Title: "Educational Influences on Student Academic Attainment: A Multi-level Analysis in the context of Bangladesh."

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DEDICATION

This work is dedicated

To my Father:

The late Md. Rafiqul Alam Khan, who had a great desire that one of his daughters would choose their grandfather's profession (He was head pundit of the Guru Training (GT) schools in the British Period in the Indian subcontinent).

গভর্নমেন্ট ল্যাবরেটরি হাইস্কুলের জিপিএ-৫ প্রাপ্ত শিক্ষার্থীদের উল্লাস (ইনসেটে প্রধান শিক্ষক এ কে এম মোস্তফা কামাল) –ইত্তেফাক

ABSTRACT

Bangladesh has made significant progress in terms of improving student access and gender disparity at primary and secondary levels of education. Currently, the major concern is the quality of education. In the national interest, the government of Bangladesh has undertaken a number of intervention programmes to increase the quality of primary and secondary education. Recently, researchers and practitioners are more engaged in investigating the quality of education, particularly at primary and secondary levels, where they have focused on the following themes:

- internal efficiency
- achievement of basic competency
- acquisition of terminal competencies
- teacher education
- private expenditure on education

There has been little application of School Effectiveness Research (SER) in Bangladesh, though SER became one of the most important educational movements and discourses in the West and came to prominence very rapidly in other developed and developing countries, namely Australia, Canada, South Africa, Indonesia, China and India. Therefore, the current study is significant in that it explores contemporary issues in the Bangladesh education system, which influence student academic attainment and present the findings of the first school effectiveness study in Bangladesh using multi-level analysis.

Reviewing SER in other developed and developing countries, I discuss the status of SER in Bangladesh. This is followed by an assessment of the education system, educational management and policy making procedure at secondary level in Bangladesh to aid readers' understanding. Different perspectives of what constitutes 'school effectiveness' are illustrated, in the light of important issues such as models and the theory of SER, effect size, consistency and stability. Various criticisms of SER are also illustrated, along with a number of counterpoints to justify the importance of SER. The significant methodological aspect (i.e. multi-level analysis with 'value added' approach) is introduced, along with other different types of statistical analysis, for example, descriptive and cross tabulation (chi-square) analysis and exploratory factor analysis. The normalised public examination scores of 2,462 students nested into 90 classes

and 45 schools are analysed by means of multi-level modelling. The multi-level analysis of the data shows that most of the variations were found at the student level. A significant proportion of variations was also found at class level accounting for prior attainment, background factors and some class level process factors implying that teacher effect on pupil attainment is greater than school effect.

It is argued that it is possible to construct a model of school effectiveness in the Bangladeshi setting. The findings of my research indicate that factors external to the schools are more important than school level factors for academic attainment. Student academic attainment and academic self-concept were found to be positively correlated. The interrelation between the two variables is significantly higher at school level than at class and student levels. A significant proportion of variation in academic attainment was found to be at class level, implying that teachers 'make the difference', not schools and that the teachers who teach individual classes within the school are the key factors for effective teaching and learning outcome. Finally, the policy implications of my findings are discussed and a framework is proposed for measuring school effectiveness in Bangladesh.

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ACRONYMS

AD	Assistant Director
ADB	Asian Development Bank
BANBEIS	Bangladesh Bureau of Educational Information & Statistics
B. Ed	Bachelor of Education
BEDU	Bangladesh Examinations Development Unit
BISE	Board of Intermediate and Secondary Education
BTEB	Bangladesh Technical Education Board
CAMPE	Campaign for Popular Education
CFA	Confirmatory Factor Analysis
CIDA	Canadian International Development Agency
DD	Deputy Director
DEO	District Education Officer
DFID	Department for International Development
DG	Director General
DPE	Directorate of Primary Education
DPI	Director of Public Instruction
DSHE	Directorate of Secondary and Higher Education
DTE	Directorate of Technical Education
ECNEC	Executive Committee of National Economic Council
EFA	Education for All
EFA	Exploratory Factor Analysis
EMIS	Education Management Information System
ERD	External Resources Division
EU	European Union
FSSAP II	Female Secondary School Assistance Project II
GB	Governing Body
GCSE	General Certificate of Secondary Education
GDP	Gross Domestic Product
GED	General Economics Division
GOB	Government of Bangladesh
GPS	Government primary school
HSC	Higher Secondary Certificate
IER	Institute of Education and Research
IMED	Implementation, Monitoring and Evaluation Division
MCQ	Multiple Choice Questions
MDGs	Millennium Development Goals

M.Ed	Master in Education
ML	Maximum Likelihood
MOE	Ministry of Education
MOPME	Ministry of Primary and Mass Education
NAEM	National Academy for Education Management
NAPE	National Academy of primary Education
NCCC	National Curriculum Co-ordinating Committee
NCTB	National Curriculum and Text Board
NGO	Non Government Organisation
NORAD	Norwegian Agency for Development
NRC	National Research Committee on Primary Education
OFSTED	Office for Standards in Education
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PISA	Programme for International Student Assessment
POD	Policy and Operations Division
PROMOTE	Program to Motivate, Train and Employ
RNGPS	Registered Non-Government Primary School
SBA	School-Based Assessment
SDQ II	Self Description Questionnaire II
SEM	Structure Equation Model
SER	School Effectiveness Research
SES	Socio-Economic Status
SESDP	Secondary Education Sector Development Project
SESIP	Secondary Education Sector Improvement Project
SIDA	Swedish International Development Co-operation Agency
SMC	School Management Committees
SPBM	School Performance Based Management
SSC	Secondary School Certificate
TIMSS	Third International Mathematics and Science Study
TQI	Teaching Quality Improvement
TQI-SEP	Teacher Quality Improvement in Secondary Education Project
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USEO	Upazila Secondary Education Officers
UZ	Upazila
VPC	Variance Partition Co-efficient
WB	World Bank

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- After Professor Pamela Sammons moved, my condition was like a ship without a captain, searching for a direction to reach its destination. One day, I knocked on Professor Andy Noyes's door and asked for help, as he was then the only remaining person who had experience of Multi-level Modelling in the School of Education at Nottingham University. He showed interest in my research topic and lent his helping hand. It was possible for me to complete my multi-level analysis with his sincere and sympathetic co-operation. Professor Andy was always kind, helpful and friendly. After Pam's departure, I finished the rest of my thesis with his assistance.

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CHAPTER I

1: INTRODUCTION: SCHOOL EFFECTIVENESS IN BANGLADESH

For almost half a century the school effectiveness research (SER) movement has been developing in order to explain any differential effects between schools. Substantial progress has been made in the development of SER since the early 1980's, '*when the five factors model (Edmond, 1979) was paramount*', to the period of the 1990's '*when it was widely acknowledged that the effectiveness of any school must be considered within the context in which that school operates*' (Townsend, 2007:4). Furthermore, SER became one of the most important educational movements and sources of debates in the West (Weiner, 2002) and came to prominence very rapidly in other developed and developing countries, such as Australia, Canada, South Africa, the Middle East, Asia and the Pacific nations. A number of international congresses on school effectiveness were also held during this development period. It is now recognised that SE researchers have consistently shown that effective schools are structurally, symbolically and culturally more tightly linked than less effective schools (Harries & Bennett, 2001:11). Compared with other countries, there has been little application of SER in Bangladesh, though a number of intervention programmes has been undertaken by the government to make the schools more effective in providing quality education.

1.1: Intervention Programmes in Bangladesh for School Improvement

Education is considered one of the basic requirements for human resource development and for inducing social change and promoting the overall economic development of a country. Bangladesh has made good progress and has introduced changes into its education system, particularly in the primary and secondary levels of education, to meet the challenges of the 21st century. The government of Bangladesh has undertaken significant reform measures for the development of primary, secondary and tertiary education, albeit quality remains the major concern. A number of comprehensive reform measures have been undertaken by the Government of Bangladesh (GoB) jointly with other international agencies for the development of secondary education. It is important to note that reform programmes related to secondary education are being discussed as the current study is being carried out on the secondary level

of education. The major initiatives underway or completed recently include the following (Education Watch, 2007:10):

- Secondary Education Sector Improvement Project (SESIP)
- Teaching Quality Improvement Project in Secondary Education (TQI-SEP)
- Monitoring schools at the local level and public level disclosure of information
- Strengthening use of information for monitoring of performance and decision making
- Co-ordinating of teacher training, registration and accreditation of teachers
- Enforcement of criteria of registration of schools

The GoB has already implemented five development projects under the title of '*The Free Tuition and Stipend Programme*' aided by the financial assistance of the World Bank (WB), the Asian Development Bank (ADB) and the Norwegian Agency for Development (NORAD). The chief objectives of these projects were to increase the access and retention rate, particularly of girls' participation at secondary and higher secondary level throughout the country. PROMOTE (Programme to Motivate, Train and Employ Female Teachers in Rural Secondary Schools) was implemented with the collaboration of the GoB and the European Union (EU), in order to increase the empowerment of women, particularly by promoting and accelerating the recruitment of female teachers in rural non-government schools. Under the Female Secondary School Assistance Project (FSSAP) II, the Government has, with the financial assistance of the WB, taken various reform measures for teacher education, training and support providing incentive awards for institution performance and student achievement; and improving school facilities.

Generally, significant progress in the education sector has been made in terms of equality i.e. in access and gender parity at primary and secondary level with the implementation of these reforms (Alam, 2008; Education Watch, 2008). Specifically, through the implementation of SESIP[1] project, the following significant improvements at secondary education level have been achieved:

- The National Curriculum and Text Board (NCTB) strengthened and developed a new curriculum for grade 9 and grade 10 under the supervision of SESIP. However, despite having obtained approval from the

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[1] ADB Completion Report, June 2008, Bangladesh: Secondary Education Sector Improvement Project.

National Curriculum Coordinating Committee[2] (NCCC) and the Cabinet in 2005, implementation was not possible, since, over a period of three years, the Ministry of Education (MoE) issued orders to postpone the introduction of the new grade 9 and 10 curricula[3] (SESDP, 2008).

- For reforming and enhancing education management, SESIP was influential in strengthening policy-making and management capacity, decentralising management, designing a school performance-based management (SPBM) system, initiating an education management information system (EMIS) within DAHE, strengthening school management and supervision, reforming student assessment and the public examination system and updating the curriculum of teacher training (TQI-SEP, 2005 & SESDP, 2008).

Owing to the complexity and breadth of the education sector in Bangladesh, SESIP was not able to implement the education reform across the whole sector. Thus, the programme was reviewed and will be extended from 2010 to 2013 as the Secondary Education Sector Development Project (SESDP) for the accomplishment of SESIP's unfinished work. The most significant contribution of SESDP was to introduce school-based assessment (SBA), along with a reformed examination system establishing the Bangladesh Examinations Development Unit (BEDU). Many head teachers and subject teachers had already received introductory training on school-based assessment. In order to ensure quality secondary education through effective teaching, the GoB, with financial assistance from ADB and from CIDA (the Canadian International Development Agency), is now in the process of implementing the project under the title of '*The Teacher Quality Improvement in Secondary Education Project (TQI-SEP)*'. It is expected that the project could be effective in increasing the professional quality of teachers through the continuous professional development (CPD) training.

Basically, most of the GoB intervention programmes for school improvement have placed emphasis on more equitable access to secondary education with regard to age and gender; strengthened management and transparency, restructured the secondary education providing physical facilities, renewed the curriculum and increased teacher quality for effective teaching. There is some misunderstanding of the terms 'school effectiveness' and 'school improvement' as all of the intervention programmes for school improvement have taken place in Bangladesh

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[2] NCCC approval is required before revised curricula are implemented.
[3] MoE orders issued for postponement to 31 December, 2006, then 31 December, 2007 and finally 31 December, 2008.

to enhance the quality of education, making schools effective. Smink, (1991, cited in Townsend, 2007:3) pointing out the difference between the two concepts, states:

> School effectiveness is concerned with results. Researchers try to describe certain variables for school success in measurable terms. On the other hand, school improvement places the accent on the process; here one finds a broad description of all the variables that play a role in a school improvement project. Both approaches need the other to successfully modernise the system.

It is clear that, in Bangladesh, the reform programmes have focused upon school improvement rather than on the outcome of schooling and the characteristics of schools that are effective (Harris & Bennett, 2001). The report of Education Watch (2007:3) reveals that, in Bangladesh, as part of a broader interest in the quality of education (primary and secondary), the following areas were investigated (Chowdhury et al., 1999 & 2002; Alam & Haq, 2001; Alam & Ahmed, 2008 and Alam, 2008):

- internal efficiency
- achievement of basic competency
- acquisition of terminal competencies
- teacher education
- private expenditure of education

Although there had been a government intervention programme (i.e. TQI-SEP) focusing on teacher effectiveness, only a few studies can be found in this relevant field. It is notable that different traditions of SER are found in the literature (Scheerens, 2000), that is:

- Research on equality of opportunities in education
- Economic studies on education production functions
- The evaluation of compensatory programmes
- Studies of unusually effective schools
- Studies on the effectiveness of teachers, classes and instructional procedures

All these aspects of effectiveness will be discussed in the subsequent chapter in this thesis. In the case of Bangladesh, most of the studies can be judged under the label of 'education production function'. On the other hand, intervention programmes are much nearer to the traditions of equality of opportunity in education and the evaluation of compensatory programmes.

1.2: My interest on school effectiveness research (SER) in Bangladesh

From the above discussion, it is clear that a number of initiatives have been taken by the GoB, is related to school improvement. Additionally, it is important to mention the name of CAMPE (Campaign for Popular Education), who claimed that they investigated the competency-based learning achievement of students at primary level using input and process variables and that was the first attempt to estimate some predictors for learning outcomes using multi-variate analysis (Nath and Chowdhury, 2001). So, it would not be fair to claim that there are no other works dealing with education quality or effectiveness in Bangladesh. Alternatively, it would not be unrealistic to argue that the current work is the first one in a Bangladeshi setting, which aims to evaluate school effectiveness from multi-level perspectives. In this introductory chapter, I would like to talk about my own interest on school effectiveness. With my PhD research work, I want to know what works in Bangladeshi schools by identifying the factors that make the schools effective in Bangladesh. It is important to point out that in Bangladesh, the summative function or raw score (i.e. pass rate and number of students who achieved A+) of the public examination result is the only indicator for identify effective or top ranking schools. So, if the schools of Bangladesh '*differ in respect of their impact on students*' or '*make a difference*', then it is important to understand these differences and provide suggestions on them measuring the differences. It is also important to mention here that the secondary education authority sets a number of criteria to identify top ranking schools and a new ranking process is currently being approved by the government.

The current study will focus on secondary schools (where the age of the students are of 14 to 17+ years). The reasons for choosing secondary level education for this study will be discussed later in methodology chapter. As a first study, my underlying thesis is that schools differ to a great extent in terms of the impact that they have on the cognitive and affective outcomes of the students. The main purposes of this study are- (a) to investigate the predictors and size of school effect and (b) to use the knowledge acquired from this investigation as a theoretical and methodological framework for future studies of educational effectiveness in Bangladesh. My study has the following research questions:

- i) How much variation in student academic attainment and in academic self-concept exists and ii) what is the interrelation between the attainment and self-concept of the students at an individual and at school level?
- How much do student characteristics and background factors influence- i) grade 10 student attainment and academic self-concept and ii) progress

(taking account of prior attainment)?

- How much do teacher characteristics influence student attainment or self-concept controlling for the influence of prior attainment and background factors?
- After taking into account prior attainment, which school, class and pupil characteristics contribute to student attainment in grade 10?

In order to answer the four research questions, the first step would be to measure the differences between schools using statistical models. The quality of schools (i.e. more or less effective schools) will be assessed based on students' progress over a 15 month period. In a second step, I will develop a model of school effectiveness that will identify predictors of effectiveness. This will lead me to propose policy recommendations for improving the quality of secondary education in Bangladesh.

1.3: Practical impediments in conducting educational research in Bangladesh

Although this is not an uncommon research approach this study makes an important contribution to the field because of the lack of studies in the Bangladeshi context. Conducting educational research in Bangladesh presents different challenges from studies in developed countries, for example, in Europe and the USA. In many of those countries reliable educational data are available, for example, TIMSS (Third International Mathematics and Science study) and PISA, 2000 (Programme for International Student Assessment) data sets. Moreover, they have better developed educational evaluation systems. For example, the UK Department for Education has well established datasets, e.g. the National Pupil Database. In most European countries and in the USA, they have school inspection systems, where inspectors visit the schools in order to evaluate the work of the teachers, the use of the resources and the processes of teaching and learning. On the contrary, the scenario in Bangladesh is dramatically different from that in the developed countries. A well developed supervision system, i.e. academic supervision (i.e. of students and teachers performance) and school supervision (i.e. of the school's physical infra-structure and other aspects of the school), is undertaken at primary level. At secondary level, there is no effective, organised and regular supervision system in Bangladesh to monitor the quality of education. In addition, there is no educational statistics published (either for

primary or secondary level) on a regular basis. This presents challenges for researching school effectiveness in Bangladesh.

Recently, SESDP has established an effective and organised academic supervision system appointing a number of employees (for example, DEO, ADEO, USEO, RO, AS, UAS, AUSEO[4]) at district and sub-district (upazilla) levels and providing them proper training. The main duty of the academic supervision body is to visit the schools every month and prepare a report on the basis of their supervision. They send the reports to the district office, where the District Education Officer (DEO) compiles all the field level reports and sends it on to the Director and Assistant director of SESDP as well as Regional Assistant Directors and Secondary Education Board for further action. It is worth mentioning here that such academic supervision has had an impact upon school performance and has, therefore, been recognised in recent education policy. The GoB is now planning to maintain this inspection system to monitor the quality of secondary education (supervision report is attached in Appendix 8.1).

Monitoring the outcomes of any educational system is a procedure heavily dependent on the availability of the necessary data (Fitz-Gibson, 1996b). In 2008 when I was undertaking this study the scarcity of educational statistics presented me with big challenge. BANBEIS (Bangladesh Bureau of Educational Information and Statistics) is the only body, which has a role in providing educational data. My early investigations highlighted the limits of the available data. Following the view of Verdis (2002), it can be said that there were no standard ways in which a researcher could ask any organisation (either state or private) in Bangladesh to supply educational statistics apart from having a percentage data base. The kinds of data need in accepted models of school effectiveness were not easy to come by. So, for example, the information for socio-economic status as well as other student, class or school levels measures would need to be collected. Where data was available there were serious questions about its reliability.

As well as the problem of getting access to good datasets, the greatest hurdle to overcome in conducting educational research in Bangladesh is obtaining permission from the Ministry of Education, as it takes a long time. Even if a researcher can obtain the permission from the Ministry, the school authority sometimes might not allow him or her into their school. Finally, there is limited

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[4] DEO= District Education Officer, ADEO= Assistant District Education Officer, USEO=Upazilla Secondary Education Officer, RO= Research Officer, AS=Assistant Supervisor, UAS= Upazilla Assistant Supervisor, AUSEO= Assistant Upazilla Secondary Education Officer.

expertise with statistical modelling and the use of statistical software. My research, in keeping with other SER studies planned to use multi-level procedures in order to understand the nested structure of the data that I would collect. This approach can help us to understand the contribution that different levels make (e.g. student, class and school) to the overall models. The concept of multi-level modelling is very new in Bangladesh. In order for me to become familiar with the methods and software for this type of SER study I would have to spend considerable time and money to develop the expertise necessary.

