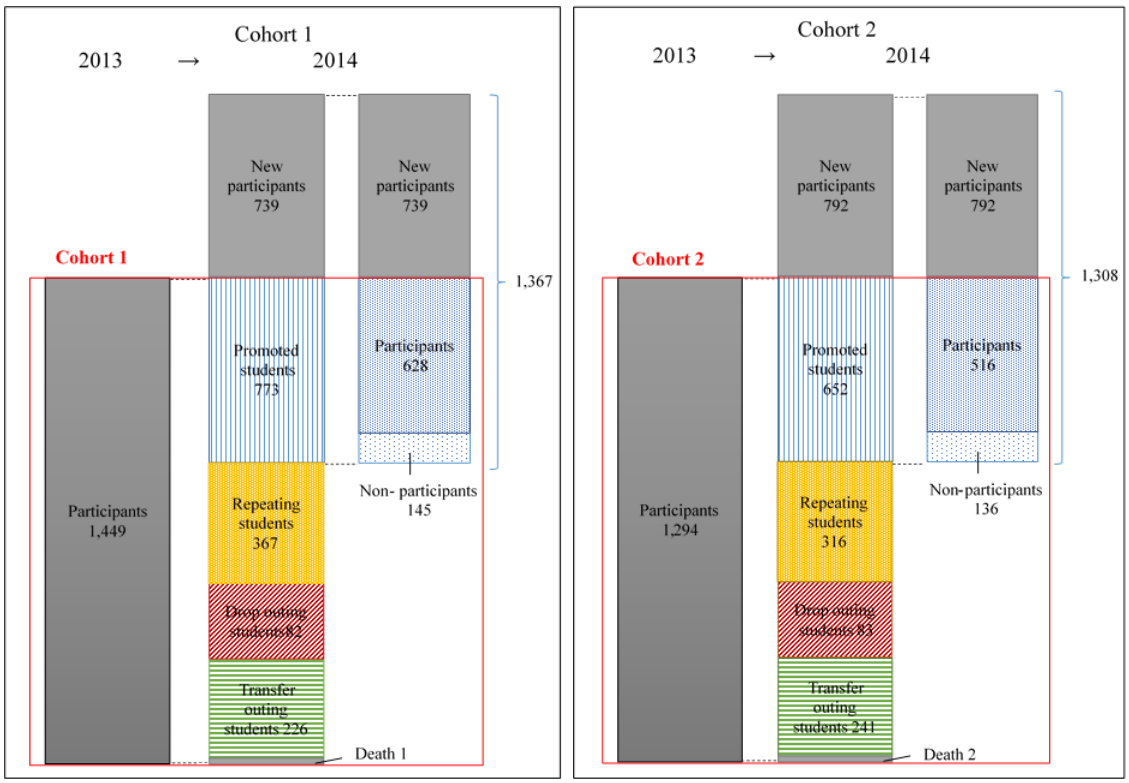

Figure 4. Summary of the participating students

Analysis

Correlation analyses and scatter plots were conducted to analyze the relationship between achievement and the other indicators (Research Question 1). Multilevel linear regression and multilevel logistic regression were employed to examine the factors that influenced the indicators (Research Question 2). Two models were constructed: Model 1 as the school composition model and Model 2 as the school input model.

Findings

Research Question 1: What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout and transfer rates?

Tables 1 and 2 present the relationships among the indicators in Cohorts 1 and 2, respectively. There was a negative relationship between achievement and achievement growth in Cohort 1 (r = 0.419, p^* < .05); there was no relationship between achievement and the other indicators in the two cohorts.

Table 1. Relationships among indicators in Cohort 1

	1.1	1.2	1.3	1.4	1.5
1.1 Achievement	–	-.419*	-0.339	0.088	-0.069
1.2 Achievement growth		–	0.36	-0.038	0.046
1.3 Repetition rates			–	-0.245	0.242
1.4 Dropout rates				–	-0.274
1.5 Transfer rates					–

Note: p^* < .05.

Table 2. Relationships among indicators in Cohort 2

	2.1	2.2	2.3	2.4	2.5
2.1 Achievement	–	-0.101	-0.107	-0.174	-0.082
2.2 Achievement growth		–	0.106	-0.334	0.237
2.3 Repetition rates			–	-0.093	-0.049
2.4 Dropout rates				–	-0.188
2.5 Transfer rates					–

Note: p^* < .05.

To examine the patterns of achievement and the other indicators, scatter plots were constructed, as shown in Figures 5 to 12. Except for the relationship between achievement and achievement growth in Cohort 1, no definite patterns appeared in the relationships between achievement and the other indicators. However, four patterns were evident: (1) high achievement and high achievement growth (or repetition, dropout, or transfer rates); (2) high achievement and low achievement growth (or repetition, dropout, or transfer rates); (3) low achievement and high achievement growth (or repetition, dropout, or transfer rates); and (4) low achievement and low achievement growth (or repetition, dropout, or transfer rates).

One interesting finding did, however, emerge in the relationship between achievement and repetition rates in Cohort 2. School 1, which had the highest pass rate in the national examination among the sampled schools, also had the highest repetition rates; School 30, which

had the lowest pass rate in the national examination, showed lower repetition rates (Figure 8). This implies that School 1 intentionally produced many repeaters so as to maintain its higher pass rates. It would appear that that the strategy and means of evaluating grade repetition differed among the schools.

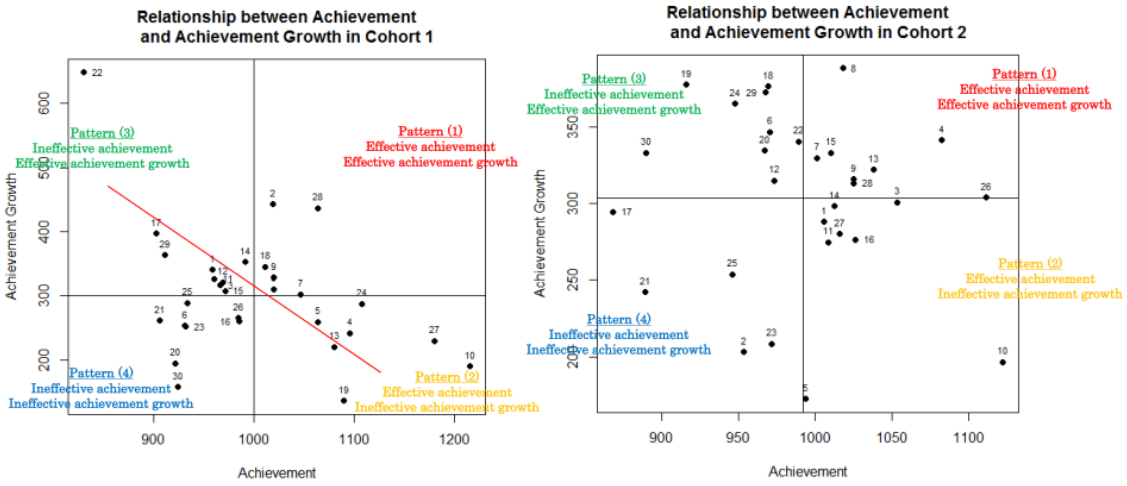

Figure 5. Relationship between achievement and achievement growth in Cohort 1 (left)
Figure 6. Relationship between achievement and achievement growth in Cohort 2 (right)

Figure 7. Relationship between achievement and repetition rates in Cohort 1 (left)
Figure 8. Relationship between achievement and repetition rates in Cohort 2 (right)

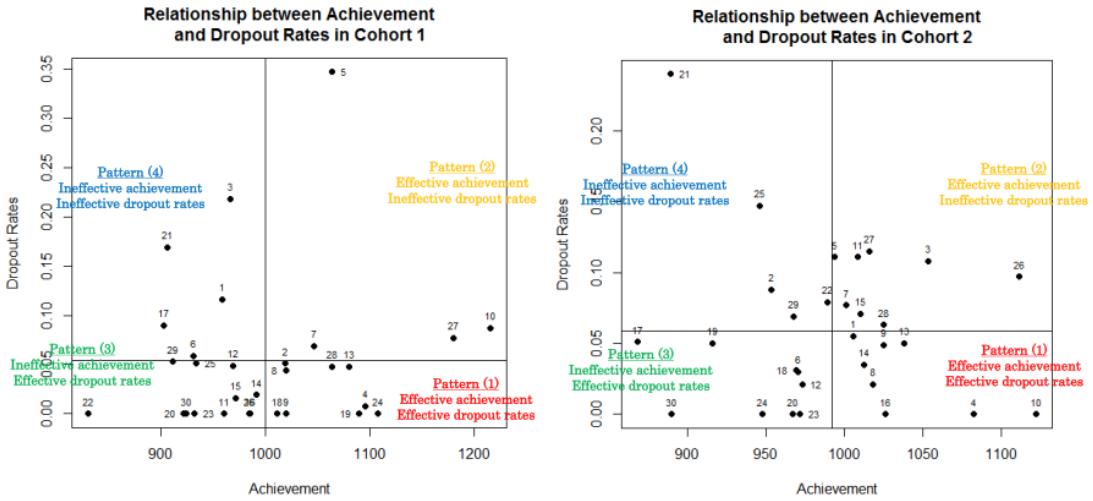

Figure 9. Relationship between achievement and dropout rates in Cohort 1 (left)

Figure 10. Relationship between achievement and dropout rates in Cohort 2 (right)

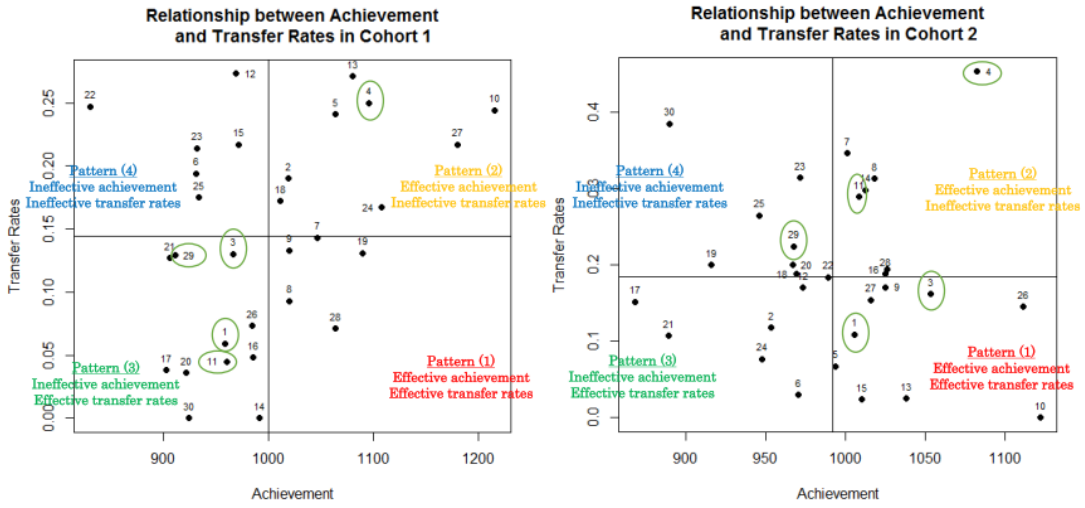

Figure 11. Relationship between achievement and transfer rates in Cohort 1 (left)

Figure 12. Relationship between achievement and transfer rates in Cohort 2 (right)

Research Question 2: What school-level factors predict the indicators after controlling for student-level factors? In addition, are the factors that influence achievement the same as those that influence the other factors?

Prior to deeper analysis, the null model was created for each indicator to identify the proportion of school-level variance within overall variance. The results are presented in Table 3. Except for transfer rates in the two cohorts and achievement growth in Cohort 2, the intraclass correlations (ICCs) were high. Schools thus had a greater effect on those indicators.

Table 3. Null model

	Achievement	Achievement growth	Repetition rates	Dropout rates	Transfer rates
Cohort 1	0.315	0.290	0.176	0.315	0.078
Cohort 2	0.123	0.078	0.256	0.125	0.091

Tables 4 and 5 show Model 2 for Cohorts 1 and 2, respectively. In both cohorts, school location influenced the transfer rates; the other results differed between the two cohorts.

Table 4. Model 2 for Cohort 1

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	998.714***	2.182	285.285***	18.121	0.982***	0.184	2.670	3.510***	0.351	33.448	1.754***	0.113	5.778
School social composition													
Mean achievement	–	–	–		–	0.002	1.001	0.003	0.003	1.003	0.000	0.001	1.000
Mean socioeconomic status	-12.215	8.557	-1.575	13.122	-0.173	0.098	0.841	0.080	0.188	1.083	-0.024	0.077	0.976
Mean number of grade repetitions	8.188	70.346	20.625	55.435	0.837	0.549	2.309	-2.097	1.202	0.123	-0.988	0.560	0.372
School inputs													
Class size	-0.064	0.390	0.238	0.461	0.008	0.005	1.008	-0.002	0.007	0.998	0.001	0.003	1.001
School location	32.588	29.026	-6.607	37.030	0.676	0.565	1.966	-0.412	0.645	0.662	0.941***	0.245	2.563
School facilities	-21.910	13.875	27.173	24.479	0.155	0.233	1.168	0.198	0.250	1.219	0.098	0.077	1.103
Random Effect													
Residual Variances													
Between level	4380.798**	1539.175	7551.809*	3035.825	0.562**	0.207		1.122	0.589		0.051	0.097	
Within level	12001.799***	594.472	21326.213***	1543.193									
ICC	0.263		0.275		0.146			0.254			0.015		
Loglikelihood	-8903.217		-3575.985		-608.888			-248.640			-578.361		
AIC	17870.435		7215.970		1283.775			563.280			1222.722		
BIC	18039.351		7354.119		1450.055			731.852			1394.970		

Note: Model 2 was controlled by individual- and family-level factors. $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Table 5. Model 2 for Cohort 2

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	994.169***	9.573	294.572***	11.673	1.176***	0.225	3.241	3.254***	0.273	25.894	1.579***	0.126	4.850
School social composition													
Mean achievement	–	–	–	–	0.010***	0.003	1.010	-0.001	0.006	0.999	0.003	0.002	1.003
Mean socioeconomic status	-0.150	4.704	-14.420	10.035	-0.231	0.234	0.794	-0.058	0.099	0.944	-0.058	0.096	0.944
Mean number of grade repetitions	-103.413**	35.126	104.291	75.116	2.412	1.630	11.156	-1.171	1.444	0.310	1.379*	0.692	3.971
School inputs													
Class size	0.187	0.279	-0.294	0.436	0.023**	0.008	1.023	-0.006	0.010	0.994	0.000	0.003	1.000
School location	12.564	19.053	71.871	38.043	-0.621	0.961	0.537	0.414	0.758	1.513	0.638*	0.276	1.893
School facilities	-4.468	9.956	-5.632	11.390	-0.448	0.242	0.639	-0.081	0.188	0.922	-0.046	0.113	0.955
Random Effect													
Residual Variances													
Between level	1631.247**	582.805	1618.154	1093.681	1.196*	0.563		0.559*	0.271		0.183	0.127	
Within level	14595.326***	667.234	29877.279***	2806.225									
ICC	0.098		0.089		0.267			0.145			0.053		
Loglikelihood	-8065.045		-2985.225		-439.699			-244.331			-557.972		
AIC	16194.091		6034.449		945.398			554.661			1181.944		
BIC	16359.386		6166.158		1106.586			718.259			1350.163		

Note: Model 2 was controlled by individual- and family-level factors. $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

In Cohort 1, except for transfer rates, no variables were significant among the indicators. Mean achievement, mean socioeconomic status, mean number of grade repetitions, class size, school location, and school facilities were not predictors of the designated indicators. However, school location showed strongly significant increases in transfer rates. Students in schools located in semi-urban areas were more likely to transfer to another school than those in rural schools (odds ratio [*OR*] = 2.563, $p^{***} < .001$). In semi-urban areas, a number of schools are usually within walking distance, and so students have greater chance to transfer from one to another; in rural areas, they do not have this opportunity. In addition, parents living in semi-urban areas often have jobs with a steady income, and so it is easier for them to move to another place than it is for rural residents.

In Cohort 2, a few variables showed significant increases in terms of achievement, repetition rates, and transfer rates; however, no variables showed significant increases in achievement growth and dropout rates. With respect to achievement, students in schools with a lower mean number of grade repetitions achieved better than those in schools with a higher mean number of such repetitions (estimation [*ES*] = −103.413, $p^{**} < .01$). This appeared to be a general finding. Schools with many repeaters tended to have a low mean school achievement.

Regarding repetition rates, students in schools with higher mean achievement were more likely to repeat a grade than those in schools with lower mean achievement (*OR* = 1.010, *p**** < .001). This result is the reverse . In general, students in schools that had lower mean achievement were more likely to repeat a grade than those in schools with higher mean achievement. This could be explained by the national examination in Malawi. In some cases, high-achieving schools may be more likely to select students who are promoted to the final grade than low-achieving schools so as to maintain the schools' higher pass rates for the national examination. Students with larger class sizes were more likely to repeat a grade than those in smaller classes (*OR* = 1.023, *p**** < .001). Larger class size carried the risk of higher repetition rates.

With respect to transfer rates, students in schools with a higher mean number of grade repetitions were more likely to transfer to another school than those in schools that had a lower mean number of such repetitions (*OR* = 3.971 *p** < .05). This result implies that a greater number of grade repetitions increased the transfer rates. This could also be related to the national examination. To pass that examination, students often repeat a grade—especially in the higher grades. Students with a number of grade repetitions in one school may be more likely to change school to obtain a better education. As with Cohort 1, students in schools located in semi-urban areas were more likely to transfer to another school than those in rural areas (*OR* = 1.893, *p** < .05).

In terms of achievement growth and dropout rates, however, no variables showed significant increases. Mean achievement, mean socioeconomic status, mean number of grade repetitions, class size, school location, and school facilities were not predictors of those indicators.

Table 6 shows a summary of the variables that influenced indicators at the school level. In Cohort 1, a comparison of the variables that influenced achievement with the other indicators showed that they differed in terms of transfer rates; they were the same for achievement growth, repetition rates, and dropout rates. In Cohort 2, the variables that influenced achievement differed

for all the indicators—except for transfer rates. From these results, it is evident that the school-level variables that influenced achievement were not always the same as those that affected repetition, dropout, and transfer rates.

Table 6. Summary of the variables influencing indicators at the school level

Indicator	Cohort 1	Cohort 2
Achievement	x	Mean number of grade repetitions** (-)
Achievement growth	x	x
Repetition rates	x	Mean achievement*** (+) Class size** (+)
Dropout rates	x	x
Transfer rates	School location*** (+)	Mean number of grade repetitions* (+) School location* (+)

Discussion

1. Types of Data Employed in School Effectiveness Research

The present study employed data obtained from field research, which employed an event history analysis that followed the same students over a period of 2 years. Although the sample size was small compared with such large-scale studies as the Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMSS) and Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), this approach offered a couple of advantages. One was that it allowed for the identification of achievement growth as well as repetition, dropout, and transfer rates. Another advantage was that an event history method accommodates data collection whereby independent variables affect dependent variables with a predetermined property expressed at a specific time (Berry and Berry, 1990). For an assessment of improvement in both achievement and completion rates, it is necessary to obtain data that follow the same students before and after the associated events occur. That was the case

with the present study.

2. Transition Rates from Grade to Grade

The present study determined the transition rates from grade to grade by following the same students. In the two cohorts, only around 50% of the students were promoted to the next grade—a notably low rate. Further, approximately 25% of the students repeated the same grade, which was relatively high. In most developing countries, grade repetition is a common practice; however, it is not always an effective remedy for low achievement. There were apparent differences in understanding the notion of dropout between the researcher and the Malawi people. When collecting the relevant data, the researcher presented questions to the schools in two ways: about students who had been absent for 15 consecutive days and those who had dropped out of school. The results indicated dropout rates (as defined in this study) of approximately 5%–6%. At 16%–19%, transfer rates were found to be unexpectedly high. Because only a limited number of studies have been conducted about transfer, further investigations are necessary to examine this effect.

3. Need for Simultaneous Consideration to Improve Achievement and Completion Rates

SER in developing countries generally concentrates on achievement as the output indicator. However, such a single focus ignores other significant outputs of schooling. The present study found the use of only achievement as an output indicator of school effectiveness to be insufficient. It is necessary to consider other indicators—including achievement growth, repetition rates, and dropout rates—toward improving the current situation in Malawi education. The government, schools, communities, and parents frequently consider academic achievement the most significant output of schooling, and so they tend to place the emphasis on that factor alone. As a result, some schools produce many repeaters and dropout students. Transfer rates do not appear to be a predictor of school effectiveness. School location was found to be a dominant factor for school

effectiveness in both cohorts in this study.

4. Effect of the national examination

The present study found that schools with the highest pass rates for the national examination also had the highest repetition rates among the sampled schools. Schools with higher mean achievement also tended to have higher repetition rates. This suggests that some high-achieving schools produced many repeaters so as to maintain their pass rates in the national examination. As noted above, parents and communities in Malawi often consider passing the national examinations to be the most important output of primary schooling. However, grade repetition is evidently ineffective in improving student achievement. Schools with higher mean number of grade repetitions tended to have higher transfer rates. This suggests that students who already have a number of grade repetitions are more likely to transfer to another school.

5. School or student matters

Since the report by Coleman et al. (1966), SER has examined whether schools can make a difference in student achievement. Heyneman and Loxley (1983) found that schools had greater effect in improving student achievement in developing countries than in developed countries. The results of the present study are in accordance with those of Heyneman and Loxley with respect to achievement, achievement growth, repetition rates, and dropout rates. School-level factors were found to exert a large influence over those indicators.

6. School-level factors that influenced the indicators

The present study examined which school-level factors, including school social composition and school input, influenced the indicators. Some findings were in keeping with those of previous studies, whereas others were not. In Cohort 1, no significant factors could be found to affect the

indicators except for transfer rates. In Cohort 2, no significant factors were identified as affecting indicators in terms of achievement growth and dropout rates. Owing to the small sample size of the schools, it was not possible to analyze other school-input and school-process factors. Examining those factors would demand further studies with a larger sample.

7. Need to improve other school-level factors

School-level variables that influenced achievement were not always the same as those that affected achievement growth and repetition, dropout, and transfer rates. This implies that policies toward improving achievement growth and reducing repetition, dropout, and transfer rates need to adopt different strategies from those for improving achievement.

Conclusion

Research Question 1: What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout and transfer rates?

In Cohort 1, there was a negative relationship between achievement and achievement growth; no relationships were observed between achievement and the other indicators. Schools that were effective in raising achievement were ineffective in promoting achievement growth, and they were not always effective in reducing repetition, dropout, and transfer rates.

In Cohort 2, no relationship was evident between achievement and the other indicators. Schools that were effective in raising achievement were not always effective in promoting achievement growth and reducing repetition, dropout, and transfer rates.

Research Question 2: What school-level factors predict the indicators after controlling for student-level factors? In addition, are the factors that influence achievement the same as those that influence the other factors?

Schools were found to exert a difference in achievement growth in Cohort 1 and in achievement, repetition rates, and dropout rates in both cohorts; schools were unable to affect achievement growth in Cohort 2 or transfer rates in either cohort. The present study was able to identify the school-level factors that had a large influence on the studied indicators; however, owing to the small sample size of schools, it was unable to determine which school-level factors could predict those indicators.

In Cohort 1, no school-level variables were found to be dominant factors in achievement, achievement growth, repetition rates, and dropout rates; a school location in a semi-urban area was a significant factor for transfer rates. In Cohort 2, no school-level variables were found to be dominant factors in achievement growth and dropout rates. The following were found as significant factors in Cohort 2: lower mean number of grade repetitions for achievement; higher mean achievement and larger class size for repetition rates; and higher mean number of grade repetitions and schools being located in semi-urban areas for transfer rates.

In summary, school-level variables that influenced achievement were not always the same as those that affected repetition, dropout, and transfer rates. In addition, they were not always the same between the cohorts.

Limitations and Suggestions for Future Studies

Although the present study produced some interesting results, a number of limitations should be noted. First, in terms of data collection, the number of sampled schools and the research area were small. Further, data were obtained over a short period of only 2 years. In addition, in the 2nd year, it was not possible to collect data related to repeaters. Second, with respect to transfers, transfer-

out but not transfer-in data were obtained. Finally, this study assessed only basic academic skills, though it is of course also possible to measure advanced skills.

Despite these few limitations, this study makes a unique contribution to evaluating the indicators of school effectiveness in Malawi. The present study raises a few questions. First, how can we improve student achievement while at the same time reducing repetition and dropout rates? One of the answers here is that teachers need to develop evaluation skills with respect to grade repetition and also appropriate teaching skills such that students are able to acquire the basic skills at each grade. Second, what school-level factors influence achievement growth and repetition, dropout, and transfer rates? Owing to the small school sample size, the present study was unable to analyze school-input and process factors other than mean achievement, mean socioeconomic status, mean number of grade repetitions, class size, school location, and school facilities. Lastly, what is the relationship between the examined indicators and the national examination in Malawi? Because of the short research period, the present study was unable to investigate this relationship, which will need to be addressed in future research.

CHAPTER ONE: INTRODUCTION

1.1 Statement of Problems

School effectiveness research (SER) has been conducted in both developed and developing countries since the mid-1960s. SER is research on the educational production functions, which involves the estimation of the impact of schooling on achievement through the regression-based input-output models in economics and sociology (Scheerens, 1990; Townsend, 2007).

School effectiveness is most often assessed using student test scores: they provide a direct measure of student academic achievement, which is viewed as one of the most significant outputs of schooling. However, as SER has been widely conducted in diverse countries, its output indicators have been evaluated in a number of ways. In developed countries, some studies have used achievement growth and non-cognitive skills (Mortimore et al., 1988; Teddlie et al., 1989; Hill et al., 1996). Other studies have simultaneously utilized achievement growth, transfer rates, and dropout rates as output indicators: they asserted that schools need to retain students while aiming to improve student achievement (Ainley, 1994; Rumberger & Palardy, 2005).

In developing countries, however, achievement is used as the single indicator of school effectiveness. As a result, governments have developed their education systems so as to focus on improving achievement. However, it is necessary to consider using other indicators of school

effectiveness in such places. Many instruments may be used as output indicators of school effectiveness. In developing countries, there is apparently also a need to consider achievement, achievement growth, repetition rates, dropout rates, and transfer rates at the primary education level.

The reason for considering such indicators is that there is a simultaneous need to improve academic achievement and completion rates. Although the initial stage of Education for All (EFA) focuses on improving access to education as its goal, low student achievement is also recognized as a significant issue. Despite having spent several years at school, many children do not acquire basic literacy and numeracy skills (UNESCO, 2014). The Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) III has reported that many students in sub-Saharan Africa have not surpassed basic reading and numeracy skills (Hungi et al., 2010). Since the report by Coleman et al., many studies have used achievement measured by tests at a single point in time as an output of school effectiveness (Coleman et al., 1966); however, some investigations have found achievement growth to be more relevant as an output of schooling (Hill et al., 1996). Using achievement growth would appear to be an effective means of improving the current situation in most developing countries. However, no studies have used achievement growth as an output of school effectiveness there.

Recently, another identified issue is the large numbers of out-of-school children and low

completion rates owing to high repetition, dropout, and transfer rates. Grade repetition is a common practice in most developing countries. In SACMEQ member countries, about 12% of grade 6 students have had experience of at least one repetition (Hungi, 2010). High dropout rates are a significant problem. The *EFA Global Monitoring Report 2013/14* notes that in sub-Saharan Africa, the proportion of students starting school who reached the final grade was only 56% in 2010 (UNESCO, 2014). With respect to transfers, there is less evidence in this regard than with repetition and dropout rates; however, high transfer rates have been reported in some countries, and they could have a negative effect on completing primary education. In Australia and the United States, school transfer has been found to be deleterious to education at high school level. High transfer rates ordinarily indicate that schools are unable to retain their students. However, this is not necessarily the case in sub-Saharan countries. In Uganda, primary students tend to transfer to another school to avoid paying fees or repeating grades (Taniguchi, 2013). One study of secondary schools in Kenya reported that schools with high transfer rates tended to have larger class sizes and lower fees (Tasaka, 2014).

Malawi, which is a low-income country in sub-Saharan Africa, follows the above pattern. It is at the bottom level of basic achievement among sub-Saharan African countries. The Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) III reported that in Malawi only 26.7% and 8.3%, respectively, of grade 6 students have surpassed

basic reading and numeracy skills (Hungi et al., 2010). Also, low completion rates are an urgent issue in Malawi. Survival rates for grades 5 and 8 were 64.0% and 31.0%, respectively (MoEST, 2013). According to a report by the Malawi government, repetition and dropout rates during primary education were 14.4% and 17.6%, respectively (MoEST, 2013). The SACMEQ III found that in Malawi, the repetition rate for grade 6 was 60.3%, which was the highest among 15 sub-Saharan African countries (Hungi, 2010). In Malawi, transfer-in rates and transfer-out rates were 7.5% and 3.9%, respectively (MoEST, 2013). Hitherto, no studies have investigated the causes of the high transfer rates in Malawi and their effect on low completion rates. The present study, therefore, attempted to address this lack.

1.2 Objectives

The present study examined the relationships among multiple indicators of school effectiveness at the primary school level in Malawi: achievement, achievement growth, repetition rates, dropout rates, and transfer rates. To pursue this aim, this study focused on the following two research questions, employing data from rural Malawi:

1. What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates?

2. What school-level factors predict the indicators after controlling for student-level factors? In addition, are the factors that influence achievement the same as those that influence the other factors?

The first research question concerns whether schools that are effective in one area of school performance are also effective in other areas. Some schools may perform better with one indicator than with others. In such situations, can we say that these schools are truly effective?

The second research question addresses whether school-level factors that contribute to raising achievement also contribute to improving the other indicators. This question thus concerns whether schools adopt the same measures for achievement as for the other indicators.

1.3 Hypotheses

No studies have examined the relationship among several indicators of school effectiveness in developing countries. However, one study on school effectiveness in US high schools by Rumberger and Palardy (2005) revealed two important points. First, some schools may perform better than other schools with respect to one particular indicator. This is because some resources and practices required to raise achievement in one area differ from those appropriate in others. Second, improving one outcome may conflict with improving others: raising test score levels has the result of increasing the number of dropout students. Thus, the present study predicted the

following results:

1. There is no definite relationship between achievement and the other indicators. Schools that are effective in raising achievement are not always effective in promoting achievement growth and reducing repetition, dropout, and transfer rates. This tendency is stronger with higher grades.
2. The predictors for achievement are not always same as those for the other indicators.

1.4 Significance

Assessing school effectiveness through five related indicators (achievement, achievement growth, repetition rates, dropout rates, and transfer rates) contributes to an improvement in the current educational situation. First, this study contributes to assessment of school effectiveness in developing countries. Although academic achievement is a major output of schooling, reducing grade repetition, dropout, and unavoidable transfer are also urgent issues in most developing countries toward achieving Goal 2 in UNESCO's Education for All (EFA), whereby all children should complete a better quality primary education.

Second, the present study contributes to enhancing educational policy in Malawi. Although the Malawian government aims to improve achievement and reduce repetition and dropout rates, it has not fully presented concrete policy plans in this regard. Resources and

practices may differ between improving achievement and reducing repetition, dropout, and transfer rates. The present study considers these issues.

1.5 Definitions of Key Terms

Achievement is a scale score measured in English and mathematics tests. High achievement indicates school effectiveness.

Achievement growth is a gain scale score over a period of a year measured in English and mathematics tests. High achievement growth indicates school effectiveness.

Grade repetition, also called *grade retention*, is the practice whereby students remain in the same school grade for an extra year rather than advancing to the next grade with their age peers (Shepard, 1994).

Repetition rate is the proportion of students from a cohort enrolled in a given grade in a given academic year who study in the same grade the following year. Low repetition rates indicate school effectiveness.

Dropout is defined as "any student, previously enrolled in a school, who is no longer actively enrolled as indicated by fifteen days of consecutive unexcused absence, who has not satisfied local standards for graduation, and for whom no formal request has been received signifying enrollment in another state-licensed educational institution" (Morrow, 1987; Kelly, 1994).

Dropout rate is the proportion of students from a cohort enrolled in a given year who are no longer enrolled the following year. This is a measure of students from a cohort leaving school without completing their education. Low dropout rates indicate school effectiveness.

Transfer, also called *student mobility,* is when students change their current school to another school.

Transfer rate is the proportion of students from a cohort enrolled in a given school in a given year who change to another school the following year. "Transfer" has two meanings. One is that children transfer their school because they or their parents change their residence. This transfer relates to the circumstances of the children or their parents. The other is that children and their parents choose a school because of the school quality or factors relating to the school itself. This transfer relates to the circumstances of the school. If students change school because of the school's circumstances, low transfer rates indicate school effectiveness.

1.6 Features of This Study

In this study, several methodological approaches were adopted. First, by means of an event history analysis, data were obtained before and after students were promoted to the next grade, repeated a grade, dropped out of school, or transferred to another school. This approach is useful because it allows data analysis just before the events occur. Second, a cluster sampling method based on the pass rates in national examinations was implemented to select high-level and low-level

schools. This was helpful in identifying the causes of events even though the sample number was small. Third, when analyzing implemented tests, item response theory (IRT), rather than classical test theory (CTT), was used to examine whether question items were valid in measuring the intended cognitive domains. Employing IRT enabled the present study to compare tests that were implemented in different populations and at different times. Fourth, multiple imputations for dealing with missing data were conducted to use all the data obtained. Finally, multilevel regression was employed to analyze the proportion of school-level variables in total and also to examine the school-level factors that influence the indicators independently of student-level factors.

1.7 Structure of the Dissertation

The structure of this dissertation is as follows. Chapter 2 presents a literature review of the history of SER, an overview of SER indicators, the relationship between achievement and other indicators, indicators of SER, and factors that influence indicators of school effectiveness. Chapter 3 outlines basic information about education in Malawi. Chapter 4 describes the methodology used in this study. The findings are presented in Chapters 5 and 6. A discussion appears in Chapter 7. Chapter 8 is a conclusion, summarizing the findings and suggesting areas for future research.

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CHAPTER TWO: LITERATURE REVIEW

This literature review presents the history of school effectiveness research (SER), an overview of output indicators of SER, the relationship between achievement and other indicators, and the factors that influence the indicators.

2.1 History of SER

SER began with the findings of the US Coleman report (Coleman et al. 1966), according to which differences in student achievement were more strongly associated with family socioeconomic status than with school resource factors. After controlling for student background characteristics, Coleman et al. found that school factors accounted for only approximately 9%–10% of the variance in student achievement. By contrast, virtually all parents, politicians, and policy makers believe schools to be of great importance. Parents often send children to what they regard as better schools. The findings of Coleman et al. thus led educational researchers to engage in SER. In the 1970s, the influence of this report spread among such countries as the United Kingdom, Netherlands, Canada, Australia, and New Zealand.

In developing countries, SER has also been widely conducted since the 1970s, and important findings have been made in this area. Investigating data from 29 countries, Heyneman

and Loxley (1983) determined that the effect of school on student achievement in developing countries is greater than in developed countries. Fuller (1987) reported that in Third World countries, the effect of school appeared to be stronger among lower-income students in rural areas than in urban middle-class areas. These findings emphasized the importance of SER for educational researchers in developing countries.

In sub-Saharan Africa, however, an indigenous SER movement has not emerged. There are at least three potential reasons for this (Townsend, 2007). First, in North America, Australia, and Europe, SER was largely spearheaded by university researchers; in sub-Saharan Africa, there has been no such initiative among university researchers. Second, the primary concerns in sub-Saharan Africa have been low quality levels, such as low enrollment, gender imbalances, and lack of infrastructure. Thus, discussion there has not involved matters relating to SER. Third, the concepts of SER have not been raised in sub-Saharan Africa with respect to issues concerning the quality of education and equality.

However, following large-scale studies, such as the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) and Programme for the Analysis of Education Systems (PASEC), SER has been used to evaluate some school systems. Lee et al. (2005) and Hungi et al. (2010) reported factors that contributed to variations in reading and achievements in mathematics in grade 6 in 14 and 15 participating countries, respectively.

2.2 Overview of SER Indicators

In general, academic achievement has been used as an output of schooling in SER. However, since SER has come to be widely employed in different countries, little progress has been made with output indicators in developed countries. There are, though, some exceptions. One of the most significant developments has been the use of achievement growth—the change in individual achievement over time (Mortimore et al., 1988; Teddlie et al., 1989). Coleman et al. (1966) employed student achievement measured by tests at a single point in time. However, achievement growth was also considered a value added by teachers and schools, and so achievement growth came to be regarded as more effective in evaluating school effectiveness (Hill et al., 1996).

A second development was to use noncognitive outcomes, such as students' behavior and attitudes toward school activities (Mortimore et al., 1988; Landeghem et al. 2002). Although academic achievement is the most significant indicator, output of education is not the only achievement measured by tests: development of noncognitive skills is also examined (Mortimore et al., 1988).

Another development was the simultaneous use of other indicators, such as school holding power, transfer rate, and dropout rate (Ainley, 1994; Rumberger & Palardy, 2005). Those studies suggest that achievement or achievement growth alone is insufficient for measuring which schools are effective: schools may be effective in terms of achievement growth because many

students with low achievement dropped out or were transferred to other schools. Thus, high achievement growth has been maintained in schools. However, such measurements as dropout and transfer cannot be neglected. It is necessary for SER to adopt wider-perspective indicators to view properly the range of value-bearing schooling traits. Together with achievement growth, dropout and transfer rates should be used as indicators of school effectiveness.

However, no research has considered other output indicators of school effectiveness in developing countries. All studies have used academic achievement measured through tests as the single indicator of school effectiveness. Some reports have proposed analyzing the factors that influence grade repetition (e.g., El-Hassan, 1998; Liddell & Rae, 2001; Ikeda, 2005) and dropout (e.g., Hanushek & Lavy, 1994; Lyoyd et al., 2000; Rwechungura, 2014); however, they have not considered those factors as output indicators of school effectiveness.

2.3 Relationship between Achievement and Other Indicators

The importance of using other indicators of school effectiveness was addressed in the previous section. In some cases, schools are effective in terms of achievement or achievement growth, but they are ineffective with respect to dropout and transfer rates. One advantage of using several indicators simultaneously is the possibility of analyzing the relationship between achievement and other indicators. In this way, other important aspects of school effectiveness may become evident. Ainely (1994) and Rumberger and Palardy (2005) described this situation.

In Australia, Ainley (1994) conducted SER using data from approximately 3,000 grade 9 students in 22 non-selective high schools in 1987 and follow-up research in 1990 by means of three indicators: achievement growth, attitudes toward school, and school holding power. Achievement growth was the extent to which student achievement changed from grades 9 to 12. Attitudes toward school were based on the School Life Questionnaire by the Australian Council for Educational Research (ACER) and the Learning Process Questionnaire. School holding power was the extent to which schools were able to prevent students from withdrawing before reaching grade 12. The results showed a moderately positive association between achievement growth and attitudes toward school, though there was no relationship between achievement growth and school holding power. The study revealed that schools with high achievement growth did not always have high holding power. Some schools had high achievement growth but low holding power; other schools showed the opposite tendency.

In the United States, Rumberger and Palardy (2005) used the National Education Longitudinal Survey (NELS) from 1988, 1990, and 1992 to investigate the relationships among several different indicators of high school performance: (1) achievement growth over 4 years of high school; (2) the proportion of grade 10 students who dropped out between grades 10 and 12; (3) the proportion of grade 10 students who transferred over the same period; and (4) the total proportion of grade 10 students who left school before grade 12 (sum of the dropout and transfer

rates). The results showed that these measures were generally unrelated. Schools that were effective in achievement growth did not successfully reduce dropout and transfer rates. School effectiveness in terms of dropout rates was slightly and positively correlated with school effectiveness with respect to transfer rates. This suggests that schools that successfully reduced dropout rates were also effective in reducing transfer rates, but they were not effective in achievement growth. The Rumberger and Palardy study therefore revealed that a single focus may disregard other important outcomes of schooling. Moreover, improving test score performance tended to have a negative impact on other areas.

The above studies were conducted in developed countries. No studies in developing countries have analyzed the relationship among several such indicators.

2.4 Factors Influencing Indicators of School Effectiveness

In this section, the factors that influence achievement, achievement growth, grade repetition, dropout, and transfer are summarized from previous studies. Those factors are broadly classified into six levels: individual, family, classroom, school, community, and government levels. The present study focuses on classroom-, school-, and community-level factors; however, individual- and family-level factors are also summarized because they are a prime concern and need to be used as control factors when analyzing classroom-, school-, and community-level factors.

2.4.1 Achievement

Ample SER has conducted to identify the factors that influence student achievement in both developed and developing countries; the present study, though, focuses on research in developing countries. Following the findings of Heyneman and Loxley (1983), educational researchers and policy makers have paid more attention to determining which inputs and processes are effective in raising achievement. Accordingly, several factors have been considered and summarized as models of school effectiveness. Several models have been developed, but at least three have been well constructed and widely used.

First, there is the integrated model of school effectiveness by Scheerens (1990; Figure 2.1). This is an education function model, and it demonstrates the context-input-process-output approach. There are several factors in the inputs and process. In the process, there are two levels—school and classroom levels.

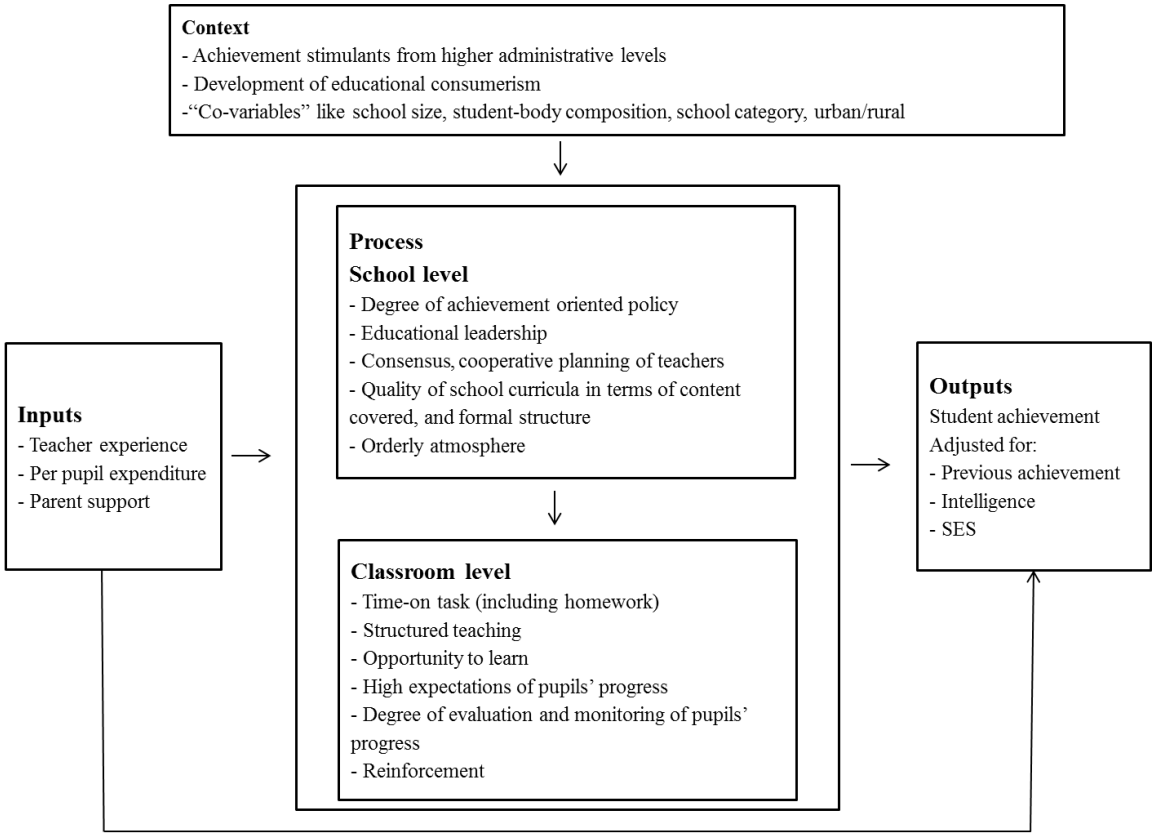


Figure 2.1. Integrated model of school effectiveness

Source: Scheerens (1990)

Second, there is a conceptual framework developed by Heneveld and Craig (1996; Figure 2.2). This is similar to the model of Scheerens (1990), and it uses an inputs-process-outcomes approach. The model of Heneveld and Craig incorporates 18 key factors that influence student outcomes. This framework was intended to reflect and operate in the context of Africa.

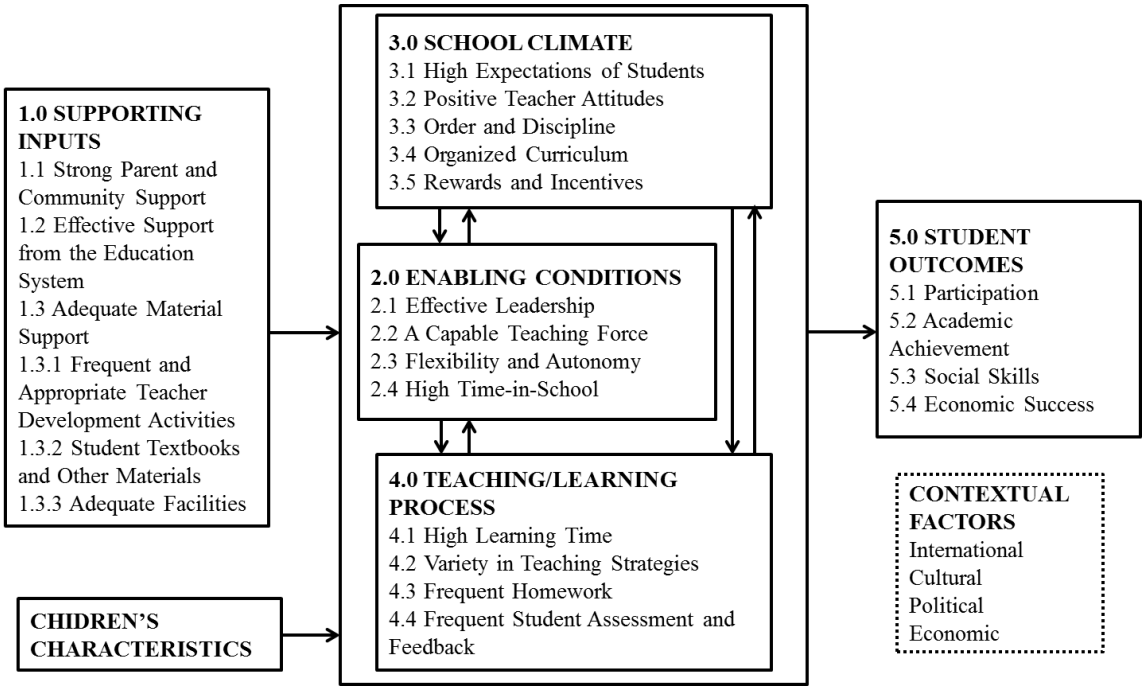


Figure 2.2. Conceptual framework: factors that determine school effectiveness
Source: Heneveld and Craig (1996)

Third, there is the hypothesized two-level model of pupil achievement for the SACMEQ III study (Figure 2.3). The SACMEQ III model includes many potential variables that are related to student achievement in the context of sub-Saharan Africa. Using this model, Hungi et al. (2010) analyzed a great number of potential factors that influence student achievement. In 15 participating countries in sub-Saharan Africa, Hungi et al. summarized common factors related to reading and mathematics achievement in grade 6. At the individual level, socioeconomic status, student sex, student age, grade repetition, absenteeism, homework, and speaking the language of instruction at home significantly influenced student achievement. Children from advantaged families performed better than those who from disadvantaged families. In reading achievement,

girls scored higher than boys in some countries, though in other countries the reverse was true. In mathematics achievement, boys outperformed girls in almost all countries. Younger students achieved better than their older peers. Students who had never repeated grades were more likely to perform better than those who had repeated grades. Also, the rate of absenteeism had the same effect. Frequently given homework had a positive effect on student achievement. Students who spoke the language of instruction at home more often performed better than those who rarely or never spoke it.

At the classroom and school levels, school resources, school location, and student teacher ratio significantly influenced student achievement. Students in schools with many resources achieved better than those in schools with few resources. Students in schools located in urban areas performed better than those in rural areas. Students in schools with a smaller student–teacher ratio achieved better than those in schools with a larger such ratio.

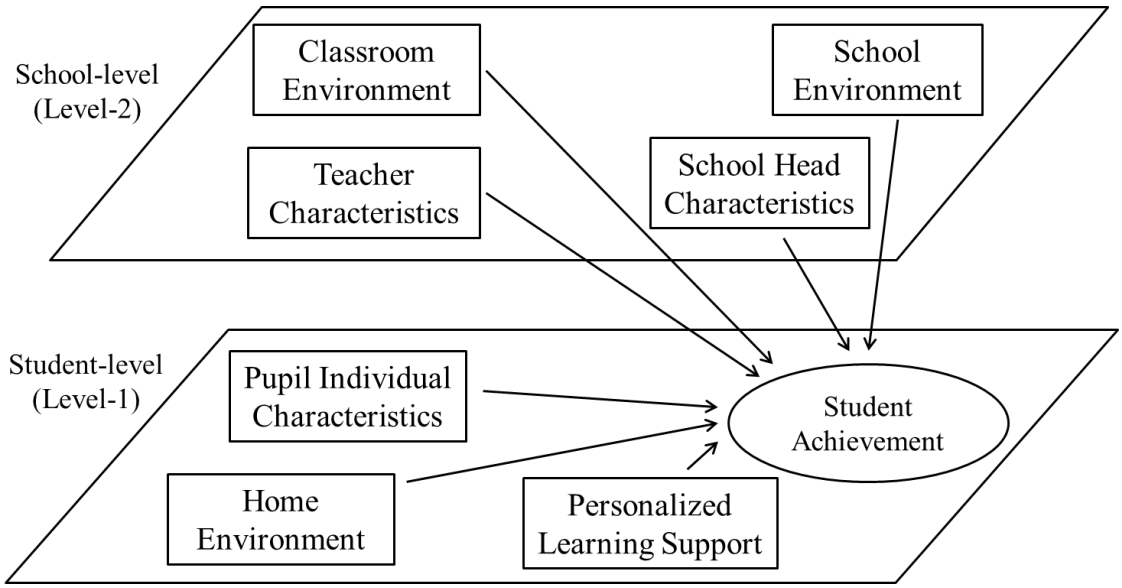


Figure 2.3. Hypothesized two-level model of pupil achievement for the SACMEQ III study
Source: Hungi et al. (2010)

Factors influencing academic achievement in Malawi

SER has frequently been conducted in developing countries and the factors that influence academic achievement have been found to vary among countries. The present study focuses on findings from Malawi. Three investigations have been undertaken to examine the factors that influence English and mathematics achievement in that country. The findings are summarized in Tables 2.1 and 2.2. In the first study, Kunje et al. (2009) used data for the South Western Division (educational division) and reported better student achievement in schools with a teacher-student ratio of under 50 in grade 7 and also in classes with trained teachers and textbooks in any teacher-student ratio than those without textbooks. Also, at upper levels, students of the appropriate age performed better than overage or underage students. In addition, the socioeconomic status of the

student's family had a positive influence on achievement, and mother's education was positively related to performance.

In the second study, Tomita and Muta (2010) used data from Monitoring Achievement in Lower Primary (MALP), and found that head teacher variables and school resource variables were the strongest factors with respect to students' learning achievements. The third study is by Hungi et al. (2010), and it used data from SACMEQ III. The authors found that at the student level, student age, sex, grade repetition, days absent, socioeconomic status, and number of books at home and at the school level, teacher years of professional training, proportion of female teachers, class size, head teacher experience, school resources, student–teacher ratio, school community problems, and student behavior problems influenced reading achievement. Hungi et al. also reported that at the student level, student age, sex, days absent, speaking the language of instruction, meals per week, living with parents or relatives, and number of books at home and at the school level, number of teacher days absent, head teacher advice to teachers, class size, classroom resources, and head teacher teaching hours per week affected mathematics achievement.

Table 2.1. Factors influencing English achievement in Malawi

Previous study	Individual level		Classroom/School level	
	Influence	Do not influence	Influence	Do not influence
Kunje et al. (2009)	Age Gender TV Motorcycle Have oxcart	Water source Type of toilet Lighting Have a bible	Trained teacher student ratio School location	Untrained teacher student ratio Textbook student ratio School owner
Hungi et al. (2010)	Age Gender Grade repetition Days absent Socioeconomic status Books at home	Preschool attendance Speaking language of instruction Number of siblings Meals per week Household tasks Homework help at home Parents alive Living with parents/relative Learning materials English textbook ownership Homework Extra tuition Travel distance to school Working place	Teacher years of prof. training Proportion of female teachers Class size SH experience as a head School resources School community problems Student teacher ratio Student's behavior problems	Teacher age Permanent teacher Teacher in-service training Teacher subject matter knowledge Teacher freq. of meeting parents Frequency of tests SH sex SH age SH management course School location School inspections School community contribution Free school meals School size Mean days absent, preschool attendance, sp. language of instruction, socioeconomic status, meals per week, textbook ownership, homework, extra tuition and working place

Note. SH = head teacher.

Table 2.2. Factors influencing mathematics achievement in Malawi

Previous study	Individual level		Classroom/School level	
	Influence	Do not influence	Influence	Do not influence
Kunje et al. (2009)	Age Gender	Water source Type of toilet Lighting	School location	Trained teacher student ratio Untrained teacher student ratio Textbook student ratio School owner
Tomita and Muta (2010; 2012)	Gender	Environment (Distance, Household task, number of meals) Family background (Infrastructure, number of books, and parents' education level) Student aspiration	Resource (Student permanent teacher ratio, student classroom ratio and improvement of materials) Teacher quality (Teacher's educational level and qualification Head teacher's educational level) Head teacher quality (Head teacher's length of training)	
Hungi et al. (2010)	Age Gender Days absent Speaking language of instruction Meals per week Living with parents/relatives Books at home	Grade repetition Preschool attendance Socioeconomic status Number of siblings Household tasks Homework help at home Parents alive Learning materials Textbook ownership Homework Extra tuition Travel distance to school Working place	Teacher days absent SH advice teacher Class size Classroom resources SH teaching hours per week	Teacher sex, Teacher teaching hours per week, Teacher subject matter knowledge, Report on mathematics, Teachers' behavior problems, Proportion of female teachers, SH experience as a teacher, School resources, School days lost, School location, School community contribution, School community problem, student teacher ratio, private school, free school meals, school size, mean socio-economic status, mean meals per week, learning materials, and extra tutu ion

Note. SH = head teacher.

2.4.2 Achievement growth

Achievement growth allows a more significant evaluation of school effectiveness than achievement measured at one particular time (Hill et al., 1996). In general, research on achievement growth is concerned with trends in school performance over time, patterns of school improvement over time, teacher- and school-level factors that enhance achievement, and teacher qualities that raise achievement after controlling for student-, class-, and school-level factors. This type of research is termed the value-added approach.

The present study concentrates on the teacher- and school-level factors that influence achievement growth. Using the Tennessee Value-Added Assessment System (TVAAS) in the United States, Wright et al. (1997) found that teachers made a difference in student achievement, but they did not determine which teaching and learning practices were effective at the classroom level. Employing data for Texas, Rivkin et al. (2005) reported that achievement gains were related to teacher and school characteristics, and they found that class size had a modestly significant effect on achievement growth in reading and mathematics. Utilizing Virginia Standards of Learning (SOL) Assessments data, Stronge et al. (2008) found that effective teachers scored higher in the instruction, student assessment, classroom management, and personal domains. In the United Kingdom, Thomas et al. (2007) analyzed General Certificate of Secondary Education (GCSE) examination data over a period of 10 cohorts. They examined trends in school

performance rather than the teacher- and school-level factors that influence achievement growth.