In starting this study I aimed to contribute to our understanding of the characteristics of effective schools in Bangladesh, where do students make greater progress, after accounting for intake characteristics. It is expected that the measures of school effectiveness would be identified in this study provide researchers, practitioners and the policy-makers with information to design and evaluate new policies and intervention programmes for the education sector in Bangladesh. At the same time, my intention is that school head teachers and teachers could also gain powerful insights for improving the quality of education, thus making schools effective. This has been a very brief introduction to my research context, questions, challenges and hopes. In the following Chapter 2 I will consider Bangladesh in more depth, its administrational and financial management and education policy. In Chapter 3 I will explore the literature on educational effectiveness followed in Chapter 4 by some of the philosophical, methodological and statistical issues that I faced in my work. That leads to three chapters (5, 6 and 7) in which I present my data analysis, models, discussion and conclusion.

CHAPTER II

2: AN OVERVIEW OF THE EDUCATION SECTOR IN BANGALDESH: EDUCATION SYSTEM, MANAGEMENT AND POLICY PROCEDURE

The main aim of this chapter is to present the education system in Bangladesh, including the educational management and the policy procedures. More emphasis will be given to secondary education, as the current research was conducted on secondary education. The educational information and statistics in the chapter come from a few key sources '*Education System of Bangladesh*' by BANBEIS (2007); '*Bangladesh Education in Transition*' by Alam (2008); '*Education Watch Report (2005, 2006, 2007 & 2008)*' and '*UNESCO Report (2007): Secondary Education Regional Information Base: Country Profile Bangladesh*'.

2.1: THE EDUCATION SYSTEM OF BANGLADESH

Bangladesh is a developing country with a huge population of about 130 million, of which 46% of its population lives below the poverty line[5] (Alam, 2008). The adult literacy rate[6] in Bangladesh is less than 50%. The net enrolment rate for the primary level (age 6-10 years) is around 80%, for the secondary level (age 11-17 years) it is about 32%[7], whereas the rate is much lower- about 4%- at the tertiary level of education (eligible population of 18-22 years). As an agriculture-based developing country, Bangladesh has an aspiration to provide all of its citizens with an education. The right of every citizen to free universal primary education was clearly stated in the constitution of Bangladesh[8] after the Liberation War in December, 1971, as (cited in Education Watch, 2008:3):

> … the State is committed to the provision of basic necessities including adopting of uniform, mass-oriented, free and compulsory education through which an equitable society can be created so that all kinds of exploitation can be removed.

Bangladesh, one of the least-developed countries, has supported universal primary education from the Jomtien World Conference to the Dakar Forum (WCEFA 1990; UNESCO 2000) under the title of '*Education for All*'. The government of Bangladesh has a number of highly ambitious development programmes, in which the main aims are to strengthen educational access to quality and efficient primary and secondary education. In order to achieve

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[5] GDP per capita is US$ 400 in 2004.
[6] According to UNESCO's standard definition.
[7] Net enrolment rate in 2005 (BANBEIS, 2006):Junior secondary =53.99%; secondary=38.39% and Higher secondary=12.18%.

'*Education for All*' (EFA) and the '*Millennium Development Goals (MDGs)*', the GoB allocates about 2.3% of GDP and 14% of total government expenditure to the education sector. Bangladesh has made significant progress specifically in term of increasing access and gender equity at primary and secondary levels, though the trend of primary level enrolment declined slightly in 2008 (Alam, 2008; Education Watch, 2008). The growth of primary and secondary school students and girls' enrolment are presented in Figure 2.1.
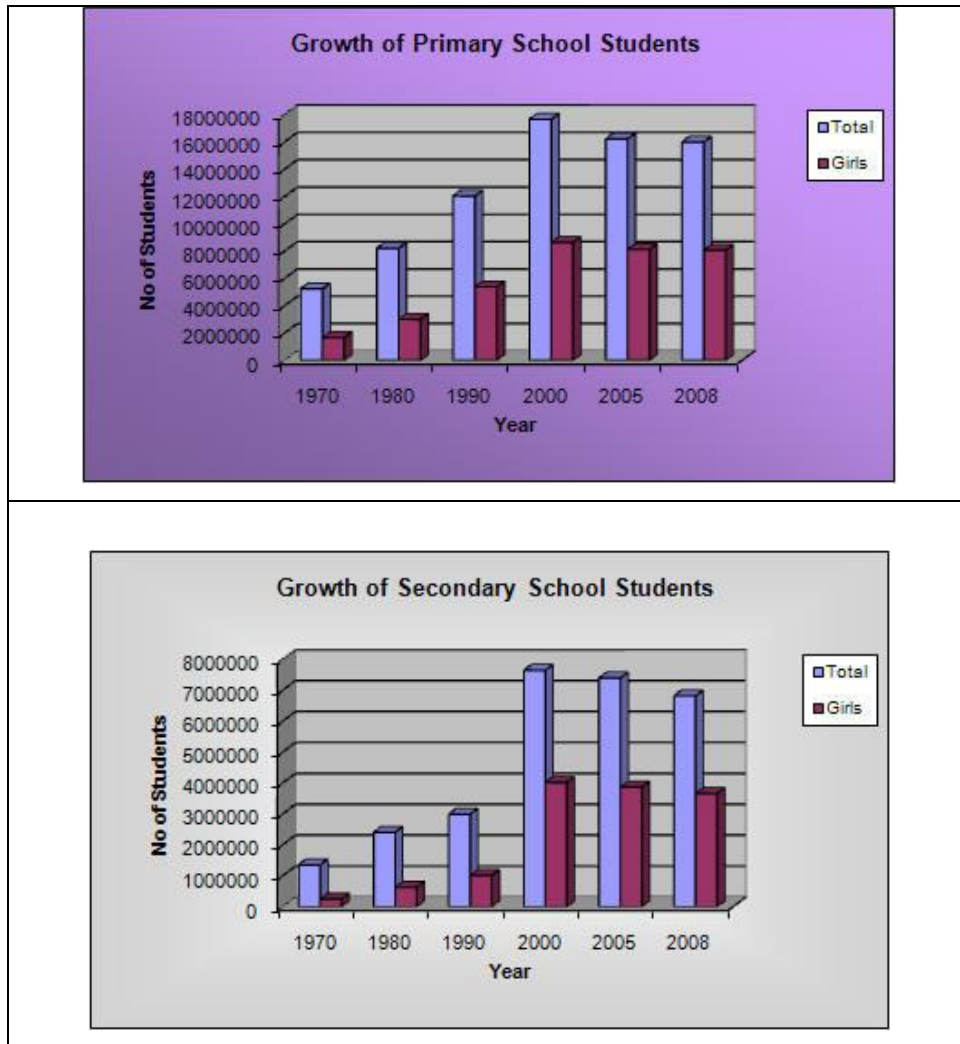
Figure 2.1: The growth of primary and secondary school students

[Source: BANBEIS website]

In general, six different types of education are found in Bangladesh: a. General Education; b. Madrasa Education; c. Technical & Vocational Education; d. Professional Education; e. Teacher Education; and f. Specialised Education. The current study considers only the general or mainstream of education. So in the following section I will focus on that.

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[8] See Government of Bangladesh, *Bangladesh Constitution*, Dhaka, 1972 (Article 15, 17 & 19).

2.1.1: General education

There are three different types of general education in Bangladesh, namely-

- Primary education
- Secondary and higher secondary education
- Tertiary education

2.1.1.1: Primary education

Primary education usually starts at the age of 6 and generally, children between 6 and 10 years are enrolled in primary education. Primary education prior to 1952 was a four-year course (i.e. classes I to IV). Since then, there has been a further addition of one year (i.e. classes I to V in 1952) and the same duration of primary education has been retained to the present day. Interestingly, ten types of different institutions deliver primary education with three different curricula (Education Watch, 2008:6):

a) Government primary schools (GPS);

b) Registered non-government primary schools (RNGPS);

c) Community schools;

d) Experimental school, which are attached to PTI (Primary Teachers' Training Institution);

e) NGO schools, which are operated by a non-government organisation (NGO);

f) Kindergartens;

g) Ebtedayee madrasas;

h) Primary sections attached to high schools;

i) Ebtedayee sections attached to high madrasas; and

j) Non registered primary schools

Many primary schools also offer pre-primary education, including: nursery, kindergarten, tutorial and pre-cadet schools. This is mostly located in urban areas (the provision is expanded now into the suburbs) but sometimes the Government does not recognise the status of such kinds of schooling. Some institutions in Bangladesh are known as 'English medium' schools, which also provide primary and secondary education addition up to 'O' level examinations. Some mosque-based institutions, like Maktab, Forkania and Qurania madrasas, also offer pre-primary education, including religious education. There are other institutions focussed on religious education like the 'Hafizia madrasas' and 'Qiratia madrasas', where the children are specialised in the recitation of the Holy Quran. Children between 3 and 5 years of age are generally enrolled at this stage.

2.1.1.2: Secondary and higher secondary education

Seven years of secondary and higher secondary schooling make a bridge between primary and tertiary education in Bangladesh. This period is sub-divided into three stages, namely:

- Junior or lower secondary (VI-VIII)
- Secondary (IX-X)
- Higher secondary (XI-XII)

These are for children aged 11-13 years, 14-15 years and 16-18 years[9] respectively. Details about secondary education will be described in the following sections as the focus of this thesis is secondary education.

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[9] One more year is often needed for public examinations (conducting and result publishing) after two years in grade IX-X and grade XI-XII respectively (Education Watch, 2007).

2.2: SECONDARY EDUCATION IN BANGLADESH

The demand for, and expansion of, secondary education is the result of the democratisation of education and globalisation (The World Bank, 2005). The issue of secondary education was also raised in two global conferences (WCEFA, 1990 and UNESCO, 2000), though the major emphasis was to expand primary education in equity and quality. One out of six goals of the Dakar Framework of Action emphasised equal access of boys and girls to secondary education by 2015 (UNESCO 2000). The Millennium Development Goals (MDGs) reiterated this aim (The World Bank, 2000). The GoB emphasises the importance of secondary education from two angles (Alam, 2008). Firstly, a quality secondary education was considered as the basis for better tertiary education by supplying good quality secondary graduates who would bridge the gap between primary and tertiary education. Secondly, in addition to being a transitional sub-sector, it is likely to be the terminal education for a great percentage of the students (30-45%) in schools. Therefore, ensuring a quality secondary education for school leavers is of the utmost importance, as this huge proportion of secondary level graduates would be entering the job market as semi-skilled labourers or self-employed people. The problems in the Bangladeshi education system have a complex history and in the following section I will briefly explore some of this.

2.2.1: Origin and development of general education

During ancient times and the middle ages, there was a rich tradition of education in the Indian sub-continent, specifically in the region which now comprises Bangladesh. The nature of this education was virtually a private, informal type of education. Primary education was delivered by the *Gurus* (i.e. Brahmins) in institutions known as *Gurugriho, Patshala, Chotushpathi* and *moth*[10]. The higher education used to be delivered at *Tols,* the place for learning Sanskrit and there were *maktabs* and *madrasas* respectively for primary and higher Islamic education. There was no provision for the kind of secondary education that is practiced today (Haque 2001). Secondary education gradually evolved, while education in stages was introduced during the British period and continued after the division of India in 1947 with minor changes in the Pakistan occupation period and later in the Bangladesh period. Therefore, the history of education in Bangladesh can be divided into three distinct phases: a. British period (1757-1947), b. Pakistan period (1947-71) and c. Bangladesh period (1971- to date).

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[10] *Gurugriho* (Guru stands for teacher and griho denotes house)*; Patshala,* (monastery);

2.2.1a: The British period

Secondary education was introduced in British India by foreign missionaries. Before 1833, the schools catered only for primary education. Secondary education began as part of schools' and colleges' curricula from 1833-1853 and was expanded throughout the subcontinent from 1835 onwards by Lord Macaulay (President of General Committee of Public Institution or GCPI). He also adopted policies to expand the English education system throughout the sub-continent. As a result, a number of English-medium schools were established under the auspices of the government to provide secondary education.

The number of secondary schools increased after the publication of Wood's Despatch in 1854, in which Sir Charles Wood (Chairman of Board of Control of India) recognised that it was the State's responsibility to provide education for the people of India. The despatch also introduced the system of education by stages in the sub-continent, where the middle stage was secondary education. Lord Stanley, in another despatch in 1859, reaffirmed the policies of 1854 with a few modifications. The main objectives of Wood's Despatch (Education Watch, 2007) were:

- the grant-in-aid system for financial support to educational institutions
- establishment of institutions for supervision and inspection of schools
- formation of an education department
- establishment of universities, offering scholarship and preparing textbooks
- establishment of teacher training schools

As a result of Wood's Despatch, institutions such as the Education Board under the Ministry of Home Affairs of the Central Government and the Department of Public Instruction (1857) with the post of Director of Public Instruction (DPI) were established to implement education. The examination at the end of the secondary stage was called the Entrance Examination, conducted under the auspices of Calcutta University. Later, an Education Board was established to conduct examinations. Institutions like Normal Schools were established for teacher training. The Calcutta madrasa (established in 1781) also introduced another but similar system of secondary education exclusively for the Muslim community.

Based on the Hunter Commission Report in 1882[11], secondary education was divided into two streams: a) a stream of general curriculum and subjects necessary for university admission; and b) a stream for technical and vocational subjects. The 'Grant-in-aid' system was introduced for financial assistance. As a

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Chotushpathi, (convent) and *moth* (temple).
[11] Sir William Hunter, the President of the Education Commission of 1882.

result, the number of secondary schools increased from 169 (in 1855) to 11,907 (in 1947) in the Indian sub-continent (Haque, 2001). The Lord Curzon Education Policy of 1904 emphasised controlled expansion, as well as the promotion of quality education. To this effect, each school needed to obtain permission from both, the Ministry of Education and the university before opening its doors as a legal institute. Following the recommendation by the Calcutta University Commission[12], secondary education was separated from the university, establishing a Board of Intermediate and Secondary Education (BISE) in 1917. Giving consideration to secondary education as a *stage complete in itself'*, the John Sergeant Education Commission Report (1944) recommended two different streams in secondary education, such as: a) knowledge-based education and b) technical and vocational education, though the students of both streams had to take the Mother language, English, History, Geography, Mathematics, Science, Economics and Agricultural Sciences as compulsory subjects.

2.2.1b: The Pakistan period

After the partition of India in 1947, Pakistan inherited the British education system and, afterwards, different education commissions were set up to promote the national education system suited to the ideology of the new state. The Maulana Akram Khan Education Commission was the first to reconstruct education of the then East Pakistan[13] in 1951. The commission report recommended six-year secondary education following a period of five years' primary education. The Ataur Rahman Khan Commission (1957) also recommended the same system. A deviation was found in the Sharif Commission Report (1958), which recommended seven years of secondary education at three stages (Ali, 2001), such as: i) Junior secondary (grade VI-VIII); ii) Secondary (grade IX-X); and iii) Higher secondary (grade XI-XII).

2.2.1c: The Bangladesh period

After the liberation of Bangladesh, the first education commission was established in 1972, known as the Qudrat-E-Khuda Commission. After that, a number of commissions were set up for the reformation of the education system, that is, the Mohammad Moniruzzaman Mia Commission (2003); the Dr. M. A. Bari Commission (2002); the Shamsul Haque Education Committee (1997); the Mofiz Uddin Commission (1988) and so on[14]. Further description of the educational

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[12] Michael Sadler Commission (1917).

[13] Now the Republic of Bangladesh.

[14] The first education policy was approved in 2010 but is not described here, as the researcher did not

legislative framework and the policy document established in Bangladesh after the liberation in 1971 to 2008 is presented in Section 2.4.2.

2.2.2: Quality indicators of secondary education (after 1971-2009)

Bangladesh has started off this millennium with a mixture of achievement and challenges to reach its target in the education sector. The Education Watch Report (2006) reported that secondary education enrolment in Bangladesh had increased three-fold and the number of institutions had more than doubled since 1980. It also highlighted that the poor achievement of students and low quality of education were attributed to a number of major causes, for example, deficiencies in teachers' skills and capability; inadequate facilities and learning materials; poor enforcement of rules and criteria for approval of government subvention; inadequate resources reflected in low per student expenditure; poor governance and management of schools (i.e. poor/non-existent supervision, dysfunctional SMC[15] or Governing Body). A high dropout rate, low survival and completion rate are still a challenge for the secondary education subsector since, out of every hundred who entered class six, the first year of the secondary stage, only 15 received the Secondary School Certificate and six received the Higher Secondary Certificate (World Bank, 2000:70).

The GoB is strongly committed to alleviating the challenges and in order to address the issues at the secondary level (also at the higher level) the MoE has developed a medium-term framework for the secondary education sub-sector, focusing on quality improvements, policy measures and specific actions needed to reform the system. This medium-term framework has benefited from an extensive range of consultations and workshops with stakeholders at the central, district and upazila[16] levels. All round positive growth is also found in secondary schools as shown in Figure 2.2.

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find the report yet.

[15] School Management Committee.