In developing countries, only one study has investigated achievement growth. Salim (2011) examined school effectiveness and school self-evaluation in Zanzibar secondary schools. Salim found statistically significant differences between the schools and in the head teachers' views regarding the process factors that were related to the schools' value-added results.

Most studies that employ a value-added approach address trends in school performance and teacher effectiveness. Thus, they have rarely examined the individual-, family-, classroom- and school-level factors that influence achievement growth. Except for Salim (2011), no studies in developing countries have focused on achievement growth: the studies have measured student achievement at a particular point in time.

2.4.3 Grade repetition

Based on the assumption that automatic promotion would disadvantage low-achieving students, grade repetition is often considered a remedy for low academic achievement (Hungi, 2010). However, the effect of grade repetition on academic achievement is mixed in both developed and developing countries. Many researchers have reported negative achievement effects when repeated children are promoted to the next grade; a few studies have identified a short-term positive effect, but the effect decreased over time and disappeared in later grades (Jimerson, 1999).

Low student achievement is a dominant factor in grade repetition, but other factors are also related. In developed countries, considerable research has found individual and family factors to be associated with grade repetition. At the individual level, important factors were identified as follows: being male (Byrd & Weitzman, 1994; Jimerson, 1999; Corman, 2003); having a low birth weight (Byrd & Weitzman, 1994); being born in the second half of the year and being born to a teenaged mother (Corman, 2003); having a younger or older age (Jimerson, 1999); being of an ethnic minority or black (Byrd & Weitzman, 1994; Jimerson, 1999; Corman, 2003); being an immigrant (García-Pérez et al., 2014); and having health or behavioral problems (Corman, 2003). At the family level, important features were being from a disadvantaged family (Byrd & Weitzman, 1994; Jimerson, 1999; Ferguson et al., 2001; Corman, 2003) and living with only one parent (Bail et al., 2005; García-Pérez et al., 2014).

There is less evidence from developing countries than from developed ones. Some studies have found gender, age, age of first entry, previous repetition, and absenteeism to be related to grade repetition at the individual level; however, their effects on grade repetition are controversial. With respect to gender, El-Hassan (1988) and Fleish and Shindler (2009) reported that boys were more likely to repeat rather than girls; Gomes-Neto and Hanushek (1994) found that there was no significant difference in repetition between boys and girls. Age was not found to be significant for grade repetition (Gomes-Neto & Hanushek, 1994); students who entered

school at a younger age tended to repeat (El-Hassan, 1988). Moreover, Marshall (2003) revealed that previous repetition and absenteeism were consistently significant in grade repetition. At the family level, findings differ between developed and developing countries. Disadvantaged children were much more likely to repeat grades in developed countries (Byrd & Weitzman, 1994; Ferguson et al., 2001; Corman, 2003); however, the results are disputable for developing countries. Marshall (2003) found that parental education and household wealth had no marginal effect on grade repetition. Similarly, Gomes-Neto and Hanushek (1994) reported that the mother's and father's education level was not significantly related to grade repetition. Conversely, El-Hassan (1988) determined that the characteristics of repeaters were being the middle children in large families, with one-third of those families being headed by a single parent.

In sub-Saharan Africa, a few studies have investigated factors related to grade repetition. Liddell and Rae (2001) found that early academic achievement was a strong predictor of retention. Using the SACMEQ II data, Ikeda (2005) analyzed age, gender, and socioeconomic background at the individual level. The results varied among different countries. In some countries, the repeaters were older than non-repeaters; in other countries, there was no significant different between the two groups. With regard to gender, in half of the SACMEQ countries, girls were statistically significantly less likely to repeat grades than boys. Except for a few countries, students who had to repeat grades came from more disadvantaged socioeconomic backgrounds

that those who had never repeated.

Previous studies have rarely identified classroom and school factors in either developed or developing countries. In other words, it seems to have been considered that individual factors, especially low academic achievement, affected grade repetition rather than classroom and school factors. However, particularly in developing countries, classroom and school conditions vary considerably. For example, there are often large numbers of untrained teachers and large numbers of students in a class in developing countries (Diyu, 2001; Hanushek, 2006). El-Hassan (1988) noted that a large percentage of the students who repeated were from public schools and rural areas. Using the SACMEQ II data, Ikeda (2005) analyzed school location, school type, school resources, and teacher's knowledge of the subject matter at the school level. Regarding school location, findings about students in rural or urban areas being more likely to repeat grades also varied among countries. With respect to school type, significant differences in grade repetition between government and private schools were found only in the case of two countries. For school resources and teacher's knowledge of the subject matter, there was no significant difference in grade repetition among most countries. These findings are, however, somewhat limited, and more studies are needed to analyze classroom and school factors.

2.4.4 Dropout

Dropout is one of the worst unexpected events that can occur with respect to completion of education. A great many studies about dropout have been conducted in both developed and developing countries.

In developed countries, most studies have focused on high school or post-secondary (or college) dropout. Initially, those studies considered individual and family factors because they are considered to exert a basic influence on dropout. Later, several studies found school factors also to be a significant predictor of dropout (e.g., Rumberger, 1987; Hanushek & Lavy, 1994; Rumberger, 1995). Rumberger (1987; 2001), Rumberger and Lim (2008), and Witte et al. (2013) reviewed the research on dropout. Rumberger (1987) analyzed four major facets: (1) incidence; (2) causes, including social, economic, psychological, and educational factors; (3) individual and social consequences; and (4) solutions. Rumberger concluded the following: (1) dropout does not simply cause academic failure, but also social and academic problems in school; (2) those problems often appear in the early stage of schooling; and (3) the problems are related to a lack of support and resources in families, schools, and communities (Rumberger, 2001). Moreover, Rumberger and Lim (2008) reviewed 203 published studies on high school dropout and graduation, and they classified factors on dropout into two types: individual characteristics of students and institutional characteristics of their families, schools, and communities (Figure 2.4).

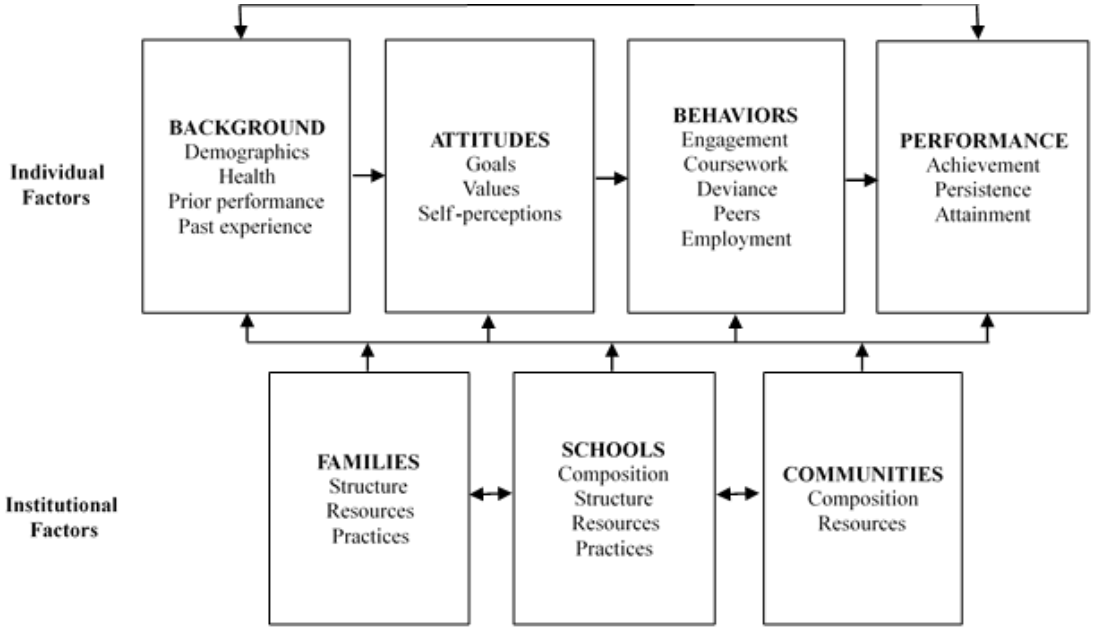


Figure 2.4. Conceptual model of high school performance

Source: Rumberger and Lim (2008)

Witte et al. (2013) reviewed hitherto unrecognized commonplace factors that could underlie the problems related to early school leaving at the level of secondary (or high school) education as well as methodological issues and research trends. They summarized dropout predictors as being of four types: student factors, family factors, school factors, and community factors (Table 2.3).

Table 2.3. Common predictors of high school dropout in the United States found in the literature

Types	Dropout predictors	Observed effect	Interaction effect(s)
Student factors	(1) Psychological and behavior factors		
	- Academic ability/ achievement	If higher, lower dropout risk	
	- Grade retention/ repetition	If the case, higher dropout risk	
	- Educational and occupational aspirations	If higher, lower dropout risk	
	- Engagement (often made operational by absenteeism and discipline problems)	If more absenteeism and/or discipline problems, higher dropout risk	E.g. with gender, race/ ethnicity, and emplyment opportunities
	- High school employment	If intensive, inadequate, stressful and unstable, higher dropout risk	
	- Teenage pregnancy and marriage	Mixed findings	
	(2) Demographic factors		
	- Gender	Miexed findings	
	- Race/ ethnicity	Mixed findings	
	- Immigration status	Mixed findings	
	- Language background	If native speaker, lower dropout risk	E.g. with gender, race/ ethnicity
	- Disabilities	If the case, higher dropout risk	E.g. with family background, perceived behaviour control, and expecatations from teachers
Family factors	(1) Structural characteristics		
	- Socioeconomic status (parental, education and employment)	If lower, then higher dropout risk	E.g. with parent-child relationship with income (they both matter)
	- Family structure (single-parent, step- and/ or large families)	No independent effect	
	(2) Underlying processes		
	- Social capital (relationships between parents, children, other families and school)	If more, lower dropout risk	
	↔ Human/ cultural capital (parental education)	If higher, lower dropout risk, but perhaps no independent effect?	
	↔ Financial capital (income, ownership)	No independent effect	
School factors	- School type (incl. student composition)	If public and a-slective, higher risk	
	- School resources (e.g., class size, teacher pupil ratio)	If balanced, lower dropout risk	E.g. with teaching quality and practice
	- Structural characteristics of schools (e.g., school size)	No independent effect	E.g. with school social climate
	- School policies and practices	If smaller, lower droput risk, but perhaps no independent effect?	
	- Social and academic climate (discipline policy considered fair, high attendance rates, and advanced course taking)	If stimulating, lower droput risk, lower droput risk	
	- Teacher and teaching quality	If higher, lower droput risk	
	- School social capital (student-teacher relationship)	If better, lower dropout risk	
Community factors	- Neighborhood characteristics	If detrimental, higher droput risk	
	- High-achieving vs. dropped-out friends	Lower and higher droput risk, resp.	
	- Employment opportunities		
	- Job scarcity and low salaries	If job scarcity, lower dropout risk	
	- Long working hours		With gender
	- Social discrimination/ injustice	If > 20 working hours, higher risk	With student's SES-background
		If the case, higher dropout risk	With race/ ethnicity

Source: Witte et al. (2013)

Fewer studies have been carried out in developing countries than in developed ones. However, a considerable body of evidence shows the factors that influence dropout (Table 2.4). Several studies have found that high repetition rates, low achievement, late school entry, and poverty at the individual and family levels influenced dropout. Also, many studies have reported

several school-level factors that affected dropout.

In Malawi, a few studies have been conducted: Jukes et al. (2014) and Mzuza et al. (2014). From data on 2,767 children aged 8–20 years in 40 schools (20 intervention groups, 20 control groups) in the Phalombe and Mzimba districts of Malawi, Jukes et al. (2014) analyzed the impact of the Strengthening Open and Flexible Learning to Increase Educational Access (SOFIE) project on dropout. The authors concluded that the project had exerted a significant impact on dropout, having reduced it overall by 45%. They also found that age was significantly associated with dropout. Mzuza et al. (2014) examined the reasons for poor examination pass rates among girls and the reasons for high dropout rates among girls in Malawi primary schools. From questionnaires to 42 head teachers, 481 teachers, and 402 grade 8 girl students, the authors found that at the student level, being overage, lack of interest, working at home, poverty, early marriage, and pregnancy and at the classroom and school levels, lack of teaching and learning materials, lack of motivation due to poor salaries and lack of accommodation, lack of role models, and lack of parental care and support influenced dropout. However, the study by Jukes et al. was the evaluation of a project and that by Mzuza et al. focused only on girls. Thus, more research needs to examine the causes of dropout in Malawi.

Table 2.4. Common predictors of dropout in primary and secondary schools in the literature

Category	Dropout predictors
Individual factors	Boys (Akhtar, 1996; Sabates et al., 2013)
	Girls (Lloyd et al., 2000; Keng, 2004; Patrick, 2012)
	High repetition rats (Levy, 1971; UNESCO, 1984; Plame, 1993; Wils, 2004; No & Hirakawa, 2012)
	Low ability (Hanushek & Lavy, 1994)
	Low achievement (Hanushek & Lavy, 1994; Hanushek et al., 2006; OSI, 2007; No & Hirakawa, 2012; No et al., 2012; Rwechungura, 2014)
	Lack of motivation (OSI, 207; Mzuza et al., 2014)
	Low self-esteem (No & Hirakawa, 2012)
	Low educational aspiration (Sibanda, 2004)
	Higher carrier expectation (Keng, 2004)
	Over age, Late school entry (Plame, 1993; Lloyd et al., 2000; Wils, 2004; Keng, 2004; No & Hirakawa, 2012; No et al., 2012; Branson et al., 2013;Sabates, 2013; Jukes et al., 2014; Mzuza et al., 2014)
	Higher children birth order (Keng, 2004)
	Poor health (OSI, 2007; Hussain et al., 2011; Sabates, 2013)
	Early marriage (Plame, 1993; OSI, 2007; Mzuza et al., 2014; Rwechungura, 2014)
	Pregnancy (Plame, 1993; Branson et al., 2013; Mzuza et al., 2014; Rwechungura, 2014)
	Rape (Rwechungura, 2014)
	Race (African) (Sibanda, 2004; Branson et al., 2013)
	Religion (Chiristian) (Lloyd et al., 2000)
Family factors	Family ethnic status (No et al., 2012)
	Low mother's education (Lloyd et al., 2000; Lloyd et al., 2006; Goksen & Cemalcilar, 2010)
	Low parental education (Keng, 2004; No et al., 2012)
	Parents' marital status (Lloyd et al., 2000)
	Arrival in family (Lloyd et al., 2006)
	Divorce (OSI, 2007; No et al., 2012)
	Loss of parents (Rwechungura, 2014)
	Living with relatives or neighbors (OSI, 2007)
	Parents being sick (Rwechungura, 2014)
	Female headship (Sibanda, 2004)
	Head's level of education (Sibanda, 2004)
	Low father's education (Branson et al., 2013)
	Larger household size (Sibanda, 2004)
	Larger land size (Keng, 2004)
	Poverty (Plame, 1993; Motala, 1995; Cardoso, 2007; OSI, 2007; Goksen & Cemalcilar, 2010; Mzuza et al., 2014)
	Low income, income growth and school expenditure (Sabates, 2013)
	Low socio-economic status (Levy, 1971; UNESCO, 1984; No et al., 2012)
	Higher consumption levels (Llyod et al., 2006)
	Higher school fees (Sibanda, 2004)
	Lack of financial support (Rwechungura, 2014)
	Indirect education expenditure (Motala, 1995; Edwards et al., 2014)
	Lack of parents support (Keng, 2004; OSI, 2007; Hussain et al., 2011; Mzuza et al., 2014)
	Higher career expectation (Keng, 2004)
	Longer distance from the child's home to school or lack of transport (OSI, 2007; Hussain et al., 2011; Edwards et al., 2014)
	Many household tasks (Plame, 1993; OSI, 2007; Goksen & Cemalcilar, 2010)
	Working or looking for work (Branson et al., 2013)
	Mobility and instability in the local community (Plame, 1993; Motala, 1995; OSI, 2007)
	Unaware of the amount or level of education for occupational aspirations (Edwards et al., 2014)
	Unwanted birth (Lloyd et al., 2006)
	Alcohol use (OSI, 200')

(continued)

Table 2.4. (continued)

Category	Dropout predictors
School factors	Low qualified and trained, in-service training for teachers (UNESCO, 1984; Lloyd et al., 2000; Kim & Rouse, 2011)
	Poor pedagogical methods (UNESCO, 1984; Motala, 1995)
	Lack of motivation due to poor salaries (Mzuza et al., 2014)
	Low teacher's motivation (Kim & Rouse, 2011)
	Teacher's harsh behavior (Hussain et al., 2011)
	Many teacher absences (OSI, 2007)
	Excessive homework (Hussain et al., 2011)
	Teacher or school unfriendliness (OSI, 2007)
	Positive student teacher relationship (Goksen & Cemalcilar, 2010)
	Lack of incentives (UNESCO, 1984)
	Lack of school-family connection (Edwards et al., 2014)
	Low percent of teachers in the primary school attended who reside in the community (Lloyd et al., 2006)
	Low school quality (Hanushek & Lavy, 1994; Hanushek et al., 2006; Lloyd et al., 2006; No et al., 2012)
	Poor facilities (UNESCO, 1984; Hussain et al., 2011)
	Improved infrastructure (Safe oaths to school) (Edwards et al., 2014)
	Lack of accommodation (Mzuza et al., 2014)
	Lack of heating (OSI, 2007)
	Lack of materials (Motala, 1995; Branson et al., 2013; Mzuza et al., 2014)
	School environment (Lloyd et al., 2000)
	Mixed school (Patrick, 2012)
	Public school (Patrick, 2012)
	Rural school (Patrick, 2012)
	Not providing nutrition at school (Motala, 1995)
	Higher school fees (Lloyd, 2000; Hussain et al., 2011; Branson et al., 2013)
	Bullying by fellow students (OSI, 2007; Townsend et al., 2008)
Community factors	Lack of community participation (UNESCO, 1984)
	More developed community (Llyod et al., 2006)
	Lack of role models (Mzuza et al., 2014)
Others	Nature of the relationship between school and the local community; rural and urban schools and the level of organization of the individual school (Plame, 1993)
	Lack of possibilities to continue beyond grade (Plame, 1993)
	Lack of post primary schooling in the community (Lloyd et al., 2006)
	Lack of health services (Edwards et al., 2014)
	Lack of government scholarships (Edwards et al., 2014)
	War (Plame, 1993)

Source: developed by the author

2.4.5 Transfer

Research on transfer or student mobility has been conducted most often in the United States and United Kingdom. It is evident that transfer or student mobility has a negative impact on schooling. In the United States, it was found that changing residence was not the only cause of transfer (Kerborw, 1996); other factors were also related. Low-achieving students are likely to change schools (Mao, 1997; Rumberger et al., 1999; Wright, 1999; Engec, 2006; South et al.,

2007). Students who have poor school behavior tend to transfer to another school (Nelson et al., 1996; Engec, 2006) Also, students with single parents are more likely to change schools (Nelson et al., 1996). Similar findings were obtained in the United Kingdom. As in the United States, changing residence was not the only cause of transfer. Minority students (Dobson et al., 2000), low-achieving students (Strand & Demie, 2007), and students from disadvantaged families (Tooley, 1997) were more likely to transfer to another school.

Transfer or student mobility is not only an individual or family matter, but also a school matter. School quality is an important factor (Kerbow, 1996; Rumberger et al., 1999). Rumberger et al. (1999) revealed that schools often initiate student mobility. For social or academic reasons, schools can force students to transfer to another school. In addition, such transfer is likely to increase the risk of dropout (Rumberger et al., 1999; South et al., 2007).

In developing countries, less attention has been paid to transfer or student mobility than in the United States and United Kingdom. Transfer rate has mostly not been calculated for most countries. Even such international organizations as UNESCO and the World Bank do not indicate this figure. One possible reason for this is that in developing societies, expanding school access has been a fundamental issue over recent decades. Students are less likely to change schools, or if students often change schools student mobility is not regarded as a major issue. Access to primary education has improved in most developing countries, and it appears that students or

parents are starting to choose particular schools in some societies.

Some sub-Saharan African countries have followed this trend regarding student mobility. High rates of student mobility have been identified in Kenya (Nishimura & Yamano, 2008; Tasaka, 2014), Uganda (Taniguchi, 2013), and Malawi (Taniguchi, 2014). In Kenya, Nishimura and Yamano (2008) found an increase in the number of students attending private primary schools from 4.8% in 2004 to 12.2% in 2007. Tasaka (2014) determined that approximately 20% of grade 12 students had transferred from another school in the sampled schools. In Uganda, 67.8% and 55.5%, respectively, of grade 3 and 6 students transferred to other schools at least once; 39.0% and 34.7% transferred more than twice (Taniguchi, 2013). In Malawi, 15.6% and 18.6%, respectively, of grade 5 and 7 students transferred during 1 year (Taniguchi, 2014).

These high transfer rates raise questions: why do students transfer to another school? and who is likely to transfer to another school? According to a study on school choice between public and private primary schools by Nishimura and Yamano (2008), students in schools with a high score in the Kenya Certificate of Primary Education Exam were more likely to transfer to private schools. Children from a relatively wealthy household were more likely to transfer to private schools than those from poorer households. Boys had more opportunity to transfer to private schools than girls. From transfer data for a Kenyan secondary school, Tasaka (2014) found that the characteristics of those who transferred were higher previous academic achievement, high

socioeconomic status, and unhappiness with the transfer-in school compared with the original students. Schools with high transfer rates tended to have larger class sizes and lower charged fees. According to one teacher's explanation in Uganda (personal communication to the author), students transferred to another school because they wanted to avoid paying school fees or repeating grades. Similarly, in Malawi (personal communication to the author), teachers explained the reasons for transfer as follows: (1) transfer to a parent's working place; (2) family reasons, such as death of parents, poverty, many children living in one house, or helping another family; (3) seeking a more advantaged environment, including a relative's house being much nearer to school, a relative being a teacher, or there being few children in a relative's house; (4) the cost of fees; and (5) seeking better school condition. These reasons may be classified into individual and school issues. Reasons (1) to (3) are individual issues; reasons (4) and (5) are related to school characteristics.

Although evidence is still poor, it would appear that transfer or student mobility in sub-Saharan Africa occurs for different reasons from the United States and United Kingdom. Unlike in those countries, transfer or student mobility is not necessarily a negative event. Two possible reasons for transfer here are seeking higher quality of education or wanting lower quality of education. In the case of Kenya, students transfer for the former reason; by contrast, in Uganda, students transfer for the latter reason. There appears to be mixture of the two reasons in Malawi.

However, these assumptions have not yet been properly investigated, and so more research needs to identify the causes of transfer.

2.4.6 Summary of factors influencing indicators

The factors influencing each indicator (achievement, achievement growth, grade repetition, dropout, and transfer) in developed and developing countries have been described. There are slight differences between developed and developing countries for these indicators. Table 2.5 presents a summary of factors that influence multiple indicators in developing countries. Though the present study aims to examine the context of sub-Saharan Africa, the case of developing countries has been summarized owing to the small number of investigations for that part of Africa. The factors have been broadly classified into six levels: student, family, classroom, school, community, and government levels. At the individual level, important factors have been found to be achievement, gender, age, age of first entry, grade repetition, absenteeism, aspiration, delinquency activities, homework, and self-esteem. At the family level, important factors were speaking the language of instruction at home, parental education, economic status, books at home, meals per week, family size, living parents, living with parents or relatives, household tasks, parental support, and paying fees. At the classroom level, class size, classroom resources, teacher years of professional training, number of teacher days absent, and teacher subject knowledge were

found to be significant factors of multiple indicators. At the school level, although not many variables were identified, important factors were found to be school type, school location, school facilities, student–teacher ratio, proportion of female teachers, head teacher teaching hours per week, head teacher experience as a head, head teacher advice to teachers, head teacher views, school management skills, student behavior problems, and school community problems. At the community level, significant features were community support, living in a more developed community, and links between education and local labor market needs. Finally, at the government level, significant features were travel distance, availability of schools, quality of teaching and curriculum, and availability of post-primary schools.

Table 2.5. Summary of factors influencing indicators in developing countries

Level	Variable	Achievement	Achievement growth	Grade repetition	Dropout	Transfer
Individual	Achievement			(-)	(-)	(-)
	Gender	(+) (-)		(+) (-)	(-)	
	Age	(-)		(+)		
	Age of first entry			(+)	(+)	
	Grade repetition	(-)		(+)	(+)	
	Absenteeism	(-)		(+)	(+)	
	Aspiration	(+)			(-)	(-)
	Delinquency activities				(+)	
	Homework	(+)			(-)	
	Self-esteem	(+)			(-)	
Family	Speaking the language of the instruction at home	(+)				
	Parental education	(+)			(-)	(-)
	Economic status	(+)			(-)	(-)
	Book at home	(+)				
	Meals per week	(+)				
	Family size				(+)	
	Parents alive	(+)		(-)	(-)	
	Living with parents/ relatives	(+)				
	Household tasks	(-)				
	Parental support	(+)			(-)	
	Paying fees					(-)
Classroom	Class size	(-)				(+)
	Classroom resources	(+)				
	Teacher years of professtional training	(+)				
	Teaacher days absent	(-)				
	Teacher subject knowledge			(-)		
School	School type	(+)		(-)		
	School location	(+)		(-)		
	School facilities	(+)		(-)	(-)	
	Student-teacher ratio	(-)				
	Proportion of female teachers	(+)	(+)			
	Head teacher teaching hours per week	(-)				
	Head teacher experience as a head	(+)				
	Head teacher advice to teacher	(+)				
	Head teacher views					
	School management skills	(+)			(-)	
	Student behavior problems	(+)				
	School community problems	(-)				
Community	Community support				(-)	
	Living in a more developed community				(-)	
	Links between education and local labor market needs				(-)	
Government	Travel distance				(-)	
	Availability of schools				(-)	
	Quality of teaching and curriculum				(-)	
	Availability of post-primary schools				(-)	

Note. (+) = positive influence; (-) = negative influence.

CHAPTER THREE: EDUCATION IN MALAWI

3.1 Education System

The education system in Malawi is an 8-4-4 system. Primary school education lasts 8 years, from standard 1 to standard 8 (grades 1 to 8). Students in primary schools sit a national examination, the Primary School Leaving Certificate Examination (PSLCE) at the end of standard 8 (grade 8). Secondary school education lasts 4 years, from form 1 to form 4 (grades 9 to 12). Students in secondary schools sit two national examinations—the Junior Certificate Examination (JCE) at the end of form 2 (grade 10) and Malawi School Certificate Examination (MSCE) at the end of form 4 (grade 12). Beyond secondary school, options include primary teacher center (PTC), technical college, and university. A university bachelor's degree course lasts 4 years.

3.2 Educational Policy

The Malawi government aims to improve the quality of education through its policies. With its *National Education Sector Plan 2008–2017*, the government intended to improve three components: quality and relevance; access and equity; and governance and management (Malawi Ministry of Education Science and Technology: MoEST, 2008). Improved quality and relevance aims to facilitate effective learning and increase learning achievement by such measures as supplying more books and teacher training materials, training more teachers, reducing class sizes,

emphasizing the relevance of the primary curriculum, and improving delivery by diversifying modes and methods of teaching. Improved access and equity is directed at increased net enrollment and completion rates, the enrollment of more girls in grades 5 to 8, and improvements to the educational infrastructure, such as in terms of classrooms, school facilities, and teachers' housing. Improved governance and management involves mobilizing community participation, reduction of repetition and dropout, enrollment of more over- and underage children, and encouraging promotion between grades.

3.3 Budget Allocation

Figure 3.1 presents the share of education in the government's budget by level. At 50%, the budget for primary education was the highest among all levels.

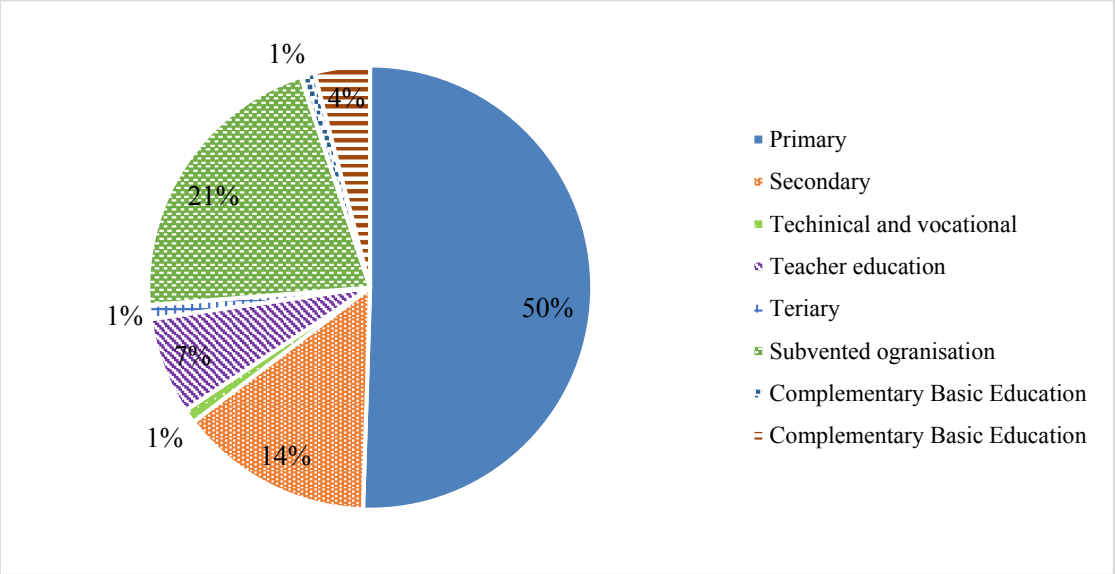


Figure 3.1. Percentage budget allocation per level in Malawi
Source: MoEST (2013)

3.4 Primary Education

Primary school education in Malawi lasts 8 years. Children aged 6 to 13 years are officially categorized as being of primary school age. The school year consists of three terms, which run from September to December, January to April, and April to July. For the first 4 years, students study in a local language, Chichewa, after which English becomes the language of instruction.

Free primary education was introduced in 1994. Subsequently, enrollment drastically increased from 1,895,423 in 1993/94 to 2,860,819 in 1994/95 (Figure 3.2). Every year thereafter, enrollment has shown a gradual increase.

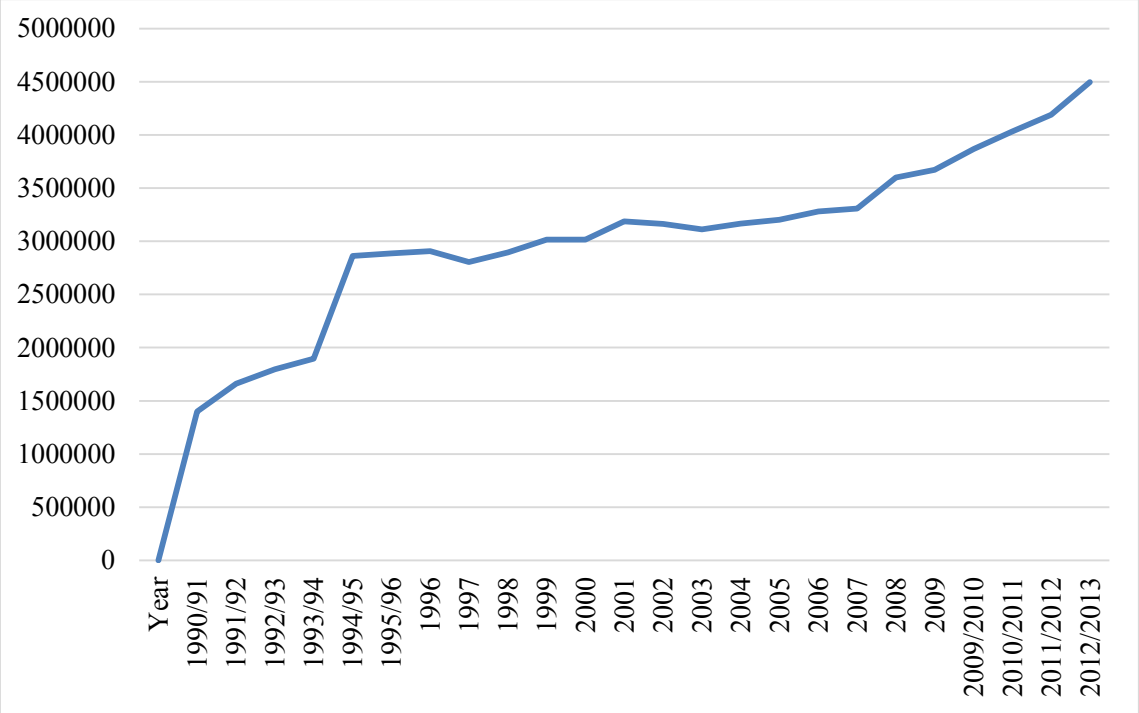


Figure 3.2. Enrollment in primary education, 1990–2012
Source: MoEST (2013)

Table 3.1 shows the gross enrollment ratio (GER) and net enrollment ratio (NER)[1]. Both these ratios were over 100. The data in Table 3.1 indicate that access to primary education in Malawi has improved.

Table 3.1. GER and NER in Malawi

Year	GER			NER		
	Boys	Girls	Total	Boys	Girls	Total
2011	127	125	126	109	110	110
2012	128	126	127	112	112	112
2013	134	131	133	111	111	111

Source: MoEST (2013)

Table 3.2 shows the number of public and private schools in Malawi. In 2012, there was a total of 5,561 primary schools. Most schools were run by the government. Approximately 96.3% of the schools were public.

Table 3.2. Number of schools in Malawi

Year	Public	Private	Total
2009	5,106	298	5,404
2010	5,191	201	5,392
2011	5,225	170	5,395
2012	5,267	138	5,405
2013	5,359	202	5,561

Source: MoEST (2013)

[1] Net enrolment rate (NER) is defined as "enrolment of the official age group for a given level of education expressed as a percentage of the corresponding population. This rate shows the extent of coverage in a given level of children and youth belonging to the official age group" (MoEST, 2012).

Table 3.3 presents the student–teacher ratio and student-trained teacher ratio. Although the government aims for 60 students per teacher (MoEST, 2008), the student teacher ratio was still 69 in 2013. The student-trained teacher ratio was worse—at 76.

Table 3.3. Student–teacher ratio

Year	Student–teacher ratio	Student-trained teacher ratio
2009	81	92
2010	80	91
2011	76	92
2012	74	95
2013	69	76

Source: MoEST (2013)

Table 3.4 shows the PSLCE pass rates for the period 2008–13. There were no drastic changes during that time, having been approximately somewhat less than 70.0%.

Table 3.4. PSLCE pass rates

Year	Boys	Girls	Total
2008	74.9	62.7	68.8
2009	74.0	61.8	67.9
2010	-	-	-
2011	74.9	61.8	68.4
2012	-	-	-
2013	-	-	-

Source: MoEST (2013)

Figure 3.3 displays the survival rate[2] for grades 5 and 8. The low survival rate has been a significant issue in Malawi. Three or fewer out of four children and two or fewer out of four children, respectively, were able to reach grades 5 and 8 in the period 2009–13.

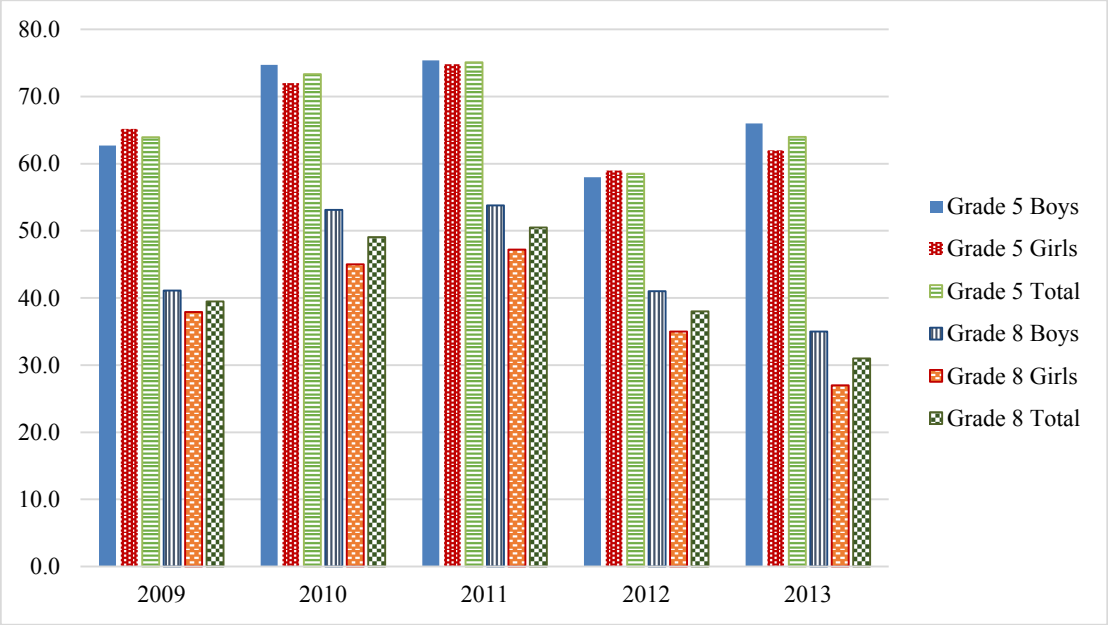


Figure 3.3. Survival rates for grades 5 and 8

Source: MoEST (2013)

Figure 3.4 shows repetition rates[3], dropout rates[4], transfer-in rates, and transfer-out rates

[2] Survival rate is defined as "a percentage of a cohort of pupils enrolled in the first grade of a given level or cycle of education in a given cycle of education in a given school year who are expected to reach successive grades. It measures the retention capacity and internal efficiency of an education system. It illustrates the situation regarding retention of pupils from grade to grade and conversely the magnitude of dropout by grade" (MoEST, 2012).

[3] Repetition rate was defined as "the proportion of pupils from a cohort enrolled in a given grade at given school year who studies in the same grade in the following year" (MoEST, 2012).

[4] Dropout rate was defined as "the proportion of pupils from a cohort enrolled in a given year who are no longer enrolled in the following school year. This measures the phenomenon of pupils from a cohort leaving school without completing. This is calculated from subtracting the sum of promotion rate and repletion rate from 100 in a given school year" (MoEST, 2012).

for 2011–13. The repetition rates in the lower grades were over 20.0%. With higher grades, the repetition rates decreased slightly, but they increased again in grade 8. The dropout rates and transfer-out rates showed similar proportions, at approximately 5.0%–6.0% through the grades. The transfer-in rates were 3.5%–6.5%, increasing with higher grades.

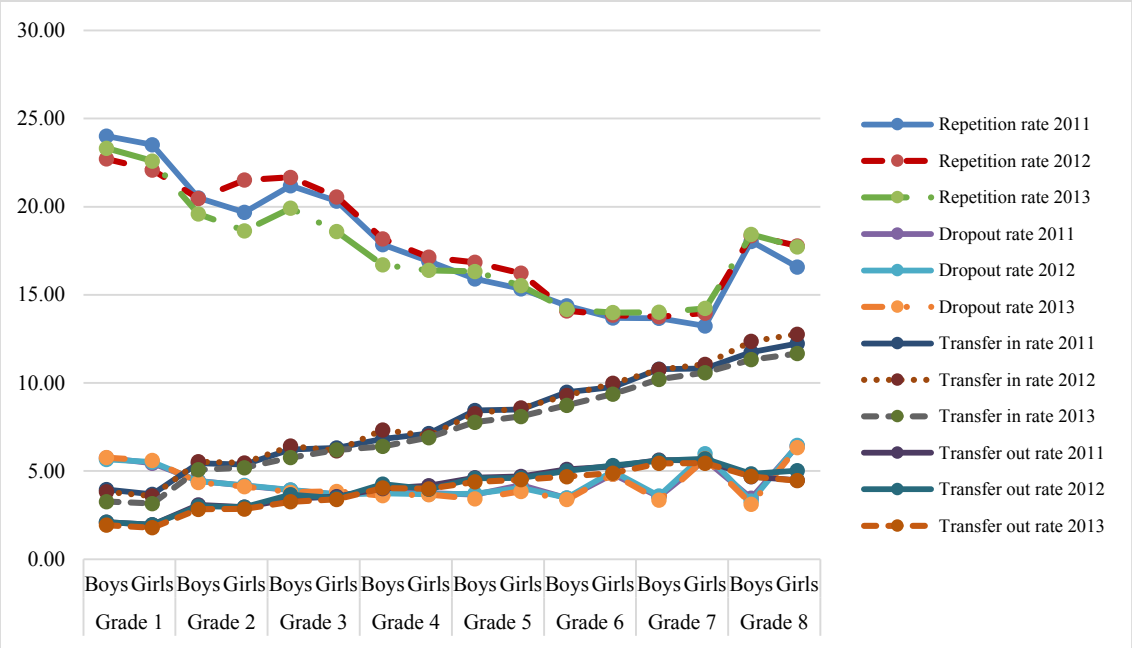


Figure 3.4. Repetition rates, dropout rates, transfer-in rates, and transfer-out rates
Source: MoEST (2013)

3.5 Primary Curriculum

As of 2014, primary education in Malawi follows the syllabuses published by the Malawi Institute of Education (MIE) in 2005. Core elements and their outcomes in English and mathematics are presented in Tables 3.5 and 3.6, respectively. All grades follow these frameworks. For both English and mathematics, there are six core elements (Tables 3.5 and 3.6).

Table 3.5. Core elements and their outcomes in English

	Core elements	Outcomes
1	Listening	The learner will be able to listen attentively and critically to understand and respond to others in a wide range of situations through a variety of media.
2	Speaking	The learner will be able to confidently express their own ideas fluently and respond appropriately to others orally in a wide range of situations.
3	Reading	The learner will be able to read fluently and critically to understand and respond to different types of texts for enjoyment and information.
4	Writing	The learner will be able to write legible factual and imaginative texts for a wide range of purposes.
5	Critical thinking and reasoning	The learner will be able to use language to think and reason as well as to access, process and use information for learning.
6	Structure and use of language	The learner will be able to understand how sounds, words and grammar can be used to create and interpret texts.

Source: MIE (2005)

Table 3.6. Core elements and their outcomes in mathematics

	Core elements	Outcomes
1	Numbers, operations and relationships	The learner will be able to use numbers and their relationships to solve practical problems.
2	Accounting and business studies	The learner will be able to use simple accounting procedures that will enhance decision making in business and private enterprise.
3	Space and shape	The learner will be able to describe characteristics of space and shape and their application in everyday life.
4	Measurements	The learner will be able to use appreciate measurement concepts and skills in real life situations.
5	Patterns, functions and algebra	The learner will be able to use algebraic language and skills to solve textual problems.
6	Data handling	The learner will be able to analyze and interpret data for decision making by using graphs, tables and models.

Source: MIE (2005)

CHAPTER FOUR: METHODOLOGY

4.1 Conceptual Framework

The overall conceptual framework of the present study appears in Figure 4.1. It is based on Scheerens (1990).

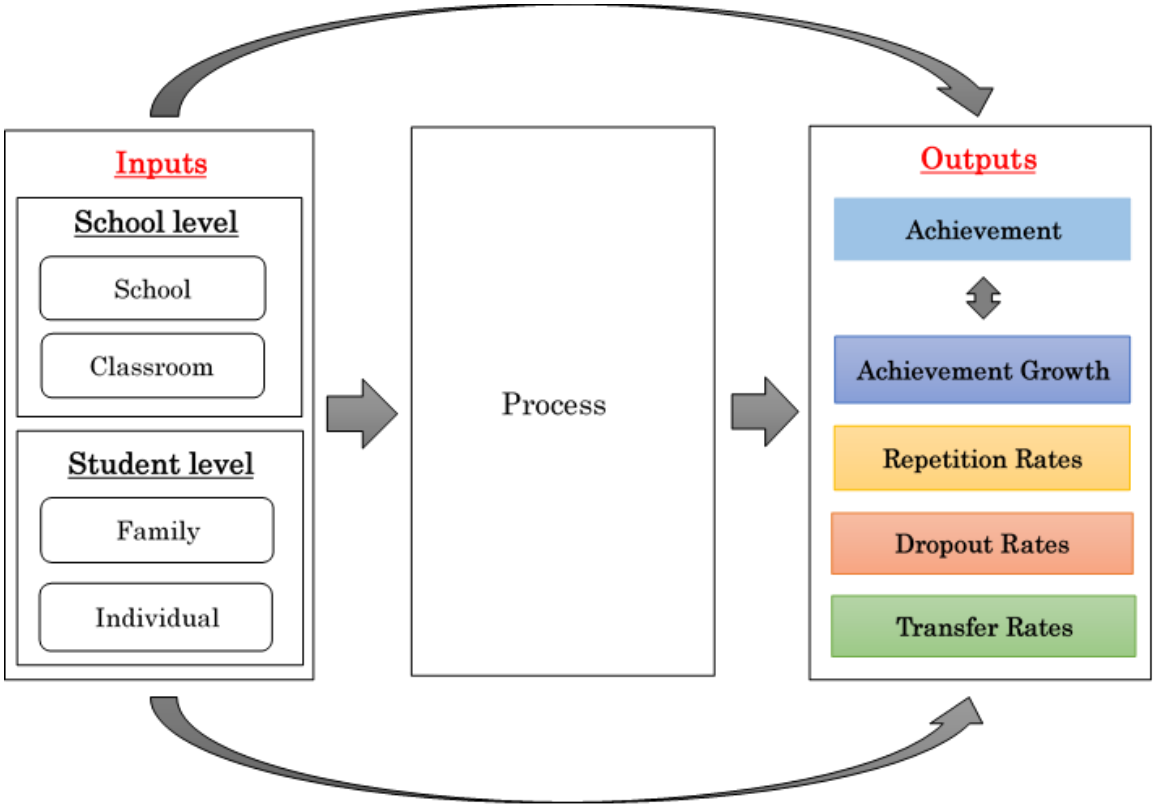


Figure 4.1. Conceptual framework of the present study
Source: Developed by the author based on Scheerens (1990)

4.2 Research Design

This study employed event history data collection and analysis. Event history analysis is widely used in the social sciences to predict events. This approach allows for the collection of data in which independent variables affect dependent variables with a predetermined property expressed at a specific time (Berry and Berry, 1990).

4.3 Research Area

The Nkhata Bay district was selected among 34 educational districts in Malawi. This rural district is located along Lake Malawi in the northern part of the country and is approximately 400 kilometers from the Malawi capital. Most local residents are Tongans, one of the major ethnicities in Malawi. One reason for selecting Nkhata Bay was that large variations in student achievement among schools were observed prior to commencement of the study. The average pass rates in the Primary Schools Leaving Certification Examination (PSLCE) for 2010–12 varied from 7.5% to 92.8% in that district (Figure 4.2). Despite the small potential sample size in this district, Nkhata Bay appeared to offer the opportunity to determine the factors that influence multiple school-level indicators.

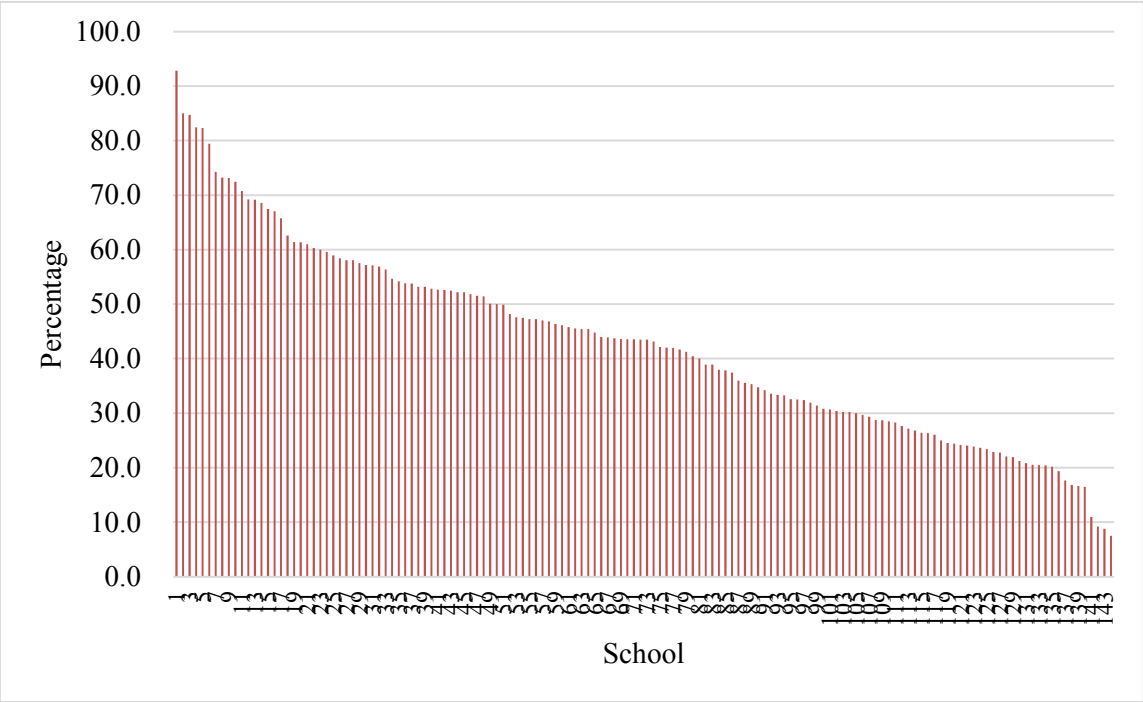


Figure 4.2. Average PSLCE pass rates for 2010–12 in Nkhata Bay
Source: Data obtained from the Nkhata Bay District Education Office

Another reason for choosing Nkhata Bay was that improving the quality of education there might exert a strong effect on other areas. The PSLCE pass rates there have long been conspicuously lower than the national average (Figure 4.3): the average PSLCE pass rate of 51.6% for 2007–10 in that district was among the lowest in all Malawi's educational districts (Figure 4.4).

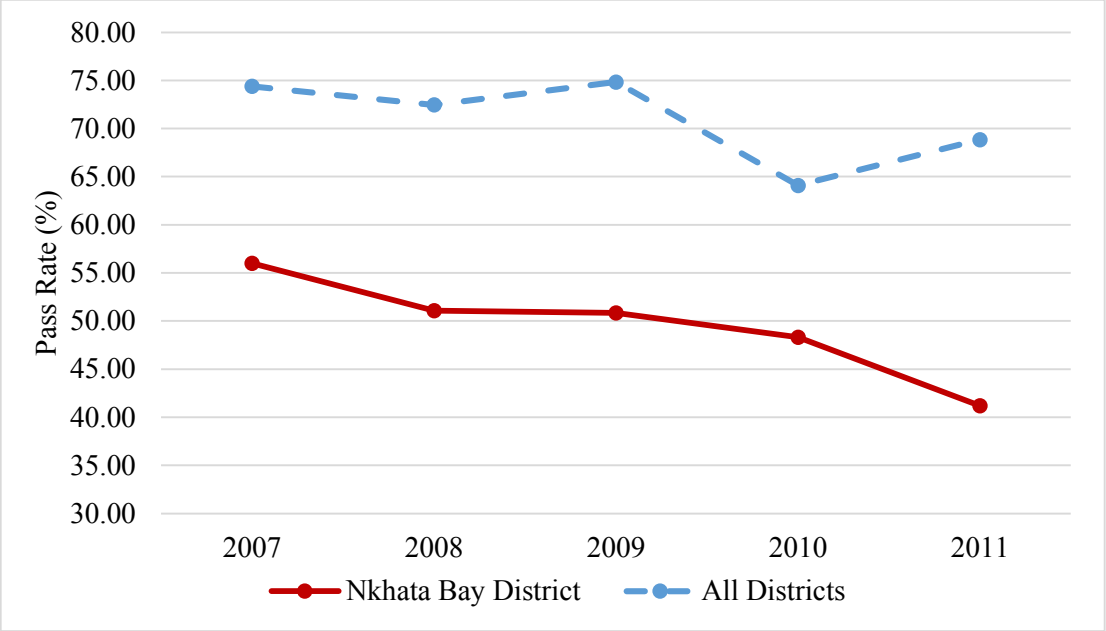


Figure 4.3. Nkhata Bay and national PSLCE pass rates

Source: Data from the Nkhata Bay District Education Office and MoEST 2007–2011

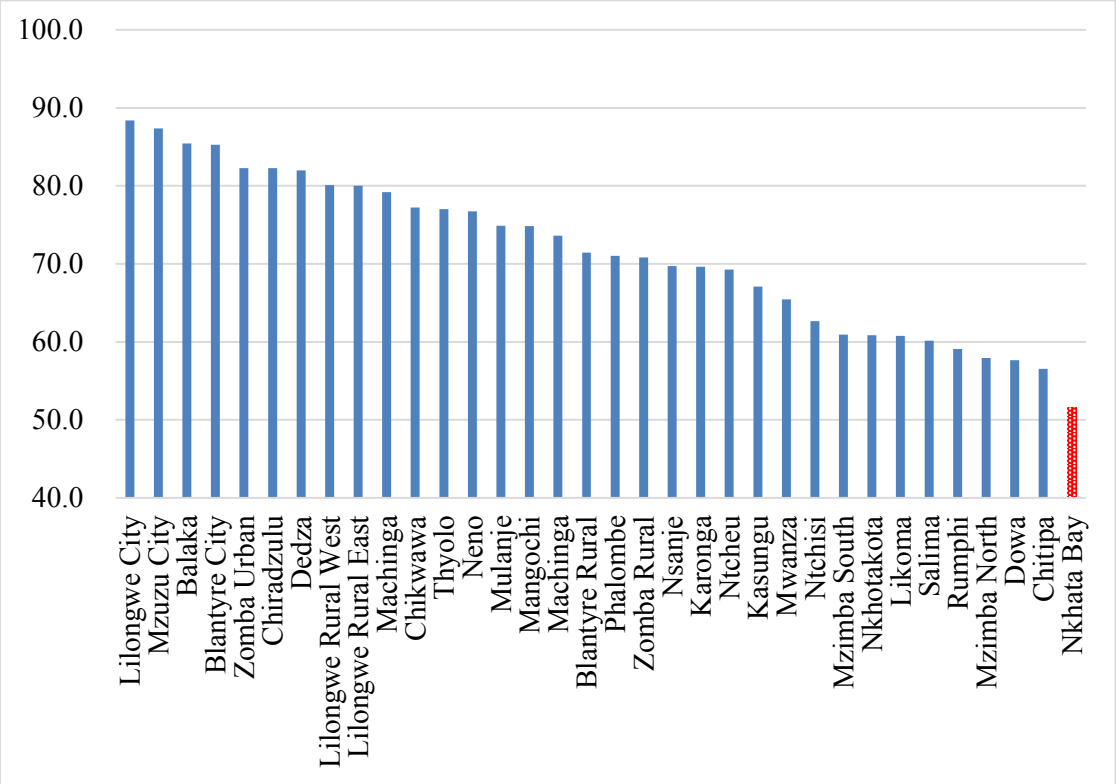


Figure 4.4. Average PSLCE pass rates by district in Malawi for 2007–10

Source: Data from MoEST

Figure 4.5 presents differences in the repetition, dropout, and transfer rates between national figures and those for Nkhata Bay. The repetition and dropout rates for Nkhata Bay were higher than at the national level. There was little difference in the transfer rates between those at the national level and those for Nkhata Bay.

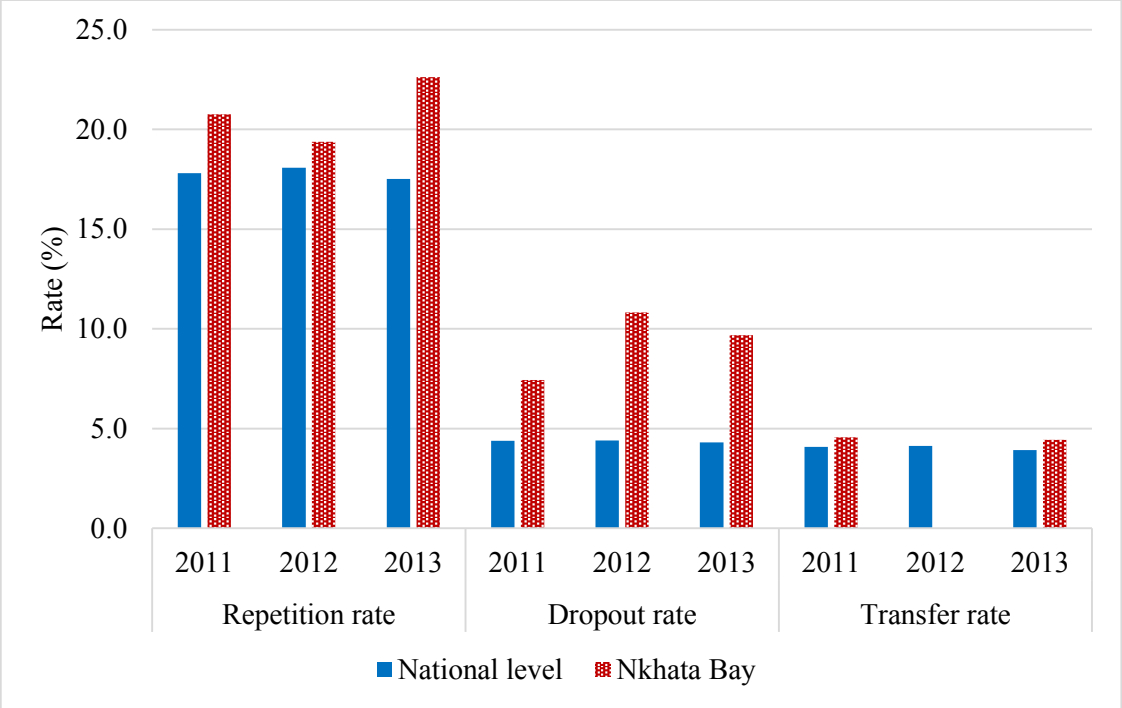


Figure 4.5. Differences in repetition, dropout, and transfer rates between the national level and Nkhata Bay

Source: MoEST 2011–2013

Note: Details of the transfer rate for 2012 in Nkhata Bay were not available.

4.4 Sample

As of January 2013, there were 144 full primary schools (138 public and six private schools) in Nkhata Bay. The district is divided into 16 zones, each of which has five to 14 schools. Among

the 144 full primary schools, 30 schools were selected using a cluster-sampling method, with the clustering as the PSLCE pass rate for 2010–12. The result was the schools were chosen from nine zones.

The field research was conducted by the author in two phases: January to March (2013, Phase 1) and during the same period (2014, Phase 2). In Phase 1, data were collected from 30 head teachers, 224 teachers, 169 members of school management committees (SMCs) and parent–teacher associations (PTAs), and 1,449 grade 5 students and 1,294 grade 7 students. In this study, the grade 5 students are referred to as Cohort 1 and grade 7 students as Cohort 2. In Phase 2, two activities were undertaken upon revisiting the same schools from Phase 1: (1) confirming whether Cohort 1 and Cohort 2 students had been promoted to the next grade, repeated the same grade, dropped out of school, or transferred to another school; and (2) collecting data from 30 head teachers, 224 teachers, 153 members of SMCs and PTAs, and 1,367 grade 6 and 1,308 grade 8 students (including the students who had been promoted to grade 6 in Cohort 1 and grade 8 in Cohort 2). The number of participants in 2013 and 2014 is indicated in Table 4.1.

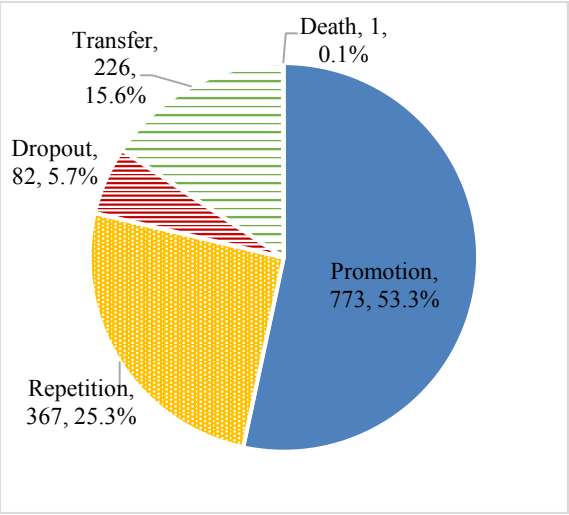
Table 4.1. Number of participants

Participants	2013	2014
Head teachers	30	30
Teachers (class teachers)	224 (68)	224 (66)
SMC and PTA members	169	153
Grade 5 students	1,449	
Grade 6 students		1,367
Grade 7 students	1,294	
Grade 8 students		1,308

Table 4.2 details the transitions of Cohort 1 and Cohort 2 students from 2013 to 2014. Figures 4.6 and 4.7 are graphic presentations of those transitions. The same tendency was found in both cohorts. Only around half of the students were promoted to the next grade in the same school. A quarter of the students repeated the same grade. Approximately 6.0% of the students dropped out of school. Surprisingly, 15.6% of Cohort 1 and 18.6% of Cohort 2 students transferred to another school.

Table 4.2. Transition of students for the academic years 2012/2013 to 2013/2014

	Cohort 1 Grade 5 to 6		Cohort 2 Grade 7 to 8	
	N	%	*N*	%
Promotion	773	53.3	652	50.4
Repetition	367	25.3	316	24.4
Dropout	82	5.7	83	6.4
Transfer	226	15.6	241	18.6
Death	1	0.1	2	0.2
Total	1,449	100.0	1,294	100.0



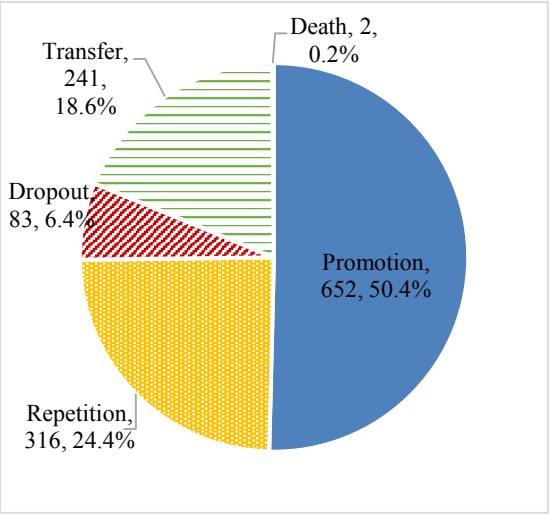


Figure 4.6. Transition in Cohort 1 (left)

Figure 4.7. Transition in Cohort 2 (right)

Of the promoted students, 628 and 516 students in Cohorts 1 and 2, respectively, participated in Phase 2 of the study (Table 4.3). The remaining students were absent or were unable to provide complete data on the day of collection.

Table 4.3. Number of participants in the cohorts in Phase 2

	Cohort 1 Grade 6		Cohort 2 Grade 8	
	N	%	*N*	%
Participants	628	81.2	516	79.1
Non-participants	145	18.8	136	20.9
Total	773	100.0	652	100.0

The details of the students who participated in this study are summarized in Figure 4.8.

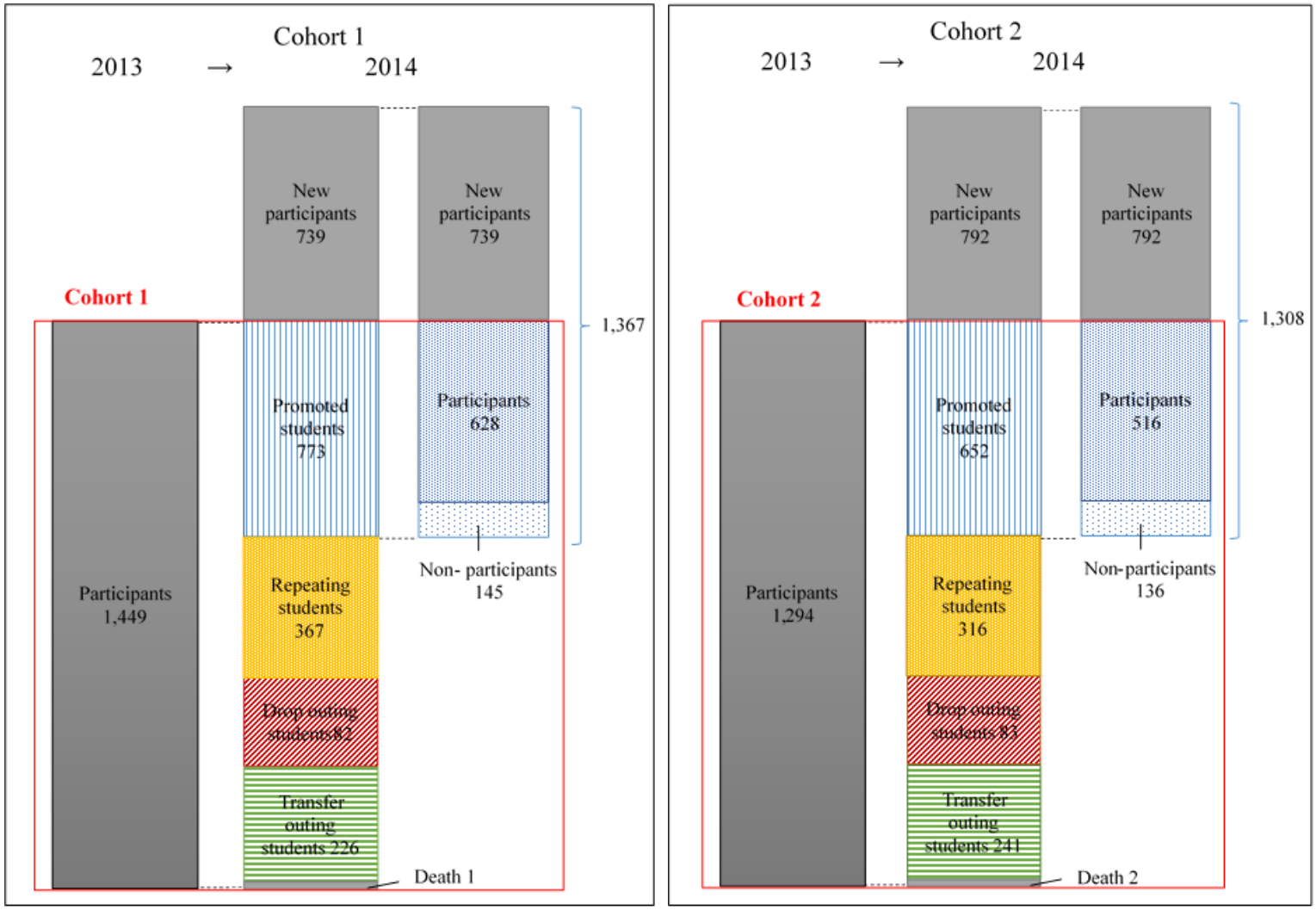


Figure 4.8. Summary of the participating students

Figures 4.9 and 4.10 present the transition rates for the two cohorts by school. The promotion, repetition, dropout, and transfer rates varied greatly among the schools.

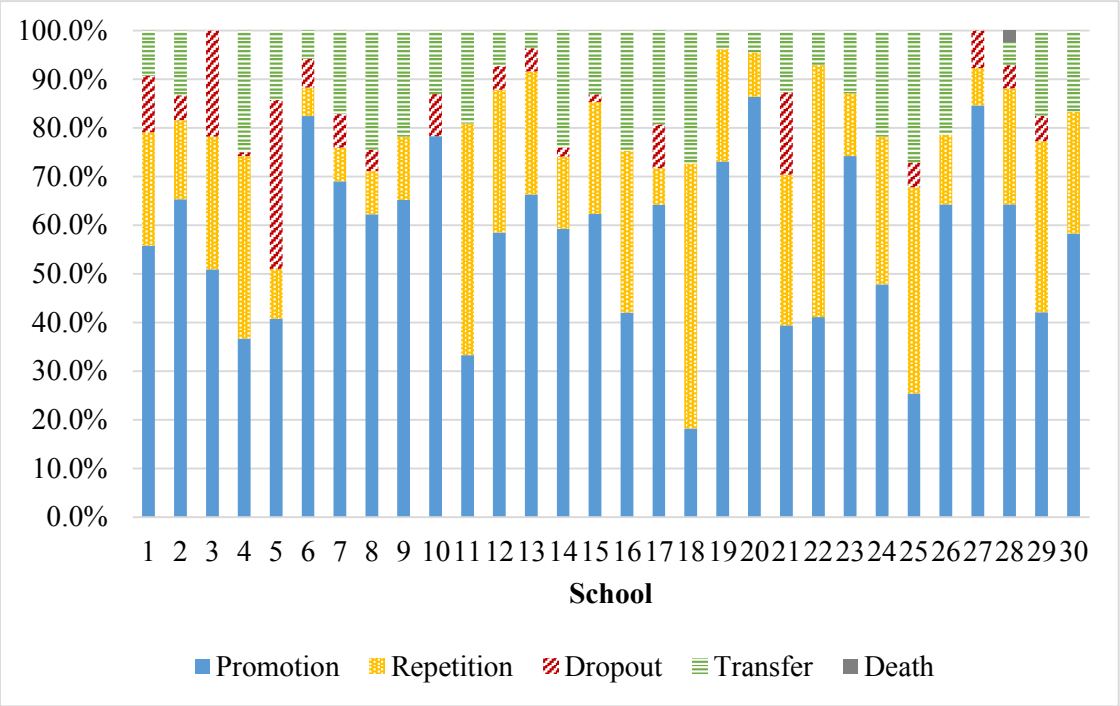


Figure 4.9. Transition rates in Cohort 1 by school

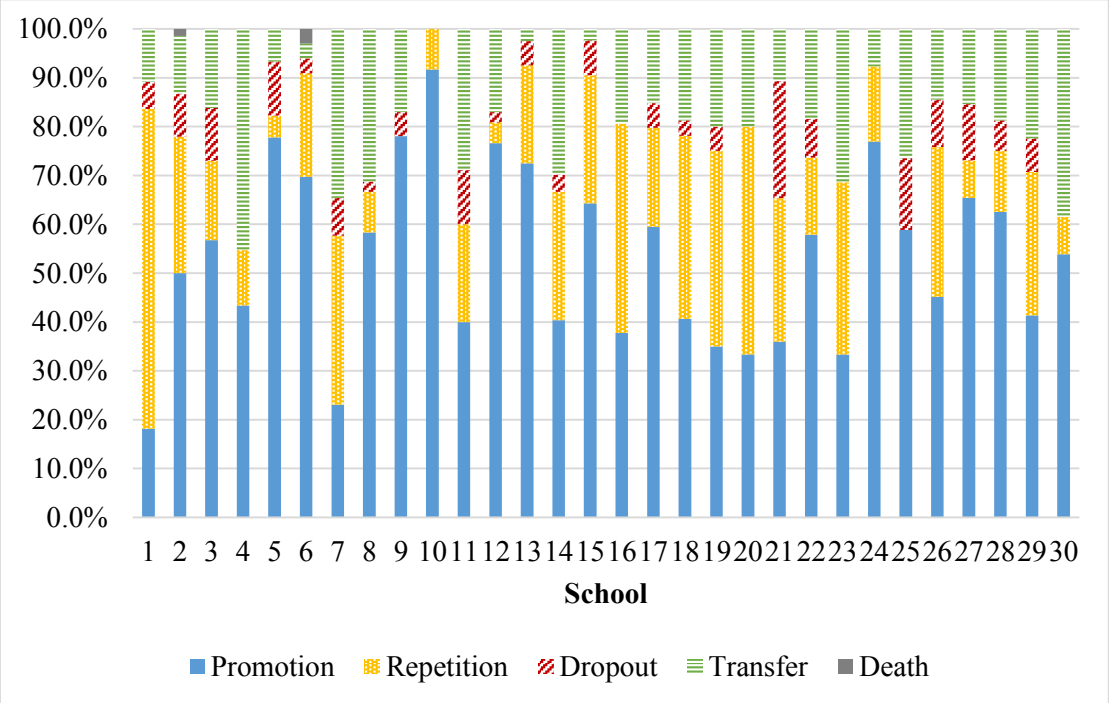


Figure 4.10. Transition rates in Cohort 2 by school

4.5 Measures

4.5.1 Dependent variables

This study adopted five output indicators: achievement, achievement growth, grade repetition, dropout, and transfer (Table 4.4).

Table 4.4. Dependent variables

Description	Scale
Achievement	Sum of English and mathematics achievements
Achievement growth	Sum of English and mathematics achievement growth
Grade repetition	0 = did not repeat; 1 = repeated
Dropout	0 = did not drop out; 1 = dropped out
Transfer	0 = did not transfer out; 1 = transferred out

Achievement

One of the most difficult tasks in the present study was constructing indicators of individual student achievement for a rural area of Malawi. There were two reasons for this. First, except for the PSLCE, there were no standardized tests at primary education level in Malawi. In general, class teachers conducted tests to assess student achievement at the end of each term. However, those tests varied considerably among the teachers. Second, standardized tests, such as the Progress in International Reading Literacy Study (PIRLS) and the Trends in International Mathematics and Science Study (TIMSS), are too difficult for most Malawi students. Their achievements are very low in such tests: the Southern and Eastern Africa Consortium for

Monitoring Educational Quality (SACMEQ) III reported that only 26.7% and 8.3%, respectively, of grade 6 students in Malawi surpassed basic reading and numeracy skills (Hungi et al., 2010). Thus, there was no possibility of measuring academic achievement other than by using tests devised by the author.

Test construction

Based on the curriculum, tests were constructed to measure the basic skills defined in the SACMEQ III. The question items were selected from textbooks and past national examinations. There were 35 question items in both English and mathematics tests for grades 5 and 6, and 40 question items in both subjects for grades 7 and 8. With the Phrase 2 tests, although the number of question items was the same as in Phase 1, approximately half the question items were the same; the rest were different. The frameworks of the tests appear in Tables 4.5–4.8. The details of the tests are presented in Appendices 1–8.

Table 4.5. English tests for grades 5 and 6

Core elements	Curriculum topic	Level	Cognitive domain	Grade 5		Grade 6	
				N	Total	N	Total
Reading	Vocabulary	Level 1	Match words to pictures, recognize alphabetical order	8	15	4	12
		Level 2	Match sentences to pictures	5		4	
		Level 3	Locate words in sentences	2		2	
		Level 4	Synonyms, antonyms			2	
Critical thinking and reasoning	Asking and answering questions	Level 1	Introduction	1	3	1	3
		Level 2	Daily life	2		2	
Structure and use of language	Tenses	Level 1	Present form, present progressive form	4	7	2	10
		Level 2	Past form, past progressive form, future form	3		3	
		Level 3	Present perfect form, adverbs, prepositions, conjunctions, singular or plural form			5	
		Level 4	Tag questions, Active and passive voices, direct and indirect speech, sentence structure, proverbs				
Reading	Passages/ stories	Level 1	Use context and simple sentence structure to match words	6	10	4	10
		Level 2	Use context and simple sentence structure to match sentences	3		4	
		Level 3	Interpret sentence to match words and phrases	1		2	
		Level 4	Interpret sentence to match sentences				
Total				35	35	35	35

Table 4.6. English tests for grades 7 and 8

Core elements	Curriculum topic	Level	Cognitive domain	Grade 7		Grade 8	
				N	Total	N	Total
Reading	Vocabulary	Level 1	Match words to pictures, recognize alphabetical order	8	15	2	8
		Level 2	Match sentences to pictures	5		3	
		Level 3	Locate words in sentences	2		1	
		Level 4	Synonyms, antonyms			2	
Critical thinking and reasoning	Asking and answering questions	Level 1	Introduction	1	3	1	2
		Level 2	Daily life	2		1	
Structure and use of language	Tenses	Level 1	Present form, present progressive form	4	12	1	15
		Level 2	Past form, past progressive form, future form	3		2	
		Level 3	Present perfect form, adverbs, prepositions, conjunctions, singular or plural form	5		6	
		Level 4	Tag questions, Active and passive voices, direct and indirect speech, sentence structure, proverbs			6	
Reading	Passages/ stories	Level 1	Use context and simple sentence structure to match words	6	10	4	15
		Level 2	Use context and simple sentence structure to match sentences	3		5	
		Level 3	Interpret sentence to match words and phrases	1		2	
		Level 4	Interpret sentence to match sentences			4	
Total				40	40	40	40

Table 4.7. Mathematics tests for grades 5 and 6

Core elements	Curriculum topic	Level	Cognitive domain	Grade 5		Grade 6	
				N	Total	N	Total
Numbers, operations and relationships	Counting and writing numbers	Level 1	Count illustrated object	1	2		0
		Level 2	Understand number and digit	1			
	Addition	Level 1	Add two-digit numbers and two-digit numbers without carrying	2	6	1	3
		Level 2	Add three-digit numbers and two-digit numbers without carrying	1		1	
		Level 3	Add one-digit number and one-digit number with carrying	1		1	
		Level 4	Add two or three-digit numbers and three-digit numbers with carrying	2			
	Subtraction	Level 1	Subtract from two-digit numbers to two-digit numbers or one-digit number without borrowing	3	5	1	3
		Level 2	Subtract from three-digit numbers to two-digit numbers without borrowing	1		1	
		Level 3	Subtract from two-digit numbers to one-digit number with borrowing			1	
		Level 4	Subtract from three-digit numbers to three-digit numbers with borrowing	1			
	Multiplication	Level 1	Multiply one-digit number by one-digit number	2	3	1	2
		Level 2	Multiply one-digit number by two-digit or three-digit numbers	1		1	
		Level 3	Multiply two-digit numbers by two-digit numbers				
	Division	Level 1	Divide one-digit number by one-digit number	1	3	1	2
		Level 2	Divide two-digit numbers by one-digit number	2		1	
		Level 3	Divide two-digit or three-digit numbers by two-digit numbers				
	Addition, subtraction, multiplication, division	Level 1	Add and subtract three-digit numbers		0		0
		Level 2	Multiply and add two-digit and three-digit numbers				
	Ratios	Level 1	Understand ratios		0		0
	Common fractions	Level 1	Understand meaning of fraction	1	5	3	7
		Level 2	Add or subtract fractions of the same denominators, decimal fractions	4		4	
		Level 3	Add or subtract fractions of the different denominators				
Space and Shape	Shapes	Level 1	Recognize simple shapes	2	2	1	1
Patterns, functions and algebra	Patterns	Level 1	Sequences (from small numbers to large numbers)	1	2	1	2
		Level 2	Sequences (from large numbers to small numbers)	1		1	
	Inequalities	Level 1	Find the value in a system of linear equation		0		0
		Level 2	Find the several values in a system of linear equation				
Measurements	Time, Volume, Areas	Level 1	Understand times, Measure volume, conversion	2	3	4	6
		Level 2	Find areas and perimeter	1		2	
		Level 3	Find volume				
Accounting and business studies	Addition or multiplication of money	Level 1	Addition or subtraction of money	2	4	2	4
		Level 2	Multiplication or division of money	2		2	
Data handing	Picture graphs	Level 1	Read graphs (Single information)		0	3	5
		Level 2	Read graphs (Multiple information)			2	
		Level 3	Read tables (Calculation of single information)				
		Level 4	Read tables (Calculation of multiple information)				
Total				35	35	35	35

Table 4.8. Mathematics tests for grades 7 and 8

Core elements	Curriculum topic	Level	Cognitive domain	Grade 7		Grade 8	
				N	Total	N	Total
Numbers, operations and relationships	Counting and writing numbers	Level 1	Count illustrated object	1	2		0
		Level 2	Understand number and digit	1			
	Addition	Level 1	Add two-digit numbers and two-digit numbers without carrying	2	6		2
		Level 2	Add three-digit numbers and two-digit numbers without carrying	1		1	
		Level 3	Add one-digit number and one-digit number with carrying	1		1	
		Level 4	Add two or three-digit numbers and three-digit numbers with carrying	2			
	Subtraction	Level 1	Subtract from two-digit numbers to two-digit numbers or one-digit number without borrowing	2	5		2
		Level 2	Subtract from three-digit numbers to two-digit numbers without borrowing	2		1	
		Level 3	Subtract from two-digit numbers to one-digit number with borrowing			1	
		Level 4	Subtract from three-digit numbers to three-digit numbers with borrowing	1			
	Multiplication	Level 1	Multiply one-digit number by one-digit number	2	3		2
		Level 2	Multiply one-digit number by two-digit or three-digit numbers	1		1	
		Level 3	Multiply two-digit numbers by two-digit numbers			1	
	Division	Level 1	Divide one-digit number by one-digit number	1	3		2
		Level 2	Divide two-digit numbers by one-digit number	2		1	
		Level 3	Divide two-digit or three-digit numbers by two-digit numbers			1	
	Addition, subtraction, multiplication, division	Level 1	Add and subtract three-digit numbers		0	1	2
		Level 2	Multiply and add two-digit and three-digit numbers			1	
	Ratios	Level 1	Understand ratios		0	1	1
	Common fractions	Level 1	Understand meaning of fraction	1	7	3	7
		Level 2	Add or subtract fractions of the same denominators, decimal fractions	4		3	
		Level 3	Add or subtract fractions of the different denominators	2		1	
Space and Shape	Shapes	Level 1	Recognize simple shapes	2	2	1	1
Patterns, functions and algebra	Patterns	Level 1	Sequences (from small numbers to large numbers)	1	2		1
		Level 2	Sequences (from large numbers to small numbers)	1		1	
	Inequalities	Level 1	Find the value in a system of linear equation		0	1	2
		Level 2	Find the several values in a system of linear equation			1	
Measurements	Time, Volume, Areas	Level 1	Understand times, Measure volume, conversion	3	4	3	6
		Level 2	Find areas and perimeter	1		2	
		Level 3	Find volume			1	
Accounting and business studies	Addition or multiplication of money	Level 1	Addition or subtraction of money	2	4	2	4
		Level 2	Multiplication or division of money	2		2	
Data handing	Picture graphs	Level 1	Read graphs (Single information)	1	2	3	8
		Level 2	Read graphs (Multiple information)	1		2	
		Level 3	Read tables (Calculation of single information)			2	
		Level 4	Read tables (Calculation of multiple information)			1	
Total				40	40	40	40

Test implementation

Before implementing the tests in the 30 selected schools, pre-tests were conducted in one school. After checking the results and obtaining the support of teachers and primary education advisers in Malawi, the tests were modified and distributed to the 30 schools.

Test analyses and their results

Item response theory (IRT). The test analyses were a critical element in this study because the tests themselves were created by the researcher: it was necessary to evaluate whether the implemented tests accurately measured the targeted academic skills. Accordingly, it was decided that rather than classical test theory (CTT), IRT should be employed to compute student ability, item difficulties, item discriminations, and test information. By the early 1990s, IRT appeared to be the most promising approach in measuring achievement by testing (Keeves, 1994). IRT has been used in test construction in large-scale studies, such as the PIRLS, TIMSS, the Programme for International Student Assessment (PISA) and SACMEQ. The greatest advantage of IRT is *equating*—a function that allows a comparison of tests implemented in different populations at different times. IRT was used in comparing the test results between Phases 1 and 2.

IRT procedure. Implementing IRT involved a number of steps. First, binary response data were created. Correct answers were indicated by 1; incorrect answers, double answers, and lack of answers were indicated by 0. Second, the assumptions of IRT were tested. IRT involves two important assumptions—local independence and unidimensionality.

Local independence signifies that when the abilities that influence test performance remain constant, the examinee's response to any pair of items is statistically independent. This assumption was firmly incorporated in the tests. As all the question items were independent of one another, answering one question had no effect on answering the other questions.

Unidimensionality signifies that only one ability is measured by the test items. To evaluate this assumption, the mean score for each question, the correlation between the rate of correct answers for each question and the total score, and the factors loading each question were calculated. The questions were selected according to the following criteria: (1) the mean score was 0.010; (2) the correlation between the rate of correct answers for each question and the total score was greater than 0.250; and (3) the factor loading was greater than 0.15. For the final results, some questions were excluded from the analyses. The numbers of question items used following the above assumptions appear in Table 4.9.

Table 4.9. Numbers of question items used in the analyses

	English	Mathematics
Grade 5	27	30
Grade 6	28	33
Grade 7	36	29
Grade 8	33	29

Finally, a two-parameter logistic model of IRT was implemented to determine student ability, item difficulties, and item discriminations. The equation of the two-parameter logistic model is as follows:

$$P_i(\theta) = \frac{e^{Da_i(\theta - b_i)}}{1+e^{Da_i(\theta - b_i)}} \ (i = 1, 2, \ \ldots, n) \qquad (1)$$

Here,

$Pi(\theta)$ is the probability that an examinee with ability level.

θ answers item i correctly.

D is a scaling factor, which is 1.702.

a is the item discrimination parameter.

b is the item difficulty parameter.

Item difficulties and item discriminations. The item difficulty and item discrimination of each item appear in Appendices 9 and 10. For all the questions, the item difficulties were indicated between −3.00 and 3.00; item discriminations were greater than 0.20. This means that

the questions used in the analyses were in accordance with the assumptions of IRT.

Table 4.10 shows the mean score for the item difficulties and item discriminations. High item difficulties and low item discriminations indicate that the test levels are high. The item difficulties showed from -0.827 to 0.205 and the item discriminations showed from 0.801 to 1.194. These indicate that these tests basically presented no difficulties for the students. Thus, the results confirmed that the implemented tests were effective in measuring basic skills.

Table 4.10. Item difficulties and item discriminations

	English tests				Mathematics tests			
	Item difficulties		Item discriminations		Item difficulties		Item discriminations	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
Grade 5	0.205	1.323	0.920	0.367	-0.198	1.267	0.920	0.367
Grade 6	-0.116	1.589	0.801	0.308	-0.127	1.619	0.824	0.344
Grade 7	-0.583	1.538	1.178	0.498	-1.320	1.190	1.194	0.560
Grade 8	-0.010	1.468	0.994	0.517	-0.827	1.290	1.066	0.375

Test information function. Test information function was computed to determine the effect of each question and its impact. The equation is as follows:

$$I(\theta) = \sum_{i=1}^{n} \frac{P_i'(\theta)^2}{P_i(\theta)Q_i(\theta)} \quad (2)$$

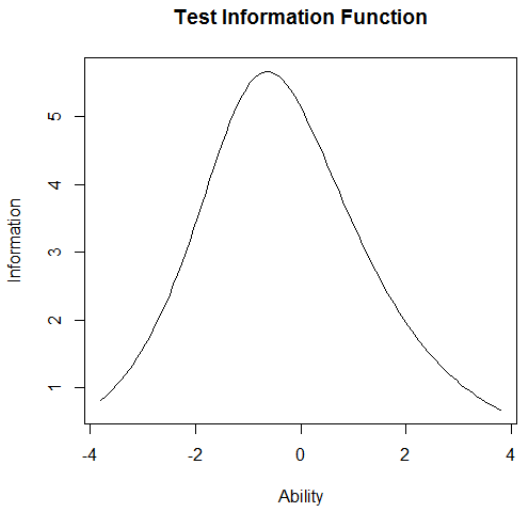
Here,

$I(\theta)$ is the test information function.

Q_i is $1 - P_i$.

The results are presented in Figures 4.11–4.18. With all the tests, the highest scores were

between −2.00 and −1.00. This means that the test results indicated under-average ability. It is also evident that the tests were effectively able to measure basic skills.



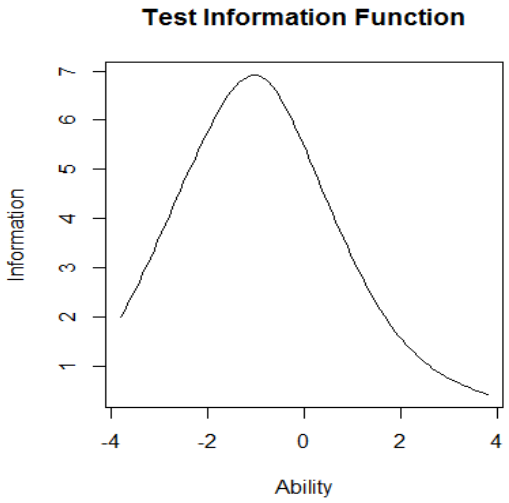
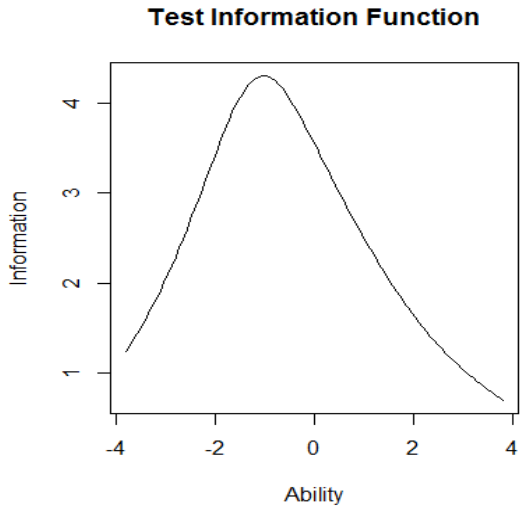


Figure 4.11. Grade 5 English test (left)

Figure 4.12. Grade 5 Mathematics test (right)



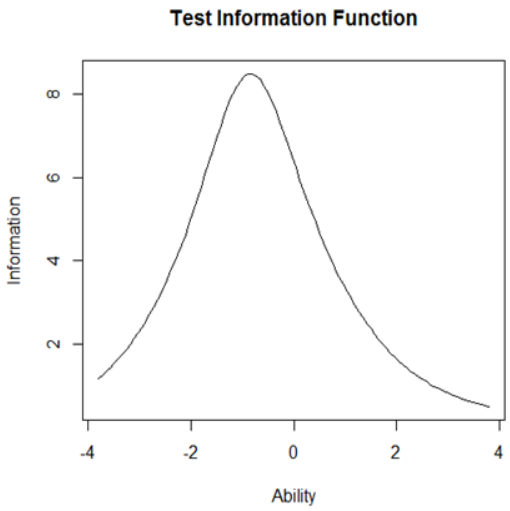
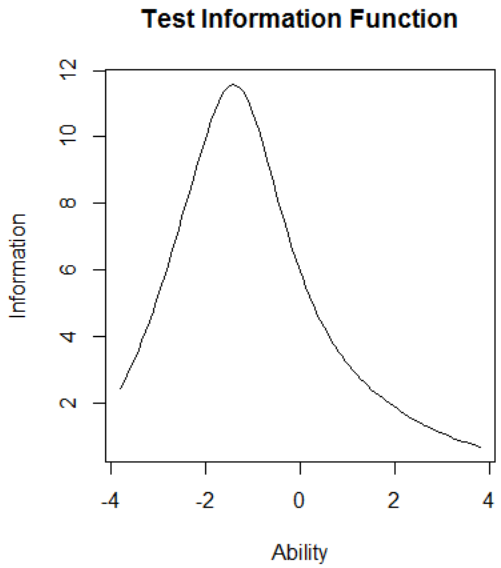


Figure 4.13. Grade 6 English test (left)

Figure 4.14. Grade 6 mathematics test (right)



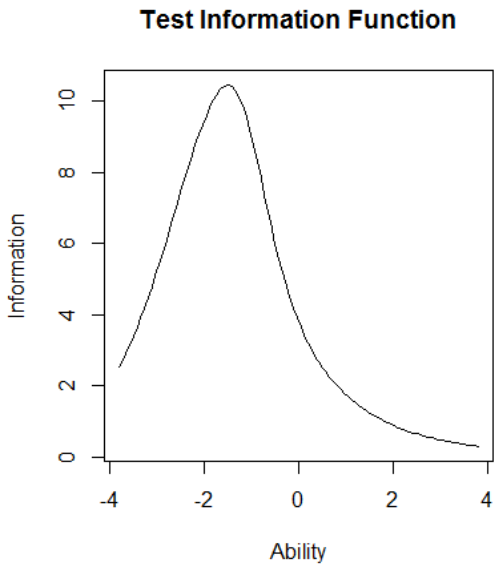
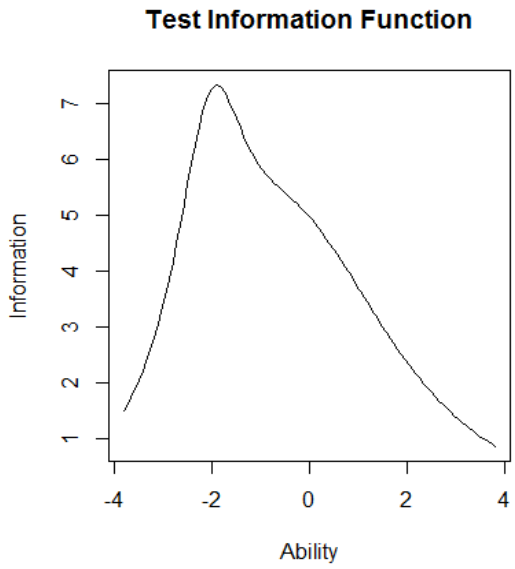


Figure 4.15. Grade 7 English test (left)

Figure 4.16. Grade 7 mathematics test (right)



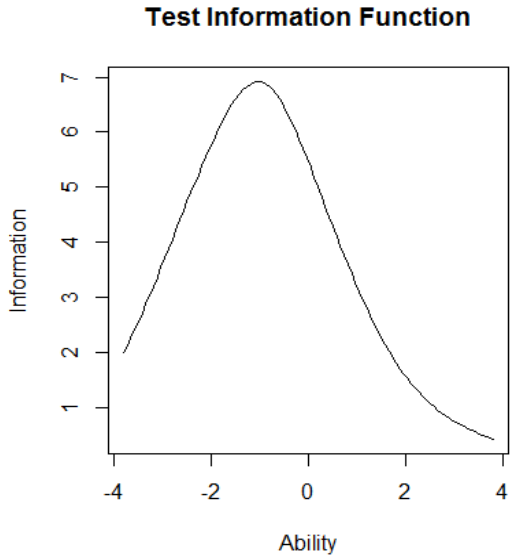
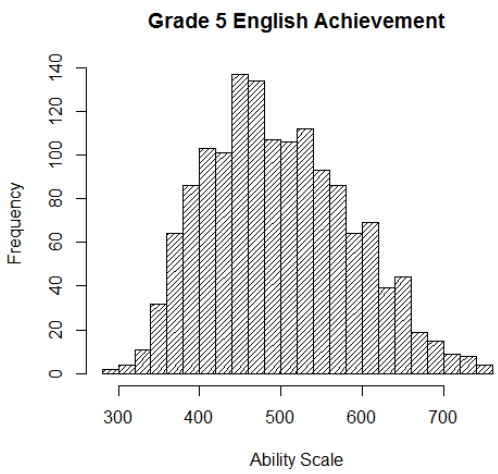


Figure 4.17. Grade 8 English test (left)

Figure 4.18. Grade 8 mathematics test (right)

Student ability. In IRT, student ability is typically found to range from −3.00 to 3.00, with 0.00 representing average ability. As negative ability scores tend to be incomprehensible, the scores in this study were transformed to have a mean of 500 and a standard deviation of 100.

Figures 4.19 to 4.26 show the distribution of the test results. Except for grade 5 English and grade 7 mathematics, the highest points were approximately 500; however, there was no symmetry in the patterns. In grade 5 English, the highest point score was approximately 450; in grade 7 mathematics, it was approximately 550. This result is also related to that for item difficulties (Table 4.10) and test information functions (Figures 4.11, 4.16). In the grade 5 English test, the item difficulty was 0.205 and the highest score for the test information function was around −1.00. However, in grade 7 mathematics, the item difficulty was −0.583 and the highest score for the test information function was almost −2.00. Therefore, the level of the grade 5 English test was slightly higher and that of the grade 7 mathematics test was slightly lower than the other tests.



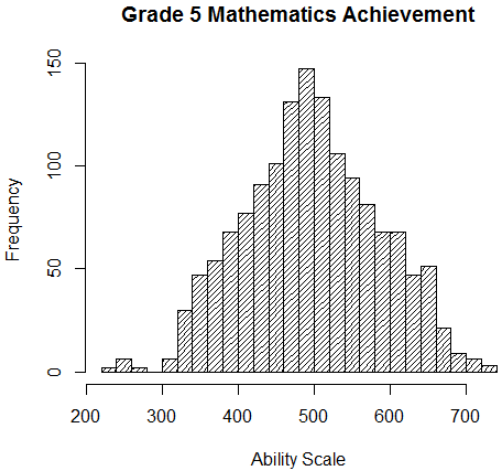
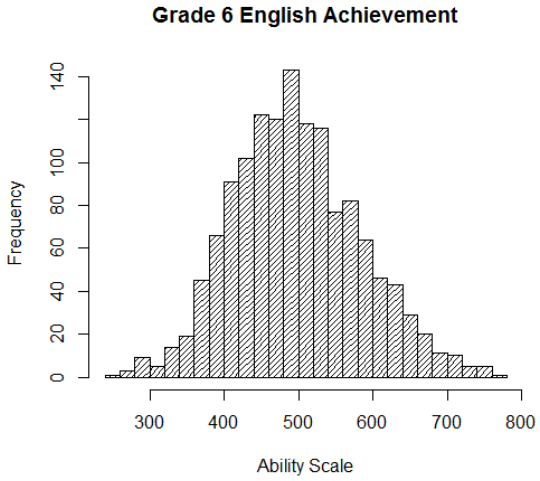


Figure 4.19. Histogram of the grade 5 English test (left)

Figure 4.20. Histogram of the grade 5 mathematics test (right)



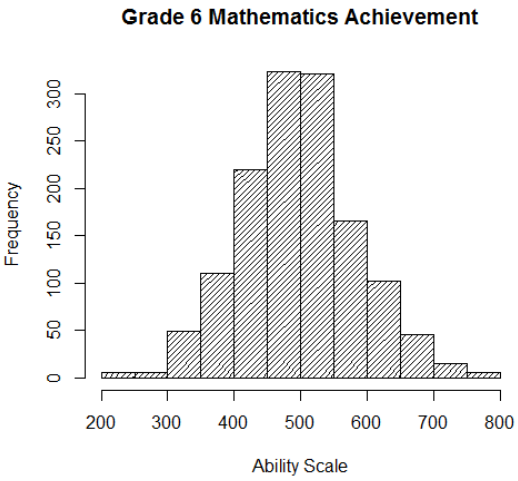
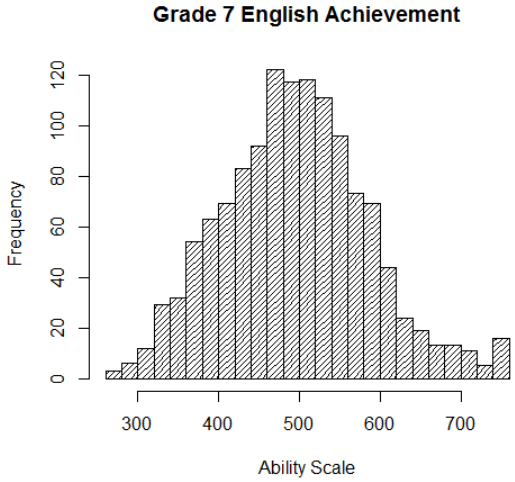


Figure 4.21. Histogram of the grade 6 English test (left)

Figure 4.22. Histogram of the grade 6 mathematics test (right)



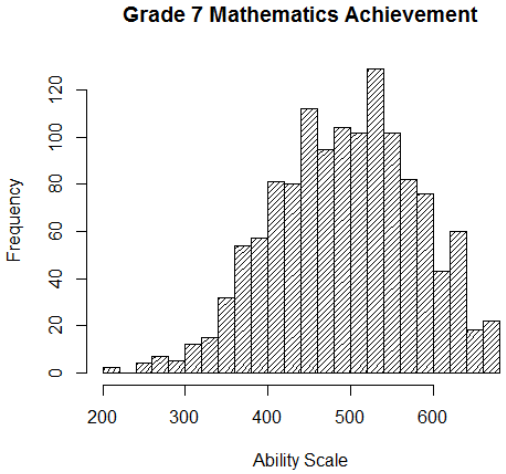
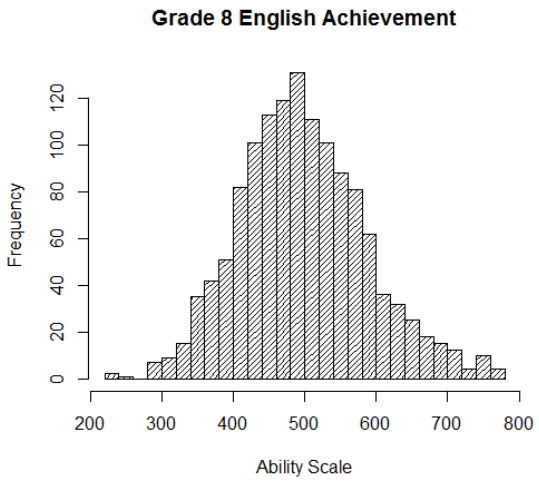


Figure 4.23. Histogram of the grade 7 English test (left)

Figure 4.24. Histogram of the grade 7 mathematics test (right)



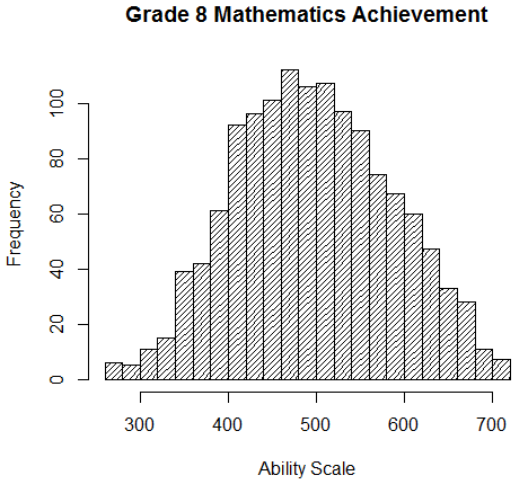


Figure 4.25. Histogram of the grade 8 English test (left)

Figure 4.26. Histogram of the grade 8 mathematics test (right)

Computing achievement

Achievement was obtained as a sum of the English and mathematics scores. Figures 4.27 and 4.28 show the distribution of achievement for grades 5 and 7, respectively.

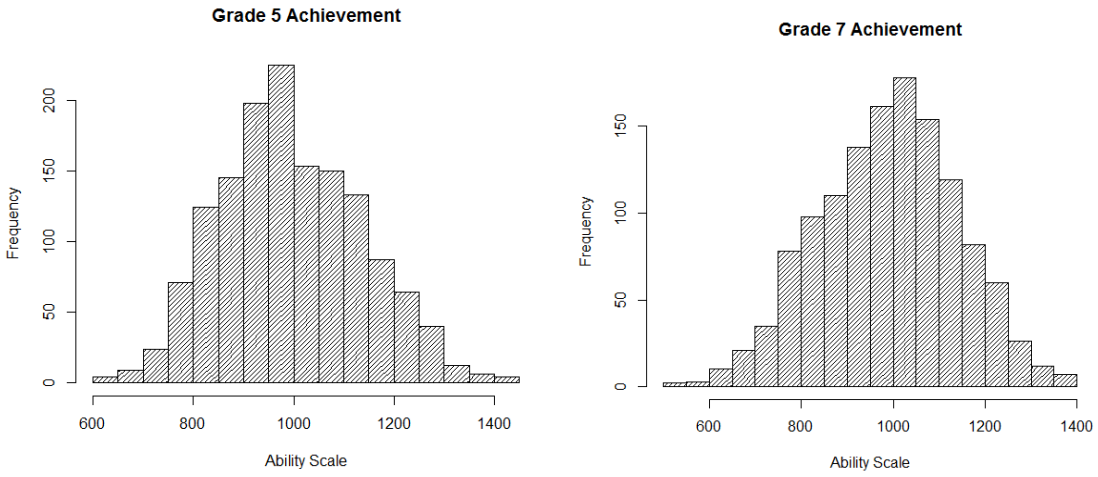


Figure 4.27. Histogram of grade 5 achievement (left)
Figure 4.28. Histogram of grade 7 achievement (right)

Achievement growth

To compute gain scores, ability scores for grades 6 and 8 were equated to those for grades 5 and 7, respectively. Equations (3) to (5) are as follows:

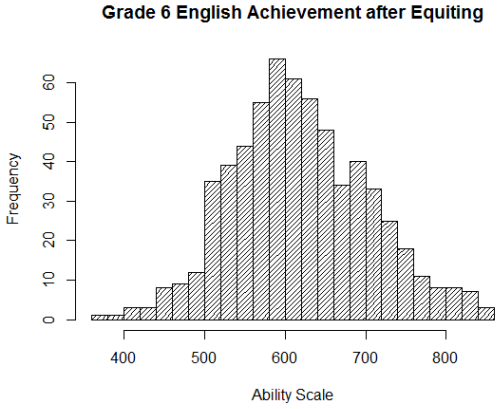
$$\theta^* = k\theta + l \quad (3)$$

$$a_j^* = \frac{1}{k} a_j \quad (4)$$

$$b_j^* = k b_j + l \quad (5)$$

The principle of equating used here may be simply explained as follows. First, the mean score and standard deviation of the item difficulties in the same questions in both tests (grades 5 and 6 or grades 7 and 8) were calculated. Then, k and l were determined using equations (4) and (5). Finally, when k and l were substituted for equation (3), θ^* was computed. The details appear in Appendix 11.

Grade 6 and 8 achievements after equating are displayed in Figures 4.29–4.32.



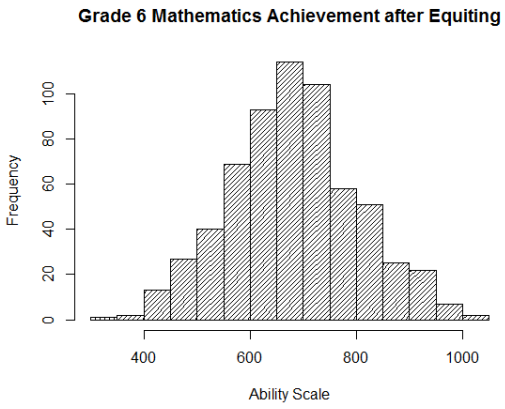
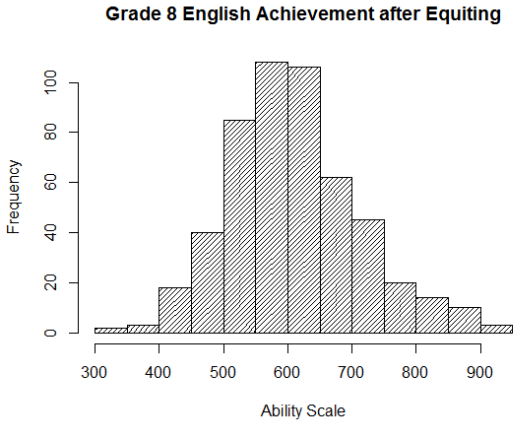


Figure 4.29. Histogram of grade 6 English achievement after equating (left)
Figure 4.30. Histogram of grade 6 mathematics achievement after equating (right)



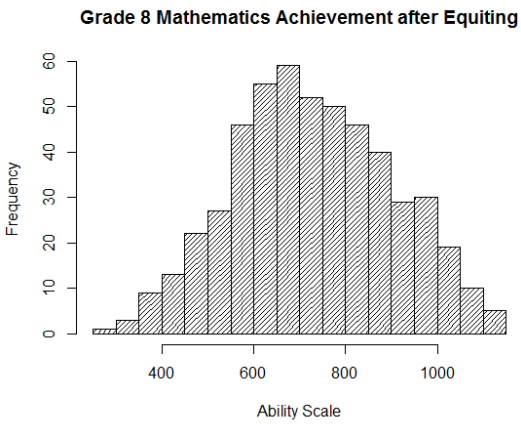


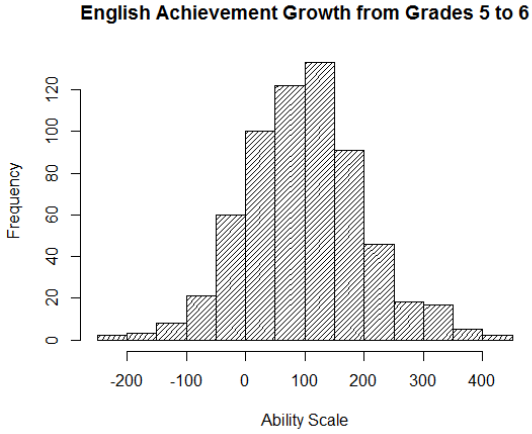
Figure 4.31. Histogram of grade 8 English achievement after equating (left)
Figure 4.32 Histogram of grade 8 mathematics achievement after equating (right)

Subsequently, gain scores were calculated by subtracting the achievements in Phase 1 from those in Phase 2. Table 4.11 shows the results for achievement growth. In both grades, mathematics achievement growth was greater than English achievement growth.

Table 4.11. Achievement growth

		M	*SD*	Min	Max	*N*
Cohort 1	English achievement growth	100.49	99.57	−231.00	439.00	628
	Mathematics achievement growth	180.60	128.44	−295.00	645.00	628
Cohort 2	English achievement growth	89.52	81.33	−155.00	469.00	516
	Mathematics achievement growth	211.88	148.98	−227.00	602.00	516

Figures 4.33–4.36 present the distribution of achievement growth. In all tests, most students showed positive achievement growth, though some had negative achievement growth.



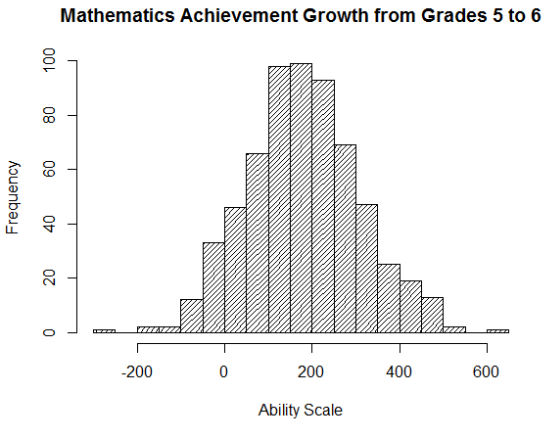
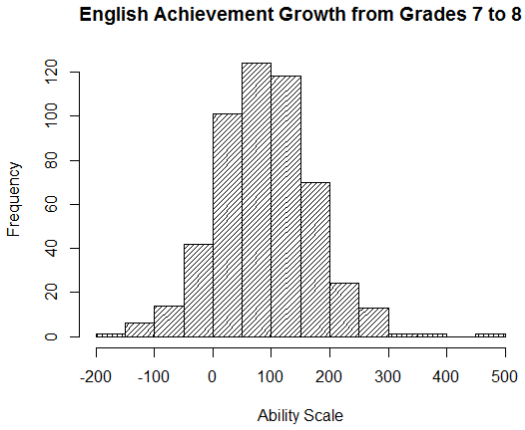


Figure 4.33. Histogram of English achievement growth in Cohort 1 (left)

Figure 4.34. Histogram of mathematics achievement growth in Cohort 1 (right)



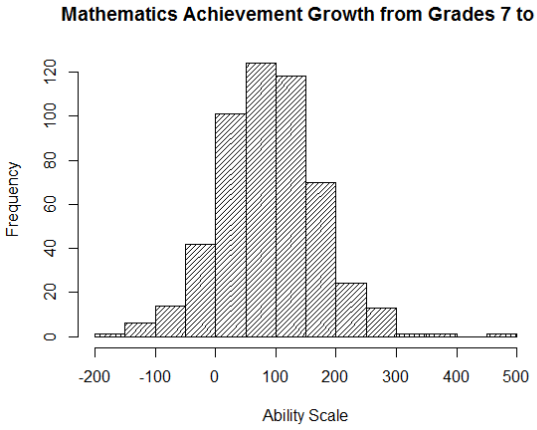


Figure 4.35. Histogram of English achievement growth in Cohort 2 (left)

Figure 4.36. Histogram of English achievement growth in Cohort 2 (right)

Computing achievement growth

Achievement growth was obtained as the sum of English and mathematics achievement growth.