[16] Upazila= Sub-district
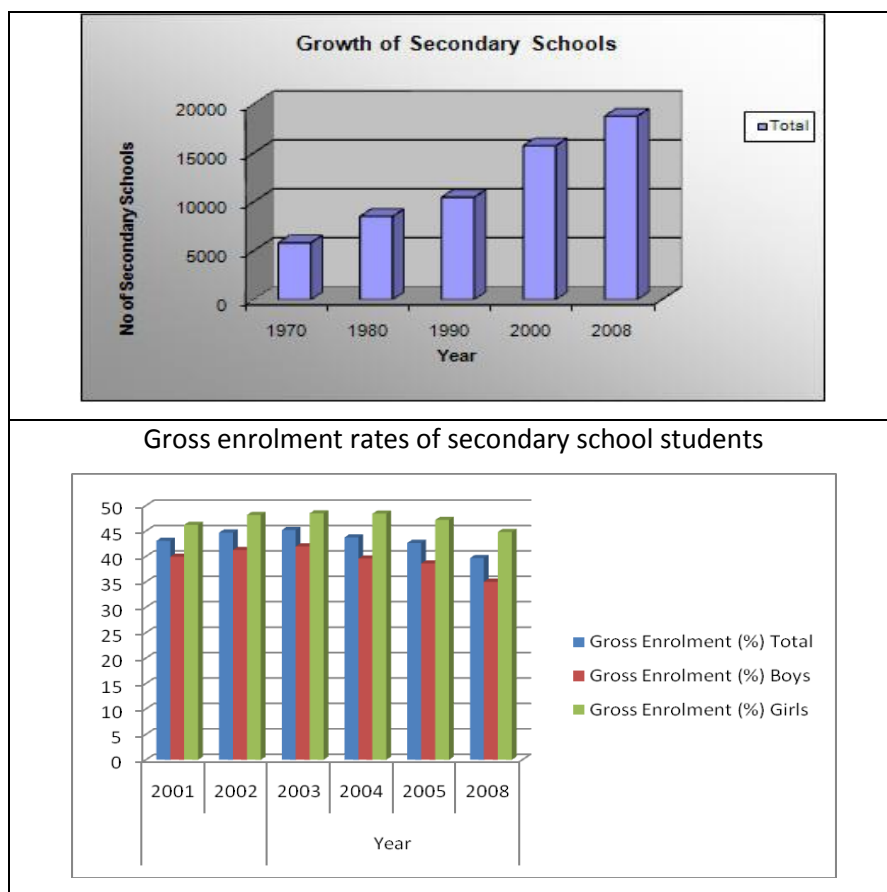
Figure 2.2: Growth of secondary schools and students

[**Source:** BANBEIS website]

Although the number of secondary schools has increased quite a bit since the start of the millennia (see Figure 2.2), the overall enrolment has not followed the same pattern and has even declined slightly in recent years. In 2008, the gross enrolment in secondary schools (mainstream) throughout the country was estimated at 6.8 million but this was only about 40% what it could have been. The proportion of the girls attending general stream schools has for some years been higher than that for boys (BANBEIS, 2006, National Education Commission, 2003). This is perhaps due to social mobilisation and the impact of incentives (i.e. stipends and tuition waivers) for rural girls.

In order to understand the context it is also useful to look at promotion, repetition and dropout rates (see Figure 2.3). Secondary schools in Bangladesh follow an examination based promotion policy for the students. Students need to appear in two ends of term examinations and one final end of year examinations throughout the year. The syllabuses are divided accordingly for two term examinations and a final examination. Students' results from these different examinations are combined to give an average.

17
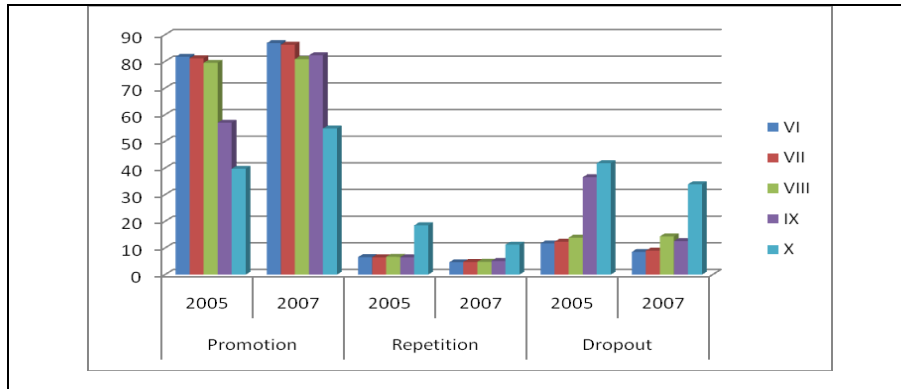
Figure 2.3: Promotion, repetition and dropout rates in percentage

[Source: BANBEIS website]

Students who pass in all the subjects qualify to be promoted to next higher grade. In some schools there is some relaxation in the progression requirements. Schools usually give students up to three opportunities (i.e. years) to pass a year and get promoted. After that schools cancel the student's studentship providing transfer certificate (TC) and they cannot then pass to the next year. This explains some of the 60% of students who were not attending secondary schools in 2008. Figure 2.3 shows how significant this becomes by years IX and X with 30-40% dropping out of year X in both of the years presented. Figure 2.4 shows these trends in more detail.

A. Promotion rates by gender & year

B. Repetition rates by gender & year

C. Repetition rates by gender & year
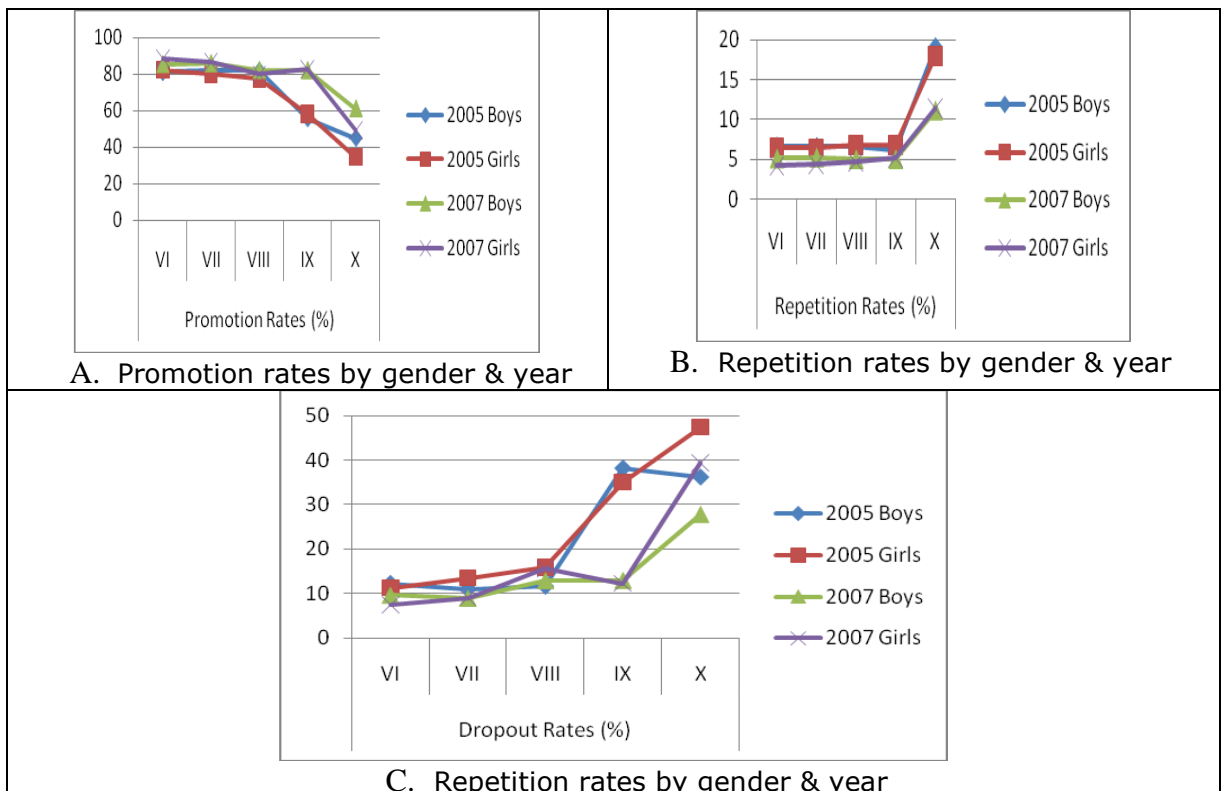
Figure 2.4: Promotion, repetition and dropout rates by gender and year

[Source: BANBEIS website]

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The secondary level of education (i.e. class VII to X) is considered as the terminal point of education for most students, since most of them start their working life, either for personal survival, to maintain their families or because they could not afford the cost of education. This is particularly the case for youngsters from the rural areas. Figure 2.4 shows that the repetition rate is higher for girls at secondary level than boys.

The most easily measurable and widely accepted performance indicator[17] of quality of secondary schools is the pass rate in public examination (Alam, 2008). In Bangladesh, the public examination known as the Secondary School Certificate (SSC) is the most important competitive examination in the life of the students aged between 15 and 16 years. Overall, the pass rate (Figure 2.5) has been increasing over the years and these rates are of those taking the examination than the population as a whole (47.74% in 2004 and 67.40% in 2009[18]).
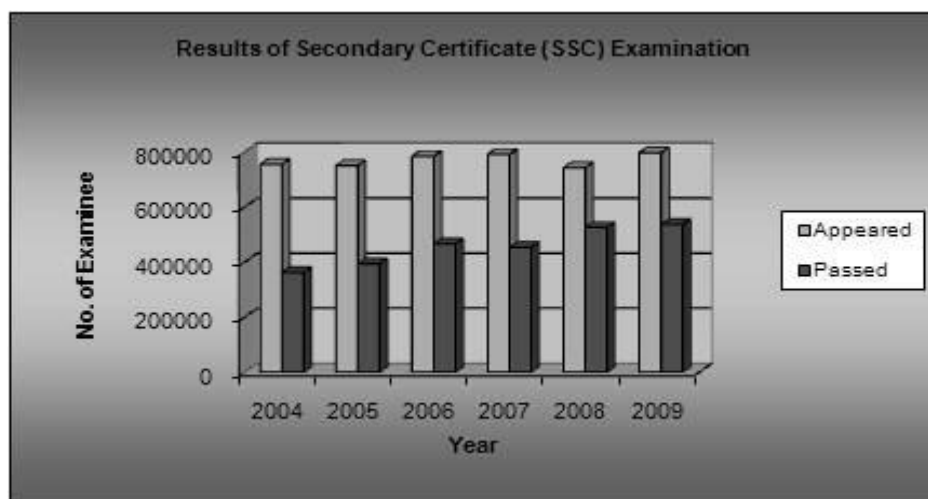
Figure 2.5: Public examination results over years

[Source: BANBEIS website]

The girls' pass rate has noticeably increased from 2006 to 2009 at a higher rate (see BANBEIS Website) than for their male counterparts. Most of the performance indicators show the improving picture of secondary education, although a good proportion of the students terminate their studies at this stage.

2.2.3: Curriculum and syllabus of secondary education

Different types of educational institutions are found in Bangladesh: junior secondary, government secondary, non-government secondary, combined school & colleges and cadet colleges, all come under the general heading of secondary

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[17] By the stakeholders (public, parents and students) and state/DSHE.

education. Over 98% of the secondary schools have been established through local initiative and are managed by a local school managing committee (SMC), whereas only 317 (less than 2%) schools are run by the government. Most of the non-government schools are co-educational whereas the government schools are mostly either for boys or girls only. In general, all of these schools followed the same curriculum and the medium of instruction under the national curriculum is Bengali. Some schools offer a choice of Bengali or English and there are also some English medium schools in operation in Bangladesh. These schools operate their own prescribed curriculum and prepare students for the British General Certificate of Secondary Education (GCSE; formerly 'O' level) or for the Junior Cambridge Examination.

Though the structure of the secondary education curriculum remains uniform from grade VI to VIII, diversification in curriculum is introduced from grade IX in both streams (general stream and madrasa education). At this stage, students are divided into three groups: Science, Humanities and Commerce. The National Curriculum and Textbook Board (NCTB) and Madrasa Education Board prescribe the curriculum for junior secondary and secondary education; and the same governmental bodies are also responsible for the development of textbooks. The secondary education curriculum was last revised in the late nineties, in order to improve its quality. More emphasis was given to the improvement of students' English communication ability. Agricultural education was introduced at junior secondary level and excluded the arithmetic section from secondary level mathematics as it was irrelevant to higher secondary education. Table 2.1 outlines the content of the curriculum for grades IX and X.

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[18] The students sitting the SSC examination in 2009 constituted the sample in the current study.

Table 2.1: Secondary school certificate syllabus (compulsory & groups)

Group		
Science	Humanities	Commerce
(a) Compulsory subjects 700	(a) Compulsory subjects 700	(a) Compulsory subjects 700
1. Bengali 200	Same	Same
2. English 200	Same	Same
3. Mathematics 100	Same	Same
4. Religion (Islam/ Hindu/Buddhist/ Christianity) 100	Same	Same
5. Social Science 100	Same	Same
(b) Elective subjects (3) 300	(b) Elective subjects (3) 300	(b) Elective subjects (3) 300
1. Physics 100 2. Chemistry 100 3. Biology or Higher mathematics 100	1. History 100 2. Geography 100 3. Economics or Civics 100	1. Introductory Business 100 2. Accounting 100 3. Business ENT* or Commercial geography 100
Total 1000	Total 1000	Total 1000
(c) Optional Subjects (Any) 100	(c) Optional Subjects (Any) 100	(c) Optional Subjects (Any) 100
1. Higher mathematics 2. Biology 3. Agriculture 4. Home economics 5. Geography 6. Computer education 7. Work oriented education 8. Basic trade 9. Accounting 10. Arabic/Sanskrit/ Pali 11. Music 12. Physical education	1. Economics 2. Civics 3. Agriculture 4. Home economics 5. Higher Bengali 6. Higher English 7. Higher mathematics 8. Arabic/Sanskrit/ Pali 9. Computer education 10. Work oriented education 11. Basic trade 12. Arts & crafts 13. Accounting 14. Music 15. Physical education	1. Commercial geography 2. Introductory business 3. Agriculture 4. Home economics 5. Economics 6. Computer education 7. Higher mathematics 8. Vocational education/Work oriented education 9. Basic trade 10. Arabic/Sanskrit/Pali 11. Music

*ENT= Entrepreneurs; Source: BANBEIS (2007: XXIII; Annexure B.1)

2.2.4: System of evaluation of secondary schools

The students are assessed at the end of each class. No public examination is held at the junior secondary stage (VI-VIII). The schools assess their students' progress throughout the year and they must meet the minimum prescribed marks in the end of year examination to gain promotion to the next grade. There is a special evaluation system known as the scholarship examination for grade V and VIII students. In these examinations students need to obtain a fixed score in Bengali, English, mathematics, science and social science subjects in order to sit this special examination.

At the end of grade X, the students are prepared for their first public examination, known as the Secondary School Certificate (SSC) examination, which is the entry point for the higher secondary stage. Before the public examination, there are three compulsory examinations students have to take: first term, pre-test and finally test. Only those students passing these tests are eligible to take part in the public examination. The public examination is conducted every year under the eight Boards of Intermediate and Secondary Education (BISE[19]). In 2009, GoB introduced public examination after primary school (grade V) and from 2010 another public examination will be commenced in the stream after grade VIII. The distribution of scores of public examination with a corresponding letter grade and grade point[20] are given in Table 2.2.

Table 2.2: Conversion of numerical score into letter grade and grade point in Secondary School Certificate (SSC) examination

Range of Mark	Grade	Grade point
80-100	A+	5.00
70-79	A	4.00
60-69	A-	3.50
50-59	B	3.00
40-49	C	2.00
33-39	D	1.00
0-32	F (Fail)	0.00

[Source: NCTB 2003, 2005a]

2.2.5: Teacher training for secondary school teachers

The government of Bangladesh has placed serious emphasis on teacher training programmes, ensuring quality teaching for secondary education. Many government and private Teachers' Training Colleges (TTC) in the country offer a one-year Bachelor of Education (B Ed) course for secondary school teachers. Pre-qualification for this course is a graduate or equivalent degree. Mostly, in-service teachers (80%) are being trained on this course, whilst the other 20% places for non-teachers. Some of the teacher training colleges offer a Bachelor of Education (B. Ed) degree after Higher Secondary Certificate and Master of Education (M Ed) for those, who have completed the B Ed.

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[19] BISE=Located at Dhaka, Rajshahi, Comilla, Jessore, Shylhet, Barisal, Chittagong and Dinajpur district headquarters.

[20] Student assigned grade points separately for each subject and calculated grade point average (GPA) for the whole test (NCTB 2003, 2005a).

2.3: MANAGEMENT OF THE EDUCATION SECTOR IN BANGLADESH

In the sections above I have outlined, the type of education, the development of secondary education in Bangladesh, the quality indicators of secondary education, the curriculum and the subjects prescribed in grade IX-X, the evaluation system and the teacher-training and the pre-requisites of this training course. It is important to understand the distinctive features of the system as they will have a bearing on understanding school effectiveness models. In the next section I will focus on educational management.

2.3.1: Administrational management

The overall administrational management of education in Bangladesh is under the control of the authority of a) the Ministry of Primary and Mass Education (MOPME) and b) the Ministry of Education (MOE). Junior secondary and secondary education is administered by the Directorate of Secondary and Higher Education (DSHE). The top authority of the DSHE is the Director-General, who is responsible for administrational and financial management and the evaluation of secondary and higher education, including madrasa[21] and other special educations. The Directorate is assisted in the management of secondary education as a whole by Regional Deputy Directors (RDD) of nine regional offices. The RDDs execute their direct supervision, control and management of secondary education at the district and the upazila levels with the help of the District Education Officers (DEO) of 64 district offices and the Upazila Secondary Education Officers (USEO) of 491 upazila offices respectively. The following chart presents an organogram of secondary education system in Bangladesh.

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[21] Madrasa education is a parallel system to the general education system, which offers Islamic education.
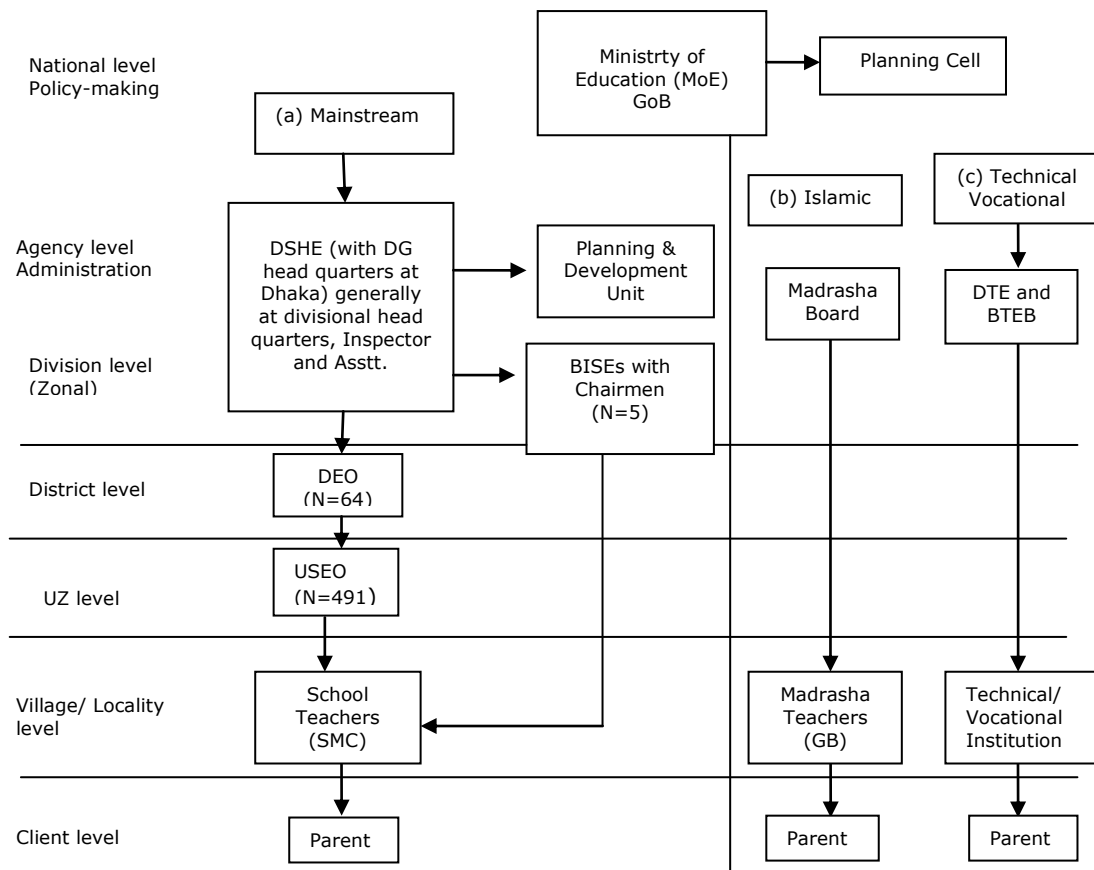
Figure 2.6: Organisation of secondary education
system in Bangladesh, 2006

[Source: Alam, 2008:48]

There are a few secondary schools in Bangladesh managed by the government[22], whereas most of the secondary schools are privately managed by School Management Committees (SMC). The SMC is constituted by the rules of the Board of Intermediate and Secondary Education (BISE). For junior secondary education, there are no government managed schools. The management system of the non-government schools is the same as the government secondary schools. The following governmental departments are responsible for different functions of secondary education management.