Figures 4.37 and 4.38 indicate the distribution of achievement growth for grades 5 to 6 and 7 to 8, respectively.

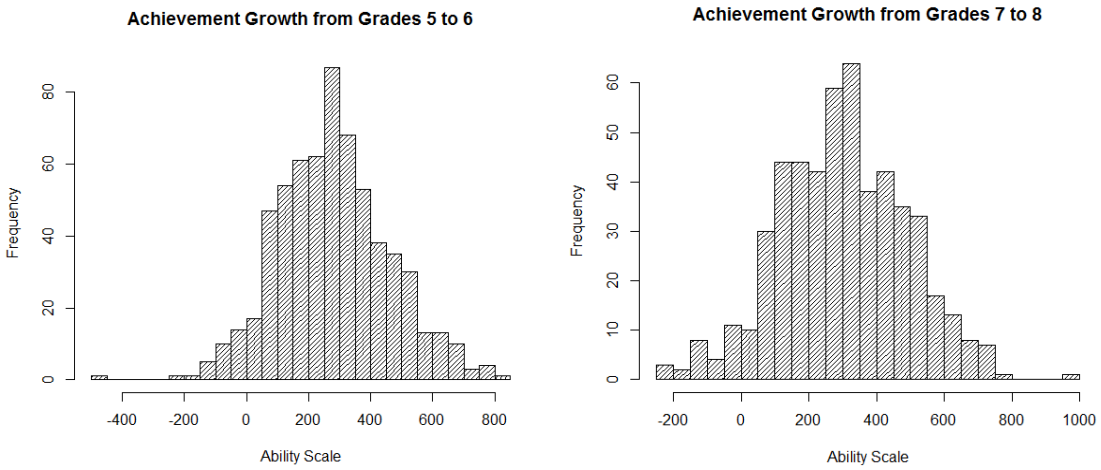


Figure 4.37. Achievement growth for grades 5 to 6 (left)

Figure 4.38. Achievement growth for grades 7 to 8 (right)

Unequal conditions of gain scores. There is a considerable debate with respect to achievement growth. The degree of achievement growth differs according to prior achievement (McCaffrey et al., 2003). For example, a student with a score of 700 faces different problems to one whose score is 400 even though both may wish to increase their respective scores by 100 points. Students with high prior achievement have greater difficulty in increasing their scores than students with low or medium previous achievements. Therefore, in the analyses, students with the high prior achievement of scores above 1,200 scores (grade 5 or 7 achievement) were excluded from the sample. Finally, 554 Cohort 1 students and 453 Cohort 2 students were analyzed in terms of achievement growth (Table 4.12).

Table 4.12. Number of samples in the analyses of achievement growth

	N	Total	%
Cohort 1	554	628	88.2
Cohort 2	453	516	87.8

Grade repetition, dropout, and transfer

Binary data were created for grade repetition, dropout, non-promotion, and transfer. In grade repetition, using the data for promoted and repeated students, students who were promoted to the next grades were coded 0, and those who repeated grades were coded 1. In dropout, using data for promoted or repeated and dropped-out students, students who were promoted to the next grades or repeated grades were coded 0, and those who dropped out of school were coded 1. In transfer, using the data for promoted or repeated and transferred students, students who were promoted to the next grades or repeated grades were coded 0, and those who transferred to another school were coded 1.

4.5.2 Independent variables

School-level variables

To construct school-level variables, three types of questionnaires (intended for head teachers, teachers, and members of SMCs and PTAs) were developed according to the previous studies in Malawi (i.e., Kunje et al., 2009; Tomita & Muta, 2010, 2012; Hungi et al., 2010; Taniguchi &

Hirakawa, 2011). The questionnaire for SMC and PTA members was translated into Chichewa, which is the national language in Malawi, to prevent linguistic difficulties affecting the results. Back-translation was conducted to check for translation errors. The details of the questionnaires appear in Appendices 12–14. First, 26 classroom-level variables, 28 school-level variables, and eight-community level variables were derived from the questionnaires. Then, the nature of the variables and the relationship among them were analyzed. Finally, based on these results and those of previous studies (Table 2.5), one classroom-level variable and two school-level variables were used in the analysis. The details appear in Table 4.13.

Student-level variables

To construct student-level variables, the questionnaires for students were developed following the previous studies in Malawi (Kunje et al., 2009; Tomita & Muta, 2010, 2012; Hungi et al., 2010; Taniguchi & Hirakawa, 2011). As with that for SMC and PTA members, the questionnaire for students was translated into Chichewa. The details of the student questionnaire are presented in Appendix 15. Thirteen individual-level variables and 12 family-level variables were obtained from the results of the questionnaire. The details are shown in Tables 4.14 and 4.15.

School social composition variables

Three school social composition variables were obtained by computing the mean values from the student-level variables. The details appear in Table 4.13.

Table 4.13. School-level variables

Category	Description	Scale
Mean	Mean achievement	
Mean	Mean socioeconomic status	
Mean	Mean number of grade repetitions	
Classroom	Class size	
School	School location	0 = rural; 1 = semi-urban; 2 = urban
School	School facilities	Sum of six items: library, hall, staff room, head teacher's room, playground, and school garden (each item: 0 = no; 1 = yes)

Table 4.14. Individual-level variables

Category	Description	Scale
Individual	Achievement	
Individual	Student gender	0 = girl; 1 = boy
Individual	Age of first entry	
Individual	Preschool attendance	0 = never; 0.5 = 2 or 3 months; 1 = 1 year; 2 = 2 years; 3 = 3 or more years
Individual	Days absent during the previous 2 weeks	0 = never; 1 = once; 2 = twice; 3 = three times; 4 = four or more times
Individual	Number of grade repetitions	0 = none; 1 = once; 2 = twice; 3 = three or more
Individual	Repetition at grade 5 or 7	0 = no; 1 = yes
Individual	Homework	0 = never; 1 = sometimes; 2 = most of the time; 3 = all of the time
Individual	Taking extra classes	0 = no; 1 = yes
Individual	Health condition	1 = very bad; 2 = bad; 3 = normal; 4 = good; 5 = very good
Individual	Self-esteem	Sum of being able to do things as well as others (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree) and feeling oneself to be useless (4 = strongly disagree; 3 = disagree; 2 = agree; 1 = strongly agree)
Individual	Feelings about school	Sum of liking going to school, enjoying learning at school, and learning a lot at school (each question: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree)
Individual	Educational aspiration	1 = primary school; 2 = junior secondary school; 3 = senior secondary school; and 4 = above secondary school

Table 4.15. Family-level variables

Category	Description	Scale
Family	Number of siblings	0 = none; 1 = one; 2 = two; 3 = three; 4 = four; 5 = five or more
Family	Speaking language of instruction	0 = never; 1 = sometimes; 2 = most of the time; 3 = all of the time
Family	Parents alive	0 = no parent alive; 1 = one parent alive; 2 = both parents alive
Family	Living with parents or relatives	0 = living with a relative or another family; 1 = living with one parent; 2 = living with both parents
Family	Socioeconomic status	Sum of the highest level of father and mother's education (each parent: 0 = no school; 1 = primary school; 2 = junior secondary school; 3 = senior secondary school; 4 = above secondary school) and number of 16 items at home (each item: 0 = no; 1 = yes)
Family	Number of books at home	0 = none; 1 = one to five; 2 = 5–10; 3 = more than 10
Family	Distance to school	0.5 = 0–0.5 km; 1.0 = 0.6–1.0 km; 1.5 = 1.1–1.5 km; 2.0 = 1.6–2.0 km; 2.5 = 2.0–2.5 km; 3.0 = 2.5–3.0 km; 3.5 = over 3 km
Family	Household tasks	Sum of involvement of student in 12 household activities (each activity: 0 = never; 1 = some days; 2 = most days)
Family	Meals per week	Complete number of meals (breakfast, lunch, and supper) taken by student per week (each meal: 0 = not at all; 1 = 1–2 days per week; 2 = 3–4 days per week; 3 = every day)
Family	Homework help at home	0 = never; 1 = sometimes; 2 = most of the time; 3 = all of the time
Family	Paying fees	Fees for extra class, report card, term examination, and school development (each item: 0 = never; 1 = sometimes; 2 = most of time; 3 = all of the time)
Family	Parental support	Sum of participating in meetings and school activities and talking with teachers (each item: 0 = never; 1 = sometimes; 2 = most of the time; 3 = all of the time)

4.6 Data-Analysis Strategy

4.6.1 Preliminary analysis

Preliminary analyses were conducted to examine variable distribution, relations, and missing data. The descriptive statistics and a correlation matrix were computed to determine the nature of the variables. Missing data characterized individual-level variables. To deal with missing data, a check was first made for missing-data patterns and missing-data mechanisms. Missing values were random, and so they were imputed using available data. Enders (2010) suggested that a minimum of 20 imputed data sets was sufficient for many situations, and so 20 data sets were computed in the present study. By employing multiple imputation, the obtained data were fully and effectively analyzed: even incomplete data had partially sufficient information.

4.6.2 Correlation analysis

Correlation analysis was conducted to examine the relationship between achievement and the other indicators (achievement growth and repetition, dropout, and transfer rates). In addition, a two-dimensional scatter plot was created to determine the patterns of association between them.

4.6.3 Multilevel analysis

Multilevel analysis was employed to identify the variables that influenced output indicators at the student and school levels.

Multilevel linear regression

Multilevel linear regression was used to analyze academic achievement and its growth. Achievement growth was scale data. The basic equations appear below:

Level 1: $Y_{ij} = \beta_{0j} + \beta_{kj}x_{kj} + r_{ij}$ (10)

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{0p}W_{pj} + u_{0j}$ (11)

$\beta_{kj} = \gamma_{k0}$ (12)

Mixed: $Y_{ij} = r_{00} + \gamma_{0p}W_{pj} + \gamma_{k0}x_{ij} + u_{0j} + r_{ij}$ (13)

Here,

Y_{ij} is the dependent variable

β_{0j} is the intercept (expected achievement for student *i* within cluster *j* with $x = 0$)

β_{kj} is the regression slope (Level 1)

x_{kj} is the predictor on at the student level

γ_{00} is the grand mean or overall intercept

W_{pj} is the Level 2 predictor for random intercepts

u_{0j} is the group-level deviation from the overall intercept (random effect)

γ_{k0} is the average regression slope over all clusters (as a fixed effect).

Multilevel logistic regression

In the analyses of grade repetition, dropout, and transfer, multilevel logistic regression was employed because the data were binary. The basic equations appear below:

Level 1: $logit(P_{ij}) = \ln\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_{0j} + \beta_{kj}x_{kj}$ (6)

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{0p}W_{pj} + \mu_{0j}$, where $\mu_{0j} \sim N(0, \tau_{00})$ (7)

$\beta_{kj} = \gamma_{k0}$ (8)

Mixed: $logit(P_{ij}) = \gamma_{00} + \gamma_{0p}W_{pj} + \gamma_{k0}x_{ij} + \mu_{0j}$ (9)

Here,
P_{ij} is the probability of the dependent variable (grade repetition)
β_{0j} is the intercept for school j
β_{kj} is the slope
x_{kj} is an explanatory variable at Level 1 (independent variable)
r_{00} is the mean grade repetition for school
r_{0p} is the mean grade repetition difference between schools
$W_{pj}$is an explanatory variable at Level 2 (independent variable) explaining the intercept
u_{0j} represents random variables with 0 means and variances
$r_{k0}$is the average of the explanatory variable (independent variable) grade repetition slope for the school

Model specification

The first essential task in multilevel analysis is estimating the proportion of between variance on overall variance, which is known as the intraclass correlation (ICC). This is computed by creating the null model, also called the *empty model*. The null model examines whether it is meaningful to conduct multilevel analysis. Using the equations of multilevel logistic regression and multilevel linear regression, the ICC was calculated for each model.

Two random intercept models were then created: Model 1 for school social composition and Model 2 for school input. Model 1 for school social composition added the mean of student-level variables and student-level variables to the model. This model demonstrated the effect of the mean of student-level variables on dependent variables after controlling for student-level variables. This model reflects the unique effect of the school, and a difference in the dependent variables between two schools occurred when the mean of the student-level variables differed

in one unit. This effect is called the contextual effect. Model 2 for school input added the school-input variables to Model 1. It demonstrated the effect of the mean of student-level and school-input variables on dependent variables after controlling for student-level variables. The details of the models are presented in Appendix 16.

CHAPTER FIVE: RELATIONSHIPS AMONG INDICATORS

This chapter answers the first research question: What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates?

Correlation analysis was conducted to examine the relationship between achievement and the other indicators—achievement growth and repetition, dropout, and transfer rates. A two-dimensional scatter plot was created to identify the patterns of association between them.

5.1 Correlation Analysis

Tables 5.1 and 5.2 present the results of correlation analysis for Cohorts 1 and 2, respectively.

Table 5.1. Relationships among school-level indicators for Cohort 1

	1.1	1.2	1.3	1.4	1.5
1.1 Achievement	-	−.419*	−.339	.088	−.069
1.2 Achievement growth		-	.360	−.038	.046
1.3 Repetition rates			-	−.245	.242
1.4 Dropout rates				-	−.274
1.5 Transfer rates					-

Note: $p^* < .05$.

Table 5.2. Relationships among school-level indicators for Cohort 2

	2.1	2.2	2.3	2.4	2.5
2.1 Achievement	-	−.101	−.107	−.174	−.082
2.2 Achievement growth		-	.106	−.334	.237
2.3 Repetition rates			-	−.093	−.049
2.4 Dropout rates				-	−.188
2.5 Transfer rates					-

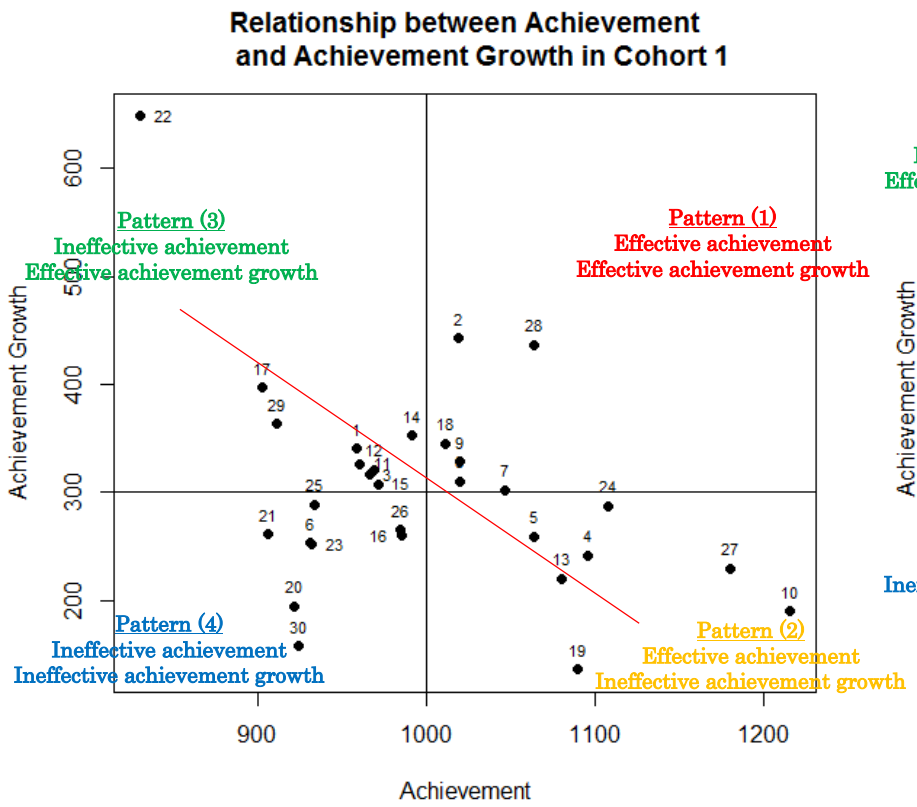
In Cohort 1, there was a weakly negative relationship between achievement and achievement growth ($r = -.419$, $p^* < .05$). This means that schools that were effective in raising achievement were ineffective in promoting achievement growth. Low-achieving schools were more likely to improve the basic skills of students than high-achieving schools. This appears to be a general condition because the achievement growth of low-achieving students tended to be greater than that of high-achieving students. There are large numbers of low-achieving students in low-achieving schools—rather than in high-achieving schools—and so achievement growth in low-achieving schools tends to be greater than in high-achieving schools.

There was a slightly negative relationship between achievement and repetition rates ($r = -.339$), but it was not statistically significant. Schools that were effective in raising achievement were not always effective in reducing repetition rates. However, there was no relationship between achievement and dropout or transfer rates. This means that schools that were effective in enhancing achievement were not always effective in reducing dropout or transfer rates.

In Cohort 2, achievement was not related to the other indicators. This signifies that schools that were effective in raising achievement were not always effective in promoting achievement growth or reducing repetition, dropout, or transfer rates.

5.2 Scatter Plots

Correlation analysis is the basic method for analyzing relationships among indicators; however, in the present study, the sample size of the schools was small. Accordingly, scatter plots were used to examine the relationships in detail. Figures 5.1 to 5.8 present the scatter plots between achievement and the other indicators.



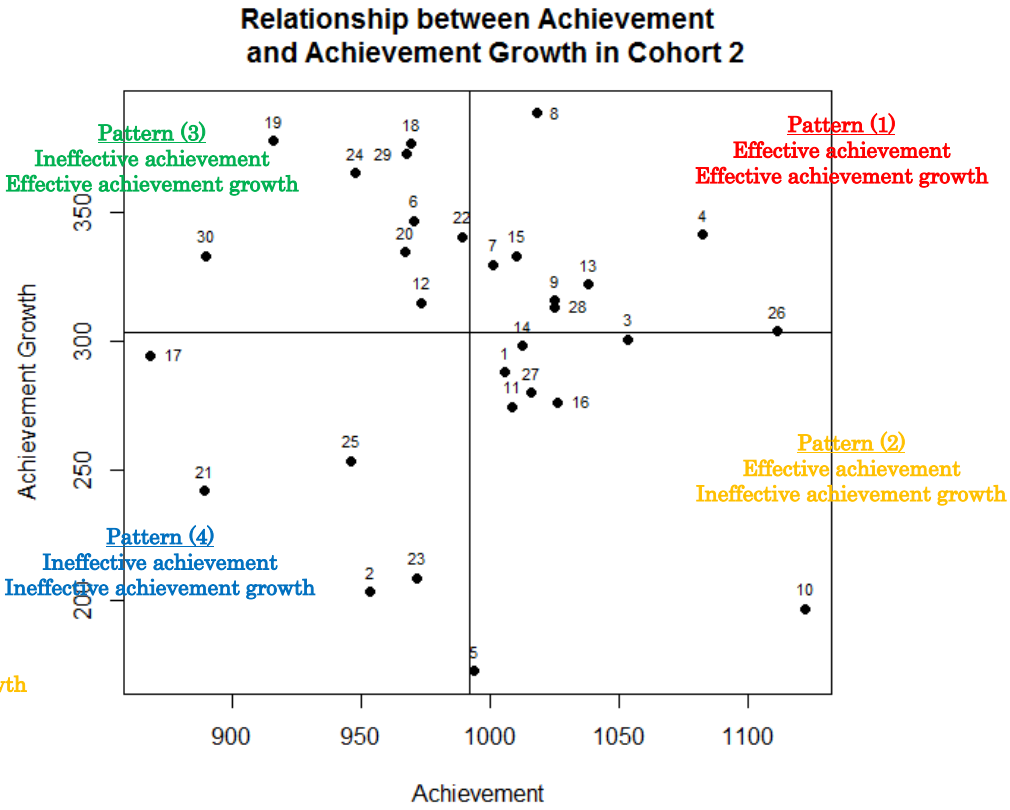


Figure 5.1. Relationship between achievement and achievement growth in Cohort 1 (left)

Note: In both the vertical and horizontal axes, mean values appear in black.

Figure 5.2. Relationship between achievement and achievement growth in Cohort 2 (right)

Note: In both the vertical and horizontal axes, mean values appear in black.

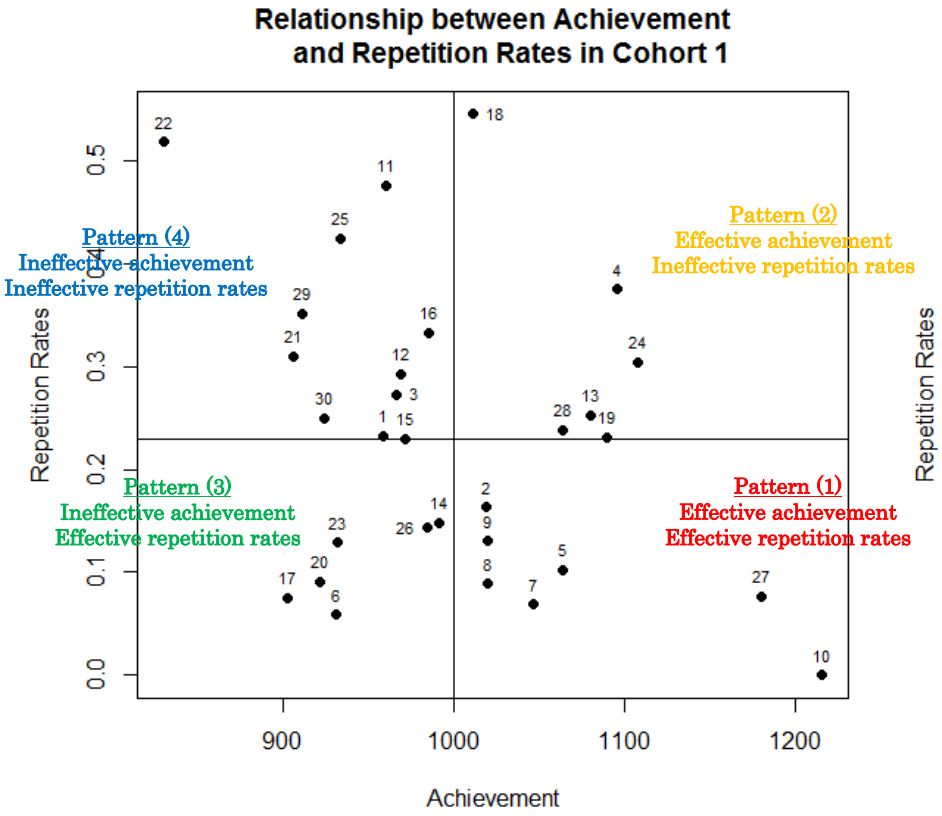
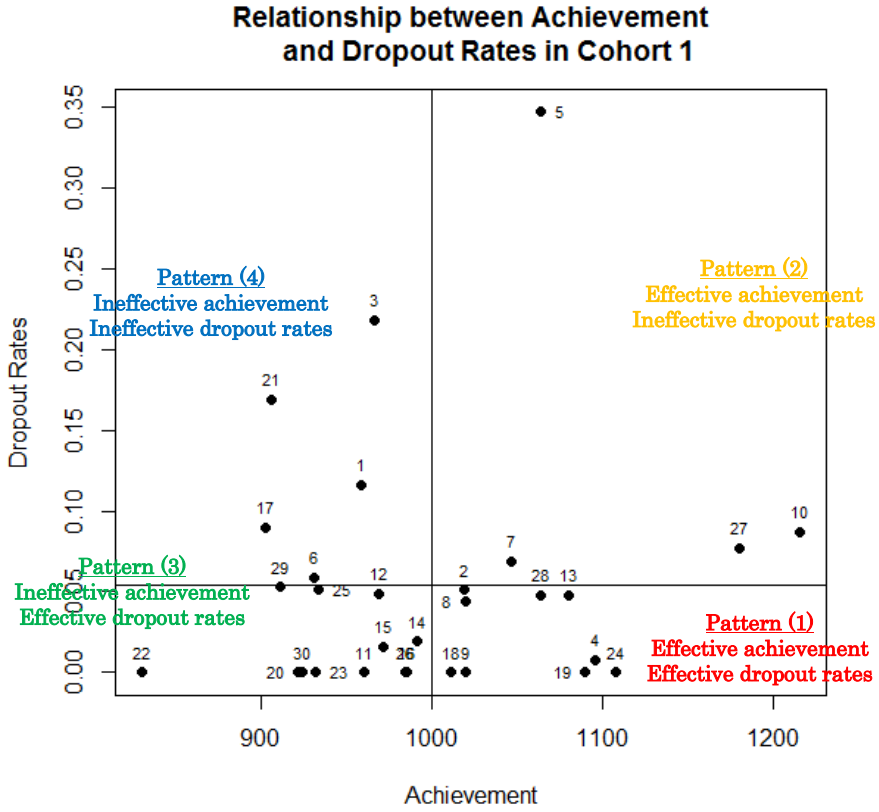


Figure 5.3. Relationship between achievement and repetition rates in Cohort 1 (left)

Note: In both the vertical and horizontal axes, mean values appear in black.

Figure 5.4. Relationship between achievement and repetition rates in Cohort 2 (right)

Note: In both the vertical and horizontal axes, mean values appear in black.



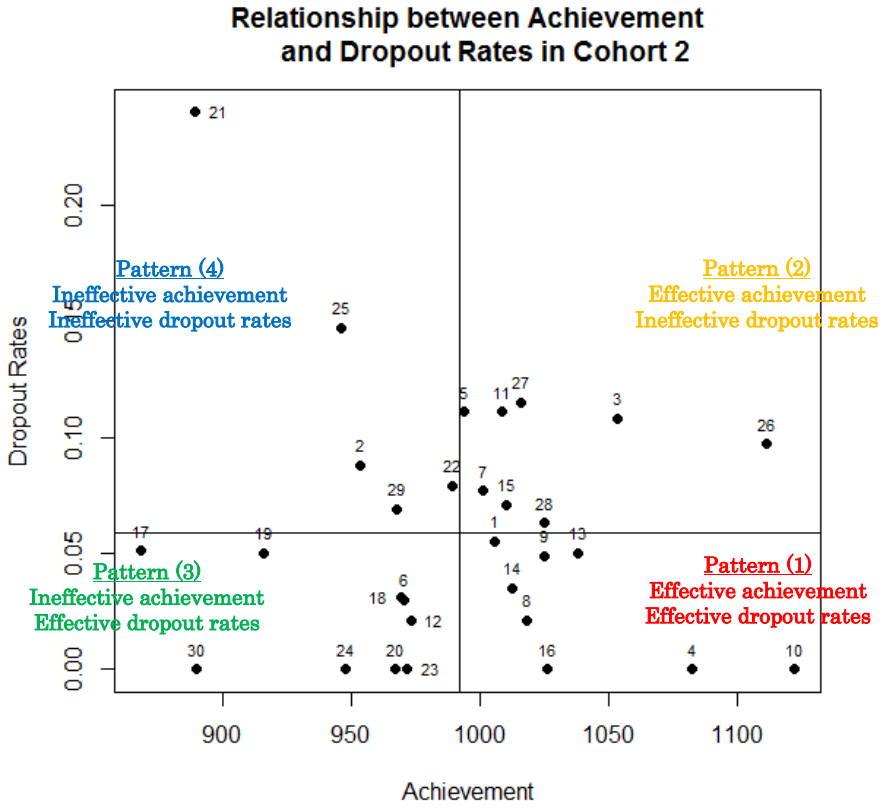


Figure 5.5. Relationship between achievement and dropout rates in Cohort 1 (left)

Note: In both the vertical and horizontal axes, mean values appear in black.

Figure 5.6. Relationship between achievement and dropout rates in Cohort 2 (right)

Note: In both the vertical and horizontal axes, mean values appear in black.

Figure 5.7. Relationship between achievement and transfer rates in Cohort 1 (left)

Note: In both the vertical and horizontal axes, mean values appear in black; schools circled in green were located in a semi-urban area.

Figure 5.8. Relationship between achievement and transfer rates in Cohort 2 (right)

Note: In both the vertical and horizontal axes, mean values appear in black; schools circled in green were located in a semi-urban area.

The patterns of achievement and the other indicators were classified into four types: (1) effective achievement and effective achievement growth and repetition, dropout, or transfer rates; (2) effective achievement and ineffective achievement growth and repetition, dropout, or transfer rates; (3) ineffective achievement and effective achievement growth and repetition, dropout, or transfer rates; and (4) ineffective achievement and ineffective achievement growth and repetition, dropout, or transfer rates.

As seen in Table 5.1, there was a weakly negative relationship between achievement and achievement growth in Cohort 1. This is also evident in Figure 5.1 and is indicated as the red line.

One interesting case between achievement and repetition rates occurred in Cohort 2 (Figure 5.4). School 1 (indicated by a yellow circle) was classified as (2): effective achievement and ineffective repetition rates. The repetition rate of School 1 was in fact the highest among the sampled schools. By contrast, School 30 (indicated by a green circle) was classified as (4): ineffective achievement and ineffective repetition rates. Among the sampled schools, School 1 had the highest pass rates in the national examination, and it is widely regarded as the best school in the district; School 30 had the lowest pass rates in the national examination. This implies that School 1 maintained its high pass rates in the national examination by controlling the students who were promoted to the next grade. As a result, that school produced many repeaters. By

contrast, it would appear that School 30 did not implement such a system, and so it did not produce many repeaters.

5.3 Summary

The first research question is as follows: What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates?
In Cohort 1, there was a negative relationship between achievement and achievement growth, though achievement was not related to the other indicators. Schools that were effective in raising achievement were ineffective in promoting achievement growth, and they were not always effective in reducing repetition, dropout, and transfer rates. In Cohort 2, achievement was not related to the other indicators. Schools that were effective in enhancing achievement were not always effective in promoting achievement growth or reducing repetition, dropout, and transfer rates.

CHAPTER SIX: FACTORS INFLUENCING INDICATORS

This chapter addresses the second research question: What school-level factors predict the designated indicators after controlling for student-level factors? Are the factors that influence achievement the same as those that influence other factors?

Preliminary analyses were conducted to determine the nature of the variables with respect to this second research question. Descriptive statistics and a correlation matrix for school- and student-level variables are presented in Appendixes 17–41. Two-level linear and logistic regression analysis was conducted to determine the factors that influenced each indicator. Prior to deeper analysis, the null model was created for each indicator to identify the proportion of school-level variance within overall variance. This step indicated the appropriateness of using multilevel analysis. Two models (Model 1 for school social composition and Model 2 for school input) were created to examine how school-level variables influenced the indicators. The results for each indicator appear in Appendices 42–51.

6.1 Null Model

Tables 6.1 and 6.2 present, respectively, the null model for Cohorts 1 and 2.

Table 6.1. Null model for Cohort 1

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	999.512***	15.301	283.370***	18.389	0.980***	0.173	2.664	3.300***	0.320	27.113	1.768***	0.161	5.859
Random Effect													
Residual Variances													
Between level	9733.229	5375.981	9358.893*	4429.618	0.705**	0.226		1.512*	0.665		0.278*	0.146	
Within level	13748.663***	904.469	22256.391***	1650.215									
ICC	0.315		0.290		0.176			0.315			0.078		
Loglikelihood	-9025.258		-3590.015		-676.429			-270.825			-603.579		
AIC	18056.515		7186.030		1356.858			545.651			1211.158		
BIC	18072.351		7198.981		1366.936			555.867			1221.598		

Table 6.2. Null model for Cohort 2

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	991.893***	10.528	295.572***	13.039	1.050***	0.233	2.858	2.698***	0.211	14.850	1.494***	0.143	4.455
Random Effect													
Residual Variances													
Between level	10731.921***	0.700	2781.227*	1444.912	1.130**	0.432		0.471	0.277		0.331*	0.154	
Within level	18979.855***	1149.971	31719.738***	2423.316									
ICC	0.123		0.078		0.256			0.125			0.091		
Loglikelihood	-8257.940		-3002.109		-561.590			-281.577			-592.042		
AIC	16521.880		6010.218		1127.180			567.154			1188.084		
BIC	16537.377		6022.566		1136.949			577.069			1198.279		

The intraclass correlations (ICCs) varied from 0.078 for the models of achievement growth in Cohort 2 and transfer in Cohort 1 to 0.315 for the model of achievement and dropout in Cohort 1. Coleman et al. (1966) revealed that the proportion of school-level variance within the overall variance was small—approximately 0.100 (10.0%). Accordingly, the present study examined whether the proportion of school-level variance within overall variance was greater or smaller than that determined by Coleman et al.

In terms of achievement, the ICC was 0.315 (31.5%) in Cohort 1 and 0.123 (12.3%) in Cohort 2. Figures 6.1 and 6.2 are graphic presentations of those proportions. The ICC in Cohort 1 was thus much higher than in Cohort 2, which means that the effect of school-level variability in basic skills was greater in Cohort 1 than in Cohort 2. This would appear to reflect a general condition: as grades become higher, the number of students with low-level basic skills tends to decrease. Thus, the difference in basic student skills among schools becomes smaller with higher grades.

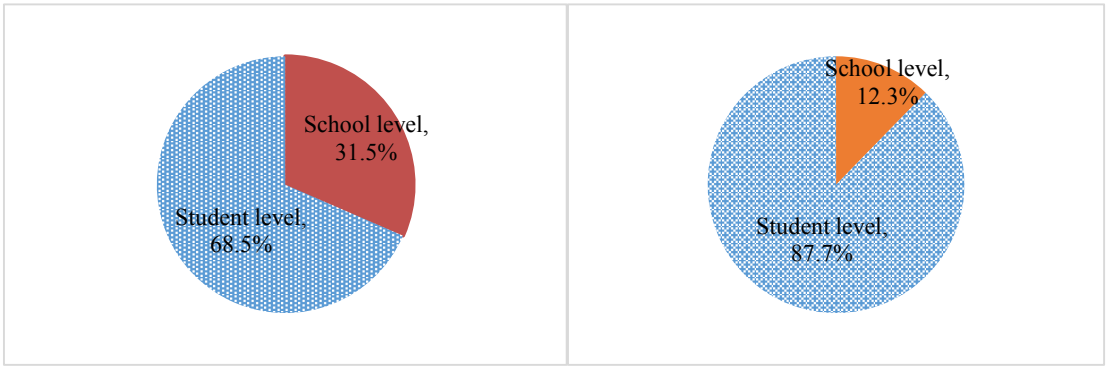


Figure 6.1. Proportion of school and student levels for achievement in Cohort 1 (left)
Figure 6.2. Proportion of school and student levels for achievement in Cohort 2 (right)

With achievement growth, the ICC was 0.290 (29.0%) in Cohort 1 and 0.078 (7.8%) in Cohort 2. Figures 6.3 and 6.4 are graphic presentations of those proportions. As with achievement, the ICC in Cohort 1 was thus far higher than in Cohort 2. One of the reasons for the fairly low ICC in Cohort 2 here is related to achievement in that cohort. In the present study, the majority of Cohort 2 students already possessed the basic skills measured by testing, and so their achievement did not differ much among the schools (Figures 4.23, 4.24, 4.28). Likewise, their achievement growth did not show much difference among schools.

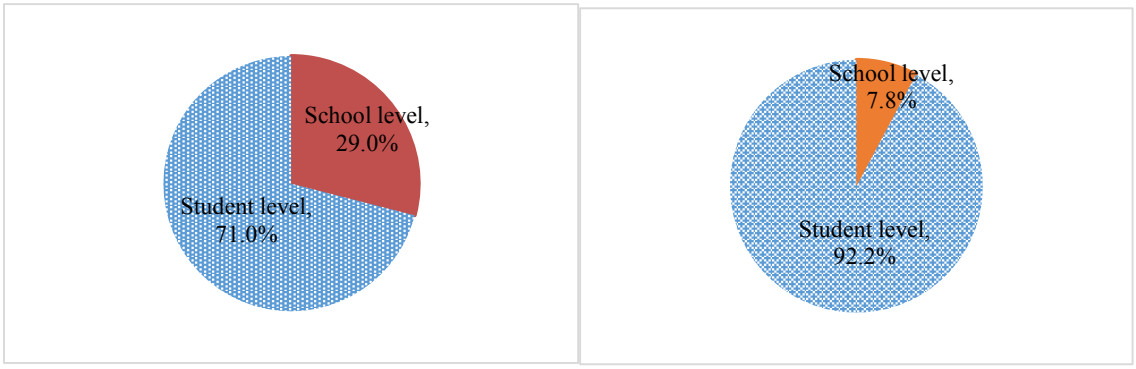


Figure 6.3. Proportion of school- and student- levels for achievement growth in Cohort 1 (left)
Figure 6.4. Proportion of school- and student- levels for achievement growth in Cohort 2 (left)

With respect to repetition rates, the ICCs were high in both cohorts—0.176 (17.6%) for Cohort 1 and 0.256 (25.6%) for Cohort 2. Figures 6.5 and 6.6 are graphic presentations of those proportions. Schools thus had a greater effect on repetition rates in Cohort 2 than in Cohort 1. This implies that the school-level variables related to grade repetition tended to become greater

as students reached higher grades. One possible reason for this is the influence of the national examination. Cohort 2 corresponds to grade 7 students, and grade 8 students take the national examination in Malawi. Some schools tend to control the students who are promoted to grade 8 so as to maintain their high pass rates. The strategy of grade repetition may therefore differ among schools, and so the school-level variables exerted a greater effect in Cohort 2 than in Cohort 1.

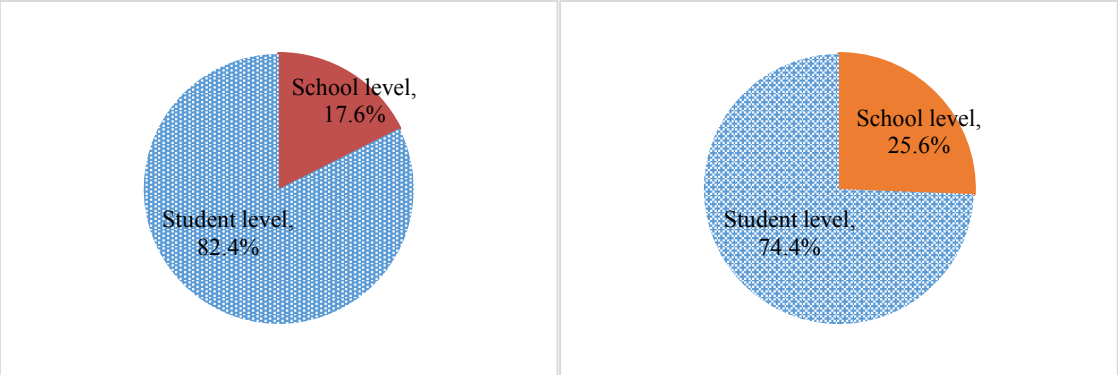


Figure 6.5. Proportion of school- and student- levels for repetition rates in Cohort 1 (left)
Figure 6.6. Proportion of school- and student- levels for repetition rates in Cohort 2 (right)

The findings for dropout rates were the reverse of those for grade repetition. The ICCs for dropout rates were 0.315 (31.5%) for Cohort 1 and 0.125 (12.5%) for Cohort 2. Figures 6.7 and 6.8 are graphic presentations of those proportions. The ICC in Cohort 1 was thus higher than in Cohort 2. In Cohort 1, schools played a larger role in dropout and could therefore make greater efforts to reduce this problem. By contrast, schools in Cohort 2 did not have such a large impact on dropout as they did in Cohort 1. This could be explained by students in higher grades showing

increasingly similar characteristics.

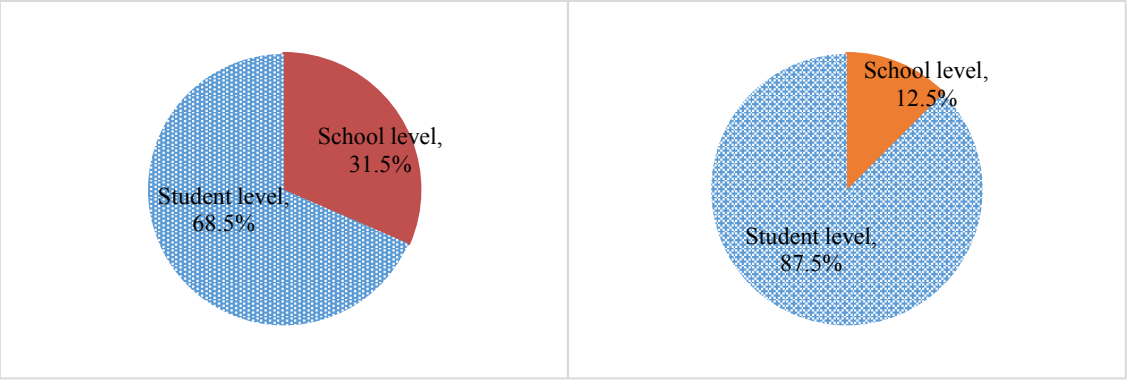


Figure 6.7. Proportion of school- and student- levels for dropout rates in Cohort 1 (left)
Figure 6.8. Proportion of school- and student- levels for dropout rates in Cohort 2 (right)

Regarding transfer rates, the proportion of school-level variance within overall variance was small in both Cohorts 1 and 2. Figures 6.9 and 6.10 are graphic presentations of those proportions. The ICCs were 0.078 (7.8%) for Cohort 1 and 0.091 (9.1%) for Cohort 2. These results indicate that most transfers were caused by student- and family-level factors. This could be because 24 of the 30 schools were located in rural areas with a limited number of schools. In rural areas, students do not have as much chance to change school as they do in urban areas. Thus, schools did not have as much influence on transfer rates as student- and family-level factors.

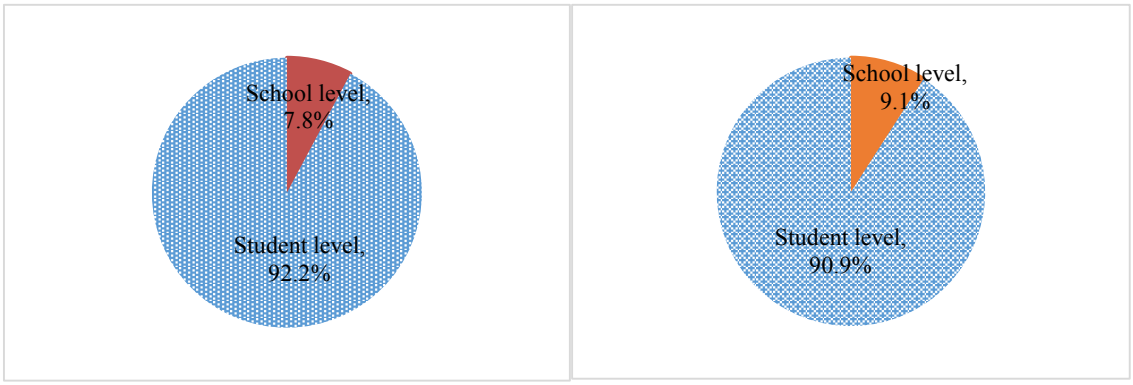


Figure 6.9. Proportion of school- and student- levels for transfer rates in Cohort 1 (left)
Figure 6.10. Proportion of school- and student- levels for transfer rates in Cohort 2 (right)

Overall, the results of the present study for achievement in Cohorts 1 and 2 and achievement growth in Cohort 1 are in accordance with those of Heyneman and Loxley (1983), though the findings for achievement growth in Cohort 2 differ. In terms of repetition, dropout, and transfer rates, no comparison of the present results with those for other developing countries can be made because no other studies have examined such factors. However, in the case of developed countries, the present findings for achievement, achievement growth, repetition rates, and dropout rates confirm those of Heyneman and Loxley (1983), whereas the results for transfer rates are not in accordance with them.

6.2 School-Level Variables

6.2.1 Model 1.

Tables 6.3 and 6.4 show, respectively, Model 1 for Cohorts 1 and 2. Model 1 for the school social composition model added mean achievement, mean social economic status, mean number of grade repetitions, 13 individual-level, and 12 family level variables to the null model to examine whether school social composition variables influenced indicators after controlling for student- and family-level variables.

Table 6.3. Model 1 for Cohort 1

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	1000.208***	13.321	283.272***	17.538	1.109***	0.200	3.031	3.525***	0.352	33.954	1.827***	0.159	6.215
School social composition													
Mean achievement	–	–	–	–	0.001	0.003	1.001	0.002	0.003	1.002	0.000	0.002	1.000
Mean socioeconomic status	-9.435	8.199	-2.558	12.298	-0.087	0.117	0.917	0.028	0.178	1.028	0.043	0.088	1.044
Mean number of grade repetitions	8.447	68.543	31.321	59.856	1.138	0.776	3.121	-2.209	1.299	0.110	-0.276	0.603	0.759
Individual													
Achievement	–	–	–	–	-0.004***	0.001	0.996	-0.001	0.001	0.999	0.000	0.001	1.000
Student gender	14.260	7.610	7.190	11.930	0.173	0.165	1.189	-0.180	0.340	0.835	-0.217	0.149	0.805
Age of first entry	-6.493**	2.056	-5.633	5.513	0.039	0.067	1.040	0.270***	0.078	1.310	-0.055	0.065	0.946
Preschool attendance	6.556	4.981	-1.257	8.610	-0.034	0.094	0.967	-0.136	0.182	0.873	0.120	0.098	1.127
Days absent during the previous 2 weeks	-2.763	2.323	-1.492	3.992	0.131*	0.059	1.140	0.139	0.109	1.149	0.015	0.051	1.015
Number of grade repetitions	-9.792**	3.307	-4.106	8.990	0.026	0.106	1.026	0.392*	0.165	1.480	0.045	0.090	1.046
Repetition at grades 5 or 7	4.060	6.442	-1.328	16.151	-0.071	0.174	0.931	-0.261	0.352	0.770	-0.040	0.196	0.961
Homework	-65.547	194.080	12.806	7.232	0.172	0.099	1.188	-0.110	0.157	0.896	-0.036	0.094	0.965
Taking extra classes	-23.172***	6.897	34.678**	13.036	0.101	0.196	1.106	0.126	0.300	1.134	0.246	0.183	1.279
Health condition	2.645	2.582	0.018	5.555	0.009	0.053	1.009	0.113	0.116	1.120	0.087	0.068	1.091
Self-esteem	-8.690***	1.919	-5.295	4.144	0.098*	0.048	1.103	0.080	0.085	1.083	0.013	0.045	1.013
Feelings about school	9.725***	1.989	-2.933	3.882	-0.069	0.046	0.933	-0.128**	0.050	0.880	0.028	0.039	1.028
Educational aspiration	10.181***	3.199	4.743	6.535	0.015	0.071	1.015	0.046	0.107	1.047	-0.032	0.084	0.969

(continued)

Table 6.3. (continued)

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Family													
Number of siblings	-7.267***	1.969	-5.489	4.043	-0.070	0.043	0.932	-0.116	0.086	0.890	-0.064	0.046	0.938
Speaking language of instruction	-8.229*	3.743	18.736**	6.806	-0.015	0.077	0.985	-0.046	0.169	0.955	0.048	0.081	1.049
Parents alive	7.729*	3.420	5.986	9.086	-0.179	0.123	0.836	-0.363	0.210	0.696	-0.304***	0.091	0.738
Living with parents or relatives	5.578	4.767	5.359	11.149	-0.086	0.095	0.918	0.490*	0.210	1.632	0.121	0.120	1.129
Socioeconomic status	1.005	0.663	-1.027	1.221	-0.030	0.021	0.970	-0.014	0.026	0.986	0.004	0.019	1.004
Number of books at home	1.065	3.345	-2.191	7.473	0.136	0.079	1.146	-0.055	0.095	0.946	-0.148	0.080	0.862
Distance to school	-0.868	4.466	5.136	8.747	0.047	0.120	1.048	0.014	0.201	1.014	0.094	0.109	1.099
Household tasks	1.307*	0.670	0.218	1.358	-0.017	0.015	0.983	-0.009	0.025	0.991	-0.008	0.008	0.992
Meals per week	1.560	1.241	2.956	3.074	-0.055	0.032	0.946	0.052	0.051	1.053	0.004	0.034	1.004
Homework help at home	65.859	193.763	-7.949	7.053	-0.030	0.092	0.970	-0.073	0.148	0.930	-0.100	0.093	0.905
Paying fees	3.352*	1.701	1.732	3.818	0.003	0.045	1.003	0.132	0.090	1.141	-0.036	0.041	0.965
Parental support	0.917	1.388	-0.759	3.082	-0.066*	0.033	0.936	-0.010	0.084	0.990	0.057	0.040	1.059
Random Effect													
Residual Variances													
Between level	5022.601**	1609.002	8373.854*	3904.843	0.788***	0.222		1.273	0.576		0.284	0.157	
Within level	11999.907***	593.997	21325.086***	1547.868									
R-square													
Between level	0.040	0.063	0.010	0.036									
Within level	0.186***	0.028	0.053**	0.020									
ICC	0.264		0.274		0.193			0.279			0.079		
Loglikelihood	-8905.025		-3577.282		-612.466			-249.135			-585.354		
AIC	17868.050		7212.563		1284.932			558.270			1230.708		
BIC	18021.130		7337.761		1436.095			711.518			1387.298		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Table 6.4. Model 1 for Cohort 2

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	992.176***	8.929	295.311***	12.490	1.301***	0.299	3.673	3.207***	0.243	24.705	1.580***	0.140	4.855
School social composition													
Mean achievement	–	–	–	–	0.009**	0.004	1.009	-0.001	0.005	0.999	0.004	0.002	1.004
Mean socioeconomic status	3.650	4.789	-8.916	7.584	0.044	0.178	1.045	-0.055	0.111	0.946	0.014	0.071	1.014
Mean number of grade repetitions	-99.288***	29.719	131.571	71.223	1.789	2.018	5.983	-1.017	1.669	0.362	1.818**	0.670	6.160
Individual													
Achievement	–	–	–	–	-0.009***	0.001	0.991	-0.003*	0.001	0.997	-0.002*	0.001	0.998
Student gender	31.885***	8.364	45.561*	18.460	0.063	0.175	1.065	-0.958***	0.249	0.000	-0.501**	0.162	0.606
Age of first entry	-11.093***	2.747	-15.969	9.242	-0.039	0.058	0.962	0.333***	0.087	1.395	0.074	0.046	1.077
Preschool attendance	7.382	3.881	-0.658	8.669	-0.033	0.123	0.968	-0.074	0.190	0.929	-0.168	0.092	0.845
Days absent during the previous 2 weeks	-5.167	3.625	1.831	7.090	0.136*	0.064	1.146	-0.121	0.146	0.886	-0.030	0.073	0.970
Number of grade repetitions	-21.724***	5.391	-24.983	16.451	-0.065	0.107	0.937	0.157	0.222	1.170	0.125	0.086	1.133
Repetition at grades 5 or 7	-7.297	8.510	-6.454	23.037	-0.402	0.252	0.669	-0.129	0.356	0.879	-0.205	0.192	0.815
Homework	0.406	3.472	-9.063	9.753	-0.019	0.102	0.981	-0.044	0.138	0.957	0.160	0.106	1.174
Taking extra classes	1.915	7.069	-14.575	18.315	-0.187	0.232	0.829	0.112	0.243	1.119	0.100	0.136	1.105
Health condition	4.257	3.185	-3.755	6.793	-0.114	0.076	0.892	0.060	0.131	1.062	0.032	0.080	1.033
Self-esteem	9.940***	2.234	0.812	4.940	0.038	0.075	1.039	-0.185*	0.089	0.831	-0.027	0.053	0.973
Feelings about school	7.117*	2.790	3.534	6.338	-0.011	0.093	0.989	-0.015	0.141	0.985	-0.120*	0.054	0.887
Educational aspiration	41.813***	7.425	12.077	18.252	-0.285	0.199	0.752	-0.283	0.215	0.754	-0.053	0.194	0.948

(continued)

Table 6.4. (continued)

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Family													
Number of siblings	-2.589	2.085	0.293	5.633	0.087	0.058	1.091	-0.081	0.090	0.922	-0.071	0.051	0.931
Speaking language of instruction	-12.638***	3.306	4.494	11.050	0.075	0.086	1.078	0.092	0.177	1.096	-0.005	0.085	0.995
Parents alive	15.229*	7.171	11.266	15.122	-0.086	0.186	0.918	0.713*	0.339	2.040	0.034	0.116	1.035
Living with parents or relatives	10.360*	5.163	-22.564	14.195	-0.047	0.122	0.954	-0.094	0.198	0.910	-0.010	0.098	0.990
Socioeconomic status	1.541	0.999	2.781	1.778	-0.009	0.020	0.991	-0.001	0.042	0.999	-0.003	0.026	0.997
Number of books at home	1.950	3.361	-4.683	8.896	0.064	0.081	1.066	0.092	0.129	1.096	0.027	0.073	1.027
Distance to school	8.855	5.484	4.008	8.268	0.033	0.089	1.034	0.177	0.182	1.194	0.207*	0.089	1.230
Household tasks	-2.826***	0.709	-1.516	2.125	0.058*	0.025	1.060	-0.013	0.032	0.987	-0.057***	0.014	0.945
Meals per week	6.102***	1.390	0.932	4.027	-0.017	0.036	0.983	-0.056	0.044	0.946	0.035	0.028	1.036
Homework help at home	0.631	3.939	3.110	6.844	0.018	0.096	1.018	0.218	0.126	1.244	-0.219	0.112	0.803
Paying fees	-0.302	1.313	0.801	3.754	-0.011	0.030	0.989	0.026	0.043	1.026	0.078*	0.036	1.081
Parental support	5.515***	1.638	-4.008	3.746	-0.018	0.027	0.982	-0.029	0.044	0.971	-0.007	0.033	0.993
Random Effect													
Residual Variances													
Between level	1689.549**	590.402	2336.337*	1156.307	1.757*	0.776		0.592*	0.291		0.263*	0.125	
Within level	14593.397***	669.317	29794.586***	2785.294									
R-square													
Between level	0.184*	0.074	0.262	0.185									
Within level	0.253***	0.025	0.063*	0.032									
ICC	0.098		0.092		0.348			0.152			0.074		
Loglikelihood	-8065.382		-2987.135		-444.027			-244.784			-559.584		
AIC	16188.763		6032.269		948.054			549.569			1179.168		
BIC	16338.563		6151.630		1094.589			698.293			1332.094		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Cohort 1

The results for Cohort 1 showed that no variables showed significant increases for the indicators. This means that the indicators were unaffected by school social composition, including mean achievement, mean social economic status, and mean number of grade repetitions.

Cohort 2

In Cohort 2, the results were different from those for Cohort 1. For social composition in Model 1, a few variables showed significant increases in achievement, repetition rates, and transfer rates, whereas no variables showed significant increases in achievement growth and dropout rates.

In terms of achievement, students in schools that had a lower mean number of grade repetitions performed better than those in schools with a higher mean number of grade repetitions (Estimate [*ES*] = −99.288, $p^{***} < .001$). An increase of 1 in the mean number of grade repetitions reduced the ability score for achievement by 99.288. This appeared to be a general finding: schools that have many repeaters tend to have low mean achievement.