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[22] No of secondary schools (N= 18,770): Government= 317 and Private= 18,453 (Source: BANBEIS website)

Table 2.3: Governmental department of secondary education
and responsible body

Functions	Responsible body
• General secondary education	• Directorate of Secondary & Higher Education, MOE
• Personnel management and development	• Directorate of Secondary & Higher Education, MOE • Directorate of Technical Education, MOE
• Learning assessment	• Board of Intermediate & Secondary Education
• Curriculum development and research • Textbook	• National Curriculum & Textbook Board (NCTB)
• Planning	• Ministry of Education • Education Wing, Planning Commission
• Budgeting	• Ministry of Education • Ministry of Finance
• Government-aided institutions	• Directorate of Secondary & Higher Education, MOE
• Private institutions	• Self-management

2.3.2: Financial management

The financial management procedure of the education sector in Bangladesh is highly centralised. The budget of education expenditure mainly comes from the central government funding sources; although foreign loans and grants are also administered at the central level. Budgetary allocations are made for (a) non-development, which mainly caters for salary, other benefits for teachers and for support staff and (b) development allocation, which mostly caters for the expenditure of the institutions, related to the construction of buildings, the purchase of equipment and books. Very little has been available for improving the quality of education, including the training of teachers and the upgrading of teaching facilities and the school environments (Education Watch, 2006). Secondary education is largely financed by private sources, *per se*, individual contributions; students fee; income from the assets of the institutions (except for government MPO allocation and project-based support for construction of buildings). The pupils in government schools have to pay fees. The amount is negligible, compared to non-government schools. The trends of budget allocation are as shown in Table 2.4 and Figure 2.7.

Table 2.4: Public expenditure on education, 2005

GDP	2.5%
Total govt. expenditure	14.2%
Per pupil GDP per capita	
Primary education	7.7%
Secondary education	14.7%
Tertiary education	49.7%

[Source: UNESCO Institute for Statistics, 2007a; cited from UNESCO, 2007:7]
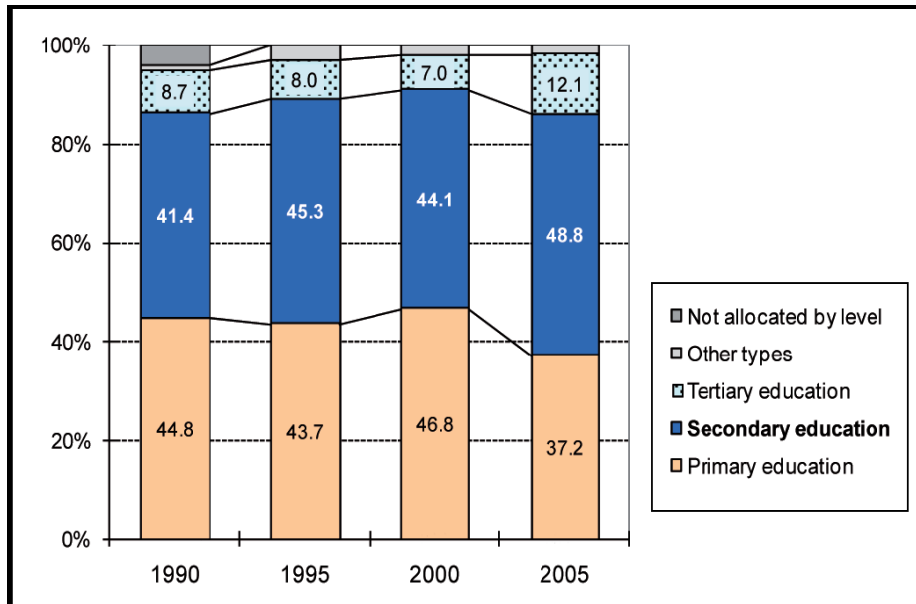
Figure 2.7: Resource allocation by level of total education expenditure (in percentage)

[Source: Ministry of Finance. 1991, 1996, 2001 and 2006; cited in UNESCO 2007:8]

From the statistics of public expenditure it should be clear that the government spends from its GDP (per capita) 14.7% per pupil at the secondary level. The level of resource allocation at the secondary level (48.8%) also increased in 2005 in comparison to previous years.

The Government of Bangladesh has taken some initiatives to boost female participation in secondary education. The use of stipends is one such initiative targeted at girls, with support of external agencies. The girls at junior secondary and secondary schools located other than in metropolitan cities are given this government stipend as part of the 'Female Stipend Programme'. The following conditions are the basis for achieving the stipend, such as-

• Minimum 75% attendance rate;
• 45% marks need to be secured in each examination;
• Being single.

2.4: POLICY ESTABLISHMENT AND DEVELOPMENTAL INTIATIVES FOR QUALITY EDUCATION

The economical and social development of any country largely depends on the quality of education and so this present study seeks to make a contribution to understanding the Bangladeshi system. In Bangladesh, despite the increases in secondary education enrolment educational quality is still a great concern. According to Education Watch Report (2005), high rates of dropout (averaged over 50% between grades 6 to 10 in recent years) and failure in public examinations indicate serious deficiencies in the quality of education (on an average, half of the candidates passed the SSC examination). Different initiatives, some with international support, have been aimed at addressing the problems of quality and equitable opportunities in secondary education and I will discuss these in the following section.

2.4.1: Legislative framework and key policy documents (1972-2008) established by the state to governing education reformation

In order to maintain a modern and effective education system, Bangladesh Government provides the highest priority to the improvement of education sector. With this objective, the GoB had established several Education Commissions and Committees after the liberation of Bangladesh in 1971. The policy documents and reports currently in effect are presented in the following section. More importance is given here to secondary education as stated earlier that the current research is conducted on the secondary level of education.

2.4.1a: The constitution of the people's republic of Bangladesh (1972)

According to this constitution, the GOB has the obligation to ensure literacy for all of its citizens within the shortest possible time. Therefore, the constitution mandates that the state is to adopt the following effective measures-

- establishing a uniform, mass-oriented and universal system of education and extending free and compulsory education for all children (i.e. the Compulsory Primary Education Act, 1990);
- relating education to the needs of the society and producing properly trained and motivated citizens to serve those needs;
- removing illiteracy within such time as may be determined by law.

2.4.1b: Qudrat-e-Khuda commission (1972)

The Qudrat-e-Khuda commission was set up in 1972, aimed at an overall reform and reorganisation of the education system to fulfill the demands of a newly

independent country. A National Curriculum and Syllabus Committee was set up in 1975 as a part of the recommendations of this commission (submitted in 1974). Instead of the diversified curriculum of 1961, the committee recommended a uniform curriculum for grades IX and X (Sarfuddin 1990). However, due to the political changes of 1975 and owing to lack of support in favour of this uniform curriculum, a partial reform was made and a two-stream system, viz. Science and Humanities, was introduced in 1983 (NCTB 1995b). However, in 1996, a new stream called Commerce or Business studies was introduced into the secondary curriculum.

2.4.1c: Interim education policy (1979)

The interim education policy document was published in February 1979 that consisted of the recommendations of the National Education Advisory Council, headed by the State Ministry of Education. The interim policy document focused on an increasing literacy status for its citizens for the development of the country. The document also established the present secondary education framework, consisting of three sub-stages, namely: junior secondary (3 years); secondary (2 years) and higher secondary (2 years). In addition, the document stipulated the following aims for general education:

1. terminal examinations will be conducted by the District Education Authorities for all stages of secondary education;
2. vocational, technical, agricultural and medical education will be integrated into secondary and higher secondary education;
3. there will be provision for skills development in any technical subject at junior secondary and secondary levels.

2.4.1d: Mohammad Moniruz Zaman Mia commission report (2003)

The Mohammad Moniruz Zaman Mia commission report was published in March, 2004 and consisted of three parts covering general education, professional education and special education, with eleven subdivisions in each of the parts. Among a number of recommendations reported in the document, those of particular importance and relevance to secondary education were:

- maintaining the existing education framework (i.e. 3 years schooling in junior secondary, 2 years in secondary and 2 years for higher secondary);
- introducing uni-track secondary education;
- formulating secondary education in such a manner so that the dropouts could manage some livelihood;

- decentralising administration, particularly for secondary and higher secondary education;
- establishing one model secondary school in each district;
- exploring the full utility of modern technology for quality improvement in primary and secondary education.

2.4.1e: Major policy documents established after the democratic transition in Bangladesh (1990-2006)

Following the democratic transition in Bangladesh in 1991, the state agencies, such as the Planning Commission and the MoE[23], , prepared four important policy documents: the Fourth Five-Year Plan (1990-1995), the Fifth Five-Year Plan (1997-2002), National Education Commission Report 2000 and National Education Policy 2003. These reports included general objectives and specific sub-sectoral objectives. Some of the state intentions in the documents are:

- a strong emphasis on achieving universal compulsory and free primary education (UPE) in the shortest possible time.
- improvement of course contents in science subjects, mathematics and English at primary and secondary levels.
- regulation of schools (primary and secondary) and higher secondary institutions by fiscal means (for example, salary, subventions/MPOs, tuition fee-waivers and stipends to female students in rural areas) and supplying quality textbooks at subsidised prices.
- more co-ordinated and planned educational interventions at secondary level.
- the establishment of a core curriculum of subjects at the primary and secondary education levels. For both the mainstream education and the islamic stream (Ebtedaiye/primary and Dakhil/secondary)

2.4.1f: The Sixth Five Year Plan (2003-2008)

The Sixth Five-Year Plan (2003-2008) presented a description of different projects, including their budget estimates and project implementation periods. The document prescribed the targets for secondary education in the following areas:

- participation in different levels and types of education, such as- lower secondary, secondary and higher secondary levels, including madrasa education;

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[23] Or its appointed Education Committee/Commission

- participation of girls through stipend programmes in all levels of secondary education;
- quality of secondary education through in-service training of the teachers.

2.4.2. Development projects taken for quality secondary education

The State has taken different initiatives ensuring quality secondary education for its citizens. The main goals of these initiatives were accelerating female participation, equity in secondary education, improving secondary education, preventing drop-out rates, improving teaching quality and enhancing teacher training facilities. Developmental projects are either being implemented or on the way are given in Table 2.5.

Table 2.5: Bangladesh secondary education: development
projects under implementation, 2006

Project name (Donor support)	Development objectives	Total cost (in core taka)	Project period
I. SESIP (ADB)	1. Strengthening management systems & capacity of secondary education. 2. Quality support system of secondary education. 3. Equitable access to secondary education.	490.20	June 1999-Dec. 2006

II. Female Secondary stipend*
  a. FSSAP (IDA)
  b. FESO (NORAD)
  c. FSSP (ADB)
	1. Improving quality of secondary education.
	2. Enhancing access & retention of girls.
	3. Strengthening management, accountability and monitoring of the school system.
		766.27
		
		209.90
		
		502.99
			July 2001-June 2007
			
			Jan. 2004-Dec. 2006
			
			Jan. 2004-Dec.2008

III. Development of selected secondary schools* (government and non-government)	1. To expand physical facilities. 2. To develop village level school. 3. To ensure geographical equity. 4. To enhance quality of education.	520.00	July 1997-June 2006
IV. Reconstruction of very old non-government schools*	1. To restore old heritage of educational buildings. 2. To construct new buildings according to old architecture. 3. To supply furniture. 4. To restore the facilities and ensure educational environment.	500.0	July 1998-June 2006
V. Teaching quality improvement in secondary education project [TQI-SEP] (ADB & CIDA)	1. Improving teaching quality by organisational and capacity building. 2. Enhancing teacher training facilities, both in-service & pre-service. 3. Equitable access to training & community involvement.	630.19	April 2005-Nov. 2011
VI. Life skill based reproductive health education for adolescents & youth ** (UNFPA)	1. To provide skill based reproductive health education to youth, adolescents, empowering to protect against STIs & HIV/AIDs. 2. To facilitate positive behaviour change, especially among vulnerable & hard to reach population. 3. To establish linkages with MDGs, PRS-goal. 4. To enhance technical capacity of the government to implement population policies.	5.64	Jan.2006-Dec.2010

Note: * All over Bangladesh; ** Covering districts of Sylhet and Cox's Bazar.
[Source: Alam, 2008:50]

As a result of reform initiatives in secondary education the following progress was found to have been made:

- Major advances in access to secondary education in Bangladesh with almost nine million students now enrolled in the secondary schools.
- The overall dropout rate declined to less than 40% by 2003, whereas attendance rate had increased to 65% (2003) and the repetition rate had decreased.
- The overall SSC examination pass rate also increased. For example, in 2004 the pass rate was 48% in total (50% for boy and 48% for girls), while the figure was 35% (total) in 2001, 36% for boys and 34% for girls. However, a large proportion of this population remained low achievers and about 40% were still dropping out, as the Bangladesh national press reported it (The Daily Star, 28 June 2004; cited in Alam, 2008):

> while looking at the rate of success, we cannot overlook the stark reality that there are an equal number of unsuccessful candidates.

   However, this situation has changed, as the success rate was 70.81% in 2008 (in total) and 67.40% in 2009 (in total)[24].

- The GOB policies placed strong emphasis on improvement in the quality of education through better teacher-recruitment and training, in-service upgrading of existing teachers, setting standards for teacher-recruitment and increasing school inspection.
- Major initiatives have been taken for the development of a curriculum relevant to the needs of the 21st century. The revised NCTB curriculum of 1995-1996 focused on the development of every student's key intellectual skills, such as questioning, understanding, analysing and evaluating, which are essential for students' further learning and future career.

In this chapter, I have tried to present the education system of Bangladesh; how its education management programme works; and the policy establishment and developmental initiatives taken by the government for improving quality education. Over the last 40 years the GoB has established a number of education policies and launched many development programmes for improving primary and secondary education. The main objectives of these programmes were to ensure access and equity, deliver quality education and improve teacher qualities, thereby making the schooling system more effective. I have shown that the GoB has made significant progress in improving primary and secondary education as

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[24] BANBEIS website

seen in the increased student enrolment rate, girls' participation, pass rate in the public examination and promotion; and the corresponding reduction in grade repetition and dropout rates. All of the school improvement programmes were conducted at the national level and were supported by international agencies.

Despite the clear evidence that shows the progress that has been made in Bangladesh, there has been little interest from government, educationalists, educational researchers and practitioners to research and identify the characteristics of the most effective schools. The field of SER is still unfamiliar in Bangladesh as described in Chapter 1 and that is why this current research is important. My thesis is the first SER study in a Bangladeshi setting, and aims to identify the characteristics that make schools effective in Bangladesh. The findings of the study might be helpful for the further improvement of secondary education sector. In the next chapter I will explore the literature on school effectiveness research that has framed my thinking and informed the design of my study.

CHAPTER III

3. A LITERATURE REVIEW OF SCHOOL EFFECTIVENESS RESEARCH

In the previous chapter I discussed the educational policies and the quality indicators of education in Bangladesh. The main intention of this chapter is to provide a critical review and synthesis of school effectiveness research (SER) conducted in developed and developing countries. This literature review has enabled me to conceptualise my research focus, theoretical framework, research design and methodology for the study. The review is presented in seven different sections. In the first section, the main focus is the definition and the research traditions of school effectiveness research.

3.1: DEFINITION AND RESEARCH TRADITIONS OF SCHOOL EFFECTIVENESS

This section examines three interrelated terms i.e. school effectiveness, teacher effectiveness and educational effectiveness that are often used in the SER literature, and seeks to clarify meanings in the light of sometimes inconsistent usage. I also present the different types of studies conducted in different countries in the area of school effectiveness to provide a broad picture of SER approaches and findings.

3.1.1: Definition of school effectiveness (SE)

One of the controversial aspects of SER is the definition of effectiveness. The problem is that there is a multiplicity of meanings of school effectiveness, which Stoll and Fink (1996:27) describe:

> to arrive at a definition of a school as effective, people are forced to choose between competing values. What educators perceive as important outcomes of schooling may not coincide with views of pupils, parents, governors, the local community, government or the media. It is also feasible that any or all of the above groups may have differing perceptions of effectiveness and that individuals within any of these groups may not agree with each other on a definition.

Reviews of SER assume that effective schools can be differentiated from ineffective ones, though Reid *et al.* (1987) stated that there is still no consensus on what constitutes an effective school. In general, school effectiveness is judged in relation to the school's influence on students' learning outcomes. A basic

definition of effectiveness is the production of a desired result or outcome (Levine and Lezotte, 1990). Similarly, Scheerens (1992) and Scheerens & Bosker, (1997) describe effectiveness as 'the extent to which the desired output is achieved'. According to Cheng (1993), the term effectiveness refers to 'school outputs limited to those in school or just after schooling (i.e. learning behaviour, skills obtained, attitude changes etc.)'. In fact, all of the above definitions reflect the economic view of SE known as the 'production function' approach. The production function approach views the learning output as a function of various inputs and measures the value of educational input and output in more monetary terms. However, Scheerens (2000) explains that the economic view of SE has the following problems:

- It is a problem to define the 'desired output', as there are different choices to be made to measure effectiveness, for example, as 'production' or output criteria, one can use grades, whereas others may consider student pass-rates in the final examination.
- The economic analysis of schools presents difficulties in determining the monetary value of inputs and processes, and the prevailing lack of clarity on how the production process operates.
- It does not examine other important aspects of education.

Another branch of definitions can be found from the organisational viewpoint. For example, Georgopoulos & Tannenbaum (1957), (cited in Reynolds *et al.*, 1996a:2) describe SE as -

> the extent to which any (educational) organisation as a social system, given certain resources and means, fulfill its objectives without incapacitating its means and recourses and without placing undue strain upon its members.

According to Raynolds *et al.* (*ibid.*), this definition implies a low degree of effectiveness of the school rather than zero effectiveness (*ibid.*). Another definition has been given by Madaus *et al.* (1980; cited in Verdis, 2002:81):

> the extent that there is congruence between its objectives and achievements. In other words it (i.e. the school) is effective to the extent that it accomplishes what it sets out to do.

The majority of current SER accepts an operational definition of an effective school as one 'in which students progress further than might be expected from consideration of its intake' (Mortimore, 1991a). SE definitions should pay attention to student outcomes with the concept of the 'value added' by the school (Mc Pherson, 1992). Therefore, based on the concept of 'value-added', Sammons

et al. (1995a) provided a basic definition of SE. Following the definition of Mortimore (*op. cit.*), the authors (*ibid:3*) stated:

> an effective school thus adds extra value to its students' outcomes in comparison with other schools serving similar intakes.

Sammons (1994; see also Sammons *et al.*, 1995:3) argued that definitions of SE are dependent upon a variety of factors, which include:

- Samples of schools examined (as many studies have focused on inner city schools and this context may affect the general applicability of results);
- Choice of outcome measures (studies which focus on only one or two outcomes may give only a partial picture of effectiveness, both in term of effects and the correlates of effectiveness); a broad range reflecting the aims of schooling being desirable (for example the Mortimore *et al.* (1988) study examined several cognitive measures and a range of social/affective outcomes);
- Adequate control for differences between schools in intakes to ensure that 'like is compared with like' (ideally, information about individual pupils, including baseline measures of prior attainment, personal, socio-economic and family characteristics are required);
- Methodology (value-added approaches, focusing on progress over time and adopting appropriate statistical techniques, such as multi-level modelling to obtain efficient estimates of school effects and their attached confidence limits are needed) and
- Time scale (longitudinal approaches following one or more age cohorts over a period of time, rather than cross-sectional 'snapshots' are necessary for the study of school effects on their students) to allow issues of stability and consistency in school effects from year to year to be addressed.

In the current research, the definition of effectiveness by Mortimore (1991a) seems to be more appropriate and a school would be regarded as 'effective' if its students were found to have progressed further than might be expected from a consideration of the school's intake. At the same time, I kept in mind the factors proposed by Sammons (1994; also Sammons *et al.*, 1995), while measuring school effectiveness in the Bangladeshi context. The current research also points towards the characteristics of schools which are made up of nested layers, for example, students within classrooms, classrooms within schools. The cross-level influences in nested (i.e. multi-level) models of school effectiveness imply that

higher-level conditions (for example, school leadership, policy and organisation) in some way facilitate conditions at lower levels (i.e. the quality of teaching and learning in classrooms), which have a direct impact on pupils' academic outcomes (see Goldstein,1987, 1995; Scheerens & Bosker,1997; Hill & Rowe, 1996, 1998).

3.1.2: Research traditions in school effectiveness research

In SER, different research traditions have been distinguished on a disciplinary basis. The different research traditions identified by Scheerens (1999 & 2000) are:

- Research on equality of opportunities in education and the significance of the schools
- Economic studies on education production functions
- The evaluation of compensatory programmes
- Studies of unusually effective schools
- Studies on the effectiveness of teachers, classes and instructional procedures.

I will explore these further in the following section.

3.1.2a: School effectiveness in equal educational opportunity research

The central focus of this research tradition was on school achievement and its relation to students' ethnic and social background. Coleman's research into educational opportunity, generally known as the Coleman Report, is widely considered as the underpinning for school effectiveness studies (Coleman *et al.*, 1966). The possible influences of the school factors namely: (a) teacher characteristics; (b) material facilities and curriculum; and (c) characteristics of the groups or classes were measured in this study, which produced a 10% variation in pupil performance after statistically eliminating the influences of ethnic origin and SES. The general criticism of Coleman's report was on the limited interpretation of the school characteristics and an inappropriate outcome (an ability measure rather than attainment; see Madaus *et al.*, 1979). Other large-scale studies of this tradition also focused on equality of opportunity (see Jencks *et al.*, 1972, 1979; Alexander and Eckland, 1980; and Hauser *et al.*, 1976) but were criticised for their narrow choice of school characteristics and on methodological grounds (Aitkin & Longford, 1986).

3.1.2b: Economic studies on educational production functions

The focus of economic approaches towards SER is to identify and assess inputs, which lead to increased output. This input-output view is known as the

'production function' in education. The Coleman report (1966) is often considered in the category of input-output studies. Inconsistent findings and inadequate effects of early works related to education production function were challenged by Hanushek (1997), as shown in Table 3.1. The author noted that though the financial aggregates might be increased student achievement, the relatively highest proportion of positive effects was found for teacher experience.

Table 3.1: Percentage distribution of estimated effects of
key resources on student performance

Resources	No. of estimates	Statistically significant (%)		Statistically insignificant (%)		
		Posi-tive	Nega-tive	Posi-tive	Nega-tive	Unknown Sign
Real classroom resources						
• Teacher-pupil ratio	277	15	13	27	25	20
• Teacher education	171	9	5	33	27	26
• Teacher experience	207	29	5	30	24	12
Financial aggregates						
• Teacher salary	119	20	7	25	20	28
• Expenditure per pupil	163	27	7	34	19	13

[Source: Hanushek, 1997:144; adopted from Scheeren, 1999: 8 & 2000:39]

The author also analysed the reviews of Verstegen & King (1998) as presented in Table 3.2, which showed more positive interpretation on the same set of studies.

Table 3.2: Verstegen & King's (1998) review analysed by
Hanushek (1997)

Resources	No. of Estimates	Statistically significant	
		Positive (%)	Negative (%)
Real classroom resources			
• Teacher-pupil ratio	78	54	46
• Teacher education	24	64	36
• Teacher experience	70	85	15
Financial aggregates			
• Teacher salary	32	74	26
• Expenditure per pupil	55	79	21

[Source: Scheerens, 1999:9 & 2000:40]

Note: Percentage distribution of significant estimated effects of key resources on student achievement, based on 377 studies

In fact, from the research evidence, education production function researchers are trying to explore the combinations and interactions between resource input levels and school organisational and instructional variables.

3.1.2c: The evaluation of compensatory programmes

The main intention of compensatory programmes was to improve the levels of performance of the educationally disadvantaged population. Compensatory programmes like 'Head Start' were started in the USA as part of President Johnson's 'war on poverty'. Another large-scale American programme was 'Follow-Through'. Similar programmes, for example, the Amsterdam Innovation Project, the Playgroup Experiment project, Rotterdam's Education and Social Environment (OSM) project and the Differentiated Education project (GEON) were also launched in the late sixties and early seventies in the Netherlands. School effectiveness studies in the compensatory programmes category can be considered as the active branch of equal educational opportunity research.

3.1.2d: Effective schools research

Research conducted under the label of 'effective schools' or 'effective schools movement' is the core of SER. The studies of Coleman and Jencks are generally the basis of SER. Research like '*Schools can make a difference*' (Brookover *et al.*, 1979) and '*School matters*' (Mortimore *et al.*, 1988) were also an important source of inspiration of this type of research. The most distinguishing feature of SER was breaking the image of school as a 'black box' by studying the organisational characteristics, form and content of schools. SER tended to become more integrated into the education production function and instructional effectiveness research, where from comparative case-studies to surveys with conceptual and analytical multi-level modelling were used to analyse and interpret the results.

Scheerens & Bosker (1997) distinguished three different types of SER:

1. Studies of schools that were identified after controlling the prior achievement of the students, demonstrated an exceptionally favourable output.

2. Studies in which the knowledge base of research of 'exceptionally effective schools' are adopted for school improvement programmes.

3. Studies related to effective teaching and teaching method, albeit they did not exactly fall in the area of SER.

3.1.2e: Studies on instructional effectiveness

This research tradition is familiar as 'process-product' studies. The focus of this tradition is on the characteristics of effective teachers, teaching and classroom processes. Carroll's (1963) model of teaching and learning and its off-spring, namely, the models of mastery learning (Bloom, 1976) and 'direct teaching' (e.g. Doyle, 1985) are the sources of inspiration of this category of studies. The

'process-product' studies explored the variables as shown in Table 3.3, which were considered strongly associated to pupil achievement (Weeda, 1986:68).

Table 3.3: Variables identified by Weeda, (1986)

Clarity	• Clear presentation adapted to suite the cognitive level of pupils.
Flexibility	• Varying teaching behaviour and teaching aids, organising different activities etc.
Enthusiasm	• Expressed in verbal and non-verbal behaviour of the teacher.
Task related and/or business-like behavior	• Directing the pupils to complete tasks, duties, exercises etc. in a business-like manner.
Criticism	• Much negative criticism has a negative effect on pupil achievement.
Indirect activity	• Taking up ideas, accepting pupils' feelings and stimulating self-activity.
Providing the pupils with an opportunity to learn criterion material	• A clear correspondence between what is taught in class and what is tested in examinations and assessments.
Making use of stimulating comments	• Directing the thinking of pupils to the question, summarising a discussion, indicating the beginning or end of a lesson, emphasising certain features of the course material.
Varying the level	• Cognitive questions and cognitive interaction

The findings of this instructional research tradition are mainly centred on three major factors, namely- (a) effective learning time; (b) structured teaching; and (c) opportunity to learn (Scheerens & Bosker, 1997).

The overall message of all of the above research traditions is the importance of the following factors: basic subjects, an achievement-oriented orientation, an orderly school environment and structured teaching, with frequent assessment of progress; all these factors are significantly effective for learning outcome. The main characteristics of the five research traditions are presented in Table 3.4.

Table 3.4: General characteristics of different types of School Effectiveness Research

Research Traditions	Independent Variable	Dependent Variable	Discipline	Main study type
(Un)equal opportunities	SES and IQ of pupil, material school characteristics	Attainment	Sociology	Survey
Production functions	Material school characteristics	Achievement level	Economics	Survey
Evaluation of compensatory programmes	Specific curricula	Achievement level	Inter-disciplinary pedagogy	Quasi-experiment
Effective schools	School's 'process' characteristics	Achievement level	Inter-disciplinary pedagogy	Case-study
Effective instruction	Teachers, instruction, class, organisation's characteristics	Achievement level	Educational psychology	-Experiment -Observation

[Source: Scheerens, 1999: 19 & 2000:53]

3.2: SCHOOL EFFECTIVENESS RESEARCH: ORIGINS AND MOVEMENT

In this section I will discuss the historical development of school effectiveness research, in particular, the origin and movement of SER in developed and developing countries. In doing this I will outline contemporary SER traditions and be able to compare the status of SER in Bangladesh with other developed and developing countries.

3.2.1: The first generation of school effectiveness studies

Schools and classroom effects were studied from a variety of perspectives under different sub-disciplines (Reynolds *et al.*, 1994; Creemers, 1994). SER has a long history of almost half a century. The majority of SER was conducted in the 1960's and early 70's, reporting that school differences had importance for pupil learning. In fact, during the first three decades, the influential SER movement brought together researchers and practitioners from different disciplines: psychology, sociology, statistics, educational evaluation and educational policy. Creemers (1996) distinguished two 'generations' from the long advance of SER.

Historically, the movement of SER began by responding to the pessimistic and deterministic interpretation of findings by Coleman *et al.* (1966) in the USA and Jencks *et al.* (1972) in the UK under the label of '*Equality of Educational Opportunity*'. Coleman *et al.* (*op. cit.*) collected data from 6,45,000 students in 4,000 schools and analysed the results of standardised tests of ability and achievement. The authors claimed that the particular school attended by a pupil had no or little influence on their educational outcomes compared to factors like IQ, race and SES. Their findings encouraged educators to undertake further research, though criticism arose in methodological grounds. Consequently, a number of studies were published, which suggested that some schools did, in fact, do much better in student achievement than could be expected of them. Mostly, these studies used a research design of comparing positive and negative 'outlier' schools. Weber (1971), for example, published the report of an 'outlier' study with the title '*Inner City Children Can Be Taught to Read'.* Weber (*op. cit.*) argued, by identifying characteristics (e.g. good leadership, high expectations and good atmosphere), that some schools can offer much more to their students and that the characteristics of the successful schools can be identified.

At about the same time, SER published in both the USA and the UK received much attention from the scholars and the popular press, addressing practitioners

(e.g. Edmonds, 1979), and the educational research community (e.g. Brookover *et al.,* 1979). In the USA, Brookover *et al.* (*op. cit.*) collected quantitative data from a survey of 159 elementary schools to measure student and teacher perception of school climate. They stated that not only did the students' social and racial background explain the variation, but that more than 85% of the variance between schools in average reading and mathematics achievement could be accounted for by the combination of a school's social structure variables (i.e. combination of social composition and personal characteristics and the social climate). This had strong policy implications. Another important study in the USA -*'Effective Schools for the Urban Poor'* - was conducted by Edmonds (1979) and had an important influence upon researchers and policy makers. The most well known 'five-factor model' was propagated by Edmonds (see details in Section 3.3.1).

In the UK, SER started with the '*Fifteen Thousand Hours* Study' by Rutter *et al.* (1979). The factors that determined school effectiveness in this study were: i) the reward system; ii) the school's physical environment, iii) the use of homework, iv) the teacher operating as a positive role-model, v) good management of the classroom and vi) strong leadership. Certain other factors, such as class size, the school size, school's age and the physical characteristics of school buildings were not considered significant. In this study, other factors, for example, attendance rate and delinquency rate were measured along with academic outcome, as they suggested that effective schools were consistently effective across a wide range of student outcomes.

After the mid-1980's, more sophisticated multi-level statistical procedures were introduced, while the '*Fifteen Thousand Hours Study'* was criticised on methodological grounds (e.g. Goldstein, 1980) and the new generation of the 'state-of-the–art' SER studies began in the UK (e.g. Mortimore *et al.*, 1988). SER then expanded in other countries, building on the new methods and avoiding some of the criticisms of earlier studies that centred on methodological flaws.

3.2.2: The second generation of school effectiveness studies
The second generation of SER did not start until the mid-1980. The work of the first generation was criticised on different grounds from the early 1980s because of their biased and less verifiable evidence. Purkey & Smith (1983; cited in Verdis, 2002:88), for example, identified five flaws of the first generation studies, namely, (a) small and unrepresentative samples; (b) possible errors in identifying

effective schools; (c) achievement data aggregated at the school level; (d) inappropriate comparisons; and (e) use of subjective criteria in determining school success. After the mid 1980's, most SER addressed such criticisms, using new techniques for statistical analysis, such as hierarchical linear modelling (HLM). Major studies were carried out by Mortimore *et al.* (1988) in the UK and by Teddlie and Stringfield (1993) in the USA. At the same time, SER also began in other countries, like the Netherlands, Hong Kong, Canada, Taiwan and Norway.

Mortimore *et al.* (1988), using 50 randomly selected London primary schools, measured the academic and social progress of 2,000 children over four years, under the title '*School Matters*'. They identified characteristics of effective schools including: (1) a purposeful leadership, (2) the involvement of the deputy head, (3) the involvement of teachers, (4) consistency among the teachers, (5) structured sessions, (6) intellectually challenging teaching, (7) a work-centred environment, (8) limited focus within sessions, (9) maximum communication between teachers and students, (10) record-keeping, (11) parental involvement and (12) a positive climate.

Teddlie and Stringfield (1993) carried out a study with the title '*Louisiana School Effectiveness Study*'. Their study was, in fact, a programme of four studies, starting in 1980 with a first pilot study and ending with the fourth study in 1992. A combination of qualitative and quantitative techniques (mixed methods) was used in the study, collecting data from both the meso school level, and the micro class level. The characteristics of effective schools found were a) higher time given to tasks, b) presentation of new material, c) encouragement of independent practice, d) high expectation, e) use of positive reinforcement, f) presence of a small number of interruptions, g) firm discipline, h) a friendly atmosphere, i) displayed student work and j) physical conditions of the classroom. In addition to these studies, a review of North American studies by Levine and Lezotte (1990) confirmed the salience of a 'five-factor model' including additional characteristics (see in Section 3.4.1).

SER was also conducted in the Netherlands after the mid 1980's. For example, summarising sixteen Dutch SE studies, as shown in Table 3.5, Scheerens (1992:65) found a weak association between outcomes and school characteristics, particularly for factors 'frequent evaluation' and 'educational leadership', which were identified in other countries .

Table 3.5: Synthesis of Dutch SE Research

School characteristics	Number of studies with positive effect	Total number of studies
• Teacher's experience	3	3
• Changes in staff	2	3
• Private/state education	3	3
• Positive expectations of pupil achievement	4	5
• Frequent evaluation	2	6
• Achievement-oriented policy	4	6
• Teacher co-operation/consensus	1	3
• Child-centred approach	0	2
• Opportunity to learn	1	2
• Structure teaching	1	1
• City/rural school	2	3
• Orderly climate.	2	4

[Source: Scheerens, 1992:65]

The research project conducted in the second half of the 1980's used more sophisticated research designs and data analysis techniques than the earlier studies. Although research was improved over those years, the result was still a long list of correlates for effectiveness that needed regrouping and rethinking in order to generate better understanding (Creemers, 1990).

3.2.3: Recent development of SER

In the late 1980s and early 1990s, SE researchers were more concerned with identifying SE factors. A number of integrated models of SER (i.e. Creemers, 1994; Scheerens, 1992; Sammons *et al.,* 1997) had been developed by the late 1990s and early 2000s. During this period studies addressed the issues such as consistency, stability, differential effectiveness and departmental effects. Very few studies can be found in the early phase of SER that looked at both school and classroom simultaneously (i.e. Mortimore *et al.,* 1988; Teddlie & Stringfield, 1993). This weakness is addressed by the researchers and theoreticians (i.e. Jong *et al.,* 2004, Kyriakides 2005). Thus, the more recent research on teaching has tended to highlight classroom level processes. Factors, at classroom level, for example, teaching and learning are considered to be of primary importance in effectiveness models (Creemers and Kyriakides, 2008). The research has concluded that the classroom level is more directly influential on students' performance than the school level (e.g. Scheerens, 1992; Creemers, 1994; Muijs & Reynolds, 2000) and neither level can be adequately studied ignoring the other (Creemers & Kyriakides, 2008; Reynolds *et al.,* 2002). So the term educational effectiveness (EE) is now widely used rather than school or teacher effectiveness to identify the interaction between the school, classroom and individual student

levels and their influence on student performance (Creemers & Kyriakides, 2008). So new models exploring school and classroom effects simultaneously were investigated in different countries in different times emphasising the dynamic perspective of educational effectiveness. One such study in the area of educational effectiveness research (EER) was conducted in the Netherlands by Jong *et al.* (2004). In this study, classroom-level factors (i.e. average prior achievement in mathematics, grouping of students, task directness and amount of homework assigned) were found to have significant effects on students' mathematics achievement.