With respect to repetition rates, students in schools with higher mean achievement were more likely to repeat a grade than those in schools with lower mean achievement (odds ratio [*OR*] = 1.009, $p^{**} < .01$). In schools with higher mean achievement, students had an increased possibility of grade repetition of 1.009. Thus, if the repetition rate of students in schools with mean achievement of 500 were 10.00%, the repetition rate in schools with mean achievement of

501 would be 10.09% (10.00%*1.009). It might generally be supposed that students in schools with lower mean achievement are more likely to repeat a grade than those in schools with higher mean achievement; however, the results of the present indicate the opposite. This finding might be explained by the national examination in Malawi. The students in Cohort 2 were in grade 7, which is 1 year before they take the national examination. To maintain higher school pass rates in the national examination, some high-achieving schools may have been more likely to select students who would be promoted to the final grade than low-achieving schools. Therefore, in Cohort 2, there would be a tendency for a greater number of students to repeat a grade than in low-achieving schools.

Regarding transfer rates, students in schools with a higher mean number of grade repetitions were more likely to transfer to another school than those in schools with a lower mean number of grade repetitions (OR = 6.160, $p^{**} < .01$). In schools with a higher mean number of grade repetitions, students had an increased possibility of transfer of 6.160. Thus, if the transfer rate of students in schools with a mean number of grade repetitions of 1.0 were 10.00%, the transfer rate in schools with a mean number of grade repetitions of 2.0 would be 61.60% (10.00%*6.160). This result implies that a large number of grade repetitions would increase transfer rates. This may also be related to the national examination in Malawi. To pass that examination, it is often necessary for students to repeat a grade—especially in the higher grades.

Students with a number of grade repetitions in one school may be more likely to change to another school in hope of getting a better education.

In terms of achievement growth and dropout rates, no variables showed significant increases. This means that the indicators were unaffected by school social composition variables, including mean achievement, mean social economic status, and mean number of grade repetitions. Other school input variables and school process variables may have influenced these indicators. Those other variables need to be investigated using a larger sample in future research.

6.2.2 Model 2

Tables 6.5 and 6.6 show, respectively, Model 2 for Cohorts 1 and 2. Model 2 for the school input model added class size, school location, and school facility variables to Model 1 to determine whether these variables influenced indicators. The model fits of Model 2, including log likelihood, Akaike information criterion (AIC), and Bayesian information criterion (BIC) were better than those of Model 1 for all indicators in both cohorts. Model 2 was thus a better model than Model 1.

Table 6.5. Model 2 for Cohort 1

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	998.714***	2.182	285.285***	18.121	0.982***	0.184	2.670	3.510***	0.351	33.448	1.754***	0.113	5.778
School social composition													
Mean achievement	–	–	–		–	0.002	1.001	0.003	0.003	1.003	0.000	0.001	1.000
Mean socioeconomic status	-12.215	8.557	-1.575	13.122	-0.173	0.098	0.841	0.080	0.188	1.083	-0.024	0.077	0.976
Mean number of grade repetitions	8.188	70.346	20.625	55.435	0.837	0.549	2.309	-2.097	1.202	0.123	-0.988	0.560	0.372
School inputs													
Class size	-0.064	0.390	0.238	0.461	0.008	0.005	1.008	-0.002	0.007	0.998	0.001	0.003	1.001
School location	32.588	29.026	-6.607	37.030	0.676	0.565	1.966	-0.412	0.645	0.662	0.941***	0.245	2.563
School facilities	-21.910	13.875	27.173	24.479	0.155	0.233	1.168	0.198	0.250	1.219	0.098	0.077	1.103
Individual													
Achievement	–	–	–	–	-0.004***	0.001	0.996	-0.001	0.001	0.999	0.000	0.001	1.000
Student gender	14.206	7.572	7.038	12.004	0.179	0.163	1.196	-0.176	0.341	0.839	-0.222	0.151	0.801
Age of first entry	-6.443**	2.062	-5.803	5.547	0.039	0.067	1.040	0.267***	0.079	1.306	-0.055	0.066	0.946
Preschool attendance	6.543	5.016	-1.438	8.567	-0.051	0.095	0.950	-0.127	0.184	0.881	0.109	0.100	1.115
Days absent during the previous 2 weeks	-2.755	2.316	-1.319	4.021	0.134*	0.059	1.143	0.136	0.108	1.146	0.023	0.049	1.023
Number of grade repetitions	-9.709**	3.303	-4.404	9.067	0.028	0.107	1.028	0.386*	0.165	1.471	0.045	0.088	1.046
Repetition at grades 5 or 7	3.976	6.452	-0.588	16.212	-0.064	0.173	0.938	-0.259	0.352	0.772	-0.050	0.195	0.951
Homework	-65.667	194.451	12.567	7.188	0.169	0.101	1.184	-0.110	0.158	0.896	-0.059	0.095	0.943
Taking extra classes	-23.254***	6.863	34.783**	12.675	0.090	0.199	1.094	0.135	0.301	1.145	0.272	0.187	1.313
Health condition	2.701	2.585	0.144	5.513	0.011	0.052	1.011	0.111	0.115	1.117	0.082	0.068	1.085
Self-esteem	-8.697***	1.914	-5.213	4.156	0.102*	0.048	1.107	0.081	0.084	1.084	0.014	0.045	1.014
Feelings about school	9.735***	2.017	-2.969	3.842	-0.061	0.044	0.941	-0.132**	0.051	0.876	0.040	0.039	1.041
Educational aspiration	10.130***	3.216	4.918	6.508	0.023	0.071	1.023	0.050	0.109	1.051	-0.025	0.083	0.975

(continued)

Table 6.5 (continued)

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Family													
Number of siblings	-7.251***	1.968	-5.412	4.066	-0.068	0.043	0.934	-0.116	0.087	0.890	-0.058	0.045	0.944
Speaking language of instruction	-8.086*	3.756	18.009**	6.805	-0.023	0.075	0.977	-0.050	0.168	0.951	0.054	0.078	1.055
Parents alive	7.767*	3.402	5.559	9.000	-0.176	0.123	0.839	-0.366	0.211	0.694	-0.302***	0.088	0.739
Living with parents or relatives	5.744	4.763	5.567	11.173	-0.090	0.095	0.914	0.485*	0.209	1.624	0.109	0.119	1.115
Socioeconomic status	1.002	0.663	-0.968	1.229	-0.030	0.021	0.970	-0.013	0.025	0.987	0.004	0.019	1.004
Number of books at home	0.889	3.342	-1.663	7.593	0.135	0.079	1.145	-0.048	0.095	0.953	-0.142	0.084	0.868
Distance to school	-0.925	4.442	5.714	8.698	0.042	0.119	1.043	0.018	0.202	1.018	0.064	0.107	1.066
Household tasks	1.319*	0.671	0.225	1.353	-0.017	0.015	0.983	-0.009	0.025	0.991	-0.009	0.008	0.991
Meals per week	1.570	1.241	3.000	3.081	-0.054	0.031	0.947	0.050	0.052	1.051	0.009	0.033	1.009
Homework help at home	66.058	194.132	-7.781	7.174	-0.033	0.094	0.968	-0.066	0.149	0.936	-0.129	0.096	0.879
Paying fees	3.333*	1.703	1.441	3.837	0.003	0.044	1.003	0.131	0.091	1.140	-0.032	0.039	0.969
Parental support	0.929	1.389	-0.707	3.058	-0.066*	0.032	0.936	-0.012	0.084	0.988	0.060	0.039	1.062
Random Effect													
Residual Variances													
Between level	4380.798**	1539.175	7551.809*	3035.825	0.562**	0.207		1.122	0.589		0.051	0.097	
Within level	12001.799***	594.472	21326.213***	1543.193									
R-square													
Between level	0.156	0.153	0.110	0.141									
Within level	0.186***	0.028	0.052**	0.020									
ICC	0.263		0.275		0.146			0.254			0.015		
Loglikelihood	-8903.217		-3575.985		-608.888			-248.640			-578.361		
AIC	17870.435		7215.970		1283.775			563.280			1222.722		
BIC	18039.351		7354.119		1450.055			731.852			1394.970		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Table 6.6. Model 2 for Cohort 2

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect													
School													
Intercepts	994.169***	9.573	294.572***	11.673	1.176***	0.225	3.241	3.254***	0.273	25.894	1.579***	0.126	4.850
School social composition													
Mean achievement	–	–	–	–	0.010***	0.003	1.010	-0.001	0.006	0.999	0.003	0.002	1.003
Mean socioeconomic status	-0.150	4.704	-14.420	10.035	-0.231	0.234	0.794	-0.058	0.099	0.944	-0.058	0.096	0.944
Mean number of grade repetitions	-103.413**	35.126	104.291	75.116	2.412	1.630	11.156	-1.171	1.444	0.310	1.379*	0.692	3.971
School inputs													
Class size	0.187	0.279	-0.294	0.436	0.023**	0.008	1.023	-0.006	0.010	0.994	0.000	0.003	1.000
School location	12.564	19.053	71.871	38.043	-0.621	0.961	0.537	0.414	0.758	1.513	0.638*	0.276	1.893
School facilities	-4.468	9.956	-5.632	11.390	-0.448	0.242	0.639	-0.081	0.188	0.922	-0.046	0.113	0.955
Individual													
Achievement	–	–	–	–	-0.009***	0.001	0.991	-0.003*	0.001	0.997	-0.002*	0.001	0.998
Student gender	31.828***	8.396	45.469*	18.273	0.059	0.174	1.061	-0.954***	0.248	0.385	-0.499**	0.163	0.607
Age of first entry	-11.006***	2.775	-14.747	9.091	-0.039	0.058	0.962	0.335***	0.088	1.398	0.076	0.047	1.079
Preschool attendance	7.435	3.904	-1.778	8.830	-0.031	0.123	0.969	-0.076	0.188	0.927	-0.163	0.094	0.850
Days absent during the previous 2 weeks	-5.175	3.635	1.789	7.223	0.126*	0.064	1.134	-0.119	0.150	0.888	-0.026	0.072	0.974
Number of grade repetitions	-21.674***	5.417	-24.259	16.560	-0.068	0.107	0.934	0.157	0.224	1.170	0.126	0.085	1.134
Repetition at grades 5 or 7	-7.265	8.517	-8.238	23.424	-0.384	0.258	0.681	-0.130	0.355	0.878	-0.208	0.189	0.812
Homework	0.332	3.433	-10.732	9.306	-0.030	0.103	0.970	-0.045	0.139	0.956	0.136	0.109	1.146
Taking extra classes	1.773	7.036	-12.252	17.971	-0.194	0.230	0.824	0.127	0.242	1.135	0.101	0.139	1.106
Health condition	4.241	3.187	-3.210	6.849	-0.116	0.076	0.890	0.059	0.131	1.061	0.026	0.081	1.026
Self-esteem	9.974***	2.246	0.785	5.032	0.038	0.075	1.039	-0.186*	0.092	0.830	-0.026	0.053	0.974
Feelings about school	7.109**	2.770	3.005	6.275	-0.009	0.094	0.991	-0.014	0.145	0.986	-0.114*	0.056	0.892
Educational aspiration	41.940***	7.354	12.668	17.999	-0.271	0.199	0.763	-0.288	0.224	0.750	-0.056	0.194	0.946

(continued)

Table 6.6 (continued)

Variable	Achievement		Achievement growth		Repetition rates			Dropout rates			Transfer rates		
	ES	*SE*	*ES*	*SE*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Family													
Number of siblings	-2.640	2.075	-0.353	5.596	0.091	0.058	1.095	-0.082	0.090	0.921	-0.075	0.053	0.928
Speaking language of instruction	-12.651***	3.296	4.947	10.997	0.075	0.086	1.078	0.093	0.175	1.097	-0.006	0.085	0.994
Parents alive	15.226*	7.161	12.330	15.403	-0.075	0.185	0.928	0.712*	0.341	2.038	0.031	0.117	1.031
Living with parents or relatives	10.381*	5.160	-23.679	14.027	-0.039	0.123	0.962	-0.097	0.198	0.908	-0.008	0.098	0.992
Socioeconomic status	1.544	0.999	2.881	1.782	-0.010	0.020	0.990	-0.001	0.042	0.999	-0.003	0.026	0.997
Number of books at home	1.929	3.391	-4.606	8.847	0.063	0.081	1.065	0.091	0.130	1.095	0.030	0.072	1.030
Distance to school	8.835	5.512	3.972	8.564	0.042	0.089	1.043	0.172	0.184	1.188	0.204*	0.091	1.226
Household tasks	-2.824***	0.711	-1.541	2.135	0.057*	0.025	1.059	-0.013	0.032	0.987	-0.056**	0.014	0.946
Meals per week	6.090***	1.410	0.994	4.007	-0.014	0.036	0.986	-0.058	0.045	0.944	0.034	0.028	1.035
Homework help at home	0.670	3.996	4.658	7.042	0.016	0.096	1.016	0.232	0.129	1.261	-0.212	0.111	0.809
Paying fees	-0.331	1.324	0.565	3.704	-0.013	0.030	0.987	0.026	0.043	1.026	0.078*	0.036	1.081
Parental support	5.574***	1.620	-4.243	3.770	-0.015	0.028	0.985	-0.029	0.044	0.971	-0.005	0.032	0.995
Random Effect													
Residual Variances													
Between level	1631.247**	582.805	1618.154	1093.681	1.196*	0.563		0.559*	0.271		0.183	0.127	
Within level	14595.326***	667.234	29877.279***	2806.225									
R-square													
Between level	0.209**	0.079	0.063	0.032									
Within level	0.253***	0.025	0.470*	0.267									
ICC	0.098		0.089		0.267			0.145			0.053		
Loglikelihood	-8065.045		-2985.225		-439.699			-244.331			-557.972		
AIC	16194.091		6034.449		945.398			554.661			1181.944		
BIC	16359.386		6166.158		1106.586			718.259			1350.163		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Cohort 1

The results showed that except for transfer rates, no variables showed significant increases for the indicators. This means that the indicators were unaffected by school input, including class size, school location, and school facilities. Other school input variables, for example, teachers' teaching experience and the head teacher's experience as head, may have influenced the indicators. In addition, school process variables, for example, teacher absenteeism, school management, and school policy, may have affected the indicators. Because the number of sampled schools in the present study was small, other variables could not be included in the models. Those variables should be investigated using a larger sample in future research. However, the present study did find that class size, school location, and school facilities were not predictors of achievement, achievement growth, repetition rates, and dropout rates. This study also determined that the results of achievement were the same as those for repetition and dropout rates.

With respect to transfer rates, however, school location showed strongly significant increases. Students in schools located in semi-urban areas were more likely to transfer to another school than those in schools located in rural areas (OR = 2.563, $p^{***} < .001$). In semi-urban schools, students had an increased possibility of transfer of 2.563. Thus, if the transfer rate of students in rural schools were 10.00%, that of students in semi-urban schools would be 25.63% (10.00%*2.563). In semi-urban areas, a few schools are usually located within walking distance, and so students have the possibility to change from one school to another; in rural areas, students

do not have this possibility. Parents living in semi-urban areas also often have jobs with steady incomes, such as work in government offices, school teaching, and nursing in hospitals, and so they have greater opportunity to move to other places than parents living in rural areas. Therefore, it is inappropriate to compare the transfer rates between semi-urban and rural schools. It is necessary to analyze the factors that influence transfer rates by classifying schools according to location. That was not attempted in the present study owing to the small school sample size. It is necessary to examine this point in future studies using a larger sample of schools.

Cohort 2

In the school input model in Model 2, a few variables showed significant increases in repetition and transfer rates. However, no variables showed significant increases in achievement, achievement growth, or dropout rates.

In terms of repetition rates, students in larger class sizes were more likely to repeat a grade than those in smaller classes (OR = 1.023, $p^{**} < .01$). In larger classes, students had an increased possibility of grade repetition of 1.023. Thus, if the repetition rate of students in a class with 100 students were 10.00%, that of students in a class with 101 students would be 10.23% (10.00%*1.023). Larger class sizes result in higher repetition rates.

With respect to transfer rates, the results for Cohort 2 were the same as those for Cohort 1. Students in schools located in semi-urban areas were more likely to transfer to another school

than those in schools located in rural areas ($OR = 1.893$, $p^* < .05$). In semi-urban schools, students had an increased possibility of transfer of 1.893. Thus, if the transfer rate of students in rural schools were 10.00%, that of students in semi-urban schools would be 18.93% (10.00%*1.893). As with Cohort 1, the transfer rates could not compared between semi-urban and rural schools for Cohort 2.

Regarding achievement, achievement growth, and dropout rates, no variables showed significant increases. This means that the indicators were unaffected by school input, including class size, school location, and school facilities. Other school input and school process variables could have influenced those indicators. This matter should be investigated using a larger sample in future research.

6.2.4 Summary

The findings at the school level are summarized in Table 6.7. In Cohort 1, a comparison of the variables that influenced achievement with those for other indicators revealed a difference in transfer rates; however, the variables were the same for achievement growth, repetition rates, and dropout rates. In Cohort 2, the variables that influenced achievement differed for all the indicators—except with the variable for transfer rates (underlined in Table 6.7). From these results, the school-level variables that influenced achievement were not always the same as those that influenced repetition, dropout, and transfer rates.

A comparison of Cohorts 1 and 2 showed that they had some variables in common (indicated by shading in Table 6.7). In both Cohorts 1 and 2, no variables were significant with respect to achievement and dropout rates. School location exerted an influence on transfer rates in both cohorts. This implies that transfer rates were strongly related to school location. However, some variables differed between Cohorts 1 and 2. The different variables were significant in terms of achievement, repetition rates, and transfer rates. The following applied only to Cohort 2: a lower mean number of grade repetitions increased achievement; higher mean achievement and larger class size affected repetition rates; and a higher mean number of grade repetitions influenced transfer rates.

Table 6.7. Summary of the variables that affected indicators at the school level

Indicator	Cohort 1	Cohort 2
Achievement	x	Mean number of grade repetitions** (−)
Achievement growth	x	x
Repetition rate	x	Mean achievement*** (+) Class size** (+)
Dropout rate	x	x
Transfer rate	School location*** (+)	Mean number of grade repetitions* (+) School location* (+)

Note: (+) = positive influence; (−) = negative influence. $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Summary

The second research question was as follows: What school-level factors predict the designated indicators after controlling for student-level factors? Are the factors that influence achievement the same as those that influence the other factors?
In Cohort 1, no school-level variables were identified as dominant factors for achievement, achievement growth, repetition rates, and dropout rates. Schools being located in semi-urban areas were found to be a significant factor for transfer rates. In Cohort 2, no school-level variables were identified as dominant factors for achievement growth and dropout rates. Significant factors were found to be the following: lower mean number of grade repetitions for achievement; higher mean achievement and larger class size for repetition rates; and higher mean number of grade repetitions and schools being located in semi-urban area for transfer rates. School-level variables that influenced achievement were not always the same as those that influenced repetition, dropout, and transfer rates. These variables were not always the same between the two cohorts.

6.3 Student-Level Variables

Although the present study used student-level variables as a control, the findings for those variables are summarized in Table 6.8. A few variables that were found to be significant for achievement were also significant for other indicators; however, this was not the case for other variables (indicated by underlining in Table 6.8). The variables that were significant for achievement were not always significant for achievement growth and repetition, dropout, and transfer rates. Cohorts 1 and 2 had some variables in common (indicated by shading in Table 6.8), though other variables differed between the two cohorts.

Table 6.8. Summary of the variables that influenced the indicators at the student level

Indicator	Cohort 1	Cohort 2
	Individual level	Individual level
Achievement	Age of first entry** (−) Number of grade repetitions** (−) Taking extra classes*** (−) Self-esteem*** (−) Feelings about school*** (+) Educational aspiration*** (+)	Student gender*** (+) Age of first entry*** (−) Number of grade repetitions*** (−) Self-esteem*** (+) Feelings about school** (+) Educational aspiration*** (+)
Achievement growth	Taking extra classes** (+)	Student gender* (+)
Repetition rate	Achievement*** (−) Days absent during previous 2 weeks* (+) Self-esteem* (+)	Achievement*** (−) Days absent during previous 2 weeks* (+)
Dropout rate	Age of first entry*** (+) Number of grade repetitions* (+) Feelings about school** (−)	Achievement* (−) Student gender*** (−) Age of first entry*** (+) Self-esteem* (−)
Transfer rate	x	Achievement* (−) Student gender** (−) Feelings about school* (−)
	Family level	Family level
Achievement	Number of siblings*** (+) Speaking language of instruction* (−) Parents alive* (+) Household tasks* (+) Paying fees* (+)	Speaking language of instruction*** (−) Living with parents or relatives* (+) Household tasks*** (−) Meals per week*** (+) Parental support*** (+)
Achievement growth	Speaking language of instruction** (+)	x
Repetition rate	Parental support* (−)	Household tasks* (+)
Dropout rate	Living with parents or relatives* (+)	Parents alive* (+)
Transfer rate	Parents alive*** (−)	Distance from school* (+) Household tasks** (−) Paying fees* (+)

Note: (+) = positive influence; (−) = negative influence. p* < .05. p ** < .01. p *** < .001.

Cohort 1

The following results were found as significant factors in Cohort 1.

Achievement

- Students who enrolled in grade 1 at younger ages performed better than those who enrolled in grade 1 at older ages ($ES = -6.443$, $p^{**} < .01$). An increase of 1 year in age reduced the ability score for achievement by 6.443.
- Students with few grade repetitions performed better than those with many grade repetitions ($ES = -9.709$, $p^{**} < .01$). An increase of one grade repetition reduced the ability score for achievement by 9.709.
- Students who did not take extra classes performed better than those who took extra classes ($ES = -23.254$, $p^{***} < .001$). Taking extra classes reduced the ability score for achievement by 23.254.
- Students with lower self-esteem performed better than those with higher self-esteem ($ES = -8.697$, $p^{***} < .001$). An increase of one in the scale for self-esteem reduced the ability score for achievement by 8.697.
- Students with a positive feeling about school performed better than those with a negative feeling ($ES = 9.735$, $p^{***} < .001$). An increase of one in the scale for feelings about school increased the ability score for achievement by 9.735.

- Students with higher educational aspiration performed better than those with lower aspiration (*ES* = 10.130, *p**** < .001). An increase of one in the scale for educational aspiration increased the ability score for achievement by 10.130.
- Students with few siblings performed better than those with many siblings (*ES* = –7.251, *p**** < .001). An increase of one sibling reduced the ability score for achievement by 7.251.
- Students who did not speak the language of instruction performed better than those who spoke the language (*ES* = –8.086, *p** < .05). An increase of one in the scale for speaking the language of instruction reduced the ability score for achievement by 8.086.
- Students with both parents alive performed better than those with no parents alive (*ES* = 7.767, *p** < .05). An increase of one in the scale for parents being alive increased the ability score for achievement by 7.767.
- Students with many household tasks performed better than those with few household tasks (*ES* = 1.319, *p** < .05). An increase of one in the scale for household tasks increased the ability score for achievement by 1.319.
- Students who paid their fees on time performed better than those who did not (*ES* = 3.333, *p** < .05). An increase of one in the scale for paying fees on time increased the ability score for achievement by 3.333.

Achievement growth

- Students who took extra classes performed better than those who did not (*ES* = 34.783, *p*** < .01). Taking extra classes increased the ability score for achievement by 34.783.
- Students who spoke the language of instruction performed better than those who did not (*ES* = 18.009 *p*** < .01). An increase of one in the scale for speaking the language of instruction increased the ability score for achievement by 18.009.

Repetition rates

- Students with lower achievement were more likely to repeat a grade than those with higher achievement (*OR* = 0.996, *p**** < .001). Students with lower achievement had an increased possibility of grade repetition of (1 − 0.996). Thus, if the repetition rate of students with achievement of 500 were 10.00%, the repetition rate with achievement of 501 would be 0.04% [10.00%*(1 − 0.996)].
- Students with many absent days over the previous 2 weeks were more likely to repeat a grade than those with a few or no absent days over the previous 2 weeks (*OR* = 1.143, *p** < .05). Students with many absent days over the previous 2 weeks had an increased possibility of dropout of 1.143. Thus, if the repetition rate of students with 1 absent day over the previous 2 weeks were 10.00%, the repetition rate for 2 absent days over the previous 2 weeks would be 11.43% (10.00%*1.143).

Dropout rates

- Students who enrolled in grade 1 at older ages were more likely to drop out of school than those who enrolled in grade 1 at younger ages (OR = 1.306, $p^{**} < .001$). Students who enrolled in grade 1 at older ages had an increased possibility of dropout of 1.306. Thus, if the dropout rate of students who enrolled in grade 1 at age 6 years were 10.00%, the dropout rate of students who enrolled in grade 1 at age 7 years would be 13.06% (10.00%*1.306).
- Students with many grade repetitions were more likely to drop out of school than those with few grade repetitions (OR = 1.471, $p^{*} < .05$). Students with many grade repetitions had an increased possibility of dropout of 1.471. Thus, if the dropout rate of students who repeated a grade once were 10.00%, the dropout rate of students who repeated a grade twice would be 14.71% (10.00%*1.471).
- Students with a negative feeling about school were more likely to drop out of school than those with a positive feeling (OR = 0.876, $p^{**} < .01$). Students with a negative feeling about school had an increased possibility of dropout of (1– 0.876). Thus, if the dropout rate of students with a negative feeling about school were 10.00%, the dropout rate of students with a positive feeling about school would be 1.24% [10.00%*(1 – 0.876)].
- Students living with both parents were more likely to drop out of school than those living with relatives (OR = 1.624, $p^{*} < .05$). Students living with their parents had an increased

possibility of dropout of 1.624. Thus, if the dropout rate of students living with both parents were 10.00%, the dropout rate of students living with one parent would be 16.24% (10.00%*1.624).

Transfer rates

- Students living with their relatives were more likely to transfer to another school than those living with both parents (*OR* = 0.739, *p** < .05). Students living with relatives had an increased possibility of transfer of 0.739. Thus, if the transfer rate of students living with their relatives were 10.00%, the transfer rate of students living with one parent would be 2.61% [10.00%*(1– 0.739)].

Cohort 2

The following results were found as significant factors in Cohort 2.

Achievement

- Boys performed better than girls (*ES* = 31.828, *p**** < .001). Boys had a higher ability score for achievement (31.828) than girls.
- Students who enrolled in grade 1 at younger ages performed better than those who enrolled in grade 1 at older ages (*ES* = −11.006, *p**** < .001). An increase of 1 year in age reduced the ability score for achievement by 11.006.

- Students with few grade repetitions performed better than those with many grade repetitions (*ES* = −21.674, *p**** < .001). An increase of one grade repetition reduced the ability score for achievement by 21.674.
- Students with higher self-esteem performed better than those with lower self-esteem (*ES* = 9.974, *p**** < .001). An increase of one in the scale for self-esteem increased the ability score for achievement by 9.974.
- Students with a positive feeling about school performed better than those with a negative feeling (*ES* = 7.109, *p*** < .01). An increase of one in the scale for feelings about school increased the ability score for achievement by 7.109.
- Students with higher educational aspiration performed better than those with lower aspiration (*ES* = 41.940, *p**** < .001). An increase of one in the scale for educational aspiration increased the ability score for achievement by 41.940.
- Students who did not speak the language of instruction performed better than those who spoke the language (*ES* = –12.651, *p**** < .001). An increase of one in the scale for speaking the language of instruction reduced the ability score for achievement by 12.651.
- Students with both parents alive performed better than those with no parents alive (*ES* = 15.226, *p** < .05). An increase of one in the scale for parents being alive increased the ability score for achievement by 15.226.

- Students living with both parents performed better than those living with relatives (*ES* = 10.381, *p** < .05). An increase of one in the scale for living with parents increased the ability score for achievement by 10.381.
- Students with few household tasks performed better than those with many household tasks (*ES* = 2.824, *p**** < .001). An increase of one in the scale for household tasks reduced the ability score for achievement by 2.824.
- Students who ate many meals a week performed better than those who ate few meals a week (*ES* = 6.090, *p**** < .001). An increase of one in the scale for meals eaten per week increased the ability score for achievement by 6.090.
- Students with more parental support performed better than those with less parental support (*ES* = 5.574, *p**** < .001). An increase of one in the scale for parental support increased the ability score for achievement by 5.574.

Achievement growth

- Boys performed better than girls (*ES* = 45.469, *p** < .05). Boys had a higher ability score for achievement (45.469) than girls.

Repetition rates

- Students with lower achievement were more likely to repeat a grade than those with higher achievement (*OR* = 0.991, *p**** < .001). Students with lower achievement had an increased

possibility of grade repetition of (1 − 0.991). Thus, if the repetition rate of students with achievement of 500 were 10.00%, the repetition rate with achievement of 501 would be 0.09% [10.00%*(1 − 0.991)].

- Students with many absent days over the previous 2 weeks were more likely to repeat a grade than those with few or no absent days over the previous 2 weeks (*OR* = 1.134, $p^* < .05$). Students with many absent days over the previous 2 weeks had an increased possibility of dropout of 1.134. Thus, if the repetition rate of students with 1 absent day over the previous 2 weeks were 10.00%, the repetition rate with 2 absent days over the previous 2 weeks would be 11.34% (10.00%*1.134).
- Students with many household tasks were more likely to repeat a grade than those with few household tasks (*OR* = 1.059, $p^* < .05$). Students with many household tasks had an increased possibility of grade repetition of 1.059. Thus, if the repetition rate of students with a score of 10 for household tasks were 10.00%, the repetition rate with a score of 11 would be 10.59% (10.00%*1.059).

Dropout rates

- Students with lower achievement were more likely to drop out of school than those with higher achievement (*OR* = 0.997, $p^* < .05$). Students with lower achievement had an increased possibility of dropout of (1 − 0.997). Thus, if the dropout rate of students with

achievement of 500 were 10.00%, the dropout rate with achievement of 501 would be 0.03% [10.00%*(1 – 0.997)].

- Girls were more likely to drop out of school than boys (*OR* = 0.385, *p**** < .001). Girls had an increased possibility of dropout of (1 – 0.385). Thus, if the dropout rate of girls were 10.00%, the dropout rate of boys would be 6.15% [10.00%*(1 – 0.385)].
- Students who enrolled in grade 1 at older ages were more likely to drop out of school than those who enrolled in grade 1 at younger ages (*OR* = 1.398, *p**** < .001). Students who enrolled in grade 1 at older ages had an increased possibility of dropout of 1.398. Thus, if the dropout rate of students who enrolled in grade 1 at age 6 years were 10.00%, the dropout rate of students who enrolled in grade 1 at age 7 years would be 13.98% (10.00%*1.398).
- Students with lower self-esteem were more likely to drop out of school than those with higher self-esteem (*OR* = 0.830, *p** < .05). Students with lower self-esteem had an increased possibility of dropout of (1– 0.830). Thus, if the dropout rate of students who strongly disagreed that they possessed self-esteem were 10.00%, the dropout rate of students who simply disagreed that they possessed self-esteem would be 1.70% [10.00%*(1 – 0.830)].
- Students with both parents alive were more likely to drop out of school than those with no parents alive (*OR* = 2.038, *p** < .05). Students with both parents alive had an increased possibility of dropout of 2.038. Thus, if the dropout rate of students with both parents alive

were 10.00%, the dropout rate of students with one living parent would be 20.38% (10.00%*2.038).

Transfer rates

- Students with lower achievement were more likely to transfer to another school than those with higher achievement (*OR* = 0.998, *p** < .05). Students with lower achievement had an increased possibility of transfer of 0.998. Thus, if the transfer rate of students with lower achievement were 10.00%, the transfer rate of students with higher achievement would be 0.02% [10.00%*(1– 0.998)].
- Girls were more likely to transfer to another school than boys (*OR* = 0.607, *p*** < .01). Girls had an increased possibility of transfer of (1 – 0.607). Thus, if the transfer rate of girls were 10.00%, the transfer rate of boys would be 3.93% [10.00%*(1 – 0.607)].
- Students with a negative feeling about school were more likely to transfer to another school than those with a positive feeling (*OR* = 0.892, *p** < .05). Students with a negative feeling about school had an increased possibility of transfer of 0.892. Thus, if the transfer rate of students with a positive feeling about school were 10.00%, the transfer rate of students with a negative feeling about school would be 1.08% [10.00%*(1– 0.892)].
- Students living at greater distance from school were more likely to transfer to another school than those living at shorter distance (*OR* = 1.226, *p** < .05). Students living at greater distance

had an increased possibility of transfer of 1.226. Thus, if the transfer rate of students living at a distance of 0–0.5 km were 10.00%, the transfer rate of students at a distance of 0.6–1.0 km would be 12.26% (10.00%*1.226).

- Students with few household tasks were more likely to transfer to another school than those with many tasks (*OR* = 0.946, *p*** < .01). Students with few household tasks had an increased possibility of transfer of 0.946. Thus, if the transfer rate of students with a score of 10 for household tasks were 10.00%, the transfer rate of students with a score of 11 would be 0.54% [10.00%*(1– 0.946)].
- Students who paid their fees on time were more likely to transfer to another school than those who did not (*OR* = 1.081, *p** < .05). Students who paid their fees on time had an increased possibility of transfer of 1.081. Thus, if the transfer rate of students with a score of 10 for paying fees were 10.00%, the transfer rate of students with a score of 11 would be 10.81% (10.00%*1.081).

6.4 Variance Explained

Table 6.9 shows the proportion of variance explained in Model 2 for achievement and achievement growth. Figures 6.11 to 6.14 are graphic presentations of those proportions. In achievement, at the between level, 0.049 (4.9%) of 0.315 (31.5%) in Cohort 1 and 0.026 (2.6%)

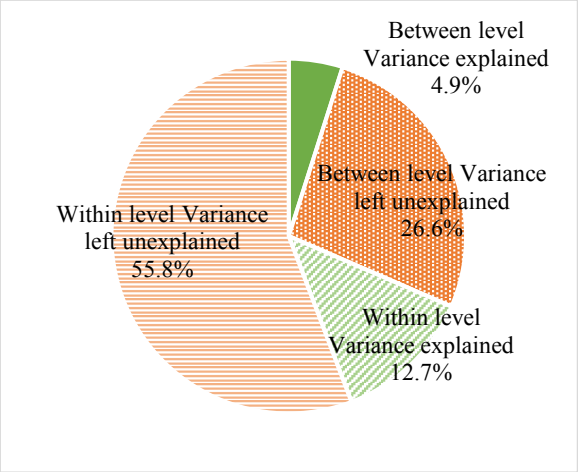
of 0.123 (12.3%) in Cohort 2 were explained by the variables added in Model 2. However, 0.266 (26.6%) in Cohort 1 and 0.097 (9.7%) in Cohort 2 were unexplained. At the within level, 0.127 (12.7%) of 0.685 (68.5%) in Cohort 1 and 0.222 (22.2%) of 0.877 (87.7%) in Cohort 2 were explained; 0.558 (55.8%) in Cohort 1 and 0.655 (65.5%) in Cohort 2 were unexplained.

In achievement growth, at the between level, 0.032 (3.2%) of 0.290 (29.0%) in Cohort 1 and 0.005 (0.5%) of 0.078 (7.8%) in Cohort 2 were explained by the variables added in Model 2. However, 0.266 (26.6%) in Cohort 1 and 0.097 (9.7%) in Cohort 2 were unexplained. At the within level, 0.037 (3.7%) of 0.710 (71.0%) in Cohort 1 and 0.433 (43.3%) of 0.922 (92.2%) in Cohort 2 were explained; 0.673 (67.3%) in Cohort 1 and 0.489 (48.9%) in Cohort 2 were unexplained.

Large proportions were explained at both the between and within levels. Further studies need to explore further which factors influence achievement and achievement growth.

Table 6.9. Variance explained in Model 2 for achievement and achievement growth

		Achievement		Achievement growth	
		Cohort 1	Cohort 2	Cohort 1	Cohort 2
Between level	Variance explained	0.049	0.026	0.032	0.005
	Variance unexplained	0.266	0.097	0.258	0.073
	Total	0.315	0.123	0.290	0.078
Within level	Variance explained	0.127	0.222	0.037	0.433
	Variance unexplained	0.558	0.655	0.673	0.489
	Total	0.685	0.877	0.710	0.922



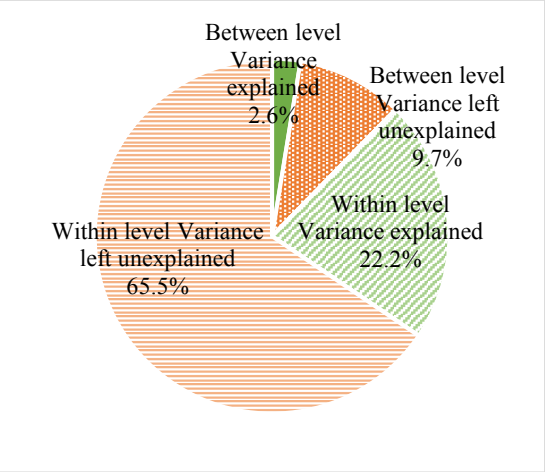
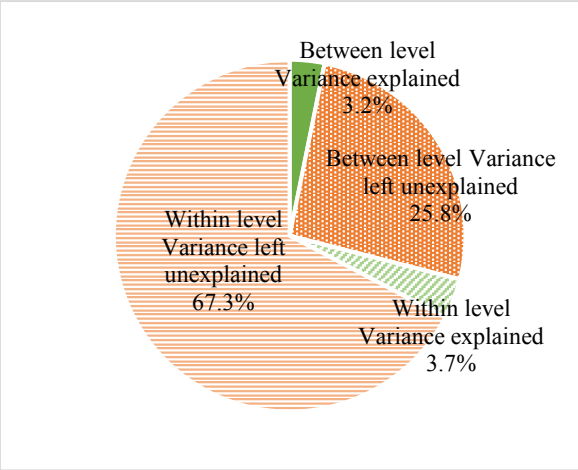


Figure 6.11. Variance explained in Model 2 for achievement in Cohort 1

Figure 6.12. Variance explained in Model 2 for achievement in Cohort 2



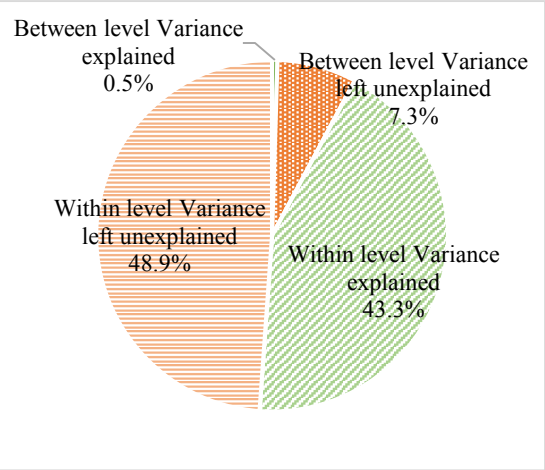


Figure 6.13. Variance explained in Model 2 for achievement growth in Cohort 1

Figure 6.14. Variance explained in Model 2 for achievement growth in Cohort 2

With respect to repetition, dropout, and transfer rates, R-square was not computed because the analysis requires multilevel logistic regression. Therefore, variance explained was not calculated.

CHAPTER SEVEN: DISCUSSION

This chapter discusses the results of the present study and compares them with those of previous investigations. It also considers ways that these study findings might be reflected in Malawi's educational policy.

School effectiveness research in developing countries has concentrated on achievement as an output indicator. However, this single focus ignores other significant schooling outputs. From the sample with two cohorts in rural Malawi, the present study examined the relationship among several indicators of school effectiveness, including achievement, achievement growth, repetition rates, dropout rates, and transfer rates. It was concluded that in addition to achievement, other indicators need to be used toward improving both achievement and completion rates in Malawi. It was evident that high-achieving schools were not always effective in the above indicators. The factors that influenced achievement were not always the same as those that affected the other indicators.

7.1 Types of Data Employed in School Effectiveness Research

School effectiveness research (SER) in developing countries often uses large-scale data, such as the Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMSS) and Southern and Eastern Africa Consortium for

Monitoring Educational Quality (SACMEQ). If only student achievement is considered as an output indicator of school effectiveness, it is appropriate to employ such data. However, large-scale data are insufficient if other indicators are also examined. The present study used data collected from field research, which employed an event history analysis that followed the same students over a period of 2 years. Although the sample size was small compared with the above large-scale studies, this approach offered a couple of advantages. One was that it allowed for the identification of achievement growth as well as repetition, dropout, and transfer rates. The above large-scale studies used cross-sectional data, which were collected at a single point in time. They did not follow the same students over time and so could not compute the indicators of achievement growth and repetition, dropout, and transfer rates. Another advantage was that an event history method allows data collection whereby independent variables affect dependent variables with a predetermined property expressed at a specific time (Berry and Berry, 1990). In general, a student's situation is likely to undergo change just before grade repetition, dropout, and transfer occur. Therefore, collecting data both before and after these events take place offers greater accuracy. The SACMEQ also obtained data about grade repetition, but there was a disparity between the time of data collection and the time when grade repetition occurred: the data were thus not representative of the students' condition at the point of grade repetition. Therefore, to assess both achievement growth and completion rates, it is necessary to obtain data that follow

the same students before and after they experience the related events. That was the case with the present study.

7.2 Transition Rates from Grade to Grade

The present study determined the transition rates from grade to grade by following the same students. Remarkable results were obtained. In the two cohorts, only around 50% of the students were promoted to the next grade—a notably low rate. Further, approximately 25% of the students repeated the same grade, which was relatively high. In most developing countries, grade repetition is common practice. However, as evidenced in this study, grade repetition carries a risk of dropout. It is necessary to achieve understanding at the societal level that grade repetition is not always an effective remedy for low achievement.

There were evident differences with respect to understanding the notion of dropout between the researcher and the Malawi people. When the researcher first checked school records for dropout students, most schools had few or no students registered as dropouts. After discussing this matter with teachers, it became evident that they generally consider dropouts as students who are unable to attend school because of such events as pregnancy or marriage. As detailed in previous reports, the notion of dropout varies among people and communities (Morrow, 1987; Kelly, 1994). Therefore, in the present study, “dropout” was defined as indicated on page 7, i.e.,

15 consecutive days of unexcused absence. When obtaining data related to dropout, the researcher asked the schools two questions: about students who had been absent for 15 consecutive days and about those who had dropped out of school. It was found that the dropout rates as defined in this study were approximately 5%–6%. Even if the Malawi people do not consider such students as dropouts, they are under the risk of dropping out of school completely. However, it seems that this situation is not properly appreciated in Malawi. It is necessary for teachers and communities there to be aware that such students are at high risk of dropping out completely.

At 16%–19%, transfer was found to be unexpectedly high. The potential reasons for this were examined in the present study; however, it is necessary to determine whether the same situation occurs in other areas or at other times. It may also be appropriate to reexamine whether or not that proportion accurately represents transferred students. Thus far, only a limited number of investigations have examined transfer, and so further studies should examine its effect.

7.3 Simultaneous Need to Consider Achievement Growth and Completion Rates

The present study used achievement, achievement growth, and repetition, dropout, and transfer rates as indicators of school effectiveness. It was found that schools that were effective in raising achievement were not necessarily effective in promoting achievement growth and reducing repetition, dropout, and transfer rates. Some high-achieving schools had lower repetition or

dropout rates; others had higher rates. If most high-achieving schools had lower repetition and dropout rates, it would not be necessary to consider using other indicators of school effectiveness. However, the present study found that this was not always the case.

In some schools, the focus on improving achievement is likely to increase repetition and dropout rates. The government, schools, communities, and parents consider academic achievement to be the most significant output of schooling, and so they tend to concentrate on that factor alone. The result is that some schools produce many repeaters and dropout students. In Malawi, communities and teachers apparently tend to focus on high-achieving students. One of the reasons for this could be that very few students are able to go to secondary school. There is a huge social barrier in gaining access to secondary school. High-achieving students are invaluable in communities, and so communities and teachers tend to believe that sending high-achieving students to secondary school is very important. Accordingly, teachers focus on selecting students for promotion to the next grade and do not consider grade repetition and dropout to be problems. However, this process is occurring at the level of basic education. UNESCO has stated that all children should complete basic education and acquire basic skills (UNESCO, 2014); however, this goal may be at odds with the situation in local communities and the international agenda. To determine whether this goal is achieved, both achievement growth and completion rates need to be considered. Hence, as well as achievement, it is important to use other indicators, such as

achievement growth, repetition rates, and dropout rates, as indicators of school effectiveness. Doing so would offer an overview of school effectiveness, and it would contribute to improving this situation in primary education in Malawi.

The results of the present study do not apply only to Malawi; they are also particularly important for other developing countries. Most of those countries face issues of low achievement, high repetition rates, and high dropout rates. To improve this situation, it is necessary to consider other indicators, such as achievement growth, repetition rates, and dropout rates.

In term of transfer rates, the present study found school location to be a significant factor. However, it may not be appropriate to assess the indicators of school effectiveness the same way in other countries. For example, in Uganda, the distance among schools is not great in most areas, and so students may easily change from one school to another. In Uganda, therefore, transfer could also be used as an indicator of school effectiveness. In the United States and Australia, transfer rates are considered an indicator of school effectiveness (Rumberger & Palardy, 2005; Ainley, 1994). Therefore, depending on the situation, it may also be necessary to consider transfer rates as an indicator of school effectiveness.

7.4 Effect of the National Examination

The present study found a relationship between achievement and repetition rates in Cohort 2. It

was found that schools with the highest pass rates in the national examination also had the highest repetition rates among the sampled schools. Further, schools with higher mean achievement tended to have higher repetition rates. In Malawi, parents and communities consider passing the national examination to be the most important output of primary schooling. Advancing to secondary school demands high scores in the national examination, and so teachers tend to focus on selecting students for promotion to the next grade. Also, some schools may force low-achieving students to repeat a grade so as to maintain the schools' level of higher achievement. This is because education boards evaluate schools that achieve a high percentage in the national examination as better institutions. If grade repetition were in fact effective in improving achievement, it could be adopted as a solution. However, the results of this study showed the number of grade repetitions to be a negative factor for improving achievement in both cohorts (Table 6.8). Grade repetition increased dropout in Cohort 1 (Table 6.8). Thus, increasing grade repetition carries the risk of not improving achievement and increasing dropout. Schools should therefore consider how to improve student achievement without increasing the number of repeaters.

A higher number of grade repetitions can result in other negative events. In Cohort 2, schools with a higher mean number of grade repetitions tended to have higher transfer rates. This suggests that students with many grade repetitions are likely to transfer to another school. In the

higher grades, students tend to repeat a grade so as to pass the national examination. However, as noted above, grade repetition was ineffective in improving achievement.

One solution to improve this situation is reducing grade repetition. Teachers should evaluate student achievement appropriately. Figures 7.1 and 7.2 show differences in the z-score of achievement between promoted students and repeaters by school for Cohorts 1 and 2, respectively. In both cohorts, the achievement of repeaters was not always lower than that of promoted students. The tests used to assess this were created by the researcher, and so the standard used to evaluate repeaters was different to that employed at each school. However, some teachers commented that the students who attained high scores in the tests used for the present study also achieved better in class or in tests conducted by class teachers. The tests employed for this study were based on the content of the national curriculum and question items selected from textbooks and past papers for the national examination. Moreover, IRT was used to determine the validity of the tests. Thus, the tests created by the researcher may be regarded as having a certain degree of reliability and validity. It is apparent that the class teachers decided which students should repeat grades based on their own criteria rather using than national standards. Thus, a marked difference in repetition rates was observed among the schools. This finding was also made by Ikeda (2005), who referred to it as the “frog-pond effect”: the class teacher has sole discretion for student promotion and repetition. To reduce the number of repeaters, teachers should develop the

knowledge and skills to devise tests and evaluate student achievement appropriately.

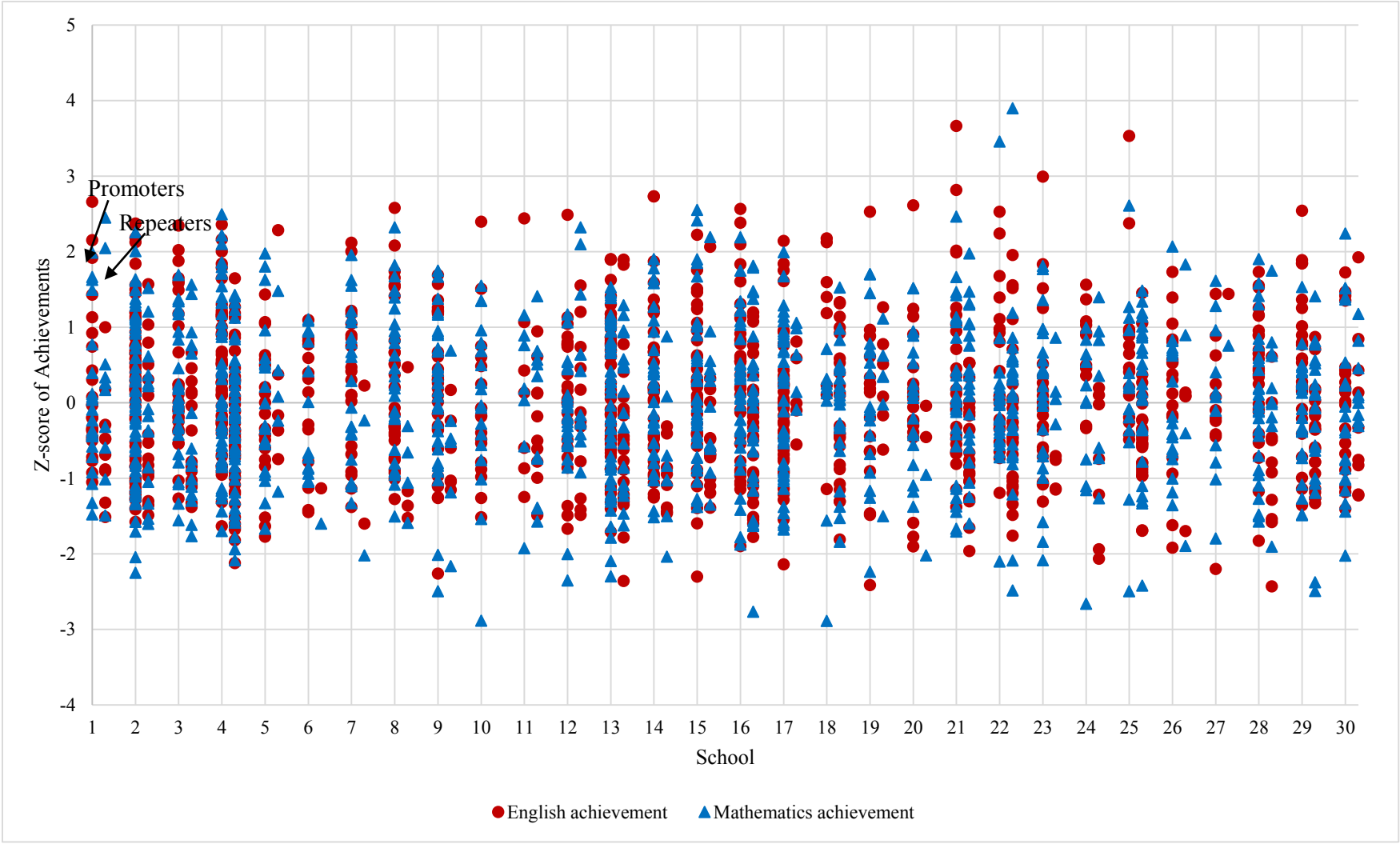


Figure 7.1. Difference in z-score of achievement between promoters and repeaters by school in Cohort 1

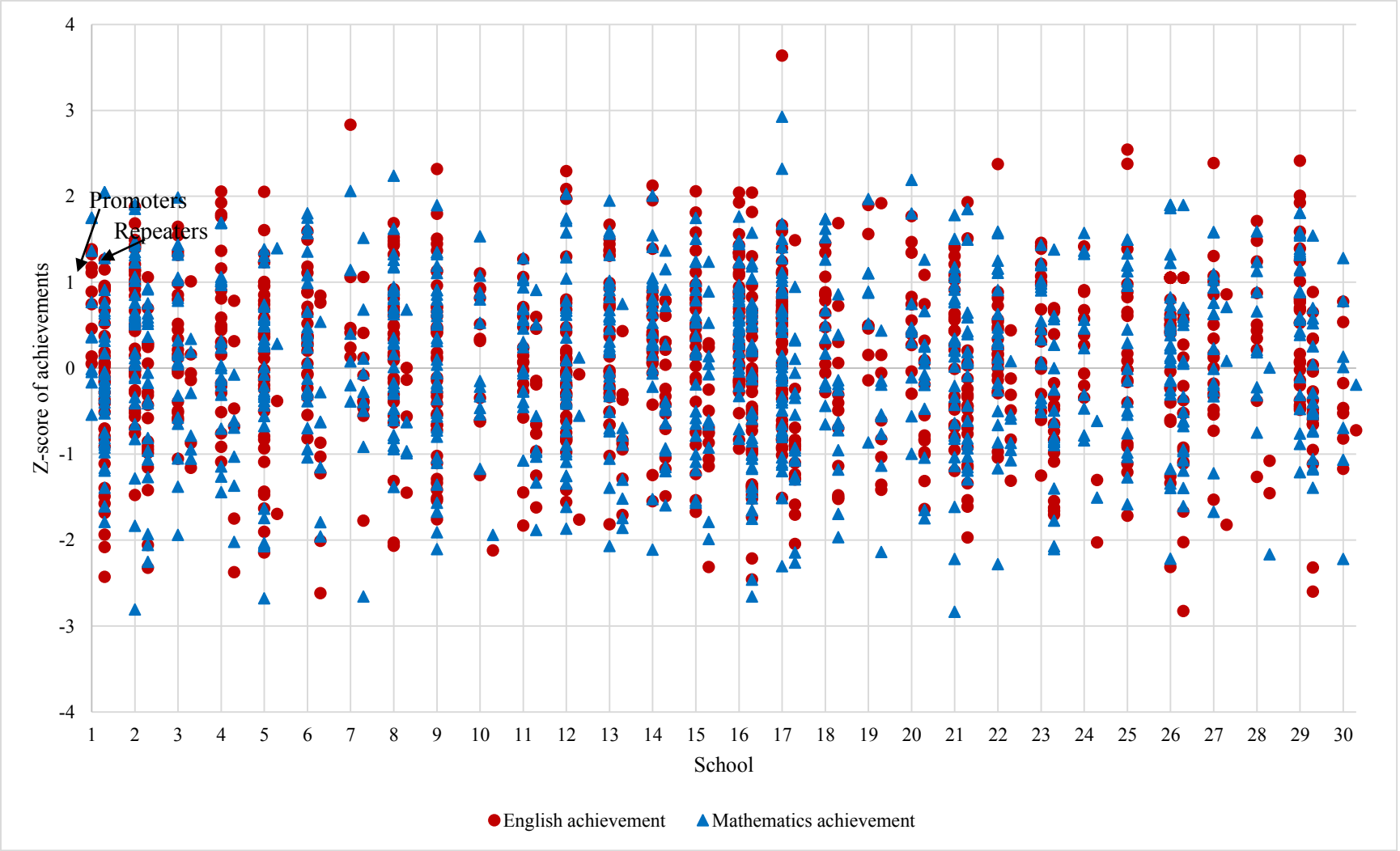


Figure 7.2. Difference in z-score of achievement between promoters and repeaters by school in Cohort 2

7.5 School or Student Matters

Multilevel analysis allows the proportion of school-level variance within overall variance to be determined. This permits an evaluation of whether schools can make a difference in the designated indicators. Since the report by Coleman et al. (1966), considerable research has been devoted to examining the degree to which schools can improve achievement. The related discussion is ongoing, but according to standard theory, schools have greater impact on improving student achievement in developing than in developed countries (Heyneman & Loxley, 1983).

The findings of the present study are in accordance with standard theory with respect to achievement. Regarding achievement growth, repetition rates, dropout rates, and transfer rates, no studies have investigated the proportion of school-level variance within overall variance in developing countries. Thus, the results of the present study cannot be compared with those of previous reports. However, with respect to achievement, schools were found to make a difference in achievement growth in Cohort 1 as well as in repetition rates and dropout rates in both cohorts; schools were unable to affect achievement growth in Cohort 2 and transfer rates in either cohort. In rural Malawi, achievement growth in lower grades, grade repetition, and dropout may therefore be considered a school matter; achievement growth in higher grades and transfer may be regarded as a student matter. In short, schools can improve achievement as well as reduce repetition and dropout rates. It is therefore necessary to focus on the school-level factors that can predict those

indicators.