In Cyprus, the EE researchers attempted to measure the school and teacher effectiveness. For example, Kyriakides *et al.* (2000) concluded that the influences on student achievement were multi-level. The authors observed that classrooms had unique effects on student learning, independently of factors operating at the school and individual levels. Following the same procedure, Kyriakides (2005) found in his study that the influences on student achievement in both the cognitive and affective areas of schooling were multi-level. In addition, this study revealed that both personality and thinking style of the students can be considered as predictors of both cognitive and affective outcomes of schooling. These two studies used the cognitive and affective outcomes of schooling, whereas Kyriakides & Tsangaridou (2008) emphasised student achievement of psychomotor skills. The findings of their study imply that it is possible for researchers to develop generic models of effectiveness as the factors found to be associated with student achievement in mathematics and language were also associated with achievement in psychomotor outcomes of physical education.

In the UK, Day *et al.* (2006) investigated variations in teachers' work and lives and their effects on pupils. They intended to address several areas of policy concern at the time, including improving the quality of teaching, raising standards of student attainment and supporting retention to the teaching profession. A significant variation in both teachers' perceived and relative effectiveness across year groups and sectors were indentified from the findings. The key influencing factors on teachers' motivation, commitment and quality retention were the quality of leadership (both at school and department levels), relationships with colleagues and personal support. Students' academic performance was also found to be related to the extent to which teachers sustain their commitment.

Looking at the historical development of EER (i.e. from first generation to current status), four sequential phases can be found which addressed different types of research questions and promote the theoretical development of EER as described fellows (Creemers *et al.* 2010:5).

First phase: a focus on the size of school effects. Establishing the field by showing that 'school matters'

During the early 1980s, the focus of the studies was to show how important it is for students to have effective teachers and schools. The studies also showed that the effects of school and teacher tend to be larger for disadvantaged groups (Scheerens and Bosker, 1997).

Second phase: a focus on the characteristics/correlates of effectiveness. Searching for factors associated with better student outcomes.

In the late 1980s and early 1990s, researchers in the area of EER were mainly concerned with indentifying factors and these studies resulted in a list of characteristics of effective teachers and schools (see Levine and Lezotte 1990; Sammons *et al.*, 1995; Scheerens and Bosker, 1997).

Third phase: modelling educational effectiveness. The development of theoretical models that show why specific factors are important in explaining variation in student outcomes

During late 1990s and early 2000s, the significant feature of EER was theoretical development that not only attempted to explain why factors that operate at different levels were associated with student outcomes but also designed the empirical studies within this field (i.e. Kyriakides *et al.,* 2000; Jong *et al.,* 2004).

Fourth phase: focus on complexity. A more detailed analysis of the complex nature of educational effectiveness that developed further links with the study of school improvement

After 2000, EE researchers increasingly paid attention to the study of complexity by giving more emphasis to the dynamic perspective of education (see Creemers and Kyriakides, 2006). The field became increasingly linked with the growth of larger scale, systematic investigations of the long-term effect of teachers and schools (Kyriakides *et al.,* 2009; Pustjens *et al.,* 2004) and also valued other research area, such as organisational change in educational administration.

The increasing development of this field contributed to establishing stronger links between EER and researchers/theoreticians, who are working in the area of EER. EER has continued to flourish in many developed countries and is also starting to be used in developing countries, as described in the next section.

3.2.4: SER in developing countries

SER is becoming more common in Asia and the Third World (Riddell, 1995). In Latin America, Murillo (2007:78) distinguished six different lines of SER, such as:

1. Studies specifically designed and developed to identify school and classroom factors associated with student achievement and evaluate their contribution. Research carried out in Venezuela by the Cultural and Educational Research Centre team (CICE) is the landmark in Latin American research concerning this area.

2. Studies that used secondary data collected for other purposes, mainly for educational system assessment.

3. Studies on school effect.

4. Studies that deal with the analysis and assessment of programmes for school improvement.

5. Studies that seek to learn about the relationship between school factors and student achievement.

6. Work that is focused on the analysis of the school culture from an ethnographic perspective.

Murillo (op. c*it.*) stated that the findings of SER as shown in Table 3.6 carried out in Latin America over the years contributed to a better understanding of the reality of education and the diverse factors associated with student achievement.

	1	2	3	4	5	6	7	8	9
School factors									
• School climate	X	X	X	X	X	X	--	X	X
• Infrastructure	X	X	X	X	X	X	--	X	--
• School resources	X	X	X	X	X	X	X	X	X
• School financial management	X	X	--	X	X	--	--	X	--
• School Autonomy	--	X	X	--	--	--	--	--	--
• Teamwork	--	X	X	--	X	--	--	--	X
• Planning	--	X	X	--	X	--	--	X	X
• School community involvement	--	--	--	X	X	X	X	X	X
Shared goals	X	X	X	X	--	X	--	X	X
• Leadership	--	X	X	--	X	--	--	X	X
Classroom factors									
• Classroom climate	--	X	X	--	X	X	X	X	X
• Classroom quality and resources	X	--	X	X	X	X	--	X	--
• Teacher-student ratio	--	--	--	--	X	--	X	--	--
• Teacher planning (work in the class room)	--	X	X	--	X	--	--	X	X
• Curricular resources	X	X	--	--	X	--	--	--	--
• Didactic methods	X	X	X	--	X	X	--	X	--
• Student assessment and follow-up	--	X	X	--	X	--	--	X	X
Factors related to the school staff									
• Teacher qualification	--	--	--	--	X	X	--	--	--
• Professional development	--	--	X	--	X	X	--	X	X
• Stability	X	X	X	--	X	--	--	--	--
• Experience	X	--	X	--	X	--	X	--	--
• Teacher working conditions	--	--	--	--	--	--	X	--	--
• Involvement	X	X	X	--	X	--	X	--	--
• Teacher-student relationship	X	X	--	--	X	--	X	--	--
• High expectations	X	X	X	--	--	X	--	X	X
• Positive reinforcement	X	--	X	--	--	--	--	X	X

Note: 1. Himmel *et al.* (1984); 2. Concha (1996); 3. Herrera and Lòpez (1996); 4. Piñeros & Rodrìguez Pinzòn (1998); 5. Cano (1997); 6. Barbosa & Fernandes (2001); 7. LLECE (2001); 8. Bellei *et al.* (2003); 9. Raczynski & Muñoz (2005)
[**Source:** Murillo, 2007:85]

Fuller and Clarke (1994) reviewed about 100 SE studies in developing countries. Most of the studies were conducted in primary schools rather than in secondary schools. Input variables investigated in these studies more frequently were financial, physical and involved human resources than school and classroom process variables, with the exception of instructional time. The authors suggested that SER in developing countries should pay more attention to cultural contexts, as it can explain more clearly why school and classroom level variables 'work' in one country but not in others. Riddell (1997) argued that Fuller and Clarke's view

cannot present clear research alternatives, although their ideas have significant implications for the design of school effectiveness studies. Most SER studies in developing countries are of the production function type. In a more methodologically oriented review, Riddell (*ibid*), focused on a 'third wave' of SER in developing countries, where multi-level modelling is becoming a methodological requirement. As part of worldwide educational reforms, three waves of SER movements (see Figure 3.1) have experienced in Asia in the past decades (Change & Tam, 2007; Chang, 2005) as described below.

3.2.4a: First wave of SE movements

Policy makers and educators in Asia paid their attention to the improvement of internal school processes, including teaching and learning, since 1980. Numerous initiatives were evident in different parts of Asia, for example, Hong Kong, India, South Korea, Singapore, Taiwan, Malaysia and China, for the improvement of factors related to internal school process. The factors are: school management, teacher quality, curriculum design, teaching methods, evaluation approaches, facilities and environment for teaching and learning (see Abdullah, 2001, Cheng, 2001a; Kim, 2000, Rajput, 2001; cited in Change & Tam, 2007).
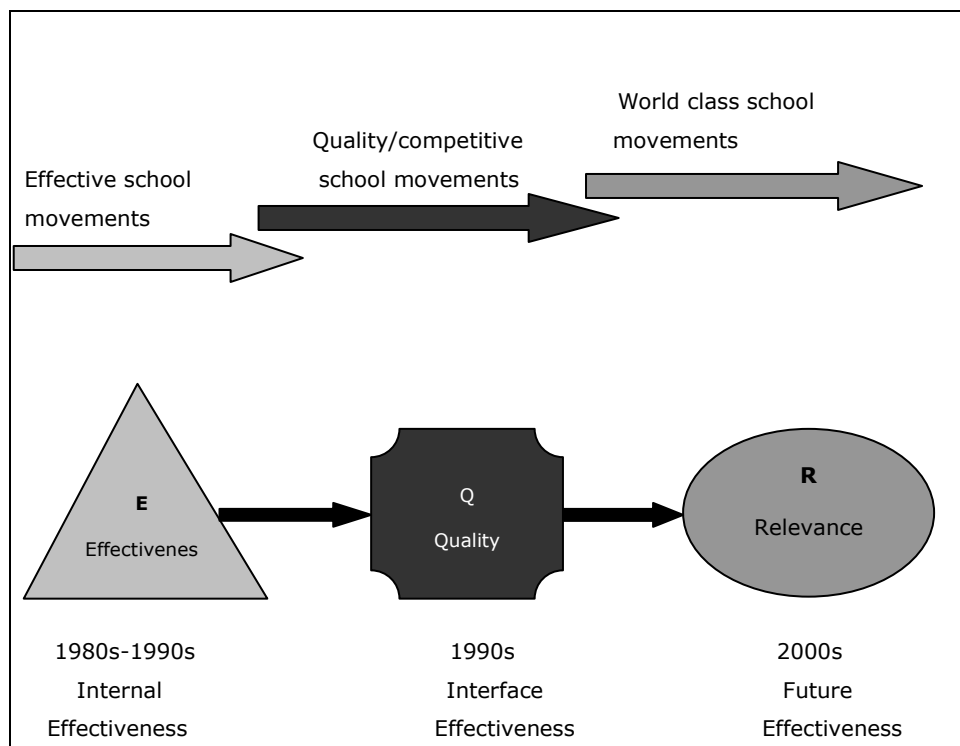
Figure 3.1: Third wave of SER in Asia
[Source: Change & Team, 2007: 246]

3.2.4b: Second wave related to quality school movements

The second wave of international educational reforms for SESI (school effectiveness and school improvement) emerged in the 1990's. The main efforts of this wave were directed at ensuring the quality and accountability of schools to the internal and external stakeholders (see Evans, 1999; Goertz & Duffy, 2001; Headington, 2000; Heller, 2001; cited in Change & Tam, 2007). In Hong Kong, South Korea, India, Singapore, Malaysia, China and Taiwan, the trend of quality school movements emphasised quality assurance, school monitoring and review, parental choice, student coupons, parental and community involvement in governance, school charters and performance-based funding.

3.2.4c: Third wave for world-Class school movements

The focus of third wave of school movement is that educators, policy-makers, and stakeholders in Asia and also other regions should pay their attention to bring a change in learning and teaching paradigms to meet the challenges and the demands of fast-moving emerging sectors, i.e. globalisation and information technology. This shift is relevant for the reformation of education in the 21st century, involving contextualised multiple intelligences, globalisation, localisation and individualisation (Baker & Begg, 2003; Cheng, 2005; cited in Change & Tam, 2007).

It is clear from the discussion that SER is more developed in industrialised countries than in developing countries. However, the benefits of using SER in different countries is potentially very great, as it enables one to examine a large number of educational factors in order to obtain a clear idea about which factors are important in a particular cultural context. The effectiveness factors, which make school effective, are discussed in the following paragraph.

3.3: CONDITIONS OF EFFECTIVE SCHOOLS

SER aims to identify the conditions of, or factors for, effective schools. Different approaches to doing this can be found in the literature of SER. Four groups of studies such as- (a) outlier studies, (b) case studies, (c) programme evaluations, and (d) other studies, were distinguished from the review by Purkey & Smith (1983). Three major trends of SER have been identified by Reynold *et al.* (2000): (a) school effects research; (b) effective schools research and (c) school improvement research. My thesis falls into the first trend of SER, i.e. school effects research. The intention of this section is to bring together the various lists of effective schools conditions that are supposed to be enhanced school effectiveness.

3.3.1: Factors which make school effective

Effective school research (ESR) identified a set of factors that contributed to make a school effective. Effective school conditions were emphasised in order to obtain a comprehensible picture of findings and theory development in the SE field. The findings of Edmond's study (1979) were converged around five factors, familiar as the 'five-factor model' in the SER literature, which are:

- strong educational leadership
- emphasis on the acquiring of basic skills
- an orderly and secure environment
- high expectations of pupil attainment
- frequent assessment of pupil progress

Edmond's 'five-factor model' is an early list of effective school conditions. However, this model has been criticised on methodological and conceptual grounds (see Ralph & Fennessey, 1983). Nonetheless, these factors are important in SER, as they epitomised the school effective knowledge base for the SE researchers, education policy makers, school inspectors, head teachers and class teachers. From the 1990s, other lists of effective school appeared in the literature of SER. Purkey and Smith (1983) re-analysed qualitative SE studies, where six studies that were evaluative in nature were conducted as compensatory programmes, nine 'outlier' studies were related to primary schools and seven case studies were also examined. Levine and Lezotte (1990) added a list of conditions to the knowledge base of SER, using the 'outlier' design in order to distinguish more or less effective schools. Based on other review studies and on the findings of individual studies, Sammons *et al.* (1995) identified eleven key characteristics of effective schools. Cotton (1995) identified effective school

characteristics from the study of improvement in student performance. Scheerens and Bosker (1997) identified thirteen general factors from ten empirical SE studies that are deemed to work in schooling. The following Table 3.7 summarises the characteristics found from the studies by Purkey and Smith (1983), Levine and Lezotte (1990), Sammons *et al.* (1995a), Cotton (1995) and Scheerens and Bosker (1997).

Table 3.7: Effectiveness-enhancing conditions of schooling in five review studies
(Italics in the column of the Cotton study refers to sub-categories)

Purkey & Smith (1983)	Levine & Lezotte (1990)	Cotton (1995)	Sammons, *et al.* (1995a)	Scheerens and Bosker (1997)
- Achievement-oriented policy	- Productive climate and culture	- Planning and learning goals	- Shared vision and goals	- Achievement - Orientation
- Co-operative atmosphere - Orderly climate		- Curriculum planning and development	- A learning environment - Positive reinforcement	- High expectations
- Clear goals on basic skills	- Focus on central learning skills	- Planning and learning goals - *School wide emphasis on learning*	- Concentration on teaching and learning	- Educational leadership
- Frequent evaluation	- Appropriate monitoring	- Assessment (district, school, classroom level)	- Monitoring progress	- Consensus and - Cohesion among staff
- In-service training/ staff development	- Practice-oriented staff development	- *Professional development* - Collegial learning	- A learning organisation	- Curriculum quality - Opportunity to learn
- Strong leadership	- Outstanding leadership	- School management and organisation, - Leadership and school improvement - Leadership and planning	- Professional leadership	- School climate
	- Salient parent involvement	- Parent community involvement	- Home school partnership	- Evaluative potential
- Time on task - Reinforcement - Streaming	- Effective instructional arrangements	- Classroom management and organisation, - Instruction	- Purposeful teaching	- Parental involvement
- High expectations	- High expectations	- Teacher student interactions	- High expectations	- Classroom climate
			- Pupil rights and responsibilities	- Effective learning time
		- Distinct school interactions		
		- Equity		
		- Special programmes		

[**Source:** Scheeren, 1999:13 & 2000:45]

Recently, Marzano (2007) developed another eleven factors model, focusing on what works in a school as shown in Table 3.8. These factors are important for school reform and can be altered in a school to enhance student achievement.

Table 3.8: What works in a school model?

School	• Guaranteed and viable curriculum • Challenging goals and effective feedback • Parent and community involvement • Safe and orderly environment • Collegiality and professionalism
Teacher	• Instructional strategies • Classroom management • Classroom curriculum design
Student	• Home environment • Learned intelligence and background knowledge • Motivation

[Source: Marzano, 2007: 600; adopted from Marzano, 2003]

3.3.2: Summary of Meta-Analysis

Scheeren and Bosker (1997:305) identified the SE factors shown in Table 3.9, summarising the findings of three meta-analyses and a re-analysis of an international data set. The findings of the meta-analysis revealed that, on average, resource-input factors have negligible effects; school factors have a small effect whereas somewhat larger effects were found for instructional factors. An analysis of resource-input variables was carried out by Hedges *et al.* (1994), based on Hanushek's (1979) re-analysis of production function studies, meta-analyses related to 'structured teaching' by Fraser *et al.* (1987); and the international analysis by Bosker (see Scheerens and Bosker, 1997) based on the IEA Reading Literacy Study.

Table 3.9: Review of the evidence from qualitative reviews,
international studies and research syntheses

	Qualitative reviews	International analyses	Research syntheses
Resource input variables:			
• Pupil-teacher ratio		-0.03	0.02
• Teacher training		0.00	-0.03
• Teacher experience		……..	0.04
• Teachers' salaries		……..	-0.07
• Expenditure per pupil		………	0.02
School organisational factors:			
• Productive climate culture	+	……..	…….
• Achievement pressure for basic subjects	+	0.02	0.14
• Educational leadership	+	0.04	0.05
• Monitoring/evaluation	+	0.00	0.15
• Co-operation/consensus	+	-0.02	0.03
• Parental involvement	+	0.08	0.13
• Staff development	+	…….	……..
• High expectations	+	0.20	……..
• Orderly climate	+	0.04	0.11
Instructional conditions:			
• Opportunity to learn	+	0.15	0.09
• Time on task/homework	+	0.00/-0.01 (n.s.)	0.019/0.06
• Monitoring at classroom level	+	-0.01	0.11 (n.s.)
Aspects of structure teaching:			
• Co-operative learning			0.27
• Feedback			0.48
• Reinforcement			0.58
• Differential/adaptive instruction			0.22

Legend: Correlation size interpreted as: 0.10=small; 0.30=medium and 0.50=large;
n. s.: statistically not significant, +: Positive effect

3.3.3: Evidence from developing countries

Ample evidence of effectiveness-enhancing conditions for schooling in developing countries can be found in SE literature. In South Africa, for example, numerous studies were conducted under the production-function label. Findings summarised in Tables 3.10 and 3.11 reveal that socio-economic factors had the largest influence on educational opportunity (Taylor, 2007), whilst the resources outside of family were of less importance.

Table 3.10: School factors associated with improved learning

Factors	Tomas (1996)	Crouch & Mabogoane (2001)	Anderson, Case & Lam (2001)	Simkins & Patterson (2003)	Van der Berg & Burger (2002)	Howie (2002)
-Race		++	++	++	++	
-Parental education	++		++	++		
-Parental income		++		++	++	
-Settlement type					+	
-Family structure		+				
-Gender			0	0		
-Language				++		++

Note: ++ denotes strong positive correlation; + relatively weak positive correlation; 0 no significant difference; blank cells indicate that the study in question did not examine this factors.
[**Source**: Taylor 2007:530; adopted from Taylor et. al. 2003]

Table 3.11: Resource factors associated with improved learning

Factors	Crouch & Mabogoane (2001)	Case & Deaton (1999)	Case & Yog (1999)	Bot, Wilson & Dove (2001)	Van der Berg & Burger (2002)
- Teacher qualification	+			+	
- Facilities				+	+
- Pupil-teacher ratio		0	++		++
- Learning materials	+				

Note: ++ denotes strong positive correlation; + relatively weak positive correlation; 0 no significant difference; blank cells indicate that the study in question did not examine this factors.
[**Source**: Taylor 2007:530; adopted from Taylor et. al. 2003]

The effects of resources were also identified by Hanushek (1995), based on 96 studies in developing countries, as given in Table 3.12.