7.6 School-Level Factors Influencing Indicators

The present study investigated the school-level factors, including school social composition and school input, that influence the designated indicators. Some findings were the same as those of previous studies, though others were not.

7.6.1 Achievement

In Cohort 1, no variables influenced achievement; in Cohort 2, the mean number of grade repetitions influenced achievement. Kunje et al. (2009) conducted an analysis of school-level factors that influenced achievement in grades 5 and 7 in Malawi. They found that the trained teacher-student ratio and school location were related to achievement (Tables 2.1 and 2.2). The results of the present study differ from those of Kunje et al. The two studies employed a different sample area and method of analysis. Kunje et al. conducted their study in southeastern Malawi and used one-way analysis of variance (ANOVA); the location of the sample in the present study was northern Malawi, and it employed multilevel analysis. In addition, in their analysis, Kunje et al. did not control for student-level factors, and so the present study may be regarded as having used a more comprehensive model. Another study, the SACMEQ, was conducted on grade 6

students in Malawi, and that analyzed school-level factors after controlling for student-level factors. The SACMEQ results indicated that class size and school resources influenced achievement (Tables 2.1 and 2.2). The SACMEQ obtained its grade 6 sample from the whole country, whereas the present study used a sample for grades 5 and 7 in a rural area. This difference may have led to differences in the results.

However, the present study produced an important finding. In rural Malawi, mean socioeconomic status of schools, class size, school location, and school facilities did not affect achievement.

7.6.2 Achievement growth

Although the present study measured achievement growth only among students who were promoted, some of the results were clear. No variables influenced achievement growth in either cohort. Although no studies have measured achievement growth, previous investigations in other countries have identified several other factors. They include the following: teacher and school characteristics and class size (Rivkin et al., 2005); higher instruction, student assessment, classroom management, and personal domains (Stronge et al., 2008); and the school's and head teacher's views on school process factors (Salim, 2011). The present study could not analyze those factors owing to the small sample size, but they should be examined in future research.

However, the findings of the present study indicate that mean socioeconomic status, mean number of grade repetitions, class size, school location, and school facilities did not affect achievement growth.

7.6.3 Repetition rates

In Cohort 1, no variables affected repetition rates, whereas in Cohort 2 mean achievement and class size influenced those rates. Using the SACMEQ data in Malawi, Ikeda (2005) showed that school location and school facilities were related to grade repetition; however, those factors were not found to be significant in the present study. This difference may be the result of a different methodology in collecting data related to grade repetition. The SACMEQ data used by Ikeda were retrospective; they did not include details of the timing of grade repetition and did not include data for individual and family factors. By contrast, the present study used data that included details of the timing of grade repetition, and data for individual and family factors were collected. Thus, the present study represents an advance on the SACMEQ III study. In addition, no studies have used the same method of collecting data as those employed in the present study; they have not examined school-level factors, and so the results of this study cannot be compared with those of other investigations.

The present study did, however, find the interesting result that schools with higher mean

achievement tended to have higher repetition rates. As noted in section 7.4, this may be related to the national examination in Malawi. Further studies are needed to analyze this relationship in detail.

In summary, the present study made an important finding. In rural Malawi, mean socioeconomic status, mean number of grade repetitions, school location, and school facilities did not affect achievement growth.

7.6.4 Dropout rates

No variables were found to influence dropout in either cohort. Jukes et al. (2014) conducted a study of dropout, which was an evaluation of the Strengthening Open and Flexible Learning to Increase Educational Access project (SOFIE) in Malawi. They compared the situation before and after the project and concluded that it was able to reduce dropout. Mzuza et al. (2014) conducted another study in Malawi by investigating the factors that caused poor pass rates in examinations and high dropout rates among primary school girls. They administered questionnaires and found lack of interest to be the main reason behind the problems. However, the above two studies did not analyze the factors that influenced dropout.

Studies conducted in other countries found that school facilities (UNESCO, 1984; Hussain et al., 2011) and school location (Patrick, 2012) were related to dropout. Different

countries have their own particular situations, and so the results may not always be comparable with those for Malawi. However, the present study found that mean achievement, mean socioeconomic status, mean number of grade repetitions, class size, school location, and school facilities did not affect dropout rates.

7.6.5 Transfer rates

School location influenced transfer rates in both cohorts. In Cohort 2, the mean number of grade repetitions also influenced transfer rates. Although no studies have been conducted in Malawi, previous investigations in developed countries have found school quality (Kerbow, 1996; Rumberger et al., 1999) to be related to transfer rates. Schools may also force students to transfer to another school (Rumberger et al., 1999). However, the present study did not identify these factors. Those studies were conducted in the United States and United Kingdom, and the results may reflect differences between developed and developing countries.

The present study found the interesting result that schools with a higher mean number of grade repetitions tended to have higher transfer rates. As mentioned in section 7.2, this may be related to the national examination. Further studies should analyze this relationship in detail.

In summary, the present study made an important finding: in rural Malawi, mean student achievement, mean socioeconomic status, class size, and school facilities did not affect transfer

rates.

7.7 Need to Improve Other School-Level Factors

The present study investigated the school-level factors that influence achievement, achievement growth, repetition rates, dropout rates, and transfer rates, and it compared the results between achievement and the other indicators. The results showed that school-level variables influencing achievement were not always same as the variables that influenced achievement growth and repetition, dropout, and transfer rates. Also, the findings differed slightly between the cohorts. This means that even if there is a focus on the school-level factors that improve student achievement, this may not always result in enhanced achievement growth and repetition, dropout, and transfer rates. Policies for improving achievement therefore need to adopt different strategies with respect to improved achievement growth and reduced repetition, dropout, and transfer rates.

CHAPTER EIGHT: CONCLUSION

Since the beginning of school effectiveness research (SER) in the mid-1960s, output indicators of school effectiveness have focused on academic achievement; however, in developed countries, other indicators, such as achievement growth, non-cognitive skills, dropout rates, and transfer rates, have been employed. In developing countries, SER still uses achievement as the sole indicator. In such countries, though, adopting only academic achievement as the output indicator of school effectiveness appears insufficient. It has been reported that 70% of children who enrolled in grade 1 were unable to complete primary education (UNESCO, 2014). It is likewise evident that in conjunction with achievement, repetition rates and dropout rates—at least—also need to be considered as output indicators of school effectiveness.

The present study examined the relationships among several indicators—achievement, achievement growth, repetition rates, dropout rates, and transfer rates—in rural Malawi. To obtain information related to those indicators, data collection was conducted twice—before and after grade repetition, dropout, and transfer. Although the data were limited to a 2-year period in rural Malawi, significant findings were obtained. The results of this study underline the importance of considering multiple indicators of school effectiveness in Malawi. These findings may also apply to other developing countries with similar situations and may provide clues to addressing related

issues in such places.

8.1 Summary of Findings

The present study aimed to examine two questions. (1) What is the relationship between achievement and the other indicators? Are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates? And are schools that are effective in raising achievement also effective in promoting achievement growth and reducing repetition, dropout, and transfer rates? (2) What school-level factors predict the designated indicators after controlling for student-level factors? In addition, are the factors that influence achievement the same as those that influence the other factors?

8.1.1 First research question

In Cohort 1, there was a negative relationship between achievement and achievement growth; however, there was no relationship between achievement and the other indicators. Schools that were effective in raising achievement were ineffective in promoting achievement growth, and they were not always effective in reducing repetition, dropout, and transfer rates.

In Cohort 2, there was no evident relationship between achievement and the other indicators. Schools that were effective in raising achievement were not always effective in promoting achievement growth and in reducing repetition, dropout, and transfer rates.

8.1.2 Second research question

Schools were found to exert a difference in achievement growth in Cohort 1 and in achievement, repetition rates, and dropout rates in both cohorts. Schools were unable to affect achievement growth in Cohort 2 or transfer rates in either cohort. The present study was able to determine that school-level factors have a large influence on the studied indicators; however, owing to the small sample size of schools, it was not possible to identify which school-level factors predict those indicators.

In Cohort 1, no school-level variables were identified as dominant factors for achievement, achievement growth, repetition rates, and dropout rates; schools located in semi-urban areas were a significant factor for transfer rates. In Cohort 2, no school-level variables were observed to be dominant factors for achievement growth and dropout rates; significant factors were found to be lower mean number of grade repetitions for achievement, higher mean achievement and larger class size for repetition rates, and higher mean number of grade repetitions and schools located in semi-urban areas for transfer rates.

In summary, school-level variables that influenced achievement were not always the same as the variables that influenced repetition, dropout, and transfer rates. In addition, there were differences in the effect of school-level variables on the indicators between the two cohorts.

8.2 Limitations

The strengths of the present study include its methods of data collection and analysis, such as the use of an event history method, IRT, and multilevel analysis. However, a number of limitations deserve consideration. First, the number of sampled schools and research area were small. With this small number of schools, students could be tracked and data collection accomplished within a period of a few months. However, a greater number of schools would be required to identify more school level-variables exercising an influence on the indicators.

Second, the data were obtained for a period of only 2 years. Greater detail would demand a longer period of data collection of at least a few more years.

Third, there were limitations in the data relating to the 2nd year. A few difficulties were encountered regarding the data collection in that year. The repetition and transfer rates were higher than the researcher's expectation. Only students who were promoted and were not absent on the days of data collection took the Phase 2 tests. In addition, students repeating grades were unable to take the tests because their grades would have differed from those of promoted students.

Fourth, only transfer-out data were obtained. It would have been more appropriate to collect both transfer-out and transfer-in data to examine the causes of transfer.

Finally, this study measured basic skills of academic achievement: it therefore ignored the skills of high-achieving students. It is not easy to devise tests for such students and their number is relatively small; however, it is necessary to distinguish somewhat advanced students

from high-achieving ones.

8.3 Suggestions for Future Studies

Despite the above limitations, the present study makes a unique contribution to the question of school effectiveness in Malawi. The findings should be of assistance to practitioners and researchers in addressing such issues as high repetition and dropout rates as well as low achievement and completion rates in Malawi primary education. This study also raises a number of questions. First, how is it possible to improve student achievement while at the same time reducing repetition and dropout rates? Thus far, schools appear to have focused on improving student achievement without considering grade repetition and dropout. Schools have tended to require low-achieving students to repeat a grade so as to enhance their achievement. Further, communities and parents generally consider grade repetition an appropriate remedy for low achievement. However, that is simply not true: more grade repetition is also likely to increase dropout. It is therefore necessary to change attitudes toward grade repetition, which is not always effective in improving achievement. One possibility here is for teachers to develop evaluation skills with respect to grade repetition and also the appropriate teaching skills such that students are able to acquire the basic skills at each grade. Some students acquire the appropriate skills, but they are still obliged to repeat grades; other students lack those skills but are not made to repeat grades.

Second, what school-level factors influence achievement growth and repetition, dropout, and transfer rates? The present study found that school-level factors may contribute significantly to improving these indicators. However, this study could not fully determine which school-level factors influenced achievement owing to the limited number of sampled schools. It would appear that rather than school-input factors, school-process factors, such as school policy and school management, are related to those indicators.

Finally, what is the relationship between the examined indicators and the national examination in Malawi? In this country, communities and parents believe that passing the national examination is the most important output of schooling. Owing to the short research period, the present study was unable to analyze the relationship between those indicators and the national examination. However, this study found that schools with higher pass rates in the national examination also had higher repetition rates; it was also determined that in Cohort 2, schools with higher mean achievement tended to have higher repetition rates. These results imply a degree of interrelationship, which could be related to the difficulty in completing primary school in Malawi.

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Appendix 1. Grade 5 English test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
ET01	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET02	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET03	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET04	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET05	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET06	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET07	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET08	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET09	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET10	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET11	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET12	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET13	Reading	Vocabulary	Recognizes alphabetical order	Level 1
ET14	Critical thinking and reasoning	Asking and answering questions	Introduction	Level 1
ET15	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 1
ET16	Asking and answering questions	Asking and answering questions	Daily life	Level 2
ET17	Critical thinking and reasoning	Vocabulary	Locate words in sentences	Level 3
ET18	Reading	Vocabulary	Locate words in sentences	Level 3
ET19	Structure and use of language	Tenses	Present form	Level 1
ET20	Structure and use of language	Tenses	Present form	Level 1
ET21	Structure and use of language	Tenses	Present progressive form	Level 1
ET22	Structure and use of language	Tenses	Present form	Level 1
ET23	Structure and use of language	Tenses	Past progressive form	Level 2
ET24	Structure and use of language	Tenses	Past form	Level 2
ET25	Structure and use of language	Tenses	Future form	Level 2
ET26	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET27	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET28	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET29	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET30	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET31	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET32	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET33	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET34	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET35	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1

Appendix 2. Grade 6 English test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
ET01	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET02	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET03	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET04	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET05	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET06	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET07	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET08	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET09	Critical thinking and reasoning	Asking and answering questions	Introduction	Level 1
ET10	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 2
ET11	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 2
ET12	Reading	Vocabulary	Locate words in sentences	Level 3
ET13	Reading	Vocabulary	Locate words in sentences	Level 3
ET14	Structure and use of language	Tenses	Present forms	Level 1
ET15	Structure and use of language	Tenses	Present forms	Level 1
ET16	Structure and use of language	Tenses	Past progressive forms	Level 2
ET17	Structure and use of language	Tenses	Past forms	Level 2
ET18	Structure and use of language	Tenses	Future forms	Level 2
ET19	Structure and use of language	Nouns	Singur or plural forms	Level 3
ET20	Structure and use of language	Adverbs	Adverbs	Level 3
ET21	Structure and use of language	Prepositions	Prepositions	Level 3
ET22	Structure and use of language	Prepositions	Prepositions	Level 3
ET23	Structure and use of language	Conjunctions	Conjunctions	Level 3
ET24	Reading	Vocabulary	Synonyms	Level 4
ET25	Reading	Vocabulary	Antonyms	Level 4
ET26	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET27	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET28	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET29	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET30	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET31	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET32	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET33	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET34	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET35	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1

Appendix 3. Grade 7 English test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
ET01	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET02	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET03	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET04	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET05	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET06	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET07	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET08	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET09	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET10	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET11	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET12	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET13	Reading	Vocabulary	Recognizes alphabetical order	Level 1
ET14	Critical thinking and reasoning	Asking and answering questions	Introduction	Level 1
ET15	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 1
ET16	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 2
ET17	Reading	Vocabulary	Locate words in sentences	Level 3
ET18	Reading	Vocabulary	Locate words in sentences	Level 3
ET19	Structure and use of language	Tenses	Present forms	Level 1
ET20	Structure and use of language	Tenses	Present forms	Level 1
ET21	Structure and use of language	Tenses	Present progressive forms	Level 1
ET22	Structure and use of language	Tenses	Present forms	Level 1
ET23	Structure and use of language	Tenses	Past progressive forms	Level 2
ET24	Structure and use of language	Tenses	Past forms	Level 2
ET25	Structure and use of language	Tenses	Future forms	Level 2
ET26	Structure and use of language	Adverbs	Adverbs	Level 3
ET27	Structure and use of language	Nouns	Singular or plural forms	Level 3
ET28	Structure and use of language	Prepositions	Prepositions	Level 3
ET29	Structure and use of language	Prepositions	Prepositions	Level 3
ET30	Structure and use of language	Conjunctions	Conjunctions	Level 3
ET31	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET32	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET33	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET34	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET35	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET36	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET37	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET38	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET39	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET40	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1

Appendix 4. Grade 8 English test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
ET01	Reading	Vocabulary	Match words to pictures (Noun)	Level 1
ET02	Reading	Vocabulary	Match words to pictures (Verb)	Level 1
ET03	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET04	Reading	Vocabulary	Match sentences to pictures (Three words)	Level 2
ET05	Reading	Vocabulary	Match sentences to pictures (More than four words)	Level 2
ET06	Critical thinking and reasoning	Asking and answering questions	Introduction	Level 1
ET07	Critical thinking and reasoning	Asking and answering questions	Daily life	Level 2
ET08	Reading	Vocabulary	Locate words in sentences	Level 3
ET09	Structure and use of language	Tenses	Present forms	Level 1
ET10	Structure and use of language	Tenses	Past forms	Level 2
ET11	Structure and use of language	Tenses	Future forms	Level 2
ET12	Structure and use of language	Adverbs	Adverbs	Level 3
ET13	Structure and use of language	Prepositions	Prepositions	Level 3
ET14	Structure and use of language	Conjunctions	Conjunctions	Level 3
ET15	Structure and use of language	Nouns	Singular or plural forms	Level 3
ET16	Structure and use of language	Phrases	Prepositions	Level 3
ET17	Structure and use of language	Tenses	Present perfect forms	Level 3
ET18	Structure and use of language	Tag questions	Tag questions	Level 4
ET19	Structure and use of language	Active and passive voices	Active and passive voices	Level 4
ET20	Structure and use of language	Direct and indirect speech	Direct and indirect speech	Level 4
ET21	Reading	Vocabulary	Synonyms	Level 4
ET22	Reading	Vocabulary	Antonyms	Level 4
ET23	Structure and use of language	Sentence structure	Sentence structure	Level 4
ET24	Structure and use of language	Sentence structure	Sentence structure	Level 4
ET25	Structure and use of language	Proverbs	Proverbs	Level 4
ET26	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET27	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET28	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET29	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET30	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET31	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1
ET32	Reading	Passages/ stories	Interpret sentence to match words and phrases	Level 3
ET33	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET34	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET35	Reading	Passages/ stories	Interpret sentence to match sentences	Level 4
ET36	Reading	Passages/ stories	Interpret sentence to match sentences	Level 4
ET37	Reading	Passages/ stories	Interpret sentence to match sentences	Level 4
ET38	Reading	Passages/ stories	Interpret sentence to match sentences	Level 4
ET39	Reading	Passages/ stories	Use context and simple sentence structure to match sentences	Level 2
ET40	Reading	Passages/ stories	Use context and simple sentence structure to match words	Level 1

Appendix 5. Grade 5 mathematics test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
MT01	Numbers, operations and relationships	Counting and writing numbers	Count illustrated object	Level 1
MT02	Space and Shape	Shapes	Recognize simple shapes	Level 1
MT03	Space and Shape	Shapes	Recognize simple shapes	Level 1
MT04	Numbers, operations and relationships	Addition	Add two-digit numbers and two-digit numbers without carrying (Horizontal form)	Level 1
MT05	Numbers, operations and relationships	Addition	Add one-digit number and one-digit number with carrying	Level 3
MT06	Numbers, operations and relationships	Addition	Add two-digit numbers and two-digit numbers without carrying	Level 1
MT07	Numbers, operations and relationships	Addition	Add three-digit numbers and two-digit numbers without carrying	Level 2
MT08	Numbers, operations and relationships	Addition	Add three-digit numbers and two-digit numbers with carrying	Level 4
MT09	Numbers, operations and relationships	Addition	Add three-digit numbers and three-digit numbers with carrying	Level 4
MT10	Numbers, operations and relationships	Subtraction	Subtract from two-digit numbers to two-digit numbers without borrowing (Horizontal form)	Level 1
MT11	Numbers, operations and relationships	Subtraction	Subtract from two-digit numbers to one-digit number without borrowing	Level 1
MT12	Numbers, operations and relationships	Subtraction	Subtract from two-digit numbers to two-digit numbers without borrowing	Level 1
MT13	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to two-digit numbers without borrowing	Level 2
MT14	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to three-digit numbers with borrowing	Level 4
MT15	Numbers, operations and relationships	Multiplication	Multiply one-digit number by one-digit number (Horizontal form)	Level 1
MT16	Numbers, operations and relationships	Multiplication	Multiply one-digit number by one-digit number	Level 1
MT17	Numbers, operations and relationships	Multiplication	Multiply two-digit numbers by one-digit number	Level 2
MT18	Numbers, operations and relationships	Division	Divide one-digit number by one-digit number (Horizontal form)	Level 1
MT19	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number (Horizontal form)	Level 2
MT20	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number	Level 2
MT21	Patterns, functions and algebra	Patterns	Sequences (Small numbers to large numbers)	Level 1
MT22	Patterns, functions and algebra	Patterns	Sequences (Large numbers to small numbers)	Level 2
MT23	Numbers, operations and relationships	Counting and writing numbers	Understand number and digit	Level 2
MT24	Numbers, operations and relationships	Common fractions	Understand meaning of fractions	Level 1
MT25	Numbers, operations and relationships	Common fractions	Add fractions of the same denominators	Level 2
MT26	Numbers, operations and relationships	Common fractions	Subtract fractions of the same denominators	Level 2
MT27	Numbers, operations and relationships	Common fractions	Add decimal fractions and decimal fractions without carrying	Level 2
MT28	Numbers, operations and relationships	Common fractions	Subtract from decimal fractions to decimal fractions without borrowing	Level 2
MT29	Measurements	Time	Tell the time on the hour	Level 1
MT30	Measurements	Volume	Measure volume	Level 1
MT31	Measurements	Areas	Find area of rectangles	Level 2
MT32	Accounting and business studies	Addition of money	Addition of money (Formula)	Level 1
MT33	Accounting and business studies	Addition of money	Addition of money (Answer)	Level 1
MT34	Accounting and business studies	Multiplication of money	Multiplication of money (Formula)	Level 2
MT35	Accounting and business studies	Multiplication of money	Multiplication of money (Answer)	Level 2

Appendix 6. Grade 6 mathematics test

Item ID	Core Elements	Curriculum Topic	Cognitive domain	Level
MT01	Numbers, operations and relationships	Addition	Add two-digit numbers and two-digit numbers without carrying	Level 1
MT02	Numbers, operations and relationships	Addition	Add two-digit numbers and three-digit numbers with carrying	Level 2
MT03	Numbers, operations and relationships	Addition	Add three-digit numbers and three-digit numbers with carrying	Level 3
MT04	Numbers, operations and relationships	Subtraction	Subtract from two-digit numbers to two-digit numbers without borrowing	Level 1
MT05	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to two-digit numbers without borrowing	Level 2
MT06	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to three-digit numbers with borrowing	Level 3
MT07	Numbers, operations and relationships	Multiplication	Multiply two-digit numbers by one-digit number	Level 1
MT08	Numbers, operations and relationships	Multiplication	Multiply two-digit numbers by two-digit numbers	Level 2
MT09	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number	Level 1
MT10	Numbers, operations and relationships	Division	Divide three-digit numbers by two-digit numbers	Level 2
MT11	Patterns, functions and algebra	Patterns	Sequences (Small numbers to large numbers)	Level 1
MT12	Patterns, functions and algebra	Patterns	Sequences (Large numbers to small numbers)	Level 2
MT13	Numbers, operations and relationships	Common fractions	Understand meaning of fraction	Level 1
MT14	Numbers, operations and relationships	Common fractions	Add fractions of the same denominators	Level 2
MT15	Numbers, operations and relationships	Common fractions	Subtract fraction of the same denominators	Level 2
MT16	Numbers, operations and relationships	Common fractions	Change decimal to fraction	Level 2
MT17	Numbers, operations and relationships	Common fractions	Change fraction to decimal	Level 2
MT18	Numbers, operations and relationships	Common fractions	Add decimal fractions and decimal fractions without carrying	Level 2
MT19	Numbers, operations and relationships	Common fractions	Subtract from decimal fractions to decimal fractions without borrowing	Level 2
MT20	Measurements	Mass	Convert kg to g	Level 1
MT21	Measurements	Length	Convert cm to m	Level 1
MT22	Measurements	Mass	Measure weight	Level 1
MT23	Space and Shape	Shapes	Recognize simple shapes	Level 1
MT24	Measurements	Perimeter	Find the perimeter of rectangles	Level 2
MT25	Measurements	Side	Find the side of triangles	Level 2
MT26	Measurements	Time	Tell the time on the hour	Level 1
MT27	Accounting and business studies	Addition of money	Addition of money	Level 1
MT28	Accounting and business studies	Subtraction of money	Subtraction of money	Level 1
MT29	Accounting and business studies	Multiplication of money	Multiplication of money	Level 2
MT30	Accounting and business studies	Division of money	Division of money	Level 2
MT31	Data handling	Picture graphs	Read picture graphs (One information)	Level 1
MT32	Data handling	Picture graphs	Read picture graphs (Multiple information)	Level 1
MT33	Data handling	Graphs	Read graph (One information)	Level 1
MT34	Data handling	Graphs	Read graph (One information)	Level 1
MT35	Data handling	Graphs	Read graph (Multiple information)	Level 2

Appendix 7. Grade 7 mathematics test

Item ID	Core Elements	Curriculum Topic	Cognitive Domain	Level
MT01	Numbers, operations and relationships	Counting and writing numbers	Counts illustrated object	Level 1
MT02	Space and Shape	Shapes	Recognizes simple shapes	Level 1
MT03	Space and Shape	Shapes	Recognizes simple shapes	Level 1
MT04	Numbers, operations and relationships	Addition of numbers	Add two-digit numbers and two-digit numbers without carrying (Horizontal form)	Level 1
MT05	Numbers, operations and relationships	Addition of numbers	Add one-digit number and one-digit number with carrying	Level 3
MT06	Numbers, operations and relationships	Addition of numbers	Add two-digit numbers and two-digit numbers without carrying	Level 1
MT07	Numbers, operations and relationships	Addition of numbers	Add three-digit numbers and two-digit numbers without carrying	Level 2
MT08	Numbers, operations and relationships	Addition of numbers	Add three-digit numbers and two-digit numbers with carrying	Level 4
MT09	Numbers, operations and relationships	Addition of numbers	Add three-digit numbers and three-digit numbers with carrying	Level 4
MT10	Numbers, operations and relationships	Subtraction of numbers	Subtract from two-digit numbers to two-digit numbers without borrowing (Horizontal form)	Level 1
MT11	Numbers, operations and relationships	Subtraction of numbers	Subtract from two-digit numbers to one-digit number without borrowing	Level 2
MT12	Numbers, operations and relationships	Subtraction of numbers	Subtract from two-digit numbers to two-digit numbers without borrowing	Level 1
MT13	Numbers, operations and relationships	Subtraction of numbers	Subtract from three-digit numbers to two-digit numbers without borrowing	Level 2
MT14	Numbers, operations and relationships	Subtraction of numbers	Subtract from three-digit numbers to three-digit numbers with borrowing	Level 4
MT15	Numbers, operations and relationships	Multiplication	Multiply one-digit number by one-digit number (Horizontal form)	Level 1
MT16	Numbers, operations and relationships	Multiplication	Multiply one-digit number by one-digit number	Level 1
MT17	Numbers, operations and relationships	Multiplication	Multiply two-digit numbers by one-digit number	Level 2
MT18	Numbers, operations and relationships	Division	Divide one-digit number by one-digit number (Horizontal form)	Level 1
MT19	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number (Horizontal form)	Level 2
MT20	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number	Level 2
MT21	Patterns, functions and algebra	Patterns	Sequences (Small numbers to large numbers)	Level 1
MT22	Patterns, functions and algebra	Patterns	Sequences (Large numbers to small numbers)	Level 2
MT23	Numbers, operations and relationships	Counting and writing numbers	Understand number and digit	Level 2
MT24	Numbers, operations and relationships	Common fractions	Understand meaning of fractions	Level 1
MT25	Numbers, operations and relationships	Common fractions	Add fractions of the same denominators	Level 2
MT26	Numbers, operations and relationships	Common fractions	Subtract fractions of the same denominators	Level 3
MT27	Numbers, operations and relationships	Common fractions	Add fractions of the different denominators	Level 2
MT28	Numbers, operations and relationships	Common fractions	Subtract fractions of the different denominators	Level 3
MT29	Numbers, operations and relationships	Common fractions	Add decimal fractions and decimal fractions without carrying	Level 2
MT30	Numbers, operations and relationships	Common fractions	Subtract from decimal fractions to decimal fractions without borrowing	Level 2
MT31	Measurements	Time	Tell the time on the hour	Level 1
MT32	Measurements	Volume	Measure volume	Level 1
MT33	Measurements	Mass	Measure weight	Level 1
MT34	Measurements	Areas	Find area of rectangles	Level 2
MT35	Accounting and business studies	Addition of money	Addition of money (Formula)	Level 1
MT36	Accounting and business studies	Addition of money	Addition of money (Answer)	Level 1
MT37	Accounting and business studies	Multiplication of money	Multiplication of money (Formula)	Level 2
MT38	Accounting and business studies	Multiplication of money	Multiplication of money (Answer)	Level 2
MT39	Data handling	Picture graphs	Read picture graphs (One information)	Level 1
MT40	Data handling	Picture graphs	Read picture graphs (Multiple information)	Level 2

Appendix 8. Grade 8 mathematics test

Item ID	Core Elements	Curriculum Topic	Cognitive domain	Level
MT01	Numbers, operations and relationships	Addition	Add two-digit numbers and three-digit numbers without carrying	Level 2
MT02	Numbers, operations and relationships	Addition	Add three-digit numbers and three-digit numbers with carrying	Level 3
MT03	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to two-digit numbers without borrowing	Level 2
MT04	Numbers, operations and relationships	Subtraction	Subtract from three-digit numbers to three-digit numbers with borrowing	Level 3
MT05	Numbers, operations and relationships	Multiplication	Multiply one-digit number by three-digit numbers	Level 2
MT06	Numbers, operations and relationships	Multiplication	Multiply two-digit numbers by two-digit numbers	Level 3
MT07	Numbers, operations and relationships	Division	Divide two-digit numbers by one-digit number	Level 2
MT08	Numbers, operations and relationships	Division	Divide three-digit numbers by two-digit numbers	Level 3
MT09	Numbers, operations and relationships	Addition and subtraction	Add and subtract three-digit numbers (Horizontal form)	Level 1
MT10	Numbers, operations and relationships	Multiplication and addition	Multiply and add two-digit and three-digit numbers (Horizontal form)	Level 2
MT11	Patterns, functions and algebra	Patterns	Sequences (Large numbers to small numbers)	Level 2
MT12	Numbers, operations and relationships	Common fractions	Add fractions of the same denominators	Level 2
MT13	Numbers, operations and relationships	Common fractions	Subtract fraction of the different denominators	Level 2
MT14	Numbers, operations and relationships	Common fractions	Arrange fractions in ascending order	Level 1
MT15	Numbers, operations and relationships	Common fractions	Convert decimal fractions to fractions	Level 1
MT16	Numbers, operations and relationships	Common fractions	Convert fractions to decimal fractions	Level 1
MT17	Numbers, operations and relationships	Common fractions	Add decimal fractions and decimal fractions without carrying	Level 2
MT18	Numbers, operations and relationships	Common fractions	Subtract from decimal fractions to decimal fractions without borrowing	Level 2
MT19	Numbers, operations and relationships	Ratios	Understand ratios	Level 1
MT20	Measurements	Length	Convert cm to m	Level 1
MT21	Patterns, functions and algebra	Inequalities	Find the value of y in a system of linear equation	Level 1
MT22	Patterns, functions and algebra	Inequalities	Find the value of x in a system of linear equation	Level 2
MT23	Measurements	Time	Tell the time on the hour	Level 1
MT24	Measurements	Mass	Measure weight	Level 1
MT25	Space and Shape	Shapes	Recognize simple shapes	Level 1
MT26	Measurements	Areas	Find areas of a rectangle	Level 2
MT27	Measurements	Perimeter	Find perimeter of the figures	Level 2
MT28	Measurements	Volume	Find volume of the cuboids	Level 3
MT29	Accounting and business studies	Addition of money	Addition of money	Level 1
MT30	Accounting and business studies	Subtraction of money	Subtraction of money	Level 1
MT31	Accounting and business studies	Multiplication of money	Multiplication of money	Level 2
MT32	Accounting and business studies	Division of money	Division of money	Level 2
MT33	Data handling	Picture graphs	Read picture graphs (Single information)	Level 1
MT34	Data handling	Picture graphs	Read picture graphs (Multiple information)	Level 2
MT35	Data handling	Bar graphs	Read bar graphs (Single information)	Level 1
MT36	Data handling	Bar graphs	Read bar graphs (Single information)	Level 1
MT37	Data handling	Bar graphs	Read bar graphs (Multiple information)	Level 2
MT38	Accounting and business studies	Postal services	Read tables (Calculation of single information)	Level 3
MT39	Accounting and business studies	Postal services	Read tables (Calculation of single information)	Level 3
MT40	Accounting and business studies	Postal services	Read tables (Calculation of multiple information)	Level 4

Appendix 9. Item difficulties and item discriminations in English tests

Grade 5					Grade 6					Grade 7					Grade 8				
Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations	
	M	SE	M	SE		M	SE	M	SE		M	SE	M	SE		M	SE	M	SE
ET1	-1.282	0.080	1.643	0.146	ET1	-2.815	0.349	0.859	0.126	ET1	-2.486	0.218	1.673	0.230	ET4	-1.961	0.153	1.492	0.168
ET2	-2.151	0.209	0.956	0.112	ET2	-2.153	0.235	0.841	0.106	ET2	-2.894	0.332	1.168	0.175	ET5	-2.007	0.130	2.951	0.457
ET3	-1.481	0.109	1.259	0.119	ET3	-1.934	0.213	0.791	0.097	ET3	-2.800	0.297	1.579	0.251	ET6	-3.044	0.387	1.216	0.203
ET4	-0.020	0.066	0.960	0.080	ET4	-2.337	0.283	0.733	0.100	ET4	-1.623	0.121	1.278	0.122	ET7	-2.178	0.185	1.449	0.177
ET5	-0.484	0.065	1.090	0.089	ET6	-1.069	0.103	0.986	0.098	ET5	-1.697	0.157	0.936	0.099	ET9	1.866	0.159	1.010	0.099
ET6	-0.827	0.060	1.608	0.127	ET7	-0.987	0.086	1.178	0.110	ET6	-2.299	0.181	1.750	0.221	ET10	0.145	0.064	1.093	0.093
ET7	-0.644	0.056	1.531	0.117	ET8	-0.949	0.087	1.110	0.104	ET7	-2.651	0.288	0.998	0.134	ET11	0.384	0.077	0.924	0.084
ET8	-2.052	0.210	0.839	0.099	ET9	-1.706	0.151	1.070	0.116	ET9	-1.129	0.073	1.663	0.136	ET12	0.796	0.117	0.699	0.075
ET9	0.640	0.088	0.835	0.075	ET10	-0.758	0.091	0.894	0.089	ET10	-1.958	0.158	1.234	0.131	ET13	-0.069	0.073	0.880	0.083
ET10	-0.440	0.053	1.458	0.109	ET11	-1.561	0.167	0.800	0.092	ET11	-1.330	0.087	1.557	0.134	ET15	-1.766	0.215	0.671	0.086
ET11	0.232	0.067	0.979	0.081	ET12	-1.679	0.150	1.053	0.114	ET12	-1.429	0.092	1.610	0.143	ET16	0.078	0.081	0.786	0.078
ET12	0.531	0.101	0.665	0.069	ET13	-0.048	0.064	1.036	0.092	ET13	-0.048	0.097	0.624	0.071	ET17	1.029	0.127	0.733	0.077
ET14	-0.269	0.061	1.098	0.087	ET16	0.215	0.156	0.369	0.066	ET14	-1.787	0.122	1.562	0.155	ET18	2.434	0.442	0.388	0.070
ET15	-0.191	0.076	0.795	0.074	ET17	1.978	0.200	0.810	0.091	ET15	-1.834	0.135	1.393	0.141	ET19	3.065	0.665	0.320	0.069
ET16	-0.944	0.100	0.855	0.082	ET18	2.381	0.480	0.351	0.070	ET17	-1.527	0.108	1.362	0.126	ET21	0.848	0.196	0.401	0.066
ET17	-0.154	0.075	0.802	0.074	ET19	-1.127	0.200	0.465	0.071	ET18	-0.034	0.073	0.892	0.081	ET22	0.386	0.097	0.692	0.075
ET18	2.287	0.338	0.465	0.069	ET21	1.613	0.232	0.530	0.073	ET20	3.031	0.382	0.666	0.092	ET23	0.321	0.170	0.357	0.065
ET23	1.159	0.208	0.427	0.064	ET22	1.254	0.181	0.561	0.073	ET22	1.667	0.149	0.946	0.092	ET24	1.432	0.227	0.483	0.070
ET26	-0.026	0.061	1.068	0.085	ET23	0.348	0.085	0.776	0.079	ET23	-0.287	0.151	0.397	0.065	ET25	-0.244	0.057	1.294	0.105
ET27	0.018	0.063	1.009	0.082	ET24	2.578	0.619	0.288	0.068	ET24	1.298	0.113	1.057	0.096	ET26	-1.582	0.113	1.487	0.146
ET28	0.775	0.101	0.765	0.073	ET25	2.591	0.445	0.425	0.074	ET25	1.738	0.300	0.418	0.067	ET27	-1.179	0.095	1.238	0.114
ET29	0.503	0.065	1.164	0.089	ET26	0.295	0.070	0.989	0.089	ET26	3.058	0.587	0.367	0.071	ET28	0.080	0.069	0.959	0.086
ET30	1.705	0.175	0.726	0.077	ET27	0.978	0.118	0.769	0.081	ET27	0.728	0.241	0.301	0.063	ET29	-1.083	0.085	1.322	0.118
ET31	1.078	0.127	0.708	0.072	ET28	1.909	0.247	0.594	0.078	ET28	0.898	0.102	0.882	0.082	ET30	-0.834	0.101	0.842	0.086
ET32	2.451	0.352	0.486	0.071	ET29	0.593	0.092	0.807	0.081	ET29	0.400	0.081	0.880	0.081	ET31	-2.225	0.176	1.911	0.254
ET34	2.619	0.480	0.364	0.066	ET30	0.121	0.094	0.634	0.074	ET30	-0.366	0.064	1.159	0.095	ET33	0.048	0.074	0.876	0.082
ET35	2.513	0.589	0.277	0.063	ET31	-1.176	0.077	1.753	0.166	ET31	-1.413	0.078	2.113	0.188	ET34	0.162	0.063	1.128	0.095
					ET32	0.195	0.069	0.966	0.088	ET32	-1.372	0.073	2.265	0.201	ET35	1.132	0.192	0.487	0.069
										ET33	-1.219	0.101	1.126	0.103	ET36	0.996	0.107	0.893	0.084
										ET34	-1.2497	0.0714	1.9838	0.1666	ET37	2.5453	0.3307	0.5927	0.0814
										ET35	-0.3949	0.0545	1.5182	0.1154	ET38	-0.1202	0.0612	1.139	0.0956
										ET36	-0.7912	0.0618	1.6011	0.1242	ET39	-0.4577	0.0612	1.2795	0.1061
										ET37	0.1208	0.0679	1.0085	0.0861	ET40	0.6683	0.0977	0.8013	0.0791
										ET38	1.1851	0.1489	0.6721	0.0746					
										ET39	-0.3285	0.0656	1.0943	0.0913					
										ET40	-0.1788	0.0919	0.6754	0.0732					
M	0.205		0.920			-0.116		0.801			-0.583		1.178			-0.010		0.994	
SE	1.323		0.367			1.589		0.308			1.538		0.498			1.468		0.517	

Appendix 10. Item difficulties and item discriminations in mathematics tests

Grade 5					Grade 6					Grade 7					Grade 8				
Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations		Item ID	Item difficulties		Item discriminations	
	M	SE	M	SE		M	SE	M	SE		M	SE	M	SE		M	SE	M	SE
MT1	-2.777	0.266	1.323	0.175	MT1	-2.046	0.162	1.379	0.152	MT2	-2.484	0.366	0.547	0.085	MT4	-2.813	0.298	1.691	0.281
MT2	-0.662	0.131	0.523	0.066	MT2	-1.166	0.089	1.331	0.122	MT3	-0.557	0.137	0.503	0.071	MT6	-1.654	0.129	1.222	0.121
MT3	0.198	0.141	0.396	0.062	MT3	-1.479	0.109	1.371	0.133	MT7	-2.525	0.223	1.534	0.201	MT7	-1.376	0.113	1.118	0.106
MT4	-1.291	0.081	1.566	0.127	MT4	-2.079	0.155	1.576	0.176	MT8	-2.103	0.179	1.219	0.136	MT8	-0.975	0.069	1.588	0.131
MT5	-1.700	0.110	1.522	0.139	MT5	-2.084	0.163	1.465	0.166	MT9	-2.144	0.173	1.383	0.156	MT9	-2.204	0.217	0.961	0.114
MT6	-1.242	0.098	1.111	0.096	MT6	-1.619	0.128	1.233	0.124	MT10	-2.221	0.217	0.978	0.116	MT10	-0.507	0.110	0.616	0.072
MT7	-0.883	0.076	1.167	0.094	MT7	-1.807	0.176	0.910	0.102	MT11	-2.696	0.318	0.832	0.114	MT11	-1.842	0.129	1.583	0.165
MT8	-0.181	0.062	1.043	0.084	MT8	-0.059	0.093	0.636	0.074	MT12	-2.724	0.267	1.424	0.200	MT12	0.382	0.061	1.294	0.103
MT9	-0.231	0.064	1.011	0.083	MT9	-1.667	0.147	1.038	0.109	MT13	-1.851	0.115	2.032	0.220	MT13	0.399	0.060	1.356	0.106
MT10	-0.471	0.062	1.177	0.091	MT10	0.909	0.144	0.583	0.073	MT14	-1.652	0.106	1.710	0.166	MT16	0.844	0.158	0.503	0.069
MT11	-0.699	0.071	1.125	0.090	MT11	-1.608	0.143	1.022	0.107	MT15	-2.184	0.193	1.170	0.134	MT17	-2.953	0.356	0.979	0.145
MT12	-0.977	0.061	1.821	0.138	MT12	-1.017	0.087	1.191	0.109	MT16	-2.273	0.171	1.859	0.233	MT18	-1.834	0.164	1.019	0.109
MT13	-0.266	0.059	1.150	0.088	MT14	2.464	0.417	0.435	0.074	MT17	-2.077	0.159	1.496	0.167	MT19	2.229	0.335	0.490	0.075
MT14	0.272	0.080	0.779	0.072	MT15	2.041	0.448	0.323	0.068	MT18	-1.235	0.064	2.514	0.237	MT21	0.753	0.117	0.668	0.074
MT15	-0.655	0.055	1.636	0.121	MT16	2.355	0.498	0.330	0.068	MT19	-1.261	0.065	2.520	0.240	MT23	-1.248	0.106	1.077	0.100
MT16	-0.919	0.054	2.170	0.171	MT18	0.233	0.076	0.863	0.083	MT20	-1.439	0.096	1.534	0.141	MT24	-1.692	0.204	0.661	0.082
MT17	-0.722	0.051	2.044	0.153	MT19	-0.706	0.090	0.873	0.087	MT21	-1.255	0.089	1.428	0.127	MT25	-2.859	0.356	0.799	0.115
MT18	0.315	0.059	1.210	0.092	MT20	2.216	0.248	0.727	0.089	MT22	-0.896	0.077	1.265	0.109	MT26	1.383	0.147	0.778	0.082
MT19	0.277	0.060	1.170	0.090	MT21	1.824	0.214	0.666	0.081	MT24	-2.707	0.384	0.595	0.091	MT28	-0.627	0.094	0.795	0.079
MT20	0.047	0.063	1.012	0.082	MT22	-1.619	0.255	0.485	0.074	MT29	-1.535	0.126	1.118	0.110	MT29	-2.112	0.198	1.018	0.117
MT21	-0.121	0.073	0.839	0.075	MT23	-1.903	0.316	0.449	0.074	MT30	-0.173	0.074	0.883	0.085	MT30	-1.129	0.157	0.607	0.075
MT22	0.547	0.083	0.845	0.076	MT24	-2.265	0.281	0.676	0.091	MT31	-0.438	0.101	0.668	0.076	MT31	-0.665	0.068	1.240	0.101
MT23	-1.858	0.149	1.093	0.107	MT25	1.846	0.340	0.392	0.069	MT33	-0.808	0.144	0.553	0.073	MT32	-0.754	0.058	1.756	0.138
MT24	-1.997	0.218	0.699	0.082	MT26	-0.080	0.076	0.822	0.081	MT35	-1.183	0.114	0.945	0.093	MT33	-1.065	0.074	1.571	0.134
MT25	1.630	0.277	0.410	0.065	MT27	-1.472	0.151	0.835	0.092	MT36	-0.281	0.066	1.077	0.094	MT34	-1.637	0.122	1.337	0.133
MT26	0.977	0.236	0.335	0.061	MT28	2.309	0.335	0.517	0.077	MT37	1.834	0.248	0.594	0.082	MT35	-0.478	0.059	1.372	0.108
MT27	0.345	0.120	0.494	0.064	MT29	2.133	0.370	0.416	0.071	MT38	1.784	0.279	0.500	0.077	MT36	0.309	0.059	1.324	0.103
MT29	2.154	0.306	0.490	0.070	MT30	1.107	0.129	0.763	0.081	MT39	0.253	0.069	1.019	0.091	MT37	0.210	0.080	0.819	0.078
MT33	2.017	0.338	0.404	0.066	MT31	0.478	0.084	0.852	0.083	MT40	-1.461	0.166	0.733	0.085	MT38	-0.078	0.090	0.679	0.073
MT35	2.9371	0.6102	0.3181	0.0658	MT32	-0.5086	0.0887	0.7857	0.0815										
					MT33	-0.3039	0.0936	0.6667	0.0758										
					MT34	0.1126	0.0819	0.7513	0.0787										
					MT35	1.2777	0.1328	0.8338	0.086										
M	-0.198		1.029			-0.127		0.824			-1.320		1.194			-0.827		1.066	
SE	1.267		0.502			1.619		0.344			1.190		0.560			1.290		0.375	

Appendix 11. Equating

Grade 5 English Test			Grade 6 English Test			Grade 5 Mathematics Test			Grade 6 Mathematics Test			Grade 7 English Test			Grade 8 English Test			Grade 7 Mathematics Test			Grade 8 Mathematics Test		
Item ID	Dis	Dif	Item ID	Dis	Dif	Item	Dis	Dif	Item	Dis	Dif	Item	Dis	Dif	Item	Dis	Dif	Item	Dis	Dif	Item	Dis	Dif
ET2	0.956	-2.151	ET1	0.859	-2.815	MT6	1.111	-1.242	M1	1.379	-2.046	ET24	1.057	1.298	ET10	1.093	0.145	MT30	0.883	-0.173	MT18	1.019	-1.834
ET4	0.960	-0.020	ET2	0.841	-2.153	MT8	1.043	-0.181	M2	1.331	-1.166	ET28	0.882	0.898	ET13	0.880	-0.069	MT31	0.668	-0.438	MT23	1.077	-1.248
ET5	1.090	-0.484	ET3	0.791	-1.934	MT9	1.011	-0.231	M3	1.371	-1.479	ET36	1.601	-0.791	ET26	1.487	-1.582	MT33	0.553	-0.808	MT24	0.661	-1.692
ET7	1.531	-0.644	ET4	0.733	-2.337	MT14	0.779	0.272	M6	1.233	-1.619	ET37	1.009	0.121	ET27	1.238	-1.179	MT39	1.019	0.253	MT33	1.571	-1.065
ET9	0.835	0.640	ET6	0.986	-1.069	MT17	2.044	-0.722	M7	0.910	-1.807	ET38	0.672	1.185	ET28	0.959	0.080	MT40	0.733	-1.461	MT34	1.337	-1.637
ET10	1.458	-0.440	ET7	1.178	-0.987	MT20	1.012	0.047	M9	1.038	-1.667	ET39	1.094	-0.329	ET29	1.322	-1.083						
ET11	0.979	0.232	ET8	1.110	-0.949	MT21	0.839	-0.121	M11	1.022	-1.608	ET40	0.675	-0.179	ET30	0.842	-0.834						
ET14	1.098	-0.269	ET9	1.070	-1.706	MT22	0.845	0.547	M12	1.191	-1.017												
ET15	0.795	-0.191	ET10	0.894	-0.758	MT27	0.494	0.345	M19	0.873	-0.706												
ET16	0.855	-0.944	ET11	0.800	-1.561																		
ET17	0.802	-0.154	ET12	1.053	-1.679																		
ET31	0.708	1.078	ET26	0.989	0.295																		
M	1.006	-0.279		0.942	-1.471	M	1.020	-0.143		1.150	-1.457		0.999	0.315		1.117	-0.646		0.771	-0.525		1.133	-1.495
SD	0.257	0.808		0.142	0.833	SD	0.427	0.556		0.196	0.419		0.316	0.815		0.242	0.692		0.183	0.651		0.344	0.324
k	0.970					*k*	1.327					*k*	1.177					*k*	2.008				
l	1.148					*l*	1.790					*l*	1.075					*l*	2.477				

Appendix 12. Questionnaire for teachers

International Development and Cooperation, Hiroshima University, Japan

Questionnaire of Teacher

School:_____ Name:_____

1. Which class do you teach? Std1☐ Std2☐ Std3☐ Std4☐ Std5☐ Std6☐ Std7☐ Std8☐.
2. What is your sex? Female☐ Male☐.
3. What is your date of birth? _____year
4. How old are you? ___ years old
5. Are you a permanent or non-permanent teacher?

   Non-permanent (Volunteer)☐ Permanent teacher☐.
6. What is the highest level of academic education you have attained?

   PSLCE☐ JCE☐ MSCE☐ More than diploma☐.
7. How many years of teacher training have you received altogether?

   Not training☐ 1 – 3 years☐ More than 3 years☐.
8. How many years altogether have you been teaching? _____years
9. How many years have you been teaching in this school? _____years
10. After having completed your initial teacher training, how many short in-service courses have you attended during the last three years? _____courses
11. After having completed your initial teacher training, what is the total number of days that you spent attending in-service courses during the last three years? _____days
12. Generally, do you think that these in-service courses were effective in terms of improving teaching?

    I did not attend any in-service course.☐ Not effective☐ Reasonably effective☐.

    Effective☐ Very effective☐.
13. Which subject(s) do you teach?

    English☐ Mathematics☐ Sciences☐ Chichewa☐ Scocial and environmental sciences☐.

    Bible knowledge☐ Expressive arts☐ Others (_____)☐.
14. Where do you live?

    Teacher' house in school☐ Official house☐ Own my house (land)☐ Borrow from someone☐.

    Other (_____) ☐.

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15. How far is it from your house to school?
    0 – 0.5 km☐ 0.6 – 1 km☐ 1.1 – 2 km☐ 2.1 – 2 km☐ 2.1 – 3 km☐ More than 3 km☐.
16. How many repeaters are there in your classroom? Girl_____ Boy_____
17. How many dropouts have been there in your classroom since a school year started? Girl_____Boy_____
18. Can pupils borrow books from school to their homes? No☐ Yes☐.
19. Which of the following are available in your classroom?
    (1) Usable writing board: No☐ Yes☐ (2) Chalk: No☐ Yes☐.
    (3) Duster/eraser: No☐ Yes☐ (4) Wall chart of any kind: No☐ Yes☐.
    (5) Teacher table: No☐ Yes☐ (6) Teacher chair: No☐ Yes☐.
20. How many of the following do you have in your classroom?
    Sitting places (chairs or benches) for pupils_____ Writing places (desks or tables) for pupils_____
21. Which of the following do you have access in your school?
    (1) English dictionary: No☐ Yes☐ (2) Instruments (compass, protractor etc): No☐ Yes☐.
    (3) Teacher's guide (English): No☐ Yes☐ (4) Teacher's guide (Mathematics): No☐ Yes☐.
22. How many periods of actual teaching do you have in a typical school week at this school?
    ._____periods per week
23. How many hours, on average, do you spend in a typical school week working on lesson preparation and making for this school, outside school hours? _____hours per week
24. How often do you usually meet with the parents or guardians of the pupils in your class to discuss pupil performance or related matters?
    Never☐ Once a year☐ Once a term☐ Once or more a month☐.
25. How many days were you absent during this school year due to the following reasons?
    (1) My own illness: _____days (2) Family member's illness: _____days
    (3) Funerals(family,colleagues,friends etc):_____days (4) Bad weather / road not accessible:_____days
    (5) Official business(meeting,examination,course etc):_____days (6) Other reasons:_____days
26. How often does your head teacher advise you on your teaching?
    Never☐ Once a year☐ Once a term☐ Once or more a month☐ I am a head teacher.☐.

Please continue on backside.

27. What have you used the education resource centre for during this school year?

(1) No resource centre: No☐ Yes☐ (2) Not visist the centre: No☐ Yes☐.

(3) Look materials: No☐ Yes☐ (4) Borrow materials: No☐ Yes☐.

(5) Attend training course: No☐ Yes☐. (6) Seek advice from the staff of the centre No☐ Yes☐.

(7) Exchange ideas with teachers from other schools: No☐ Yes☐.

28. Do you give report to pupils at the end of term? No☐ Yes☐.

29. Do pupils receive the reports? None☐ A few☐ Half of them☐ Most of them☐ All of them☐.

30. Do you ask parents or guardians to sign that pupils have completed their homework? No☐ Yes☐.

31. How often do you give your pupils a written test?

No test☐ Once per term☐ Two or Three times per term☐.

Two or Three times per month☐ Once or more per week☐.

- END - Thank you very much!

Appendix 13. Questionnaire for head teachers

IDEC International Development and Cooperation, Hiroshima University, Japan

Questionnaire of Head Teacher

School:_____ Zone:_____

Name:_____Cell phone number:_____

1. Which class do you teach? Std1☐ Std2☐ Std3☐ Std4☐ Std5☐ Std6☐ Std7☐ Std8☐.
2. What is your sex? Female☐ Male☐.
3. What is your date of birth? _____year
4. How old are you? _____ years old
5. What is the highest level of academic education you have attained?

   PSLCE☐ JCE☐ MSCE☐ More than diploma☐.
6. How many years of teacher training have you received altogether?

   Not training☐ 1-3 years☐ More than 3 years☐.
7. How many years altogether have you been teaching? _____years
8. How many years have you been a head teacher? _____years
9. How many years have you been a head teacher in this school? _____years
10. Did you receive specialized training in school management after you became a head teacher?

    No☐ Yes☐, a training programme of around _____days
11. How many periods do you actually teach in a typical school week at this school? _____periods
12. Six activities that can contribute to your work as a head teacher are listed below. Pease rank the important activities by placing a 1 beside the most important activity, a 2 beside the second most important activity, etc and finally place a 6 beside the least important activity. Please write the number for each activity in the box below.

    - Contacts with local community ☐.
    - Monitoring pupils' progress ☐.
    - Administrative tasks concerning the functioning of the school ☐.
    - Discussing educational objectives with the teaching staff ☐.
    - Activities aimed at the professional development of teachers ☐.
    - Activities aimed at the professional development of a head teacher ☐.

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13. About how often the school has to deal with the following behaviours of pupils?

(1) Pupils arriving late at school Never☐ Sometimes☐ Often☐.

(2) Pupils absenteeism (i.e., unjustified absence) Never☐ Sometimes☐ Often☐.

(3) Pupils skipping classes Never☐ Sometimes☐ Often☐.

(4) Pupils dropping out of school Never☐ Sometimes☐ Often☐.

(5) Pupils Fights among pupils Never☐ Sometimes☐ Often☐.

(6) Pupil health problems Never☐ Sometimes☐ Often☐.

14. About how often does the school have to deal with the following behaviours of teachers?

(1) Teachers arriving late at school Never☐ Sometimes☐ Often☐.

(2) Teachers absenteeism (i.e.,unjustified absence) Never☐ Sometimes☐ Often☐.

(3) Teachers skipping classes Never☐ Sometimes☐ Often☐.

(4) Teacher health problems Never☐ Sometimes☐ Often☐.

15. How frequently do you take the following measures in your school when a teacher is absent for a week or more?

(1) Send pupils home Never☐ Sometimes☐ Often☐.

(2) Leave pupils to learn on their own Never☐ Sometimes☐ Often☐.

(3) Combine the class with another class Never☐ Sometimes☐ Often☐.

(4) Assign senior pupils to supervise the class Never☐ Sometimes☐ Often☐.

(5) Substitute the absent teacher with the head teacher Never☐ Sometimes☐ Often☐.

(6) Other_____ Never☐ Sometimes☐ Often☐.

16. Can pupils borrow books from school to take them to their homes? No☐ Yes☐.

17. What is the result of National Examination in your school?

	Sat	Pass
2010		
2011		
2012		

18. Which one is the location of your school? Urban☐ Semi-urban☐ Rural☐.

19. When was your school established? _____year

20. Which type is your school? L. E. A.☐ Government☐ Religious Agency☐ Others☐.

Please continue on backside.

21. What a kind of water does your school use? No water☐ Bore hole☐ Piped water☐.
22. Which a kind of electricity does your school use?

    No☐ Candle☐ Praffin or lamp ☐ Solar☐ ESCOM☐.
23. Which of the following does your school have?

    (1) Library: No☐ Yes☐. (2) Hall: No☐ Yes☐.

    (3) Staff room: No☐ Yes☐. (4) Head teacher's room: No☐ Yes☐.

    (5) Playground: No☐ Yes☐. (6) School garden: No☐ Yes☐.
24. How many classrooms does your school have?

    Open-air teaching areas_____ Temporary classrooms_____ Permanent classrooms_____
25. How many toilets does your school have?

    Girls_____ Boys_____ Staff_____
26. How far is your school from the paved road? _____km
27. Does the government allocate funds for your school? No☐ Yes☐, received MK_____
28. Are there any NGOs or donors active in your school? No☐ Yes☐,_____
29. Has there been a School Feeding Programme for pupils? No☐ Yes☐.
30. How many teachers are there in your school?

    Non-permanent (Volunteer) male teachers_____ Permanent male teachers_____

    Non-permanent (Volunteer) female teachers_____ Permanent female teachers_____

    Total number of all teachers_____
31. How many of the teachers in your school have completed the following levels of academic education?

    PSLCE_____ JCE_____ MSCE_____ More than diploma_____
32. How many of the teachers in your school have completed the following teacher training?

    No teacher training_____ 1 – 3 years_____ More than 3 years_____
33. What is the enrollment of your school?

	Std 1	Std 2	Std 3	Std 4	Std 5	Std 6	Std 7	Std 8	Total
Girl									
Boy									
Total									

34. How many villages where most pupils live? _____villages

35. About how many books are there in school?

	Std 1	Std 2	Std 3	Std 4	Std 5	Std 6	Std 7	Std 8
English								
Mathematics								

36. Does your school collect money from parents?

(1) Volunteer teachers: MK_____ (2) Mock examination: MK_____

(3) Extra class: MK_____ (4) Report card: MK_____

(5) School development: MK_____ (6) Fundation body (i.e., church): MK_____

(7) Others (_____): MK_____

37. What do parents / the community contribute to the school?

(1) Attendance of meetings Never☐ Sometimes☐ Often☐.

(2) Attendance of school activities Never☐ Sometimes☐ Often☐.

(3) Make School Improvement Plan Never☐ Sometimes☐ Often☐.

(4) Construction and maintenance of school blocks Never☐ Sometimes☐ Often☐.

(5) Construction and maintenance of classrooms Never☐ Sometimes☐ Often☐.

(6) Construction and maintenance of teacher houses Never☐ Sometimes☐ Often☐.

(7) Maintenance and repair of desks and chairs Never☐ Sometimes☐ Often☐.

(8) Provision of learning materials Never☐ Sometimes☐ Often☐.

(9) Provision of school meals Never☐ Sometimes☐ Often☐.

(10) Monitor of teachers Never☐ Sometimes☐ Often☐.

(11) Monitor of pupils Never☐ Sometimes☐ Often☐.

(12) Others (_____) Never☐ Sometimes☐ Often☐.

38. To what extent is lack of co-operation from the community a problem in your school?

Not a problem☐ A minor problem☐ A major problem☐.

39. How many times has your school visited by Primary Education Advisers? _____times

- END - Thank you very much!

Appendix 14. Questionnaire for SMC and PTA members

International Development and Cooperation, Hiroshima University, Japan

Questionnaire of SMC / PTA

School:_____Name:_____

1. What is your sex? Female☐ Male☐.
2. What is your date of birth? _____year
3. How old are you? ___ years old
4. What is your present or previous occupation? _____
5. What is the highest level of academic education you have attained?

   PSLCE☐ JCE☐ MSCE☐ More than diploma☐.
6. When did you become a member of SMC / PTA? Since_____
7. What is a role of SMC/ PTA? (i.e, chairman, secretary, member, etc) _____
8. How many times do you have meetings in a term? _____times
9. Does your school collect money from parents?

   (1) Volunteer teachers: MK_____

   (2) Mock examination: MK_____

   (3) Extra class: MK_____

   (4) Report card: MK_____

   (5) School development: MK_____

   (6) Foundation body (i.e. church): MK_____

   (7) Others (_____): MK_____
10. What do parents / the community contribute to the school?

    (1) Attendance of meetings Never☐ Sometimes☐ Often☐.

    (2) Attendance of school activities Never☐ Sometimes☐ Often☐.

    (3) Make School Improvement Plan Never☐ Sometimes☐ Often☐.

    (4) Construction and maintenance of school blocks Never☐ Sometimes☐ Often☐.

    (5) Construction and maintenance of classrooms Never☐ Sometimes☐ Often☐.

    (6) Construction and maintenance of teacher houses Never☐ Sometimes☐ Often☐.

    (7) Maintenance and repair of desks and chairs Never☐ Sometimes☐ Often☐.

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(8) Provide learning materials Never☐ Sometimes☐ Often☐.

(9) Provision of school meals Never☐ Sometimes☐ Often☐.

(10) Monitor teachers Never☐ Sometimes☐ Often☐.

(11) Monitor pupils Never☐ Sometimes☐ Often☐.

(12) Others Never☐ Sometimes☐ Often☐.

11. To what extent is lack of co-operation from the community a problem in your school?

Not a problem☐ A minor problem☐ A major problem☐.

12. How far is it from your house to school?

0 – 0.5 km☐ 0.6 – 1 km☐ 1.1 – 2 km☐ 2.1 – 2 km☐ 2.1 – 3 km☐ More than 3 km☐.

13. What a kind of water do you use? Bore hole☐ Piped water☐.

14. Which a kind of electricity do you use at home?

No☐ Candle☐ Praffin or lamp ☐ Solar☐ ESCOM☐.

15. Which of the following things do you have at home?

(1) Clock: No☐ Yes☐ (2) Bed: No☐ Yes☐.

(3) Bicycle: No☐ Yes☐. (4) Car: No☐ Yes☐.

(5) Motorcycle: No☐ Yes☐ (6) Radio: No☐ Yes☐.

(7) Cellphone: No☐ Yes☐ (8) Table: No☐ Yes☐.

(9) Chair: No☐ Yes☐. (10) Sofa: No☐ Yes☐.

(11) Mbaula: No☐ Yes☐ (12) TV: No☐ Yes☐.

(13) Video prayer: No☐ Yes☐ (14) DVD prayer: No☐ Yes☐.

(15) Radio cassette: No☐ Yes☐ (16) Cooker: No☐ Yes☐.

16. What is the roof of your home made of? Grass thatch☐ Iron sheet☐ Wood☐.

17. What are the outside walls of your home made of? Grass thatch☐ Brick☐ Wood☐.

- END - Thank you very much!

Appendix 15. Questionnaire for students

International Development and Cooperation, Hiroshima University, Japan

Questionnaire of Pupil

School:_____ Name:_____

1. Which class are you? Std3☐ Std4☐ Std5☐ Std6☐ Std7☐ Std8☐.
2. Are you a boy or a girl? Girl☐ Boy☐ .
3. What is your date of birth? _____year
4. How old are you? ___ years old
5. Did you go to a nursery school?
   Never☐ 2 or 3 months☐ 1 year☐ 2 years☐ 3 or more years☐.
6. Do you speak English outside school?
   Never☐ Sometimes☐ Most of the time☐ All of the time☐.
7. Is your biological (natural) mother alive? No☐ Yes☐ I do not know.☐.
8. Is your biological (natural) father alive? No☐ Yes☐ I do not know.☐.
9. With whom do you stay during the school week?
   With my parents☐ With my mother only☐ With my father only☐ With a relative or another family☐.
10. How many brother(s) and sister(s) live with you at your home? ~~(Including yourself).~~
    0☐ 1☐ 2☐ 3☐ 4☐ More than 5☐.
11. What sibling order are you at home?
    1st☐ 2nd☐ 3rd☐ 4th☐ 5th☐ 6th☐ Other☐.
12. Are you any chronically ill persons at home? No☐ Yes☐.
13. How far is it from your house to school?
    0 – 0.5 km☐ 0.6 – 1 km☐ 1.1 – 2 km☐ 2.1 – 2 km☐ 2.1 – 3 km☐ More than 3 km☐.
14. How many books are there at home? 0☐ 1 – 5☐ 5 – 10☐ More than 10☐.
15. What a kind of water do you use? Bore hole☐ Piped water☐.
16. Which a kind of electricity do you use at home?
    No☐ Candle☐ Praffin or lamp ☐ Solar☐ ESCOM☐.
17. Which of the following things do you have at home?
    (1) Clock: No☐ Yes☐ (2) Bed: No☐ Yes☐ (3) Bicycle: No☐ Yes☐.
    (4) Car: No☐ Yes☐ (5) Motorcycle: No☐ Yes☐ (6) Radio: No☐ Yes☐.
    (7) Cellphone: No☐ Yes☐ (8) Table: No☐ Yes☐ (9) Chair: No☐ Yes☐.
    (10) Sofa: No☐ Yes☐ (11) Mbaula: No☐ Yes☐ (12) TV: No☐ Yes
    (13) Video player: No☐ Yes☐ (14) DVD player: No☐ Yes☐ .
    (15) Radio cassette: No☐ Yes☐ (16) Cooker: No☐ Yes☐.
18. What is the roof of your home made of? Grass thatch☐ Iron sheet☐ Wood☐.
19. What are the outside walls of your home made of? Grass thatch☐ Brick☐ Wood☐.

1

20. What is the highest level of education completed by your mother(or female guardian)?
    No school☐ Primary☐ Junior Secondary(Form 1-2)☐ .
    Senior Secondary(Form 3-4)☐. More than Secondary(Technical, TTC, Diploma, Degree etc)☐.
21. What is the highest level of education completed by your father(or male guardian)?
    No school☐ Primary☐ Junior Secondary(Form 1-2)☐ .
    Senior Secondary(Form 3-4)☐. More than Secondary(Technical, TTC, Diploma, Degree etc)☐.
22. How many school days were you absent during the last two weeks?
    0☐ 1☐ 2☐ 3☐ More than 4☐.
23. What was the reason for your absence?
    I was ill.☐ A member of my family was ill.☐ I had to visit the doctor.☐ .
    I had to care for my borhter(s) or sister(s).☐ I had to go to a funeral.☐ Other reason(s)☐.
24. How many times have you repeated a grade since you started school until now?
    0☐ 1☐ 2☐ More than 3☐.
25. Are you repeating the present standard this year? No☐ Yes☐.
26. How often do you normally eat breakfast?
    Not at all☐ 1 – 2 days per week☐ 3 – 4 days per week☐ Every day of the week☐.
27. How often do you normally eat lunch?
    Not at all☐ 1 – 2 days per week☐ 3 – 4 days per week☐ Every day of the week☐.
28. How often do you normally eat supper?
    Not at all☐ 1 – 2 days per week☐ 3 – 4 days per week☐ Every day of the week☐.
29. Do you like to go to school?
    Strongly disagree☐ Disagree☐ Agree☐ Strongly agree☐.
30. Do you enjoy learning at school?
    Strongly disagree☐ Disagree☐ Agree☐ Strongly agree☐.
31. Do you learn a lot at school?
    Strongly disagree☐ Disagree☐ Agree☐ Strongly agree☐.
32. Can you do things as well as the others can do?
    Strongly disagree☐ Disagree☐ Agree☐ Strongly agree☐.
33. Do you participate in school sport or cultural activities?
    Never☐ Sometimes☐ Most of the time☐ All of the time
34. How is your health condition? Very bad☐ Bad☐ Normal☐ Good☐ Very good☐.
35. Do you feel you are a useless person?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
36. Which of the following do you wish to complete?
    Primary☐ Junior Seconary(Form 1-2)☐ Senior Secondary(Form 3-4)☐ .
    More than Secondary(Technical , TTC, Diploma, Degree etc)☐.

Please continue on backside.

37. How often do you look after brothers and sisters? Never☐ Some days☐ Most of days☐.
38. How often do you cook? Never☐ Some days☐ Most of days☐.
39. How often do you do house cleaning? Never☐ Some days☐ Most of days☐.
40. How often do you sweep outside the house? Never☐ Some days☐ Most of days☐.
41. How often do you wash and iron clothes? Never☐ Some days☐ Most of days☐.
42. How often do you fetch water? Never☐ Some days☐ Most of days☐.
43. How often do you cut fire wood? Never☐ Some days☐ Most of days☐.
44. How often do you collect fire wood? Never☐ Some days☐ Most of days☐.
45. How often do you go shopping? Never☐ Some days☐ Most of days☐.
46. How often do you work in a garden? Never☐ Some days☐ Most of days☐.
47. How often do you take care of livestock? Never☐ Some days☐ Most of days☐.
48. How often do you help in a family business? Never☐ Some days☐ Most of days☐.
49. What do you sit on in your classroom? Floor☐ Chair☐.
50. What writing place do you have in your classroom? No desk☐ Desk☐.
51. Are you allowed to take textbooks home from school? No☐ Yes☐.
52. How often do you use textbooks in English class during the lessons?
    No☐ Only teacher☐ Share with friends☐ Use my textbook☐.
53. How often do you use textbooks in Mathematics class during lessons?
    No☐ Only teacher☐ Share with friends☐ Use my textbook☐.
54. Do you take extra class? No☐ Yes☐.
55. In which subjects do you take extra class?
    English☐ Mathematics☐ Chiechewa☐ Science☐ Life skills☐.
56. Who gives you these extra class? My class teacher☐ Another teacher☐.
57. Do you pay for taking extra class? No☐ Yes☐.
58. How often are you given homework?
    No homework☐ 1–2 times each month☐ 1–2 times each week☐ Most days of the week☐.
59. How often does a person at home help you with your homework?
    No homework☐ Never☐ Sometimes☐ Most of the time☐ Always☐.
60. How often does your teacher correct your homework?
    No homework☐ Never☐ Sometimes☐ Most of the time☐ Always☐.
61. How often does your teacher explain the answers to your homework during class?
    No homework☐ Never☐ Sometimes☐ Most of the time☐ Always☐.
62. How often does crime happen in your community?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
63. Are there people doing during drug in your village?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.

64. Do you pay the fee of a report card?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
65. Do you pay the fee of the end of the term examination?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
66. Do you pay the fee of school development?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
67. Do your parents participate in the meeting at school?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
68. Do your parents participate in school activities?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.
69. Do your parents talk with your teacher?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.

Only Grade 8 pupils

70. Do you pay the fee of mock examination?
    Never☐ Sometimes☐ Most of the time☐ All of the time☐.

- END - Thank you very much!

Appendix 16. Model specifications

1. Two-Level Logistic Regression for Repetition, Dropout, and Transfer Rates

(1) Null model.

$$logit(P_{ij}) = \ln\left(\frac{Repetition\ Rates_{ij}, Dropout\ Rates_{ij}\ or\ Transfer\ Rates_{ij}}{1 - Repetition\ Rates_{ij}, Dropout\ Rates_{ij} or\ Transfer\ Rates_{ij}}\right) = \gamma_{00} + \mu_{0j}$$

(2) Model 1 for the school social composition model.

Level 1:

$$logit(P_{ij}) = \ln\left(\frac{Repetition\ Rates_{ij}, Dropout\ Rates_{ij}\ or\ Transfer\ Rates_{ij}}{1 - Repetition\ Rates_{ij}, Dropout\ Rates_{ij} or\ Transfer\ Rates_{ij}}\right)$$
$$= \beta_{0j} + \beta_{1j} * Achieveement + \beta_{2j} * Student\ gender_{ij} + \beta_{3j} * Age\ of\ first\ entry_{ij} + \beta_{4j} * Preschool\ attendance_{ij} + \beta_{5j}$$
$$* Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \beta_{6j} * Number\ of\ grade\ repetitions_{ij} + \beta_{7j}$$
$$* Repetition\ at\ grades\ 5\ or\ 7_{ij} + \beta_{8j} * Homework_{ij} + \beta_{9j} * Taking\ extra\ classes_{ij} + \beta_{10j} * Health\ condition_{ij} + \beta_{11j}$$
$$* Self - esteem_{ij} + \beta_{12j} * Feelings\ about\ school_{ij} + \beta_{13j} * Educational\ aspiration_{ij} + \beta_{14j} * Number\ of\ siblings_{ij}$$
$$+ \beta_{15j} * Speaking\ language\ of\ instruction_{ij} + \beta_{16j} * Parents\ alive_{ij} + \beta_{17j} * Living\ with\ parents\ or\ relatives_{ij} + \beta_{18j}$$
$$* Socioeconomic\ status_{ij} + \beta_{19j} * Number\ of\ books\ at\ home_{ij} + \beta_{20j} * Distance\ to\ school_{ij} + \beta_{21j} * Household\ tasks_{ij}$$
$$+ \beta_{22j} * Meals\ per\ week_{ij} + \beta_{23j} * Homework\ help\ at\ home_{ij} + \beta_{24j} * Paying\ fees_{ij} + \beta_{25j} * Parental\ support_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\ Mean\ achievement_j + \gamma_{02}\ Mean\ socioeconomic\ status_j + \gamma_{03}\ Mean\ number\ of\ grade\ repetitions_j + \mu_{0j},$$

where $\mu_{0j} \sim N(0, \tau_{00})$

$\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$, $\beta_{8j} = \gamma_{80}$, $\beta_{9j} = \gamma_{90}$, $\beta_{10j} = \gamma_{100}$, $\beta_{11j} = \gamma_{110}$, $\beta_{12j} = \gamma_{120}$, $\beta_{13j} = \gamma_{130}$, $\beta_{14j} = \gamma_{140}$, $\beta_{15j} = \gamma_{150}$, $\beta_{16j} = \gamma_{160}$, $\beta_{17j} = \gamma_{170}$, $\beta_{17j} = \gamma_{170}$, $\beta_{18j} = \gamma_{180}$, $\beta_{19j} = \gamma_{190}$, $\beta_{20j} = \gamma_{200}$, $\beta_{21j} = \gamma_{210}$, $\beta_{22j} = \gamma_{220}$, $\beta_{23j} = \gamma_{230}$, $\beta_{24j} = \gamma_{240}$, $\beta_{25j} = \gamma_{250}$

Mixed:

$$logit(P_{ij}) = \ln\left(\frac{Repetition\ Rates_{ij}, Dropout\ Rates_{ij}\ or\ Transfer\ Rates_{ij}}{1 - Repetition\ Rates_{ij}, Dropout\ Rates_{ij} or\ Transfer\ Rates_{ij}}\right)$$

$$= \gamma_{00} + \gamma_{01}\, Mean\ achievement_j + \gamma_{02}\, Mean\ socioecnomic\ status_j + \gamma_{03}\, Mean\ number\ of\ grade\ repetitions_j + \gamma_{10} * Achieveement + \gamma_{20} * Student\ gender_{ij} + \gamma_{30} * Age\ of\ first\ entry_{ij} + \gamma_{40} * Preschool\ attendance_{ij} + \gamma_{50} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \gamma_{60} * Number\ of\ grade\ repetitions_{ij} + \gamma_{70} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \gamma_{80} * Homework_{ij} + \gamma_{90} * Taking\ extra\ classes_{ij} + \gamma_{100} * Health\ condition_{ij} + \gamma_{110} * Self - esteem_{ij} + \gamma_{120} * Feelings\ about\ school_{ij} + \gamma_{130} * Educational\ aspiration_{ij} + \gamma_{140} * Number\ of\ siblings_{ij} + \gamma_{150} * Speaking\ language\ of\ instruction_{ij} + \gamma_{160} * Parents\ alive_{ij} + \gamma_{170} * Living\ with\ parents\ or\ relatives_{ij} + \gamma_{180} * Socioeconomic\ status_{ij} + \gamma_{190} * Number\ of\ books\ at\ home_{ij} + \gamma_{200} * Distance\ to\ school_{ij} + \gamma_{210} * Household\ tasks_{ij} + \gamma_{220} * Meals\ per\ week_{ij} + \gamma_{230} * Homework\ help\ at\ home_{ij} + \gamma_{240} * Paying\ fees_{ij} + \gamma_{250} * Parental\ support_{ij} + \mu_{0j}$$

(3) Model 2 for the school input model.

Level 1:

$$logit(P_{ij}) = \ln\left(\frac{Repetition\ Rates_{ij}, Dropout\ Rates_{ij}\ or\ Transfer\ Rates_{ij}}{1 - Repetition\ Rates_{ij}, Dropout\ Rates_{ij} or\ Transfer\ Rates_{ij}}\right)$$

$$= \beta_{0j} + \beta_{1j} * Achievement_{ij} + \beta_{2j} * Student\ gender_{ij} + \beta_{3j} * Age\ of\ first\ entry_{ij} + \beta_{4j} * Preschool\ attendance_{ij} + \beta_{5j} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \beta_{6j} * Number\ of\ grade\ repetitions_{ij} + \beta_{7j} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \beta_{8j} * Homework_{ij} + \beta_{9j} * Taking\ extra\ classes_{ij} + \beta_{10j} * Health\ condition_{ij} + \beta_{11j} * Self-esteem_{ij} + \beta_{12j} * Feelings\ about\ school_{ij} + \beta_{13j} * Educational\ aspiration_{ij} + \beta_{14j} * Number\ of\ siblings_{ij} + \beta_{15j} * Speaking\ language\ of\ instruction_{ij} + \beta_{16j} * Parents\ alive_{ij} + \beta_{17j} * Living\ with\ parents\ or\ relatives_{ij} + \beta_{18j} * Socioeconomic\ status_{ij} + \beta_{19j} * Number\ of\ books\ at\ home_{ij} + \beta_{20j} * Distance\ to\ school_{ij} + \beta_{21j} * Household\ tasks_{ij} + \beta_{22j} * Meals\ per\ week_{ij} + \beta_{23j} * Homework\ help\ at\ home_{ij} + \beta_{24j} * Paying\ fees_{ij} + \beta_{25j} * Parental\ support_{ij}$$

Level 2:

$\beta_{0j} = \gamma_{00} + \gamma_{01}\ Mean\ achievement_j + \gamma_{02}\ Mean\ socioeconomic\ status_j + \gamma_{03}\ Mean\ number\ of\ grade\ repetitions_j + \gamma_{04}\ Class\ size_j + \gamma_{05}\ School\ location_j + \gamma_{06}\ School\ facilities_j + \mu_{0j}$, where $\mu_{0j} \sim N(0, \tau_{00})$

$\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$, $\beta_{8j} = \gamma_{80}$, $\beta_{9j} = \gamma_{90}$, $\beta_{10j} = \gamma_{100}$, $\beta_{11j} = \gamma_{110}$, $\beta_{12j} = \gamma_{120}$, $\beta_{13j} = \gamma_{130}$, $\beta_{14j} = \gamma_{140}$, $\beta_{15j} = \gamma_{150}$, $\beta_{16j} = \gamma_{160}$, $\beta_{17j} = \gamma_{170}$, $\beta_{17j} = \gamma_{170}$, $\beta_{18j} = \gamma_{180}$, $\beta_{19j} = \gamma_{190}$, $\beta_{20j} = \gamma_{200}$, $\beta_{21j} = \gamma_{210}$, $\beta_{22j} = \gamma_{220}$, $\beta_{23j} = \gamma_{230}$, $\beta_{24j} = \gamma_{240}$, $\beta_{25j} = \gamma_{250}$, $\beta_{26j} = \gamma_{260}$, $\beta_{27j} = \gamma_{270}$

Mixed:

$$logit(P_{ij}) = \ln\left(\frac{Repetition\ Rates_{ij}, Dropout\ Rates_{ij}\ or\ Transfer\ Rates_{ij}}{1 - Repetition\ Rates_{ij}, Dropout\ Rates_{ij} or\ Transfer\ Rates_{ij}}\right)$$

$$= \gamma_{00} + \gamma_{01}\, Mean\ achievement_j + \gamma_{02}\, Mean\ socioecnomic\ status_j + \gamma_{03}\, Mean\ number\ of\ grade\ repetitions_j$$
$$+ \gamma_{04}\, Class\ size_j + \gamma_{05}\, School\ location_j + \gamma_{06}\, School\ facilities_j + \gamma_{10} * Achieveement + \gamma_{20} * Student\ gender_{ij} + \gamma_{30}$$
$$* Age\ of\ first\ entry_{ij} + \gamma_{40} * Preschool\ attendance_{ij} + \gamma_{50} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \gamma_{60}$$
$$* Number\ of\ grade\ repetitions_{ij} + \gamma_{70} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \gamma_{80} * Homework_{ij} + \gamma_{90}$$
$$* Taking\ extra\ classes_{ij} + \gamma_{100} * Health\ condition_{ij} + \gamma_{110} * Self - esteem_{ij} + \gamma_{120} * Feelings\ about\ school_{ij} + \gamma_{130}$$
$$* Educational\ aspiration_{ij} + \gamma_{140} * Number\ of\ siblings_{ij} + \gamma_{150} * Speaking\ language\ of\ instruction_{ij} + \gamma_{160}$$
$$* Parents\ alive_{ij} + \gamma_{170} * Living\ with\ parents\ or\ relatives_{ij} + \gamma_{180} * Socioeconomic\ status_{ij} + \gamma_{190}$$
$$* Number\ of\ books\ at\ home_{ij} + \gamma_{200} * Distance\ to\ school_{ij} + \gamma_{210} * Household\ tasks_{ij} + \gamma_{220} * Meals\ per\ week_{ij} + \gamma_{230}$$
$$* Homework\ help\ at\ home_{ij} + \gamma_{240} * Paying\ fees_{ij} + \gamma_{250} * Parental\ support_{ij} + \mu_{0j}$$

2. Two-Level Linear Regression for Achievement and Achievement Growth

(1) Null model.

$$Achievement\ or\ Achievement\ Growth_{ij} = \gamma_{00} + r_{ij} + u_{0j}$$

(2) Model 1 for school social composition level.

Level 1:

$$Achievement\ or\ Achievement\ Growth_{ij} = \beta_{0j} + \beta_{1j} * Achievement_{ij} + \beta_{2j} * Student\ gender_{ij} + \beta_{3j} * Age\ of\ first\ entry_{ij} + \beta_{4j} * Preschool\ attendance_{ij} + \beta_{5j} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \beta_{6j} * Number\ of\ grade\ repetitions_{ij} + \beta_{7j} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \beta_{8j} * Homework_{ij} + \beta_{9j} * Taking\ extra\ classes_{ij} + \beta_{10j} * Health\ condition_{ij} + \beta_{11j} * Self-esteem_{ij} + \beta_{12j} * Feelings\ about\ school_{ij} + \beta_{13j} * Educational\ aspiration_{ij} + \beta_{14j} * Number\ of\ siblings_{ij} + \beta_{15j} * Speaking\ language\ of\ instruction_{ij} + \beta_{16j} * Parents\ alive_{ij} + \beta_{17j} * Living\ with\ parents\ or\ relatives_{ij} + \beta_{18j} * Socioeconomic\ status_{ij} + \beta_{19j} * Number\ of\ books\ at\ home_{ij} + \beta_{20j} * Distance\ to\ school_{ij} + \beta_{21j} * Household\ tasks_{ij} + \beta_{22j} * Meals\ per\ week_{ij} + \beta_{23j} * Homework\ help\ at\ home_{ij} + \beta_{24j} * Paying\ fees_{ij} + \beta_{25j} * Parental\ support_{ij} + r_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\ Mean\ achievement_j + \gamma_{02}\ Mean\ socioeconomic\ status_j + \gamma_{03}\ Mean\ number\ of\ grade\ repetitions_j + \mu_{0j},$$

where $\mu_{0j} \sim N(0, \tau_{00})$

$\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$, $\beta_{8j} = \gamma_{80}$, $\beta_{9j} = \gamma_{90}$, $\beta_{10j} = \gamma_{100}$, $\beta_{11j} = \gamma_{110}$, $\beta_{12j} = \gamma_{120}$, $\beta_{13j} = \gamma_{130}$, $\beta_{14j} = \gamma_{140}$, $\beta_{15j} = \gamma_{150}$, $\beta_{16j} = \gamma_{160}$, $\beta_{17j} = \gamma_{170}$, $\beta_{17j} = \gamma_{170}$, $\beta_{18j} = \gamma_{180}$, $\beta_{19j} = \gamma_{190}$, $\beta_{20j} = \gamma_{200}$, $\beta_{21j} = \gamma_{210}$, $\beta_{22j} = \gamma_{220}$, $\beta_{23j} = \gamma_{230}$, $\beta_{24j} = \gamma_{240}$, $\beta_{25j} = \gamma_{250}$

Mixed:

$$Achievement\ or\ Achievement\ Growth_{ij} = \gamma_{00} + \gamma_{01}\, Mean\ achievement_j + \gamma_{02}\, Mean\ socioecnomic\ status_j + \gamma_{03}\, Mean\ number\ of\ grade\ repetitions_j + \gamma_{10} * Achieveement + \gamma_{20} * Student\ gender_{ij} + \gamma_{30} * Age\ of\ first\ entry_{ij} + \gamma_{40} * Preschool\ attendance_{ij} + \gamma_{50} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \gamma_{60} * Number\ of\ grade\ repetitions_{ij} + \gamma_{70} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \gamma_{80} * Homework_{ij} + \gamma_{90} * Taking\ extra\ classes_{ij} + \gamma_{100} * Health\ condition_{ij} + \gamma_{110} * Self-esteem_{ij} + \gamma_{120} * Feelings\ about\ school_{ij} + \gamma_{130} * Educational\ aspiration_{ij} + \gamma_{140} * Number\ of\ siblings_{ij} + \gamma_{150} * Speaking\ language\ of\ instruction_{ij} + \gamma_{160} * Parents\ alive_{ij} + \gamma_{170} * Living\ with\ parents\ or\ relatives_{ij} + \gamma_{180} * Socioeconomic\ status_{ij} + \gamma_{190} * Number\ of\ books\ at\ home_{ij} + \gamma_{200} * Distance\ to\ school_{ij} + \gamma_{210} * Household\ tasks_{ij} + \gamma_{220} * Meals\ per\ week_{ij} + \gamma_{230} * Homework\ help\ at\ home_{ij} + \gamma_{240} * Paying\ fees_{ij} + \gamma_{250} * Parental\ support_{ij} + r_{ij} + \mu_{0j}$$

(3) Model 2 for school input model.

Level 1:

$$Achievement\ or\ Achievement\ Growth_{ij} = \beta_{0j} + \beta_{1j} * Achievement_{ij} + \beta_{2j} * Student\ gender_{ij} + \beta_{3j} * Age\ of\ first\ entry_{ij} + \beta_{4j} * Preschool\ attendance_{ij} + \beta_{5j} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \beta_{6j} * Number\ of\ grade\ repetitions_{ij} + \beta_{7j} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \beta_{8j} * Homework_{ij} + \beta_{9j} * Taking\ extra\ classes_{ij} + \beta_{10j} * Health\ condition_{ij} + \beta_{11j} * Self-esteem_{ij} + \beta_{12j} * Feelings\ about\ school_{ij} + \beta_{13j} * Educational\ aspiration_{ij} + \beta_{14j} * Number\ of\ siblings_{ij} + \beta_{15j} * Speaking\ language\ of\ instruction_{ij} + \beta_{16j} * Parents\ alive_{ij} + \beta_{17j} * Living\ with\ parents\ or\ relatives_{ij} + \beta_{18j} * Socioeconomic\ status_{ij} + \beta_{19j} * Number\ of\ books\ at\ home_{ij} + \beta_{20j} * Distance\ to\ school_{ij} + \beta_{21j} * Household\ tasks_{ij} + \beta_{22j} * Meals\ per\ week_{ij} + \beta_{23j} * Homework\ help\ at\ home_{ij} + \beta_{24j} * Paying\ fees_{ij} + \beta_{25j} * Parental\ support_{ij} + r_{ij}$$

Level 2:

$\beta_{0j} = \gamma_{00} + \gamma_{01}\, Mean\ achievement_j + \gamma_{02}\, Mean\ socioeconomic\ status_j + \gamma_{03}\, Mean\ number\ of\ grade\ repetitions_j + \gamma_{04}\, Class\ size_j + \gamma_{05}\, School\ location_j + \gamma_{06}\, School\ facilities_j + \mu_{0j}$, where $\mu_{0j} \sim N(0, \tau_{00})$

$\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$, $\beta_{8j} = \gamma_{80}$, $\beta_{9j} = \gamma_{90}$, $\beta_{10j} = \gamma_{100}$, $\beta_{11j} = \gamma_{110}$, $\beta_{12j} = \gamma_{120}$, $\beta_{13j} = \gamma_{130}$, $\beta_{14j} = \gamma_{140}$, $\beta_{15j} = \gamma_{150}$, $\beta_{16j} = \gamma_{160}$, $\beta_{17j} = \gamma_{170}$, $\beta_{17j} = \gamma_{170}$, $\beta_{18j} = \gamma_{180}$, $\beta_{19j} = \gamma_{190}$, $\beta_{20j} = \gamma_{200}$, $\beta_{21j} = \gamma_{210}$, $\beta_{22j} = \gamma_{220}$, $\beta_{23j} = \gamma_{230}$, $\beta_{24j} = \gamma_{240}$, $\beta_{25j} = \gamma_{250}$

Mixed:

$$
\begin{aligned}
&Achievement\ or\ Achievement\ Growth_{ij} \\
&\quad = \gamma_{00} + \gamma_{01}\, Mean\ achievement_j + \gamma_{02}\, Mean\ socioecnomic\ status_j + \gamma_{03}\, Mean\ number\ of\ grade\ repetitions_j \\
&\quad + \gamma_{04}\, Class\ size_j + \gamma_{05}\, School\ location_j + \gamma_{06}\, School\ facilities_j + \gamma_{10} * Achieveement + \gamma_{20} * Student\ gender_{ij} + \gamma_{30} \\
&\quad * Age\ of\ first\ entry_{ij} + \gamma_{40} * Preschool\ attendance_{ij} + \gamma_{50} * Days\ absent\ during\ the\ previous\ 2\ weeks_{ij} + \gamma_{60} \\
&\quad * Number\ of\ grade\ repetitions_{ij} + \gamma_{70} * Repetition\ at\ grades\ 5\ or\ 7_{ij} + \gamma_{80} * Homework_{ij} + \gamma_{90} \\
&\quad * Taking\ extra\ classes_{ij} + \gamma_{100} * Health\ condition_{ij} + \gamma_{110} * Self-esteem_{ij} + \gamma_{120} * Feelings\ about\ school_{ij} + \gamma_{130} \\
&\quad * Educational\ aspiration_{ij} + \gamma_{140} * Number\ of\ siblings_{ij} + \gamma_{150} * Speaking\ language\ of\ instruction_{ij} + \gamma_{160} \\
&\quad * Parents\ alive_{ij} + \gamma_{170} * Living\ with\ parents\ or\ relatives_{ij} + \gamma_{180} * Socioeconomic\ status_{ij} + \gamma_{190} \\
&\quad * Number\ of\ books\ at\ home_{ij} + \gamma_{200} * Distance\ to\ school_{ij} + \gamma_{210} * Household\ tasks_{ij} + \gamma_{220} * Meals\ per\ week_{ij} + \gamma_{230} \\
&\quad * Homework\ help\ at\ home_{ij} + \gamma_{240} * Paying\ fees_{ij} + \gamma_{250} * Parental\ support_{ij} + r_{ij} + \mu_{0j}
\end{aligned}
$$

Appendix 17. Descriptive statistics for achievement

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Mean socioeconomic status	11.12	1.42	11.60	1.76
Mean number of grade repetitions	1.00	0.20	0.87	0.15
Class size	95.31	42.36	72.70	35.87
School location	0.23	0.42	0.17	0.38
School facilities	2.78	1.03	2.70	1.03
Student gender	0.45	0.50	0.50	0.50
Age of first entry	5.89	1.58	5.88	1.58
Preschool attendance	0.70	0.81	0.76	0.85
Days absent during the previous 2 weeks	1.31	1.30	1.01	1.15
Number of grade repetitions	1.00	0.91	0.90	0.79
Repetition at grades 5 or 7	0.34	0.48	0.26	0.44
Homework	1.85	1.04	1.95	1.00
Taking extra classes	0.50	0.50	0.52	0.50
Health condition	3.79	1.35	3.92	1.24
Self-esteem	4.50	1.71	5.58	1.40
Feelings about school	10.40	2.27	8.11	1.48
Educational aspiration	3.04	1.16	3.74	0.58
Number of siblings	2.44	1.56	2.21	1.44
Speaking language of instruction	1.05	1.07	1.20	1.00
Parents alive	1.51	0.76	1.70	0.57
Living with parents or relatives	1.33	0.74	1.42	0.75
Socioeconomic status	11.09	4.80	11.54	4.73
Number of books at home	0.86	1.06	0.83	1.04
Distance to school	1.27	0.79	1.39	0.87
Household tasks	13.42	6.74	16.18	4.26
Meals per week	4.78	2.75	5.56	2.64
Homework help at home	1.85	1.04	1.19	1.03
Paying fees	5.29	2.78	6.86	3.01
Parental support	4.93	2.80	5.75	2.60

Appendix 18. Correlation matrix for school-level variables for achievement in Cohort 1

Variable	1	2	3	4	5
1. Mean socioeconomic status	-	.003	.404**	.280**	-.123**
2. Mean number of grade repetitions		-	-.068**	.254**	.098**
3. Class size			-	.418**	-.126**
4. School location				-	.049
5. School facilities					-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 19. Correlation matrix for school-level variables for achievement in Cohort 2

Variable	1	2	3	4	5
1. Mean socioeconomic status	-	.214**	.554**	.414**	-.382**
2. Mean number of grade repetitions		-	.254**	.291**	.085**
3. Class size			-	.171**	-.026
4. School location				-	-.039
5. School facilities					-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 20. Correlation matrix for student-level variables for achievement in Cohort 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Student gender	-	.099**	-.057	.030	.031	-.023	-.028	-.023	-.009	-.027	-.102**	-.022	-.009	.008	-.027	.059*	.041	.059*	.033	-.164**	-.053	-.028	-.061*	-.034
2. Age of first entry		-	-.064*	-.065*	-.340**	.043	.030	-.060*	-.023	-.017	.010	.005	-.001	-.053	-.025	-.001	-.149**	-.161**	.067*	.029	-.077**	.030	.023	-.021
3. Preschool attendance			-	-.015	-.002	.009	.020	.068*	.089**	.071*	.010	.020	.013	.171**	.032	-.022	.112**	.086**	.009	.049	.109**	.020	.024	.089**
4. Days absent during the previous 2 weeks				-	.223**	.080**	-.003	.052	-.077**	-.053	-.141**	-.129**	.105**	.054	-.122**	-.116**	-.078**	.025	.020	-.065*	-.073**	-.003	-.046	-.082**
5. Number of grade repetitions					-	.204**	-.021	.010	.033	.026	-.128**	-.074**	.037	.038	-.094**	-.097**	-.071*	.045	.028	-.030	-.021	-.021	-.035	-.001
6. Repetition at grades 5 or 7						-	.026	.014	-.054	-.016	-.076**	-.123**	.053	.060*	-.061*	-.063*	-.068*	.074*	.044	.016	-.085**	.026	.024	.010
7. Homework							-	-.022	.108**	.070*	.114**	.123**	-.033	.018	.044	.076*	.092**	-.049	-.007	.157**	.125**	1.000**	.108**	.201**
8. Taking extra classes								-	.022	.104**	-.040	-.116**	.020	.141**	-.039	.021	.021	.101**	.083**	.045	-.063*	-.022	-.084**	-.063*
9. Health condition									-	.307**	.326**	.129**	.027	.072*	.076**	.022	.201**	.061*	-.026	.191**	.163**	.108**	.063*	.081**
10. Self-esteem										-	.331**	.037	.045	.158**	.027	.009	.140**	.048	.029	.202**	.042	.070*	.092**	.093**
11. Feelings about school											-	.352**	.019	.007	.153**	.113**	.169**	-.006	.027	.317**	.259**	.114**	.252**	.173**
12. Educational aspiration												-	-.005	-.096**	.176**	.117**	.124**	-.045	-.036	.283**	.146**	.123**	.193**	.143**
13. Number of siblings													-	.062*	-.008	-.056	-.049	.127**	.074*	-.009	.058*	-.033	-.002	-.031
14. Speaking language of instruction														-	-.138**	-.065*	.081**	.167**	.036	.051	.022	.018	-.088**	.050
15. Parents alive															-	.235**	.114**	-.032	-.080**	.101**	.101**	.044	.046	.042
16. Living with parents or relatives																-	.054	-.053	-.045	.070*	.070*	.076*	-.001	.071*
17. Socioeconomic status																	-	.148**	.039	.185**	.129**	.092**	.077*	.110**
18. Number of books at home																		-	.061*	-.057*	.061*	-.049	-.004	-.055
19. Distance to school																			-	-.015	.017	-.007	.001	-.031
20. Household tasks																				-	.125**	.157**	.207**	.180**
21. Meals per week																					-	.125**	.148**	.122**
22. Homework help at home																						-	.108**	.201**
23. Paying fees																							-	.490**
24. Parental support																								-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 21. Correlation matrix for student-level variables for achievement in Cohort 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Student gender	-	.123**	-.080**	-.040	.028	-.023	-.003	.020	.012	.046	-.088**	.020	.031	.016	-.089**	.023	.029	.034	.017	-.170**	-.020	-.062*	-.047	-.026
2. Age of first entry		-	-.110**	.052	-.208**	.082**	-.012	-.053	.011	.032	-.006	-.118**	.052	-.064*	-.112**	-.051	-.211**	-.064*	.020	.047	-.148**	-.077**	-.082**	-.026
3. Preschool attendance			-	-.022	-.046	-.049	.029	.065*	.038	-.048	.053	.094**	.030	.199**	.068*	.000	.164**	.070*	.039	.080**	.057*	.053	.135**	.132**
4. Days absent during the previous 2 weeks				-	.139**	.045	-.032	.026	-.055	-.051	-.067*	-.167**	.023	-.074**	-.012	-.030	-.066*	-.011	.022	-.034	-.076**	-.013	-.084**	-.098**
5. Number of grade repetitions					-	.235**	-.123**	-.034	-.102**	-.092**	-.128**	-.113**	.053	-.024	-.043	-.022	-.110**	.012	.015	.001	-.070*	-.070*	-.017	-.082**
6. Repetition at grades 5 or 7						-	-.052	.064*	-.108**	-.055	-.038	-.119**	.019	-.017	.023	.018	-.054	.010	-.017	.028	-.043	-.021	-.031	-.030
7. Homework							-	.121**	.114**	.123**	.204**	.174**	-.029	.087**	.106**	.045	.084**	.006	.026	.042	.073*	.315**	.004	.101**
8. Taking extra classes								-	.083**	.057	.076**	.045	.017	.062*	.036	.024	.109**	.005	-.004	.070*	.034	.166**	.017	.054
9. Health condition									-	.059*	.270**	.144**	.039	.047	.035	.035	.204**	.074**	.063*	.104**	.194**	.154**	.071*	.145**
10. Self-esteem										-	.196**	.177**	-.022	-.068*	.014	-.015	.018	-.060*	-.036	-.060*	.101**	.100**	-.062*	.036
11. Feelings about school											-	.357**	-.086**	-.011	.130**	.084**	.087**	-.065*	.014	.145**	.221**	.144**	.134**	.210**
12. Educational aspiration												-	-.067*	.023	.059*	.029	.167**	-.025	.026	.031	.196**	.094**	.105**	.179**
13. Number of siblings													-	.002	.053	.024	.022	.051	.010	.050	-.020	-.009	.025	.013
14. Speaking language of instruction														-	.085**	.004	.118**	.138**	.052	.129**	-.019	.060*	.101**	.097**
15. Parents alive															-	.312**	.106**	.096**	-.074*	.034	.088**	.011	.059*	.064*
16. Living with parents or relatives																-	.095**	.001	-.064*	-.002	.074**	.051	.016	.066*
17. Socioeconomic status																	-	.246**	-.061*	-.063*	.303**	.124**	.143**	.111**
18. Number of books at home																		-	-.018	.018	.110**	.031	.067*	.066*
19. Distance to school																			-	.139**	-.082**	-.045	.047	.019
20. Household tasks																				-	-.073**	.102**	.129**	.234**
21. Meals per week																					-	.159**	.079**	.056
22. Homework help at home																						-	-.010	.110**
23. Paying fees																							-	.330**
24. Parental support																								-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 22. Descriptive statistics for achievement growth

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Mean socioeconomic status	11.04	1.48	11.42	1.79
Mean number of grade repetitions	0.98	0.23	0.84	0.15
Class size	89.21	36.77	64.32	28.09
School location	0.14	0.35	0.15	0.36
School facilities	2.66	1.03	2.80	1.19
Student gender	0.44	0.50	0.52	0.50
Age of first entry	5.91	1.59	5.88	1.55
Preschool attendance	0.65	0.77	0.80	0.91
Days absent during the previous 2 weeks	1.21	1.26	0.96	1.07
Number of grade repetitions	0.92	0.88	0.87	0.75
Repetition at grades 5 or 7	0.34	0.47	0.27	0.44
Homework	1.82	1.03	1.99	0.93
Taking extra classes	0.48	0.50	0.53	0.50
Health condition	3.75	1.35	3.98	1.16
Self-esteem	4.50	1.69	5.65	1.36
Feelings about school	10.57	2.09	8.26	1.22
Educational aspiration	3.06	1.13	3.80	0.49
Number of siblings	2.48	1.55	2.21	1.46
Speaking language of instruction	0.95	1.04	1.21	1.03
Parents alive	1.60	0.69	1.73	0.55
Living with parents or relatives	1.36	0.74	1.48	0.73
Socioeconomic status	11.37	4.78	11.32	4.63
Number of books at home	0.87	1.07	0.79	1.01
Distance to school	1.27	0.79	1.35	0.85
Household tasks	13.79	6.59	16.29	4.21
Meals per week	4.92	2.76	5.55	2.60
Homework help at home	1.21	1.00	1.22	1.02
Paying fees	5.29	2.75	6.83	2.87
Parental support	4.95	2.82	6.10	2.52

Appendix 23. Correlation matrix for school-level variables for achievement growth in Cohort 1

Variable	1	2	3	4	5
1. Mean socioeconomic status	-	.018	.252**	.264**	-.190**
2. Mean number of grade repetitions		-	.049	.212**	.040
3. Class size			-	.351**	-.125**
4. School location				-	-.072
5. School facilities					-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 24. Correlation matrix for school-level variables for achievement growth in Cohort 2

Variable	1	2	3	4	5
1. Mean socioeconomic status	-	.147**	.468**	.470**	-.461**
2. Mean number of grade repetitions		-	.220**	.324**	-.001
3. Class size			-	.318**	-.133**
4. School location				-	-.155**
5. School facilities					-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 25. Correlation matrix for student-level variables for achievement growth in Cohort 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Student gender	-	.167**	-.037	-.004	-.043	-.014	.000	-.015	-.019	-.005	-.079	-.054	-.056	.022	-.035	.012	.102*	.066	-.030	-.157**	-.044	-.051	-.032	.004
2. Age of first entry		-	-.093	-.066	-.310**	.095*	.053	-.064	-.094*	-.060	-.044	-.034	.016	-.060	-.093*	.003	-.137**	-.150**	.051	.067	-.096*	-.040	.011	-.072
3. Preschool attendance			-	.029	.042	.015	-.003	-.008	.074	.063	-.047	.035	-.036	.208**	.063	-.015	.089	.083	-.046	.044	.096*	-.027	.011	.086
4. Days absent during the previous 2 weeks				-	.174**	.049	-.015	.048	-.062	-.066	-.160**	-.160**	.106*	.045	-.081	-.177**	-.119**	.026	-.012	-.091*	-.050	-.102*	-.004	-.015
5. Number of grade repetitions					-	.201**	-.068	.029	.112*	.080	-.035	-.076	.092*	.106*	-.073	-.081	-.089	-.010	-.007	.079	.056	.062	-.035	.024
6. Repetition at grades 5 or 7						-	.056	.079	-.081	-.031	-.169**	-.112*	.107*	.116*	-.063	-.026	-.068	.084	.044	-.004	-.064	-.005	-.030	-.040
7. Homework							-	-.134**	.168**	.067	.115*	.176**	-.061	.011	.080	.111*	.114*	-.025	-.026	.137**	.178**	.224**	.032	.109*
8. Taking extra classes								-	.092*	.045	-.038	-.082	.039	.111*	-.038	.051	.021	.049	.132**	.063	-.067	-.026	-.131**	-.083
9. Health condition									-	.269**	.250**	.117**	-.005	.115*	.120**	.071	.172**	.097*	-.077	.150**	.225**	.096*	-.003	.052
10. Self-esteem										-	.314**	.107*	-.025	.170**	.101*	.088	.149**	.042	-.004	.224**	.098*	.070	.036	.086
11. Feelings about school											-	.325**	-.017	-.021	.183**	.134**	.089	-.073	.055	.237**	.298**	.143**	.208**	.117*
12. Educational aspiration												-	.007	-.022	.156**	.111*	.112*	-.008	.044	.254**	.185**	.126**	.220**	.131**
13. Number of siblings													-	.109*	.005	-.072	-.100*	.140**	.027	-.032	.017	-.020	-.012	-.023
14. Speaking language of instruction														-	-.088	-.079	.078	.204**	.025	.000	.052	.016	-.084	.043
15. Parents alive															-	.172**	.191**	.001	.001	.055	.098*	.066	.040	.051
16. Living with parents or relatives																-	.105*	-.028	.001	.130**	.124**	.065	.009	.075
17. Socioeconomic status																	-	.229**	.064	.078	.210**	.037	.055	.061
18. Number of books at home																		-	.071	-.148**	.117*	-.001	.014	-.031
19. Distance to school																			-	-.002	-.002	-.042	.010	-.009
20. Household tasks																				-	.152**	.161**	.174**	.132**
21. Meals per week																					-	.259**	.128**	.124**
22. Homework help at home																						-	.260**	.129**
23. Paying fees																							-	.467**
24. Parental support																								-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 26. Correlation matrix for student-level variables for achievement growth in Cohort 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Student gender	-	.142**	-.146**	-.038	.022	-.092	.000	.058	-.024	.087	-.046	-.032	.015	.000	-.105*	.035	-.004	-.034	.001	-.233**	-.003	-.061	-.005	.024
2. Age of first entry		-	-.055	.007	-.227**	.024	.051	-.046	.036	-.005	.027	-.063	.077	-.031	-.167**	-.097*	-.210**	-.088	.033	-.006	-.050	-.039	-.048	-.062
3. Preschool attendance			-	-.065	.027	-.029	.077	.053	.053	-.049	.003	.068	.000	.253**	.081	-.034	.131**	.118*	.031	.115*	-.010	.061	.105*	.144**
4. Days absent during the previous 2 weeks				-	.108*	-.040	-.111*	.111*	.040	-.030	-.055	-.121*	-.049	-.077	.025	-.022	.044	.012	.011	-.056	-.029	.006	-.001	-.095*
5. Number of grade repetitions					-	.240**	-.103*	-.019	-.075	-.009	-.039	-.048	.077	.010	.060	.042	-.075	.029	-.028	.012	-.094*	-.096*	-.027	-.056
6. Repetition at grades 5 or 7						-	-.040	.071	-.113*	.036	.011	-.136**	.019	-.044	.054	.037	-.096	-.055	-.005	-.051	-.018	-.081	.000	-.097
7. Homework							-	.063	.078	.029	.177**	.153**	-.046	.141**	.080	.044	.046	.067	.045	.127**	.011	.335**	.062	.138**
8. Taking extra classes								-	.059	-.067	.031	.016	.005	.029	.020	.100*	.060	.035	.060	.062	-.016	.145**	.039	.074
9. Health condition									-	.034	.229**	.135**	.037	.091	.058	.029	.175**	.125**	.031	.096*	.159**	.123*	.102*	.068
10. Self-esteem										-	.119*	.133**	.002	-.052	-.035	-.040	.002	-.049	-.069	-.046	.041	-.019	-.013	.015
11. Feelings about school											-	.289**	.008	-.011	.023	.013	.094*	.023	-.004	.126**	.163**	.125**	.183**	.136**
12. Educational aspiration												-	.024	.045	-.009	-.035	.117*	-.008	-.021	.019	.067	.080	.079	.128**
13. Number of siblings													-	-.014	.041	.062	.013	-.018	-.008	.065	-.018	.016	.000	-.040
14. Speaking language of instruction														-	.124**	.113*	.141**	.143**	.087	.173**	-.028	.068	.062	.101*
15. Parents alive															-	.271**	.071	.081	-.069	.048	.069	-.007	-.010	-.014
16. Living with parents or relatives																-	.081	-.032	-.008	.001	.035	.059	-.055	-.007
17. Socioeconomic status																	-	.285**	-.030	-.037	.265**	.201**	.201**	.149**
18. Number of books at home																		-	-.087	.057	.162**	.116*	.055	.087
19. Distance to school																			-	.160**	-.129**	-.055	.032	.041
20. Household tasks																				-	-.091	.122*	.079	.183**
21. Meals per week																					-	.136**	.123*	.082
22. Homework help at home																						-	.051	.150**
23. Paying fees																							-	.308**
24. Parental support																								-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 27. Descriptive statistics for repetition rates

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Mean achievement	995.44	78.31	990.81	59.07
Mean socioeconomic status	11.09	1.45	11.58	1.76
Mean number of grade repetitions	1.00	0.20	0.87	0.15
Class size	94.56	42.37	72.30	36.48
School location	0.21	0.41	0.15	0.36
School facilities	2.75	1.03	2.71	1.04
Achievement	996.71	141.45	1001.59	148.04
Student gender	0.46	0.50	0.53	0.50
Age of first entry	5.89	1.58	5.83	1.56
Preschool attendance	0.68	0.80	0.77	0.87
Days absent during the previous 2 weeks	1.29	1.30	1.01	1.15
Number of grade repetitions	0.98	0.91	0.88	0.77
Repetition at grades 5 or 7	0.35	0.48	0.26	0.44
Homework	1.86	1.06	1.96	0.98
Taking extra classes	0.49	0.50	0.52	0.50
Health condition	3.78	1.37	3.93	1.21
Self-esteem	4.49	1.70	5.64	1.38
Feelings about school	10.42	2.27	8.18	1.38
Educational aspiration	3.05	1.16	3.77	0.53
Number of siblings	2.47	1.56	2.23	1.44
Speaking language of instruction	1.04	1.07	1.20	0.99
Parents alive	1.54	0.74	1.69	0.57
Living with parents or relatives	1.32	0.75	1.42	0.74
Socioeconomic status	11.11	4.80	11.63	4.67
Number of books at home	0.89	1.08	0.81	1.04
Distance to school	1.26	0.79	1.37	0.85
Household tasks	13.45	6.67	16.28	4.09
Meals per week	4.79	2.75	5.58	2.64
Homework help at home	1.24	1.05	1.22	1.04
Paying fees	5.26	2.77	6.77	2.98
Parental support	4.88	2.80	5.81	2.60