Table 3.12: Estimated effects of resources on education
in developing countries

Input	Number of studies	Statistically significant		Statistically insignificant
		Positive	Negative	
Teacher/pupil ratio	30	8	8	14
Teacher's education	63	35	2	26
Teacher's experience	46	16	2	28
Teacher's salary	13	4	2	7
Expenditure per pupil	12	6	0	6
Facilities	34	22	3	9

[**Source**: Hanushenk, 1995; adopted from Scheerens, 2000:58]

In developing countries, larger variance in both independent and dependent variables was caused by these resource-input factors. Considering outcome variable (i.e. educational achievement), for example, Riddell (1997) pointed out that schools in developing countries vary on average by 40% (raw scores) and 30% (scores adjusted for intake variables). Fuller and Clark (1994) concluded from their review[25] as shown in Table 3.13, that consistent school effects can be

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[25] The review considered about 100 studies and drew upon earlier reviews by Fuller (1987), Lockheed

found in major three areas: (a) availability of textbooks and supplementary reading material, (b) teacher qualities, teachers' subject knowledge and verbal proficiency; and (c) instructional time and work demands placed on students, whereas policy-relevant factors, like class size and teachers' salary showed inconsistent effects. Thus, the authors suggested paying more attention to cultural contingencies while studying SER in developing countries.

Table 3.13: Estimated effects of resources on education
in developing countries

School/Teacher factors	Number of significant effects/ number of analyses	
	Primary schools	Secondary schools
School spending		
• Expenditure per pupil	3/6	3/5
• Total school expenditure	2/5	--
Specific school inputs		
• Average class size	9/26	2/22
• School size	7/8	1/5
• Availability of textbooks	19/26	7/13
• Supplementary readers	1/1	2/2
• Exercise books	3/3	--
• Teaching guides	0/1	--
• Desks	4/7	0/1
• Instructional media	3/3	--
• Quality of facilities	6/8	1/1
• School library	16/18	3/4
• Science laboratories	5/12	1/1
• Child nutrition and feeding	7/8	1/1
Teacher attributes		
• Total years of schooling	9/18	5/8
• Earlier measured achievement	1/1	1/1
• Tertiary or teacher college	21/37	8/14
• In-service teacher training	8/13	3/4
• Teacher subject knowledge	4/4	--
• Teacher gender (female)	1/2	2/4
• Teacher experience	13/23	1/12
• Teacher salary level	4/11	2/11
• Teacher social class	7/10	--
Classroom pedagogy and organisation		
• Instructional time	15/17	12/16
• Frequent monitoring of pupil performance	3/4	0/1
• Class preparation time		
• Frequent homework	5/8	1/2
• Teacher efficacy	9/11	2/2
• Co-operative learning tasks for students	1/1 --	0/1 3/3
School management		
• School cluster membership	2/2	--
• Principal's staff assessment	3/4	0/1
• Principal's training level	3/4	1/2
• School inspection visits	2/3	0/1
• Tracking or pupil segregation	1/1	--

[Source: Fuller & Clarke, 1994; adopted from Scheerens, 1999:29]

& Hanushek (1988); Lockheed & Verspoor (1991) and an analysis of 43 studies in the period 1988-1992 conducted by the authors themselves (source: Scheerens, 1999:30)

The list of effective school conditions has been undermined by the critics (see Slee & Weiner, 2001). The lists of school effectiveness factors, which are associated with promoting the progress of specific groups of pupils, are important to examine as-

> 'the identification of these factors may be useful for policymakers in order to attempt to design and implement policies on equal opportunities' (Creemers et al., 2010:24).

More details of school effectiveness factors can also be found in Section 3.7.2 under a process-product model of SER. The size, variation, consistency and stability of school effectiveness are discussed in the following section.

3.4. THE EFFECTS OF SCHOOL: SIZE, VARIATION, CONSISTENCY AND STABILITY

There is a disagreement between the SE researchers and their critics about the importance of the influence of schools on students' attainment. The main focus of this disagreement has been on two critical issues: a) the magnitude of the school effects and b) the school effects as being unidimensional. In the following section the magnitude and the unidimensionality of the effects exerted by schools are discussed in terms of effect size, variation, consistency and stability.

3.4.1: Size of school effects

Emphasise the ability and social backgrounds of the students as determinants of academic performance, the early literature on SE, for example, Coleman *et al.* (1966) and Jencks *et al.* (1972) suggested that schools had little direct effect on student achievement. In Coleman's Report (1966), the difference between schools in mathematics achievement (adjusted for SES and schools' intake characteristics) was only 4.95% and 8.73% of the total variation for white and black students respectively. Jencks *et al.* (1972) concluded that the school effect was 0.23 and 0.28 (after controlling for prior achievement and schools' intake characteristics) for white and black students respectively. Rutter *et al.* (1979) found in their '*Fifteen Thousand Hours Study*' less than 2% of the variances in students' examination result that could be attributed to composite school process score and they found a high value of correlation co-efficient (0.76) between examination result and the composite school process.

Second generation SER studies took the advantage of advanced statistical analysis and estimated the value of school effect more accurately using multi-level modelling (MLM). Mortimore *et al.* (1988) was one of the studies that used MLM and found 9% adjusted variance in student achievement in reading accounted for by the school effect. The percentage of variances for mathematics and writing were 9% and 11% respectively. The size of the school effect on student learning was found relatively small from the meta-analysis of over 80 British and Dutch studies implying that, on average, only around 8 to 10% of the total variances in student performance can be explained by the effects of attending different schools (Bosker and Witzeirs, 1996). Re-analysed the same database of '*Junior School Project*', Sammons *et al.* (1993) demonstrated that the total variance was 20.6% in reading scores of primary school students in year 5, after including the total background factors (for example, age, gender, ethnicity, fluency in English, FSM, & parents' occupational status), while the figure was

lower at around 11% for mathematics. Moreover, the size of primary school effects may be greater than those of secondary schools (Sammons *et al.*, 1993, 1995). Raudenbush and Bryk (2002) found 18% between schools variation in mathematics achievement. In their study, school's average SES explained 69% of the between-school variation. After controlling for the effects of a school's average SES, the between-school variation dropped to 6%.

3.4.1a: Meta-analysis of SER and size of effect

Meta-analysis of 168 SE studies was carried out by Scheerens & Bosker (1997) to estimate the size of school effect. From the international literature (ERIC, School Organisation and Management Abstracts, Educational Administration Abstracts and the Sociology of Education Abstracts), they selected only second generation studies, which used multi-level analysis. The characteristics of the selected studies are as shown in Table 3. 14.

Table 3.14: The characteristics of the 168 studies analysed by
Scheerens & Bosker (1997:73)

Measure	Gross	79	47%
	Net	15	9%
	Both	74	44%
Level	Primary	84	53%
	Secondary	74	47%
Subject	Language	81	48%
	Mathematics	72	43%
	Composite	11	7%
	Science	4	2%
Country	The Netherlands	55	33%
	United Kingdom	35	21%
	Europe-other countries	20	13%
	North America	25	15%
	Other industrialised	19	11%
	Third World countries	6	3.6%

Note: Percentage refers for the 168 studies

For meta-analysis, the above authors used random co-efficient models first proposed by Raudenbush & Bryk (1985). A number of replications was conducted for each of the 168 studies, based on different subject areas or different cohorts of students, so that, the findings of the replications were used as level 1 and the studies as level 2. The mean gross school effect was 0.4780 and net school effect was estimated to be 0.3034 (see the findings in Appendix 8.2). The school effect size varies by subject or school type (i.e. primary and secondary) as well. The net effects were larger (after control for intake) for mathematics (0.0624) than language (0.0000), as found from the meta-analysis by Scheerens & Bosker (*op.*

cit.) and largest for studies based on composite measures of achievement (0.1740). In total, 11.69% and 29.31% of the variations in gross and net effect sizes estimated respectively can be accounted for by the variables in the second part of the table (see Appendix 8.2). Effect sizes, while comparing the countries, were found to be larger in studies of Third World countries (gross=0.2638 and net=0.1812). In terms of outcome variables, for example, educational achievement, Riddell (1997) concluded that schools in developing countries vary on average by 40% (raw scores) and 30% (scores adjusted for intake variables). This variation is considerably larger than the figure found in developed countries, where the usual between school variance is 10%-15% (Bosker & Scheerens, 1999).

From the above discussion studies agree that the size of effect is typically limited to approximately 10–30% of the variance in pupil outcomes (Teddlie & Reynolds, 2000). This size can be regarded as an important proportion; given that individual student background characteristics contribute roughly 10 to 25% in total variation (see Sammons *et al.*, 1993). Sammons *et al.* (1993) found larger school effect than the influence of student background, when student progress was measured using multi-level models with value-added approaches. However, the multi-level research by Rowe & Hill (1994) indicated that most of the variances was actually explained by the differences of individual classes. Later, they found the combined school class effects to be substantial at around 50% of total variances, when intake variables were controlled (Hill & Row, 1996). The authors described that 'school effects are in the order of 16 to 18% of the total variances, which is at the upper end of estimates reported in the wider literature before controlling for intake differences (*ibid*:23)'. When class was modelled they found 10.2% variance at school and 33.6% at class level for English, whilst the figures for maths were 6.8% at school, 46.0% at class level before control for intake. But note that when intake was controlled the authors find slightly smaller school effects (i.e. 8.2 and 5.4% for English and maths respectively). Importantly, the class effect was found to be larger, however after control for intake (43.7 and 56.4% respectively). Thus, their study indicated smaller school but large class effects even after control for SES, Gender, Language and prior attainment. Overall even controlling for intake (prior attainment and background) they found that around half the remaining total variance was attributed to the school. It is important to note that they used the term total variance slightly differently. When they refered to it with no intake control it was total variance in the outcome measure. When they refered to total variance in their tables after intake control they were really talking about the proportion of total variance unaccounted for by

intake (prior attainment and background). The authors also noted that their results on large class effects might be influenced by the attainment outcome measure used (a teacher assessment that had higher rate of unreliability). However, they also argued that the smaller the unit of analysis (e.g. class rather than school) and the closer one gets to the pupils' experience of education the greater the proportion of variance explained by the class. Moreover, they also noted that school effects were by definition longer term and cumulative. For progress over a school year class effects tended to be larger than school influences. In short, according to the same authors, in students' learning, teachers make the difference, not the schools. Thus, the topic of the following section is the school and class effects.

3.4.2: School effect versus individual classroom effect

SER not only measures the school effect but is also concerned with the classroom or departmental effects, as Creemers (1990:20) states:

> about 12%-18% of the variances in student outcomes can be explained by classroom and school factors, after taking into account students' background.

Schools in a similar context can reach different levels of achievement and the proportion of variance in achievement may differ between subjects in schools and different countries (Sammons *et al.*, 1995). Using more refined statistical techniques, SER identified significant difference among schools in their effects on student achievement (Sammons *et al.*, 1997). In fact, the importance of the within-school effect has come into focus recently in the UK because of two factors (Reynolds, 2007:480):

- The PISA results showing 80% of student achievement variations being within schools, a high figure by international standards;
- The accumulation of evidence that teacher effects on pupils are greater than school effects.

Given the importance on teacher effects, Muijs & Reynolds (2000) found that the composite teaching quality variable explained 60% to 100% of the unexplained between-classroom variance (after accounting for student prior achievement and other student background factors) in student learning in various grades. The composite was derived by summing the scores of individual classroom level variables, such as: classroom management, behaviour management, direct teaching, individual practice, interactive teaching, varied teaching and classroom climate. This finding implies that various effective teaching behaviours have a large impact on student achievement. However, the drawbacks of this study were

that it did not control for classroom compositional effects, which could potentially reduce the effect of the composite variable (Opdenakker *et al*., 2002), and it did not examine other classroom-level variables or school-level variables. Reynolds (2007) later stated, referring to Muijs & Reynolds (2000, 2002), that 20% of variances in student attainment, that is, approximately four times variance was for the effects of teacher than school. The summary of the studies is given in Table 3. 15.

Table 3.15: Percentage of variances at the school,
classroom and student levels

	School	Class	Individual
Year 1	3.5	11.2	85.3
Year 2	3.7	14.5	81.3
Year 3	5.1	21.8	73.1

[**Source:** Reynolds, 2007:480]

Reynolds (2007) also pointed out, as presented in Table 3.16 that extreme school level variability in educational system was found, while comparing different countries (for example, comparing the UK to Taiwan).

Table 3.16: Variability in achievement in different countries

	Intake to end Year 1 A1 unconditional model	Intake to end Year 1 B1 with background co-variates	End Year 1 to end Year 2 A2 unconditional model	End Year 1 to end Year 2 B2 with background co-variates	Intake to end Year 2C
USA	0.35	0.29	0.37	0.20	0.25
UK	0.21	0.11	0.22	0.07	0.10
Taiwan	0.03	0.02	0.07	0.04	0.04
Norway	0.13	0.04	0.11	0.06	0.08
Hong Kong	0.18	0.10	0.02	0.02	0.05
Netherlands	0.16	0.08	0.17	0.04	0.15
Ireland	0.09	0.00	0.11	0.01	0.12
Australia	0.18	0.13	0.22	0.16	0.04

[**Source**: Reynold, 2007:481]

A number of SER studies reported that, if both the school and class levels were specified in the model and the SES composition was controlled, the school effect disappeared almost completely or became smaller than the class effect (Muijs & Reynolds, 2003; Opdenakker *et al.* 2002). Rowe (2007) illustrated the findings of a secondary analysis of data from the Secondary International Mathematics Study (SIMS) by Scheerens *et al.* (1989) given in Table 3.17. Table 3.17 represents the findings of eight out of the nine countries, for which class/teacher information was available. The adjusted estimate of variance in student achievement was larger for class/teacher effects in several countries (40%), whereas the school effects were significantly smaller, ranging from 0% to 9%.

Table 3.17: Comparison of class/teacher and school levels effects
in eight countries (secondary mathematics scores adjusted for
father's occupational status)

Country	Class/ Teacher Effects (%)	School Effects (%)
Canada	17	9
Finland	45	0
France	16	6
Israel	21	8
New Zealand	42	0
Scotland	31	5
Sweden	45	0
USA	45	9

[**Source**: Rowe 2007:773; adopted from Scheerens *et al.,* 1989:794]

The findings of the Victorian Quality Schools Project presented in Table 3.18 indicated the percentage of variances in value-added measures of literacy (English) and mathematics achievement, accounted for class and school effects stating that:

> the difference among classes within the same school are many times higher than differences between schools, indicating a high variability in teacher/class effectiveness (Hill, 1998:423).

Table 3.18: Percentage of variances in value-added measures
accounted for class and school effects

	Class (%)	School (%)
Literacy (English)		
• Primary	45	9
• Secondary	38	7
Mathematics		
• Primary	55	4
• Secondary	53	8

[**Source**: Rowe, 2007:774; adopted from Hill & Rowe, 1996:20]

Considerable variation in mathematics achievement was found at the classroom and school levels in the USA and Australia (Lamb and Fullarton, 2002). In the USA, the amount of variance between classroom differences (33.8%) was larger than the variation between school differences (12.2%). In Australia, the variance was smaller, compared to the USA, but the variance at classroom level (27.9%) was greater than the school level (10.4%). It is clear that most of the variations in student attainment is within the classroom, implying that the teachers, who teach individual classes within the schools, are the main factor. Models of SER discussed in section 3.7 can provide a clearer picture of how school conditions can affect the individual teacher working within classes or departments or schools.

3.4.3. Consistency and stability of the school effect

One of the most fundamental issues in SER is the unidimensionality of the school effects (Scheerens & Bosker, 1997), which implies consideration of whether results of schools and classes are consistent and stable for different grades, subjects, years and groups of students. Consistency refers to the correlation between rank-orderings of schools, based on different criterion variables, whereas the term 'stability' has to do with different time-points or cohorts in the same schools. Many studies can be found in SER literature that studied how stable the school effect is over a period of time. In Willms & Raudenbush's (1989) study of 20 secondary schools in Scotland, they reported the stability of 'type A' and 'type B' school effects over a period of four years (from 1980 to 1984). The correlations for type A and type B were 0.87 and 0.70 respectively. Gray *et al.* (1995) in the UK investigated the changes in school performance over time in term of GCSE results. The researchers measured value-added school effects controlling for student prior attainment and found high correlation co-efficient between three consecutive years, i.e. 0.94 (between 1990 to 1991), 0.96 (between 1991 to 1992) and 0.81 (between 1992 to 1993). Focusing on the time stability of the teacher and school effect, Kyriakides & Creemers (2008) stated that traditional approaches of measuring SE, generally, overestimate the short-term effects of teachers and student background factors, whilst underestimate the long-term effects of teachers and schools. They found from their study that at the end of Year 1, 13% of the total variations in student achievement can be attributed to the school and 18% due to the teacher. Variations were smaller at the end of Year 4 indicating less than 11% of the variations were due to the school and 16% for teachers. The findings implied that the short-term effects of the school and teacher were more significant at the early years of primary school. The study also indicated that studies investigating the long-term effect of teachers should take into account the effects of all the teachers that a student had during the period under consideration.

SER studies of stability (e.g. Gray *et al.*, 1995) and consistency (e.g. Kyriakides, 2005, Tomas & Mortimore, 1996) show that school effects are stable to a certain degree but there appears to be a lack of consistency across subjects (Kyriakides, 2007). However, some SER reported a good range of consistency. For example, Grisay (1996) found a substantial consistency based on value-added results, where for French language co-efficient was 0.42 and 0.27 for mathematics. The findings of the study by Luyten *et al.* (2009) revealed a considerable degree of consistency. The correlations are moderate for phonics (0.52) and strong for

reading and mathematics (0.78 and 0.71 respectively). Furthermore, the average consistency between subjects at the secondary level was somewhat lower than in the case of primary schools (i.e. r=0.50). This inconsistency is partly for variation between teachers, since different teachers usually teach different subjects at the secondary level. According to Scheerens *et al.* (2000), the few studies, which studied the size of a stable school's factors concerning year-specific and subject-specific effects simultaneously, have shown results varying from a school factor explaining 70% of the subject and cohort specific (gross) school effects (Bosker, 1990), 39% (Van der Werf & Guldemond, 1995) and 25% (Luyten, 1994).