Appendix 28. Correlation matrix for school-level variables for repetition rates in Cohort 1

Variable	1	2	3	4	5	6
1. Mean achievement	-	.113**	.037	.315**	.228**	-.380**
2. Mean socioeconomic status		-	.012	.397**	.279**	-.114**
3. Mean number of grade repetitions			-	-.066*	.221**	.137**
4. Class size				-	.420**	-.123**
5. School location					-	.059*
6. School facilities						-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 29. Correlation matrix for school-level variables for repetition rates in Cohort 2

Variable	1	2	3	4	5	6
1. Mean achievement	-	.325**	-.159**	.160**	.144**	-.281**
2. Mean socioeconomic status		-	.249**	.555**	.391**	-.366**
3. Mean number of grade repetitions			-	.284**	.275**	.063*
4. Class size				-	.147**	-.019
5. School location					-	-.055
6. School facilities						-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 30. Correlation matrix for student-level variables for repetition rates in Cohort 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	-	.011	-.088**	.098**	-.143**	-.036	-.041	.165**	-.137**	.132**	-.022	.247**	.262**	-.092**	-.096**	.120**	.126**	.149**	-.014	-.080*	.193**	.207**	.178**	.140**	.158**
2. Student gender		-	.112**	-.074*	-.006	.014	-.038	-.042	-.008	.000	-.015	-.080**	-.026	-.015	-.001	-.039	.062*	.046	.054	-.002	-.155**	-.043	-.051	-.066*	-.031
3. Age of first entry			-	-.084*	-.083**	-.356**	.036	.043	-.051	-.051	-.014	-.001	-.008	.019	-.029	-.022	.010	-.149**	-.149**	.061	.035	-.087**	-.022	.022	-.021
4. Preschool attendance				-	.004	-.001	-.004	.004	.039	.096**	.070*	.016	.047	.030	.169**	.030	-.040	.122**	.087*	-.027	.049	.103**	.079*	.054	.103**
5. Days absent during the previous 2 weeks					-	.215**	.046	-.009	.059	-.097**	-.042	-.159**	-.159**	.095**	.069*	-.122**	-.136**	-.059	.027	.032	-.065*	-.056	-.104**	-.048	-.078*
6. Number of grade repetitions						-	.216**	-.026	.000	.051	.025	-.098**	-.068*	.061	.040	-.090**	-.115**	-.067*	.042	.042	-.023	.002	-.001	-.022	-.010
7. Repetition at grades 5 or 7							-	.009	.022	-.066*	-.010	-.070*	-.102**	.051	.061	-.048	-.065	-.054	.080*	.038	.020	-.075*	-.028	.023	-.020
8. Homework								-	-.050	.135**	.079*	.139**	.133**	-.041	.017	.056	.082*	.077*	-.048	-.034	.148**	.159**	.252**	.095**	.192**
9. Taking extra classes									-	.038	.124**	-.031	-.123**	.038	.145**	-.025	.020	.022	.079*	.090**	.047	-.067*	-.004	-.075*	-.057
10. Health condition										-	.320**	.317**	.117**	-.001	.072*	.097**	.014	.225**	.060	-.046	.194**	.176**	.096**	.046	.085**
11. Self-esteem											-	.325**	.018	.035	.160**	.060	.020	.145**	.054	.040	.227**	.039	.079*	.088**	.100**
12. Feelings about school												-	.344**	.002	-.007	.170**	.135**	.169**	-.024	.035	.319**	.258**	.198**	.264**	.183**
13. Educational aspiration													-	-.013	-.097**	.189**	.136**	.122**	-.044	-.015	.274**	.157**	.129**	.199**	.144**
14. Number of siblings														-	.091**	-.003	-.052	-.067*	.127**	.069*	-.003	.041	.005	-.007	-.014
15. Speaking language of instruction															-	-.116**	-.060	.065	.171**	.029	.066*	.024	-.005	-.080*	.035
16. Parents alive																-	.229**	.131**	-.060	-.046	.119**	.088**	.054	.065*	.073*
17. Living with parents or relatives																	-	.059	-.067*	-.043	.094**	.090**	.054	.000	.077*
18. Socioeconomic status																		-	.173**	.014	.171**	.133**	.050	.079*	.091**
19. Number of books at home																			-	.072*	-.064*	.059	.035	-.024	-.057
20. Distance to school																				-	-.022	-.004	-.061	.004	-.047
21. Household tasks																					-	.133**	.208**	.206**	.173**
22. Meals per week																						-	.186**	.122**	.122**
23. Homework help at home																							-	.252**	.198**
24. Paying fees																								-	.484**
25. Parental support																									-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 31. Correlation matrix for student-level variables for repetition rates in Cohort 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	-	.063*	-.153**	.080*	-.093**	-.146**	-.109**	.135**	.055	.150**	.168**	.230**	.297**	-.072*	-.055	.110**	.118**	.213**	.001	-.010	-.106**	.277**	.162**	.058	.155**
2. Student gender		-	.117**	-.108**	-.053	.044	-.004	-.016	.007	.006	.046	-.084**	.013	.027	-.021	-.060	.023	.043	.043	-.010	-.179**	.002	-.075*	-.042	-.026
3. Age of first entry			-	-.101**	.051	-.201**	.082*	.029	-.052	.034	.038	.001	-.130**	.050	-.043	-.123**	-.067*	-.212**	-.060	.018	.015	-.121**	-.088**	-.082*	-.020
4. Preschool attendance				-	-.034	-.067*	-.067	.038	.060	.061	-.063	.031	.093**	.009	.193**	.059	-.012	.160**	.095**	.041	.082*	.039	.046	.137**	.140**
5. Days absent during the previous 2 weeks					-	.122**	.026	-.037	.053	-.049	-.026	-.048	-.120**	.007	-.093**	-.013	-.049	-.041	-.003	.034	-.057	-.056	.012	-.092**	-.113**
6. Number of grade repetitions						-	.251**	-.113**	.009	-.101**	-.053	-.089**	-.091**	.067*	-.004	-.013	-.036	-.080*	.023	-.004	.037	-.096**	-.038	.007	-.044
7. Repetition at grades 5 or 7							-	-.028	.047	-.064	-.020	-.018	-.108**	.050	-.030	.017	-.006	-.035	-.003	-.019	-.018	-.028	-.028	-.039	-.040
8. Homework								-	.098**	.066*	.114**	.215**	.186**	-.023	.099**	.115**	.066	.050	-.015	.034	.064	.082*	.321**	.033	.118**
9. Taking extra classes									-	.058	.046	.071*	.036	.013	.033	.023	.060	.081*	-.023	-.007	.061	.046	.167**	.009	.037
10. Health condition										-	.039	.266**	.126**	.019	.066*	.058	.056	.182**	.108**	.063	.100**	.209**	.132**	.096**	.129**
11. Self-esteem											-	.203**	.146**	-.022	-.057	.021	.000	-.004	-.066*	-.042	-.057	.103**	.087**	-.048	.018
12. Feelings about school												-	.264**	-.076*	.007	.108**	.069*	.078*	-.058	.020	.097**	.213**	.142**	.113**	.169**
13. Educational aspiration													-	-.040	.030	.040	.015	.139**	.000	.031	-.004	.157**	.118**	.096**	.147**
14. Number of siblings														-	-.015	.061	.064	.029	.044	.018	.062	-.017	.011	-.003	-.011
15. Speaking language of instruction															-	.074*	.022	.120**	.133**	.069*	.140**	-.004	.042	.085*	.099**
16. Parents alive																-	.312**	.119**	.100**	-.090**	.025	.096**	.020	.041	.046
17. Living with parents or relatives																	-	.123**	.012	-.046	-.007	.085**	.058	.007	.073*
18. Socioeconomic status																		-	.268**	-.039	-.057	.300**	.127**	.157**	.112**
19. Number of books at home																			-	-.032	.028	.100**	.043	.043	.034
20. Distance to school																				-	.165**	-.071*	-.036	.079*	.035
21. Household tasks																					-	-.091**	.084**	.094**	.209**
22. Meals per week																						-	.193**	.087**	.026
23. Homework help at home																							-	-.007	.091**
24. Paying fees																								-	.318**
25. Parental support																									-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 32. Descriptive statistics for dropout rates

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Mean achievement	995.37	78.16	989.14	60.04
Mean socioeconomic status	11.10	1.42	11.53	1.72
Mean number of grade repetitions	0.99	0.21	0.87	0.15
Class size	93.92	41.60	71.93	35.60
School location	0.20	0.40	0.15	0.35
School facilities	2.76	1.03	2.71	1.03
Achievement	995.89	140.99	994.28	150.14
Student gender	0.46	0.50	0.52	0.50
Age of first entry	5.92	1.60	5.88	1.57
Preschool attendance	0.68	0.79	0.77	0.86
Days absent during the previous 2 weeks	1.31	1.29	1.01	1.14
Number of grade repetitions	0.99	0.91	0.88	0.77
Repetition at grades 5 or 7	0.35	0.48	0.26	0.44
Homework	1.86	1.06	1.95	0.98
Taking extra classes	0.49	0.50	0.52	0.50
Health condition	3.78	1.36	3.93	1.22
Self-esteem	4.49	1.70	5.60	1.40
Feelings about school	10.39	2.29	8.16	1.41
Educational aspiration	3.05	1.16	3.75	0.55
Number of siblings	2.46	1.56	2.23	1.43
Speaking language of instruction	1.04	1.06	1.21	1.00
Parents alive	1.52	0.74	1.70	0.56
Living with parents or relatives	1.34	0.75	1.42	0.74
Socioeconomic status	11.08	4.78	11.55	4.65
Number of books at home	0.88	1.07	0.82	1.04
Distance to school	1.26	0.79	1.37	0.86
Household tasks	13.46	6.71	16.34	4.17
Meals per week	4.79	2.76	5.53	2.63
Homework help at home	1.24	1.06	1.23	1.04
Paying fees	5.30	2.77	6.75	3.01
Parental support	4.88	2.81	5.78	2.60

Appendix 33. Correlation matrix for school-level variables for dropout rates in Cohort 1

Variable	1	2	3	4	5	6
1. Mean achievement	–	.124**	.022	.292**	.216**	-.350**
2. Mean socioeconomic status		–	.007	.386**	.272**	-.109**
3. Mean number of grade repetitions			–	-.049	.231**	.096**
4. Class size				–	.416**	-.137**
5. School location					–	.048
6. School facilities						–

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 34. Correlation matrix for school-level variables for dropout rates in Cohort 2

Variable	1	2	3	4	5	6
1. Mean achievement	–	.305**	-.172**	.134**	.134**	-.266**
2. Mean socioeconomic status		–	.244**	.553**	.382**	-.365**
3. Mean number of grade repetitions			–	.282**	.301**	.069*
4. Class size				–	.146**	-.030
5. School location					–	-.026
6. School facilities						–

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 35. Correlation matrix for student-level variables for dropout rates in Cohort 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	–	.005	-.081**	.102**	-.132**	-.047	-.035	.151**	-.142**	.145**	-.026	.246**	.254**	-.083**	-.087**	.111**	.128**	.141**	-.016	-.077*	.200**	.200**	.171**	.142**	.166**
2. Student gender		–	.102**	-.074*	-.001	.018	-.043	-.033	-.003	.002	-.015	-.093**	-.030	-.002	.001	-.028	.054	.038	.059*	.003	-.174**	-.057	-.053	-.076*	-.045
3. Age of first entry			–	-.072*	-.069*	-.356**	.032	.043	-.047	-.054	-.018	-.003	-.001	-.003	-.036	-.031	.016	-.152**	-.158**	.063*	.035	-.081**	-.021	.021	-.018
4. Preschool attendance				–	.011	.001	-.006	.003	.047	.093**	.062	.006	.037	.010	.166**	.028	-.035	.121**	.082*	-.016	.050	.097**	.064	.034	.088*
5. Days absent during the previous 2 weeks					–	.221**	.057	.004	.064*	-.098**	-.060*	-.160**	-.163**	.099**	.063*	-.116**	-.126**	-.067*	.032	.027	-.072*	-.066*	-.104**	-.051	-.081*
6. Number of grade repetitions						–	.209**	-.015	.010	.040	.016	-.116**	-.074*	.061	.042	-.090**	-.112**	-.063*	.057	.041	-.025	-.008	-.014	-.031	-.019
7. Repetition at grades 5 or 7							–	.022	.015	-.050	.000	-.071*	-.109**	.056	.062	-.051	-.069*	-.052	.085**	.027	.027	-.083**	-.018	.028	-.001
8. Homework								–	-.041	.118**	.078*	.120**	.124**	-.047	.025	.049	.071*	.084*	-.035	-.029	.155**	.148**	.241**	.094**	.204**
9. Taking extra classes									–	.029	.110**	-.041	-.130**	.031	.134**	-.025	.021	.029	.089**	.093**	.038	-.067*	.002	-.070*	-.065*
10. Health condition										–	.312**	.329**	.128**	.019	.076*	.104**	.022	.220**	.060	-.047	.196**	.177**	.088**	.052	.088**
11. Self-esteem											–	.331**	.026	.032	.158**	.061*	.026	.139**	.055	.036	.226**	.040	.082*	.100**	.111**
12. Feelings about school												–	.354**	.009	.003	.170**	.139**	.166**	-.028	.032	.330**	.259**	.203**	.261**	.190**
13. Educational aspiration													–	-.007	-.102**	.185**	.132**	.113**	-.059*	-.005	.279**	.166**	.131**	.200**	.147**
14. Number of siblings														–	.083**	.006	-.049	-.057	.134**	.072*	-.004	.049	.020	.011	-.015
15. Speaking language of instruction															–	-.123**	-.068*	.075*	.168**	.018	.075*	.021	-.021	-.078*	.051
16. Parents alive																–	.232**	.127**	-.046	-.053	.097**	.097**	.046	.054	.059
17. Living with parents or relatives																	–	.050	-.076*	-.030	.087**	.096**	.066*	.004	.083*
18. Socioeconomic status																		–	.177**	.026	.183**	.142**	.062	.079*	.097**
19. Number of books at home																			–	.059	-.056	.055	.037	-.022	-.067*
20. Distance to school																				–	-.010	.000	-.040	.005	-.046
21. Household tasks																					–	.134**	.209**	.211**	.185**
22. Meals per week																						–	.194**	.135**	.124**
23. Homework help at home																							–	.265**	.206**
24. Paying fees																								–	.486**
25. Parental support																									–

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 36. Correlation matrix for student-level variables for dropout rates in Cohort 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	–	.080**	-.145**	.080*	-.107**	-.156**	-.110**	.131**	.061	.143**	.189**	.240**	.317**	-.079*	-.066*	.107**	.122**	.215**	.004	.000	-.101**	.271**	.154**	.054	.158**
2. Student gender		–	.118**	-.095**	-.041	.035	.004	-.001	.016	.004	.049	-.077*	.021	.029	-.017	-.070*	.016	.046	.040	-.021	-.185**	-.007	-.077*	-.045	-.021
3. Age of first entry			–	-.096**	.055	-.209**	.078*	.028	-.047	.023	.037	-.003	-.133**	.049	-.054	-.103**	-.055	-.198**	-.058	.011	.013	-.130**	-.081*	-.090**	-.048
4. Preschool attendance				–	-.027	-.070*	-.060	.037	.070*	.061	-.058	.042	.095**	.029	.205**	.048	-.024	.170**	.093**	.040	.086**	.035	.051	.140**	.141**
5. Days absent during the previous 2 weeks					–	.121**	.035	-.032	.044	-.048	-.027	-.047	-.135**	.022	-.086**	-.003	-.042	-.042	.007	.013	-.039	-.050	.023	-.086**	-.107**
6. Number of grade repetitions						–	.253**	-.118**	-.007	-.097**	-.077*	-.104**	-.093**	.061	-.014	-.021	-.027	-.092**	.026	.001	.036	-.088**	-.042	-.009	-.050
7. Repetition at grades 5 or 7							–	-.047	.065*	-.061	-.043	-.016	-.118**	.049	-.008	.017	.009	-.033	-.003	-.018	.003	-.037	-.027	-.024	-.035
8. Homework								–	.106**	.072*	.133**	.195**	.189**	-.016	.085**	.116**	.051	.048	-.020	.012	.052	.071*	.317**	.019	.117**
9. Taking extra classes									–	.057	.046	.070*	.050	.016	.050	.023	.038	.089**	-.020	-.009	.070*	.032	.165**	.015	.046
10. Health condition										–	.050	.283**	.126**	.030	.065*	.058	.052	.180**	.103**	.056	.105**	.198**	.136**	.090**	.147**
11. Self-esteem											–	.191**	.162**	-.025	-.064*	.029	.001	.008	-.063*	-.053	-.076*	.106**	.084**	-.063*	.024
12. Feelings about school												–	.287**	-.089**	.011	.119**	.088**	.079*	-.076*	.016	.131**	.201**	.156**	.127**	.184**
13. Educational aspiration													–	-.050	.024	.043	.021	.149**	-.013	.028	.004	.155**	.116**	.094**	.167**
14. Number of siblings														–	-.009	.057	.049	.020	.043	.016	.061	-.033	.009	.007	-.006
15. Speaking language of instruction															–	.068*	.018	.124**	.134**	.058	.141**	-.006	.058	.099**	.119**
16. Parents alive																–	.317**	.109**	.088**	-.075*	.029	.084**	.021	.054	.050
17. Living with parents or relatives																	–	.116**	-.001	-.041	-.018	.077*	.058	.020	.063
18. Socioeconomic status																		–	.246**	-.040	-.055	.291**	.127**	.145**	.116**
19. Number of books at home																			–	-.017	.032	.102**	.036	.041	.040
20. Distance to school																				–	.167**	-.071*	-.046	.070*	.029
21. Household tasks																					–	-.082**	.093**	.127**	.214**
22. Meals per week																						–	.180**	.081*	.038
23. Homework help at home																							–	-.005	.096**
24. Paying fees																								–	.330**
25. Parental support																									–

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 37. Descriptive statistics for transfer rates

Variable	Cohort 1		Cohort 2	
	M	*SD*	*M*	*SD*
Mean achievement	995.84	77.16	991.49	59.00
Mean socioeconomic status	11.12	1.44	11.62	1.79
Mean number of grade repetitions	1.00	0.20	0.88	0.15
Class size	95.94	43.03	73.13	36.72
School location	0.24	0.43	0.18	0.38
School facilities	2.77	1.03	2.70	1.03
Achievement	996.34	140.91	996.34	148.39
Student gender	0.45	0.50	0.52	0.50
Age of first entry	5.85	1.56	5.83	1.57
Preschool attendance	0.70	0.82	0.76	0.86
Days absent during the previous 2 weeks	1.30	1.31	1.01	1.15
Number of grade repetitions	0.99	0.91	0.90	0.79
Repetition at grades 5 or 7	0.35	0.48	0.26	0.44
Homework	1.85	1.04	1.95	1.00
Taking extra classes	0.51	0.50	0.52	0.50
Health condition	3.79	1.36	3.92	1.23
Self-esteem	4.49	1.71	5.61	1.38
Feelings about school	10.42	2.25	8.13	1.45
Educational aspiration	3.04	1.16	3.76	0.56
Number of siblings	2.44	1.56	2.21	1.45
Speaking language of instruction	1.05	1.07	1.20	0.99
Parents alive	1.51	0.75	1.69	0.57
Living with parents or relatives	1.32	0.75	1.42	0.74
Socioeconomic status	11.11	4.82	11.61	4.75
Number of books at home	0.87	1.07	0.82	1.04
Distance to school	1.27	0.79	1.39	0.87
Household tasks	13.40	6.71	16.14	4.21
Meals per week	4.78	2.75	5.60	2.65
Homework help at home	1.22	1.05	1.18	1.03
Paying fees	5.26	2.79	6.88	2.99
Parental support	4.93	2.78	5.79	2.60

Appendix 38. Correlation matrix for school-level variables for transfer rates in Cohort 1

Variable	1	2	3	4	5	6
1. Mean achievement	-	.147**	.038	.321**	.242**	-.364**
2. Mean socioeconomic status		-	.006	.414**	.286**	-.128**
3. Mean number of grade repetitions			-	-.084**	.245**	.133**
4. Class size				-	.420**	-.114**
5. School location					-	.059*
6. School facilities						-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 39. Correlation matrix for school-level variables for transfer rates in Cohort 2

Variable	1	2	3	4	5	6
1. Mean achievement	-	.361**	-.158**	.194**	.190**	-.287**
2. Mean socioeconomic status		-	.215**	.562**	.420**	-.383**
3. Mean number of grade repetitions			-	.255**	.272**	.082**
4. Class size				-	.172**	-.016
5. School location					-	-.052
6. School facilities						-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 40. Correlation matrix for school-level variables for transfer rates in Cohort 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	-	.013	-.069*	.101**	-.142**	-.057*	-.052	.150**	-.134**	.117**	-.033	.245**	.249**	-.105**	-.089**	.119**	.120**	.143**	-.011	-.055	.185**	.178**	.191**	.150**	.168**
2. Student gender		-	.107**	-.055	.027	.028	-.017	-.035	-.028	-.011	-.028	-.091**	-.018	-.020	.006	-.036	.066*	.047	.055	.029	-.147**	-.041	-.047	-.053	-.022
3. Age of first entry			-	-.073*	-.077**	-.339**	.047	.028	-.064*	-.019	-.014	.013	-.001	.018	-.048	-.017	-.007	-.147**	-.154**	.066*	.028	-.081**	-.043	.024	-.023
4. Preschool attendance				-	-.022	-.004	.012	.022	.063	.091**	.078*	.017	.026	.029	.174**	.033	-.026	.113**	.090**	.002	.047	.114**	.098**	.040	.102**
5. Days absent during the previous 2 weeks					-	.218**	.072*	-.013	.047	-.075**	-.038	-.140**	-.125**	.101**	.059*	-.127**	-.124**	-.073*	.021	.024	-.058*	-.065*	-.101**	-.044	-.079**
6. Number of grade repetitions						-	.209**	-.032	.002	.043	.034	-.114**	-.068*	.036	.036	-.095**	-.099**	-.075*	.032	.028	-.029	-.014	-.002	-.027	.008
7. Repetition at grades 5 or 7							-	.015	.020	-.068*	-.026	-.076*	-.118**	.049	.059	-.058	-.059	-.070*	.070*	.055	.010	-.078**	-.043	.019	-.006
8. Homework								-	-.030	.121**	.070*	.130**	.131**	-.027	.011	.050	.085**	.086**	-.060	-.011	.151**	.133**	.238**	.110**	.190**
9. Taking extra classes									-	.030	.115**	-.031	-.109**	.025	.151**	-.040	.021	.015	.093**	.080**	.054	-.063*	.019	-.089**	-.057
10. Health condition										-	.314**	.315**	.119**	.010	.069*	.068*	.016	.206**	.059*	-.023	.189**	.160**	.076*	.059*	.079**
11. Self-esteem											-	.326**	.032	.048	.159**	.023	.003	.144**	.046	.031	.201**	.042	.067*	.081**	.082**
12. Feelings about school												-	.344**	.014	.000	.152**	.108**	.173**	-.002	.030	.307**	.258**	.186**	.255**	.165**
13. Educational aspiration													-	-.009	-.091**	.179**	.119**	.134**	-.032	-.045	.279**	.137**	.107**	.193**	.140**
14. Number of siblings														-	.068*	-.016	-.059*	-.057	.120**	.072*	-.009	.051	-.011	-.017	-.031
15. Speaking language of instruction															-	-.133**	-.057	.072*	.171**	.046	.044	.025	.000	-.091**	.036
16. Parents alive																-	.231**	.119**	-.043	-.075*	.120**	.093**	.083**	.055	.053
17. Living with parents or relatives																	-	.063*	-.045	-.057	.075**	.064*	.060	-.003	.066*
18. Socioeconomic status																		-	.144**	.028	.179**	.122**	.066*	.076*	.104**
19. Number of books at home																			-	.074*	-.065*	.064*	.059	-.005	-.045
20. Distance to school																				-	-.024	.015	-.038	-.001	-.032
21. Household tasks																					-	.123**	.197**	.204**	.170**
22. Meals per week																						-	.177**	.138**	.120**
23. Homework help at home																							-	.242**	.208**
24. Paying fees																								-	.489**
25. Parental support																									-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 41. Correlation matrix for student-level variables for transfer rates in Cohort 2

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Achievement	-	.078**	-.150**	.096**	-.111**	-.164**	-.113**	.150**	.069*	.147**	.181**	.232**	.305**	-.072*	-.026	.115**	.106**	.218**	.016	-.014	-.081**	.276**	.146**	.059*	.160**
2. Student gender		-	.125**	-.086**	-.043	.038	-.028	-.018	.010	.010	.043	-.094**	.013	.025	.018	-.082**	.025	.025	.035	.028	-.164**	-.013	-.056	-.046	-.028
3. Age of first entry			-	-.116**	.045	-.202**	.085**	-.014	-.054	.024	.032	.005	-.111**	.051	-.058	-.123**	-.054	-.220**	-.065*	.026	.053	-.135**	-.084**	-.075*	-.002
4. Preschool attendance				-	-.025	-.046	-.056	.034	.060	.042	-.046	.047	.095**	.021	.189**	.077*	.011	.158**	.075*	.050	.073*	.061*	.040	.130**	.130**
5. Days absent during the previous 2 weeks					-	.140**	.035	-.032	.040	-.051	-.051	-.069*	-.154**	.011	-.081**	-.016	-.034	-.062*	-.019	.037	-.046	-.078**	-.023	-.086**	-.104**
6. Number of grade repetitions						-	.228**	-.118**	-.023	-.102**	-.074*	-.113**	-.109**	.058	-.022	-.036	-.025	-.100**	.004	.011	-.001	-.078**	-.071*	-.001	-.079**
7. Repetition at grades 5 or 7							-	-.037	.050	-.110**	-.037	-.039	-.110**	.016	-.036	.024	.012	-.057	.008	-.017	.013	-.036	-.024	-.042	-.036
8. Homework								-	.111**	.110**	.105**	.214**	.163**	-.039	.101**	.108**	.062*	.082**	.009	.044	.052	.082**	.324**	.009	.105**
9. Taking extra classes									-	.082**	.057	.069*	.026	.012	.050	.028	.040	.098**	-.001	-.002	.060*	.041	.171**	.008	.046
10. Health condition										-	.046	.253**	.136**	.031	.051	.030	.035	.202**	.075*	.066*	.102**	.195**	.153**	.073*	.132**
11. Self-esteem											-	.209**	.168**	-.022	-.062*	.008	-.017	.006	-.066*	-.028	-.038	.097**	.108**	-.052	.037
12. Feelings about school												-	.334**	-.074*	-.008	.106**	.062*	.076**	-.052	.021	.118**	.227**	.137**	.118**	.198**
13. Educational aspiration													-	-.058	.036	.051	.025	.153**	-.016	.028	.023	.196**	.095**	.100**	.163**
14. Number of siblings														-	.001	.057	.036	.029	.048	.011	.052	-.004	-.006	.018	.013
15. Speaking language of instruction															-	.092**	.009	.121**	.139**	.061*	.128**	-.017	.048	.094**	.082**
16. Parents alive																-	.302**	.110**	.105**	-.081**	.025	.092**	.011	.049	.058
17. Living with parents or relatives																	-	.097**	.011	-.066*	.005	.076**	.052	.005	.072*
18. Socioeconomic status																		-	.261**	-.060*	-.065*	.306**	.124**	.148**	.110**
19. Number of books at home																			-	-.030	.016	.107**	.037	.071*	.066*
20. Distance to school																				-	.139**	-.082**	-.034	.057	.024
21. Household tasks																					-	-.080**	.094**	.104**	.228**
22. Meals per week																						-	.168**	.083**	.050
23. Homework help at home																							-	-.015	.105**
24. Paying fees																								-	.320**
25. Parental support																									-

Note: $p^* < .05$. $p^{**} < .01$.

Appendix 42. Results for achievement in Cohort 1

Variable	Null		Model 1 School social composition		Model 2 School inputs	
	ES	*SE*	*ES*	*SE*	*ES*	*SE*
Fixed Effect						
School						
Intercepts	999.512***	15.301	1000.208***	13.321	998.714***	2.182
School social composition						
Mean socioeconomic status			-9.435	8.199	-12.215	8.557
Mean number of grade repetitions			8.447	68.543	8.188	70.346
School inputs						
Class size					-0.064	0.390
School location					32.588	29.026
School facilities					-21.910	13.875
Individual						
Student gender			14.260	7.610	14.206	7.572
Age of first entry			-6.493**	2.056	-6.443**	2.062
Preschool attendance			6.556	4.981	6.543	5.016
Days absent during the previous 2 weeks			-2.763	2.323	-2.755	2.316
Number of grade repetitions			-9.792**	3.307	-9.709**	3.303
Repetition at grades 5 or 7			4.060	6.442	3.976	6.452
Homework			-65.547	194.080	-65.667	194.451
Taking extra classes			-23.172***	6.897	-23.254***	6.863
Health condition			2.645	2.582	2.701	2.585
Self-esteem			-8.690***	1.919	-8.697***	1.914
Feelings about school			9.725***	1.989	9.735***	2.017
Educational aspiration			10.181***	3.199	10.130***	3.216
Family						
Number of siblings			-7.267***	1.969	-7.251***	1.968
Speaking language of instruction			-8.229*	3.743	-8.086*	3.756
Parents alive			7.729*	3.420	7.767*	3.402
Living with parents or relatives			5.578	4.767	5.744	4.763
Socioeconomic status			1.005	0.663	1.002	0.663
Number of books at home			1.065	3.345	0.889	3.342
Distance to school			-0.868	4.466	-0.925	4.442
Household tasks			1.307*	0.670	1.319*	0.671
Meals per week			1.560	1.241	1.570	1.241
Homework help at home			65.859	193.763	66.058	194.132
Paying fees			3.352*	1.701	3.333*	1.703
Parental support			0.917	1.388	0.929	1.389
Random Effect						
Residual Variances						
Between level	9733.229	5375.981	5022.601**	1609.002	4380.798**	1539.175
Within level	13748.663***	904.469	11999.907***	593.997	12001.799***	594.472
R-square						
Between level	0.000	0.000	0.040	0.063	0.156	0.153
Within level	0.000	0.000	0.186***	0.028	0.186***	0.028
ICC	0.315		0.264		0.263	
Loglikelihood	-9025.258		-8905.025		-8903.217	
AIC	18056.515		17868.050		17870.435	
BIC	18072.351		18021.130		18039.351	

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 43. Results for achievement growth in Cohort 1

Variable	Null		Model 1 School social composition		Model 2 School inputs	
	ES	*SE*	*ES*	*SE*	*ES*	*SE*
Fixed Effect						
School						
Intercepts	283.370***	18.389	283.272***	17.538	285.285***	18.121
School social composition						
Mean socioeconomic status			-2.558	12.298	-1.575	13.122
Mean number of grade repetitions			31.321	59.856	20.625	55.435
School inputs						
Class size					0.238	0.461
School location					-6.607	37.030
School facilities					27.173	24.479
Individual						
Student gender			7.190	11.930	7.038	12.004
Age of first entry			-5.633	5.513	-5.803	5.547
Preschool attendance			-1.257	8.610	-1.438	8.567
Days absent during the previous 2 weeks			-1.492	3.992	-1.319	4.021
Number of grade repetitions			-4.106	8.990	-4.404	9.067
Repetition at grades 5 or 7			-1.328	16.151	-0.588	16.212
Homework			12.806	7.232	12.567	7.188
Taking extra classes			34.678**	13.036	34.783**	12.675
Health condition			0.018	5.555	0.144	5.513
Self-esteem			-5.295	4.144	-5.213	4.156
Feelings about school			-2.933	3.882	-2.969	3.842
Educational aspiration			4.743	6.535	4.918	6.508
Family						
Number of siblings			-5.489	4.043	-5.412	4.066
Speaking language of instruction			18.736**	6.806	18.009**	6.805
Parents alive			5.986	9.086	5.559	9.000
Living with parents or relatives			5.359	11.149	5.567	11.173
Socioeconomic status			-1.027	1.221	-0.968	1.229
Number of books at home			-2.191	7.473	-1.663	7.593
Distance to school			5.136	8.747	5.714	8.698
Household tasks			0.218	1.358	0.225	1.353
Meals per week			2.956	3.074	3.000	3.081
Homework help at home			-7.949	7.053	-7.781	7.174
Paying fees			1.732	3.818	1.441	3.837
Parental support			-0.759	3.082	-0.707	3.058
Random Effect						
Residual Variances						
Between level	9358.893*	4429.618	8373.854*	3904.843	7551.809*	3035.825
Within level	22256.391***	1650.215	21325.086***	1547.868	21326.213***	1543.193
R-square						
Between level	0.000	0.000	0.010	0.036	0.110	0.141
Within level	0.000	0.000	0.053**	0.020	0.052**	0.020
ICC	0.290		0.274		0.275	
Loglikelihood	-3590.015		-3577.282		-3575.985	
AIC	7186.030		7212.563		7215.970	
BIC	7198.981		7337.761		7354.119	

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 44. Results for repetition rates in Cohort 1

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	0.980***	0.173	2.664	1.109***	0.200	3.031	0.982***	0.184	2.670
School social composition									
Mean achievement				0.001	0.003	1.001	0.001	0.002	1.001
Mean socioeconomic status				-0.087	0.117	0.917	-0.173	0.098	0.841
Mean number of grade repetitions				1.138	0.776	3.121	0.837	0.549	2.309
School inputs									
Class size							0.008	0.005	1.008
School location							0.676	0.565	1.966
School facilities							0.155	0.233	1.168
Individual									
Achievement				-0.004***	0.001	0.996	-0.004***	0.001	0.996
Student gender				0.173	0.165	1.189	0.179	0.163	1.196
Age of first entry				0.039	0.067	1.040	0.039	0.067	1.040
Preschool attendance				-0.034	0.094	0.967	-0.051	0.095	0.950
Days absent during the previous 2 weeks				0.131*	0.059	1.140	0.134*	0.059	1.143
Number of grade repetitions				0.026	0.106	1.026	0.028	0.107	1.028
Repetition at grade 5 or 7				-0.071	0.174	0.931	-0.064	0.173	0.938
Homework				0.172	0.099	1.188	0.169	0.101	1.184
Taking extra classes				0.101	0.196	1.106	0.090	0.199	1.094
Health condition				0.009	0.053	1.009	0.011	0.052	1.011
Self-esteem				0.098*	0.048	1.103	0.102*	0.048	1.107
Feelings about school				-0.069	0.046	0.933	-0.061	0.044	0.941
Educational aspiration				0.015	0.071	1.015	0.023	0.071	1.023
Family									
Number of siblings				-0.070	0.043	0.932	-0.068	0.043	0.934
Speaking language of instruction				-0.015	0.077	0.985	-0.023	0.075	0.977
Parents alive				-0.179	0.123	0.836	-0.176	0.123	0.839
Living with parents or relatives				-0.086	0.095	0.918	-0.090	0.095	0.914
Socioeconomic status				-0.030	0.021	0.970	-0.030	0.021	0.970
Number of books at home				0.136	0.079	1.146	0.135	0.079	1.145
Distance to school				0.047	0.120	1.048	0.042	0.119	1.043
Household tasks				-0.017	0.015	0.983	-0.017	0.015	0.983
Meals per week				-0.055	0.032	0.946	-0.054	0.031	0.947
Homework help at home				-0.030	0.092	0.970	-0.033	0.094	0.968
Paying fees				0.003	0.045	1.003	0.003	0.044	1.003
Parental support				-0.066*	0.033	0.936	-0.066*	0.032	0.936
Random Effect									
Residual Variances									
Between level	0.705**	0.226		0.788***	0.222		0.562**	0.207	
ICC	0.176			0.193			0.146		
Loglikeihood	-676.429			-612.466			-608.888		
AIC	1356.858			1284.932			1283.775		
BIC	1366.936			1436.095			1450.055		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 45. Results for dropout rates in Cohort 1

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	3.300***	0.320	27.113	3.525***	0.352	33.954	3.510***	0.351	33.448
School social composition									
Mean achievement				0.002	0.003	1.002	0.003	0.003	1.003
Mean socioeconomic status				0.028	0.178	1.028	0.080	0.188	1.083
Mean number of grade repetitions				-2.209	1.299	0.110	-2.097	1.202	0.123
School inputs									
Class size							-0.002	0.007	0.998
School location							-0.412	0.645	0.662
School facilities							0.198	0.250	1.219
Individual									
Achievement				-0.001	0.001	0.999	-0.001	0.001	0.999
Student gender				-0.180	0.340	0.835	-0.176	0.341	0.839
Age of first entry				0.270***	0.078	1.310	0.267***	0.079	1.306
Preschool attendance				-0.136	0.182	0.873	-0.127	0.184	0.881
Days absent during the previous 2 weeks				0.139	0.109	1.149	0.136	0.108	1.146
Number of grade repetitions				0.392*	0.165	1.480	0.386*	0.165	1.471
Repetition at grade 5 or 7				-0.261	0.352	0.770	-0.259	0.352	0.772
Homework				-0.110	0.157	0.896	-0.110	0.158	0.896
Taking extra classes				0.126	0.300	1.134	0.135	0.301	1.145
Health condition				0.113	0.116	1.120	0.111	0.115	1.117
Self-esteem				0.080	0.085	1.083	0.081	0.084	1.084
Feelings about school				-0.128**	0.050	0.880	-0.132**	0.051	0.876
Educational aspiration				0.046	0.107	1.047	0.050	0.109	1.051
Family									
Number of siblings				-0.116	0.086	0.890	-0.116	0.087	0.890
Speaking language of instruction				-0.046	0.169	0.955	-0.050	0.168	0.951
Parents alive				-0.363	0.210	0.696	-0.366	0.211	0.694
Living with parents or relatives				0.490*	0.210	1.632	0.485*	0.209	1.624
Socioeconomic status				-0.014	0.026	0.986	-0.013	0.025	0.987
Number of books at home				-0.055	0.095	0.946	-0.048	0.095	0.953
Distance to school				0.014	0.201	1.014	0.018	0.202	1.018
Household tasks				-0.009	0.025	0.991	-0.009	0.025	0.991
Meals per week				0.052	0.051	1.053	0.050	0.052	1.051
Homework help at home				-0.073	0.148	0.930	-0.066	0.149	0.936
Paying fees				0.132	0.090	1.141	0.131	0.091	1.140
Parental support				-0.010	0.084	0.990	-0.012	0.084	0.988
Random Effect									
Residual Variances									
Between level	1.512*	0.665		1.273	0.576		1.122	0.589	
ICC	0.315			0.279			0.254		
Loglikeihood	-270.825			-249.135			-248.640		
AIC	545.651			558.270			563.280		
BIC	555.867			711.518			731.852		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 46. Results for transfer rates in Cohort 1

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	1.768***	0.161	5.859	1.827***	0.159	6.215	1.754***	0.113	5.778
School social composition									
Mean achievement				0.000	0.002	1.000	0.000	0.001	1.000
Mean socioeconomic status				0.043	0.088	1.044	-0.024	0.077	0.976
Mean number of grade repetitions				-0.276	0.603	0.759	-0.988	0.560	0.372
School inputs									
Class size							0.001	0.003	1.001
School location							0.941***	0.245	2.563
School facilities							0.098	0.077	1.103
Individual									
Achievement				0.000	0.001	1.000	0.000	0.001	1.000
Student gender				-0.217	0.149	0.805	-0.222	0.151	0.801
Age of first entry				-0.055	0.065	0.946	-0.055	0.066	0.946
Preschool attendance				0.120	0.098	1.127	0.109	0.100	1.115
Days absent during the previous 2 weeks				0.015	0.051	1.015	0.023	0.049	1.023
Number of grade repetitions				0.045	0.090	1.046	0.045	0.088	1.046
Repetition at grade 5 or 7				-0.040	0.196	0.961	-0.050	0.195	0.951
Homework				-0.036	0.094	0.965	-0.059	0.095	0.943
Taking extra classes				0.246	0.183	1.279	0.272	0.187	1.313
Health condition				0.087	0.068	1.091	0.082	0.068	1.085
Self-esteem				0.013	0.045	1.013	0.014	0.045	1.014
Feelings about school				0.028	0.039	1.028	0.040	0.039	1.041
Educational aspiration				-0.032	0.084	0.969	-0.025	0.083	0.975
Family									
Number of siblings				-0.064	0.046	0.938	-0.058	0.045	0.944
Speaking language of instruction				0.048	0.081	1.049	0.054	0.078	1.055
Parents alive				-0.304***	0.091	0.738	-0.302***	0.088	0.739
Living with parents or relatives				0.121	0.120	1.129	0.109	0.119	1.115
Socioeconomic status				0.004	0.019	1.004	0.004	0.019	1.004
Number of books at home				-0.148	0.080	0.862	-0.142	0.084	0.868
Distance to school				0.094	0.109	1.099	0.064	0.107	1.066
Household tasks				-0.008	0.008	0.992	-0.009	0.008	0.991
Meals per week				0.004	0.034	1.004	0.009	0.033	1.009
Homework help at home				-0.100	0.093	0.905	-0.129	0.096	0.879
Paying fees				-0.036	0.041	0.965	-0.032	0.039	0.969
Parental support				0.057	0.040	1.059	0.060	0.039	1.062
Random Effect									
Residual Variances									
Between level	0.278*	0.146		0.284	0.157		0.051	0.097	
ICC	0.078			0.079			0.015		
Loglikeihood	-603.579			-585.354			-578.361		
AIC	1211.158			1230.708			1222.722		
BIC	1221.598			1387.298			1394.970		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 47. Results for achievement in Cohort 2

Variable	Null		Model 1 School social composition		Model 2 School inputs	
	ES	*SE*	*ES*	*SE*	*ES*	*SE*
Fixed Effect						
School						
Intercepts	991.893***	10.528	992.176***	8.929	994.169***	9.573
School social composition						
Mean socioeconomic status			3.650	4.789	-0.150	4.704
Mean number of grade repetitions			-99.288***	29.719	-103.413**	35.126
School inputs						
Class size					0.187	0.279
School location					12.564	19.053
School facilities					-4.468	9.956
Individual						
Student gender			31.885***	8.364	31.828***	8.396
Age of first entry			-11.093***	2.747	-11.006***	2.775
Preschool attendance			7.382	3.881	7.435	3.904
Days absent during the previous 2 weeks			-5.167	3.625	-5.175	3.635
Number of grade repetitions			-21.724***	5.391	-21.674***	5.417
Repetition at grades 5 or 7			-7.297	8.510	-7.265	8.517
Homework			0.406	3.472	0.332	3.433
Taking extra classes			1.915	7.069	1.773	7.036
Health condition			4.257	3.185	4.241	3.187
Self-esteem			9.940***	2.234	9.974***	2.246
Feelings about school			7.117*	2.790	7.109**	2.770
Educational aspiration			41.813***	7.425	41.940***	7.354
Family						
Number of siblings			-2.589	2.085	-2.640	2.075
Speaking language of instruction			-12.638***	3.306	-12.651***	3.296
Parents alive			15.229*	7.171	15.226*	7.161
Living with parents or relatives			10.360*	5.163	10.381*	5.160
Socioeconomic status			1.541	0.999	1.544	0.999
Number of books at home			1.950	3.361	1.929	3.391
Distance to school			8.855	5.484	8.835	5.512
Household tasks			-2.826***	0.709	-2.824***	0.711
Meals per week			6.102***	1.390	6.090***	1.410
Homework help at home			0.631	3.939	0.670	3.996
Paying fees			-0.302	1.313	-0.331	1.324
Parental support			5.515***	1.638	5.574***	1.620
Random Effect						
Residual Variances						
Between level	10731.921***	0.700	1689.549**	590.402	1631.247**	582.805
Within level	18979.855***	1149.971	14593.397***	669.317	14595.326***	667.234
R-square						
Between level	0.000	0.000	0.184*	0.074	0.209**	0.079
Within level	0.000	0.000	0.253***	0.025	0.253***	0.025
ICC	0.123		0.098		0.098	
Loglikelihood	-8257.940		-8065.382		-8065.045	
AIC	16521.880		16188.763		16194.091	
BIC	16537.377		16338.563		16359.386	

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 48. Results for achievement growth in Cohort 2

Variable	Null		Model 1 School social composition		Model 2 School inputs	
	ES	*SE*	*ES*	*SE*	*ES*	*SE*
Fixed Effect						
School						
Intercepts	295.572***	13.039	295.311***	12.490	294.572***	11.673
School social composition						
Mean socioeconomic status			-8.916	7.584	-14.420	10.035
Mean number of grade repetitions			131.571	71.223	104.291	75.116
School inputs						
Class size					-0.294	0.436
School location					71.871	38.043
School facilities					-5.632	11.390
Individual						
Student gender			45.561*	18.460	45.469*	18.273
Age of first entry			-15.969	9.242	-14.747	9.091
Preschool attendance			-0.658	8.669	-1.778	8.830
Days absent during the previous 2 weeks			1.831	7.090	1.789	7.223
Number of grade repetitions			-24.983	16.451	-24.259	16.560
Repetition at grades 5 or 7			-6.454	23.037	-8.238	23.424
Homework			-9.063	9.753	-10.732	9.306
Taking extra classes			-14.575	18.315	-12.252	17.971
Health condition			-3.755	6.793	-3.210	6.849
Self-esteem			0.812	4.940	0.785	5.032
Feelings about school			3.534	6.338	3.005	6.275
Educational aspiration			12.077	18.252	12.668	17.999
Family						
Number of siblings			0.293	5.633	-0.353	5.596
Speaking language of instruction			4.494	11.050	4.947	10.997
Parents alive			11.266	15.122	12.330	15.403
Living with parents or relatives			-22.564	14.195	-23.679	14.027
Socioeconomic status			2.781	1.778	2.881	1.782
Number of books at home			-4.683	8.896	-4.606	8.847
Distance to school			4.008	8.268	3.972	8.564
Household tasks			-1.516	2.125	-1.541	2.135
Meals per week			0.932	4.027	0.994	4.007
Homework help at home			3.110	6.844	4.658	7.042
Paying fees			0.801	3.754	0.565	3.704
Parental support			-4.008	3.746	-4.243	3.770
Random Effect						
Residual Variances						
Between level	2781.227*	1444.912	2336.337*	1156.307	1618.154	1093.681
Within level	31719.738***	2423.316	29794.586***	2785.294	29877.279***	2806.225
R-square						
Between level	0.000	0.000	0.262	0.185	0.063	0.032
Within level	0.000	0.000	0.063*	0.032	0.470*	0.267
ICC	0.078		0.092		0.089	
Loglikelihood	-3002.109		-2987.135		-2985.225	
AIC	6010.218		6032.269		6034.449	
BIC	6022.566		6151.630		6166.158	

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 49. Results for repetition rates in Cohort 2

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	1.050***	0.233	2.858	1.301***	0.299	3.673	1.176***	0.225	3.241
School social composition									
Mean achievement				0.009**	0.004	1.009	0.010***	0.003	1.010
Mean socioeconomic status				0.044	0.178	1.045	-0.231	0.234	0.794
Mean number of grade repetitions				1.789	2.018	5.983	2.412	1.630	11.156
School inputs									
Class size							0.023**	0.008	1.023
School location							-0.621	0.961	0.537
School facilities							-0.448	0.242	0.639
Individual									
Achievement				-0.009***	0.001	0.991	-0.009***	0.001	0.991
Student gender				0.063	0.175	1.065	0.059	0.174	1.061
Age of first entry				-0.039	0.058	0.962	-0.039	0.058	0.962
Preschool attendance				-0.033	0.123	0.968	-0.031	0.123	0.969
Days absent during the previous 2 weeks				0.136*	0.064	1.146	0.126*	0.064	1.134
Number of grade repetitions				-0.065	0.107	0.937	-0.068	0.107	0.934
Repetition at grade 5 or 7				-0.402	0.252	0.669	-0.384	0.258	0.681
Homework				-0.019	0.102	0.981	-0.030	0.103	0.970
Taking extra classes				-0.187	0.232	0.829	-0.194	0.230	0.824
Health condition				-0.114	0.076	0.892	-0.116	0.076	0.890
Self-esteem				0.038	0.075	1.039	0.038	0.075	1.039
Feelings about school				-0.011	0.093	0.989	-0.009	0.094	0.991
Educational aspiration				-0.285	0.199	0.752	-0.271	0.199	0.763
Family									
Number of siblings				0.087	0.058	1.091	0.091	0.058	1.095
Speaking language of instruction				0.075	0.086	1.078	0.075	0.086	1.078
Parents alive				-0.086	0.186	0.918	-0.075	0.185	0.928
Living with parents or relatives				-0.047	0.122	0.954	-0.039	0.123	0.962
Socioeconomic status				-0.009	0.020	0.991	-0.010	0.020	0.990
Number of books at home				0.064	0.081	1.066	0.063	0.081	1.065
Distance to school				0.033	0.089	1.034	0.042	0.089	1.043
Household tasks				0.058*	0.025	1.060	0.057*	0.025	1.059
Meals per week				-0.017	0.036	0.983	-0.014	0.036	0.986
Homework help at home				0.018	0.096	1.018	0.016	0.096	1.016
Paying fees				-0.011	0.030	0.989	-0.013	0.030	0.987
Parental support				-0.018	0.027	0.982	-0.015	0.028	0.985
Random Effect									
Residual Variances									
Between level	1.130**	0.432		1.757*	0.776		1.196*	0.563	
ICC	0.256			0.348			0.267		
Loglikeihood	-561.590			-444.027			-439.699		
AIC	1127.180			948.054			945.398		
BIC	1136.949			1094.589			1106.586		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 50. Results for dropout rates in Cohort 2

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	2.698***	0.211	14.850	3.207***	0.243	24.705	3.254***	0.273	25.894
School social composition									
Mean achievement				-0.001	0.005	0.999	-0.001	0.006	0.999
Mean socioeconomic status				-0.055	0.111	0.946	-0.058	0.099	0.944
Mean number of grade repetitions				-1.017	1.669	0.362	-1.171	1.444	0.310
School inputs									
Class size							-0.006	0.010	0.994
School location							0.414	0.758	1.513
School facilities							-0.081	0.188	0.922
Individual									
Achievement				-0.003*	0.001	0.997	-0.003*	0.001	0.997
Student gender				-0.958***	0.249	0.000	-0.954***	0.248	0.385
Age of first entry				0.333***	0.087	1.395	0.335***	0.088	1.398
Preschool attendance				-0.074	0.190	0.929	-0.076	0.188	0.927
Days absent during the previous 2 weeks				-0.121	0.146	0.886	-0.119	0.150	0.888
Number of grade repetitions				0.157	0.222	1.170	0.157	0.224	1.170
Repetition at grade 5 or 7				-0.129	0.356	0.879	-0.130	0.355	0.878
Homework				-0.044	0.138	0.957	-0.045	0.139	0.956
Taking extra classes				0.112	0.243	1.119	0.127	0.242	1.135
Health condition				0.060	0.131	1.062	0.059	0.131	1.061
Self-esteem				-0.185*	0.089	0.831	-0.186*	0.092	0.830
Feelings about school				-0.015	0.141	0.985	-0.014	0.145	0.986
Educational aspiration				-0.283	0.215	0.754	-0.288	0.224	0.750
Family									
Number of siblings				-0.081	0.090	0.922	-0.082	0.090	0.921
Speaking language of instruction				0.092	0.177	1.096	0.093	0.175	1.097
Parents alive				0.713*	0.339	2.040	0.712*	0.341	2.038
Living with parents or relatives				-0.094	0.198	0.910	-0.097	0.198	0.908
Socioeconomic status				-0.001	0.042	0.999	-0.001	0.042	0.999
Number of books at home				0.092	0.129	1.096	0.091	0.130	1.095
Distance to school				0.177	0.182	1.194	0.172	0.184	1.188
Household tasks				-0.013	0.032	0.987	-0.013	0.032	0.987
Meals per week				-0.056	0.044	0.946	-0.058	0.045	0.944
Homework help at home				0.218	0.126	1.244	0.232	0.129	1.261
Paying fees				0.026	0.043	1.026	0.026	0.043	1.026
Parental support				-0.029	0.044	0.971	-0.029	0.044	0.971
Random Effect									
Residual Variances									
Between level	0.471	0.277		0.592*	0.291		0.559*	0.271	
ICC	0.125			0.152			0.145		
Loglikeihood	-281.577			-244.784			-244.331		
AIC	567.154			549.569			554.661		
BIC	577.069			698.293			718.259		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.

Appendix 51. Results for transfer rates in Cohort 2

Variable	Null			Model 1 School social composition			Model 2 School inputs		
	ES	*SE*	*OR*	*ES*	*SE*	*OR*	*ES*	*SE*	*OR*
Fixed Effect									
School									
Intercepts	1.494***	0.143	4.455	1.580***	0.140	4.855	1.579***	0.126	4.850
School social composition									
Mean achievement				0.004	0.002	1.004	0.003	0.002	1.003
Mean socioeconomic status				0.014	0.071	1.014	-0.058	0.096	0.944
Mean number of grade repetitions				1.818**	0.670	6.160	1.379*	0.692	3.971
School inputs									
Class size							0.000	0.003	1.000
School location							0.638*	0.276	1.893
School facilities							-0.046	0.113	0.955
Individual									
Achievement				-0.002*	0.001	0.998	-0.002*	0.001	0.998
Student gender				-0.501**	0.162	0.606	-0.499**	0.163	0.607
Age of first entry				0.074	0.046	1.077	0.076	0.047	1.079
Preschool attendance				-0.168	0.092	0.845	-0.163	0.094	0.850
Days absent during the previous 2 weeks				-0.030	0.073	0.970	-0.026	0.072	0.974
Number of grade repetitions				0.125	0.086	1.133	0.126	0.085	1.134
Repetition at grade 5 or 7				-0.205	0.192	0.815	-0.208	0.189	0.812
Homework				0.160	0.106	1.174	0.136	0.109	1.146
Taking extra classes				0.100	0.136	1.105	0.101	0.139	1.106
Health condition				0.032	0.080	1.033	0.026	0.081	1.026
Self-esteem				-0.027	0.053	0.973	-0.026	0.053	0.974
Feelings about school				-0.120*	0.054	0.887	-0.114*	0.056	0.892
Educational aspiration				-0.053	0.194	0.948	-0.056	0.194	0.946
Family									
Number of siblings				-0.071	0.051	0.931	-0.075	0.053	0.928
Speaking language of instruction				-0.005	0.085	0.995	-0.006	0.085	0.994
Parents alive				0.034	0.116	1.035	0.031	0.117	1.031
Living with parents or relatives				-0.010	0.098	0.990	-0.008	0.098	0.992
Socioeconomic status				-0.003	0.026	0.997	-0.003	0.026	0.997
Number of books at home				0.027	0.073	1.027	0.030	0.072	1.030
Distance to school				0.207*	0.089	1.230	0.204*	0.091	1.226
Household tasks				-0.057***	0.014	0.945	-0.056**	0.014	0.946
Meals per week				0.035	0.028	1.036	0.034	0.028	1.035
Homework help at home				-0.219	0.112	0.803	-0.212	0.111	0.809
Paying fees				0.078*	0.036	1.081	0.078*	0.036	1.081
Parental support				-0.007	0.033	0.993	-0.005	0.032	0.995
Random Effect									
Residual Variances									
Between level	0.331*	0.154		0.263*	0.125		0.183	0.127	
ICC	0.091			0.074			0.053		
Loglikeihood	-592.042			-559.584			-557.972		
AIC	1188.084			1179.168			1181.944		
BIC	1198.279			1332.094			1350.163		

Note: $p^* < .05$. $p^{**} < .01$. $p^{***} < .001$.