From the discussion of stability and consistency of school effect, the conclusion can be drawn that the range of consistency is reasonably fair. With regards to stability, school effects appear to be quite stable over time. Schools may vary almost as much between years as between themselves (Goldstein, 1987) but 'one year's results on their own are not a very good guide to a school's performance over time' (Gray, 1989). Therefore, it is important to monitor outcomes over several years (3 is the minimum to identify trends) to establish whether schools are improving, declining or are fairly stable in terms of effectiveness (Sammons *et al.*, 1997).

The size of school/class effect, consistency and stability are described in this section to make it clear that school makes a difference, providing good quality teachers and teaching-learning support. Despite its continuous progress, SER has its critics and their concerns are considered in the following section.

3.5. CRITICISMS OF SCHOOL EFFECTIVENESS RESEARCH

In almost half a century SE studies have made a major contribution to the field of educational research (Hopkins, 1994; Mortimore, 1995; Stoll and Sammons, 2007). However, no research is perfect and SER has been criticised on different grounds. Many of the critics reject the success of SER completely and others highlight how the field of SER has been slow to respond to its critics. For example, Thrupp (2001:10) says of SER researchers' response to the critics that they simply ignore or deny criticisms; or acknowledge the criticisms but do not try to counter them; or call it 'cherry picking'; or downplay it; or deem it inconsistent; or refer to it as showing the need for future improvement.

The criticisms of SER can be found in two books: '*School effectiveness for whom? Challenges to the school effectiveness and school improvement movements*' by Slee & Weiner with Tomlinson (1998) and '*School making a difference: Let's be realistic*' by Thrupp (1999) and in the special issues of the 'School Effectiveness and School Improvement' journal in vol-12, no.1. Reynolds & Teddlie, (2001) acknowledged criticisms of SER from political, methodological and theoretical aspects. Findler (2001) recognised the criticisms of SER on principle, theory, methodology, practice and philosophical points. I will discuss the criticisms against SER in this section, illustrated by Reynolds & Teddlie (*op. cit.*) and Findler (*op. cit.*) along with a number of counterpoints.

3.5.1: Criticism of principle

There are two principle-related issues in the critiques of SER: (a) definition of effectiveness and (b) choice of measures for outcomes. In most SER, pupil progress (Mortimore, 1991a) is considered as the measure of effectiveness. According to Harries and Bennett (2001), there are competing approaches to organisational effectiveness and so it is important to see what the chosen definitions ignore. The same author also stated that the time period is important and the long-term success, rather than a measure at one point in time, should be taken into account to assess the instructional effectiveness. A similar view, i.e. SER presents a 'snapshot' of a school, was presented by Reynolds and Teddlie (2000). This 'snapshot' approach has limited usefulness for illustrating school development or improvement, while overlooking the dynamic and evolving nature of schools as organisations (Gray *et al.*, 1996b). Against this argument, it can be asserted that although there is no consensus on what constitutes an effective school, (Reid *et al.*, 1987) there is great agreement amongst the SE researchers on the concept of 'value-added' (McPherson, 1992). Elaborating the definition of

Mortimore (1991a), Sammons *et al.* (1995) recognised that an effective school adds the extra value to its students' outcome. Additionally, Sammons (1994; see Sammons *et al.*, 1995) argued that the definition of SE is dependent on the following factors: i) sample of the schools examined; ii) choice of the outcome measures (which is concerned with the second point of this criticism); iii) adequate control for differences between schools' intakes; iv) methodology and v) timescale. According to Sammons (*ibid.*), a longitudinal approach would be able to measure the stability and consistency in school effect rather than cross-sectional 'snapshots'.

The second issue concerns the narrow agenda of school outcomes (Hill, 1998). Most of the SER traditions used the readily measurable outcomes, e.g. test results on basic skills: reading and mathematics or examination results (Goodlad, 1984), emphasising the organisation and neglecting the process or cultural dimensions. Slee & Weiner (1998:2) state:

> the discourse of effective schooling and school improvement is narrow in its assessment of school effects…… reducing school learning to discrete assessable and comparable fragments of academic knowledge.

Similar criticisms have also been raised from inside the SER field (see Reynolds & Teddlie, 2000a; Sammons, 1999). The implicit assumptions in neglecting the other domains of schooling are that (1) either all schools have the same priorities or (2) effectiveness is a unidimensional concept, i.e. effectiveness in one aspect of schooling implies effectiveness in all aspects of schooling (Harries and Bennett, 2001:51). However, Daily & Ainley (2000:141; cited in Teddlie & Reynolds, 2001:72) conclude:

> It can also be acknowledged that the range of student outcomes typically being studied in SE may be too narrow and that this is an issue that needs to be addressed. In recent literature, there is a growing body of work that incorporates multiple indicators of SE.

A number of SE studies provided evidence of different academic measures, (Teddlie & Reynolds, 2001; see Sammons, 1999; Teddlie *et al.*, 2000) together with social outcomes, i.e. attendance, attitude and behaviour (Rutter *et al.*, 1979; Mortimore *et al.*, 1988; Sammons *et al.*, 2008). Teddlie and Stringfield (1993), for example, developed a four level school effectiveness classification for which they used eight different academic and non-academic indicators.

In favour of process or cultural dimensions, it can be argued that SER did not neglect the process or cultural dimensions (or context factors) of effective schools as Teddlie & Reynold (2001:58) clearly state:

context factors are deemed important by SE researchers, these context effects have been explicitly studied with SER since the field began, there have been several reviews of the study of context in SER, there are now sub-fields of the study of context factors within SER, and contingency theory has been utilised to explain these context effects.

SER is concerned with the school and classroom processes and a number of reviewers (see Levine & Lezotte, 1990; Sammons *et al.,* 1995) has identified common features concerning the processes and characteristics of more effective schools conducted during the last 30 years. At least nine processes were referred by the researchers in the US and in the UK (Reynolds & Teddlie, 2000b; see also Teddlie & Reynold; 2001, Sammons, 2007) as follows, (a) the process of effective leadership; (b) the process of effective teaching; (c) developing and maintaining a pervasive focus on learning; (d) producing a positive school culture; (e) creating high (and appropriate) expectations for all; (f) emphasising student responsibilities and rights; (g) monitoring progress at all levels; (h) developing staff skills at the school site and (i) involving parents in productive and appropriate ways.

3.5.2: Political criticism

The crucial criticism against SER is a political one whereby critics alleged that SER researchers had no control over the political use of SER findings (Thrup, 2001). Criticisms against SER in the UK (e.g. Elliot, 1996) have come from 'progressive' educators, who portrayed SER researchers as guided by an ideology of social control and possessing a technical-rationalist framework. Slee *et al.* (1998) assert that SER is a tool for social engineering, as Hamilton (1998:13) remarks:

> Effective schooling has become a global industry. Its activities embrace four processes: research, development, marketing and sales. Research entails the construction of new prototypes; development entails the commodification of these prototypes; marketing entails the promotion of these commodities; and sales entail efforts to ensure that market returns exceed financial investment. The school effectiveness industry, therefore, stands at the intersection of educational research and social engineering.

The most serious complaint from a political aspect, albeit expressed in a different way, is that the SER researchers, particularly in the UK, provide belief and legitimisation to right-wing policies. Acodring to critics, the use of SER findings by the politicians encourages a view of school failure, blaming the school and the teachers, which Elliot (*op. cit.:*199) points out:

> The findings of school effectiveness research have indeed been music in the ears of politicians and government officials. Currently, for example,

they are being used to politically justify a refusal to respond to teachers' anxieties about the increasing size of the classes that they teach, the use of traditional teaching methods, such as whole class instruction, and a tendency to blame head teachers for 'failing schools' on the grounds that they lack a capacity for strong leadership.

In favour of the value-added approach, Sammons and Reynolds (1997:124) refuted the criticisms of Elliott (*op. cit.*) as being '*far from music to the ear of politician*' and the view that SER supports neo-liberal school reforms is robustly denied by Mortimore & Sammons (1997:185) exclaiming that:

> How can anyone who understands research methodology and who has taken the trouble to study our publications and the way we work make such an unfair accusation?

Teddlie & Reynolds (2001) refuted the blame of the critics that SER has had a pervasive impact on educational policy-making and the inability of the researchers in the SER paradigm to control negative use of their findings by policy makers and argue:

> the symbolic relationship between educational policy makers and school effectiveness researchers is overstated (p.50) ..... SE researchers are not obligated to anticipate and eliminate the political misuse of their findings (p.51).

According to the authors, the link between the government and the SER movement is exclusive in the UK, whereas it has little policy impact in the Netherlands, where the flourishing and sophisticated SER knowledge base has been largely unused in government policy (see also Scheerens, 1999; Scheerens & Creemers, 1996).

In contrast, criticism of SER in the USA (e.g. Ralph and Fennessey, 1983; Rowan, 1984) is concerned with the SE researchers' greater interest in equity or improving the schooling outcome of disadvantaged and ethnic minorities, which presents their liberal attitude to specific group of children. According to the critics, although greater effectiveness may somewhat improve the absolute performance of disadvantaged groups, it will not improve their relative performance against more advantaged groups (Thrupp, 2001a:446). Thus, critics' arguments suggest that the SE field produces more problems than it has generated solutions (Slee *et al.*, 1998; Slee & Weiner, 2001; Thrupp, 2001). Mortimore (1997a:483) has written about SER's inadequate emphasis on social and political context of schooling:

> Because of the capacity of those who are advantaged to extract from any situation more than those who are disadvantaged, schools will always be inefficient and partial mechanisms for compensation [for social inequality]. It is also important to ensure that schools are not blamed for

all the ills of society nor held responsible, unfairly, for failing to overcome all the pre-existing differences in attainment amongst their student intakes.

Similarly, Angus (1993:343) defends the problem of inequity in SER tradition, exposing that:

the inequality can be managed within the walls of schools and classrooms, provided that teachers and pupils follow correct effective school procedures.

Finally, based on taxonomy of 11 (or sometimes 12) characteristics, Slee & Weiner (2001:90) ask:

how did school effectiveness research contribute to the shaping of the social order of schooling and its pupils or 'client' at the end of 20th century?

From the SE researchers' side, these points are discussed and indeed resolved within the genre itself (Stoll & Fink, 1996). However, with reference to political criticism, my view is that it is unfair to label SER work as being part of a political reforming agenda. The SER researchers' motto might be to contribute their findings improving the educational policy for quality education, not to implement the political persuasion. A similar tone is echoed by Townsend (2001:124) as a response to Thrupp's (2001) criticism:

As a researcher who has felt the wrath of a right-wing government (Victoria's Kennett government of 1992-1999) and was banned from doing research in public schools for 4 years, I feel somewhat unhappy about the tone that this argument takes. It suggests that research that has been undertaken in many parts of the world is somehow tainted because it was funded by governments not of the political persuasion of Dr. Thrupp. Yet it is obvious that there have been many advances in our knowledge about children and their learning that has come as a product of research that has spanned governments of different persuasions and levels of support.

3.5.3: Criticism from epistemological, theoretical and methodological aspects

External criticism of SER has also come on epistemological, theoretical and methodological grounds. Referring to Thrupp (2001), Townsend (2001:120) described the critics' view of SE researchers:

because of their adherence to a positivist epistemology and mostly large scale 'scientific methodology' have failed to undertake 'detailed micro-level research which builds rich data, suitable for generating theory'.

According to Thrupp (2001:23), SER was deemed *'theoretically vulnerable'*, when it is concerned with:

the effects of school organisation overlooking school composition effects (for example, student SES) in order to establish an independent school effect.

A similar view is also stated by Hatcher (1998:280):

> failure to recognise that school cultures are the product of the interaction between the 'official' culture of the school and the culture of pupils. ....a fundamental flaw of SER literature.

Given the importance of a lack of theorisation, Findler (2001) believes that the concept of the effective school might be different in term of external context, where the school is located. Poorly understood technology of teaching and the weak connection between cause and effect or the effects of teaching on learning is another consequence of flaw theorising (Bidwell, 1965). Regarding cause and effect, it is rather difficult to identify causal connections, as there are too many variables which interact. Although methodological advances identified a range of factors which are associated with effective schools, statistical significance measures show that not all of them are important.

SER is criticised for its *'paradigmatic underpinning'* (Teddlie & Reynold, 2001) as some critics believe:

> SER is an essentially technist literature which lacks a critical perspective on the relationship between schools and their social and political context (Thrupp, 1999:17).

In fact, the critics doubt whether SER can 'explain' reality with the causal mechanism or the mathematical model. The epistemological view of SER researchers is problematic, as Willmott (1999: 255) claims:

> Their commitment to a positive epistemology……itself causally conditions their indignant response [to external critics…] exponents of school effectiveness are unable to see the full force of the criticisms levelled against them, since the causal mechanisms postulated by critics….. are deemed to have no real existence and thus are held not to be permissible contenders in their exploratory framework.

On methodological grounds, the six most important methodological criticisms of SER were identified by Teddlie & Reynold, (2001:75) as:

- Inadequate sampling
- Inadequate specification of school level process variables
- Inadequate specification of (multiple) measures of school outcomes
- Overreliance on quantitative methods and data
- Issues regarding the proper unit(s) of analysis
- Lack of longitudinal studies

Another criticism is that a contextual model should be a better model for an SER paradigm (Lauder *et al.*, 1998). In response to these critics SE researchers argued that the school effects can be theorised independently and the compositional effects can often be explained with the lens of contingency theory (Thrupp, 2001). Regarding context factors, the study of context factors in SER has been an ongoing enterprise since the mid 1980's in the UK and in the USA (Teddlie & Reynold, 2001). The authors argued that perhaps the critics perceived this problem as *'an either-or-dichotomy',* whilst SE researchers believe that social class and student achievement are closely linked. As a future 'cutting edge' for SER, Reynold & Teddlie (2000: 332) also argue:

> There are now a number of data sets across a variety of national contexts which suggest that family background and school quality are related……….shows that, even if one has controlled the effects of individual pupil background factors and/or achievement levels, there is a tendency for schools in low SES areas to do worse than one would have predicted and for schools in middle class areas to do better….

In response to criticism on theoretical aspect, SE researchers argued that SER field had developed different models of educational attainment. Most prominent is the hierarchical model, which attempts to demonstrate the nature and direction of links between different factors and pupil attainment from nested levels. A more recent development is the dynamic model designed by Creemers and Kyriakides (2006), which considers the teaching-learning situation; the roles of teacher and learner and the effectiveness factors at school and context levels.

The critics' allegation that SER follows a more positivist view was refuted by Teddlie & Reynold (2001), although the post-positivistic[26] tradition was the focus of many SE researchers' work, whilst many other pragmatists enter into the discussions regarding paradigms in SER from that viewpoint. In fact, from a methodological viewpoint, there are three different groups of SE researchers: 'humanists', 'scientists' and 'pragmatists' work in SER paradigm. Pointing out the limitation of more quantitative nature of SER, Thrupp (1999:9) contended that:

> the more rewarding direction for further research is to explore likely causal mechanisms through detailed qualitative research.

In support of this point, Lauder *et al.* (1998) called for a combination of qualitative and quantitative methods. There are many SE studies where qualitative methods (e.g. Edmonds, 1979; Elliot, 1996) and mixed method (e.g. Teddlie & Stringfield, 1993; Jong *et al.*, 2004, Day *et al.,* 2006) have been used. Some of the methodological issues (i.e. the longitudinal study with value-added

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[26] The view of positivist and post-positivist can be found in chapter 4, section 4.1.

concept; research methods) have been addressed in the above discussion but, in favour of methodology, it can be claimed that methodological advance, that is, multi-level modelling, has enabled SER to estimate more accurately the contribution of progress from different levels (e.g. student, class, school).

Most of the criticisms that have been discussed here are external. However, some internal criticisms have also come from SER scholars. Scheerens *et al.* (2001) in their 'self-criticism' addressed a number of issues: a) the issues of context; b) alternative perspectives on learning; c) the use of ICT (information and communication technology); d) the need for 'state-of-art' studies on foundational issues; e) the need for more studies that focus on the teaching and learning translation; and f) the relation of SER to educational policy in the area of decentralisation and accountability.

In conclusion, a significant amount of progress has now taken place in the field of SER, such as developing methodology (multi-level modelling and mixed methodological approaches); focusing on different elements of education; leadership; teaching and learning; pupil involvement; self-evaluation and use of data; external involvement and critical friendship and capacity building in different schools (Stoll & Sammons, 2007). In the light of the above discussion, it can be said that the contribution of SER cannot be taken too lightly, albeit SER has been criticised from different point of views. It is expected that my research will contribute to this knowledge base by focusing on the application of SER methods in Bangladesh. In the following section, the findings and methodology of SE studies conducted in developing countries and Bangladesh are the main focus.

3.6: SCHOOL EFFECTIVENESS RESEARCH IN DEVELOPING COUNTRIES: FINDINGS AND METHODOLOGY

The central focus of the majority of SE studies in developing countries conducted after 1993 was on material and human resource input factors, whereas instructional and pedagogical variables were particularly absent. Some of the studies are discussed in the following sections.

Fuller *et al.* (1994) in their study of Botswana's junior secondary schools used observation and survey methods. They used four levels (A-D) of school organisational and teaching variables, assessing their effects in achievement of language and mathematics. The levels were:

A. Material conditions and school inputs
B. Teacher background, gender and training levels
C. Teaching practices and classroom rules
D. Teacher effort and pedagogical beliefs

In level C, the observed pedagogical behaviours were the complexity of instructional tools utilised by teachers, task demands placed on pupils by the teachers, particularly the frequency of active reading and writing exercises, the frequency and complexity of questions asked to the pupils, the consistency of the teachers' 'pedagogical technology' and the use of instructional time. In level D, pedagogical philosophies, teacher self-perceptions of competence, job satisfaction and level of efficacy were addressed. The two different sets of variables (level C and D) appeared to have little explanatory power (*ibid.*:368). The only variable which had a significantly negative effect was teachers' average use of open-ended questions.

Kaluge (1998) attempted to study the possible factors related to educational attainment in Indonesian primary schools, using multi-level modelling. The study used survey design and the longitudinal approach of measuring student progress over one school year. Based on 5 sub-districts, 60 primary schools were selected randomly, 12 from each sub-district. The outcome measures were student academic attainment in Indonesian language and mathematics. The findings revealed that-

- prior attainments were significant in all level of analysis.
- at student level, the significant predictors were gender, age, parents' occupation and education, home language, availability of textbook and newspapers at home.

- at the class level, the only significant ones were teacher gender, age and the amount of in-service training in mathematics.
- amongst the school level process indicators, the only statistically significant ones were school meetings, the number of male teachers and female teachers in the school.

Michaelowa (2001) analysed the data collected from a stratified random sample of classrooms at grade 5 in five Francophone Sub-Saharan African countries (i.e. Burkina Faso, Cameroon, Ivory coast, Madagascar and Senegal). Data was collected by administering questionnaires to teachers and directors, and included student achievements in French and mathematics in standardised tests, socio-economic background and school characteristics. A three-level hierarchical linear modelling process was used to analyse the effects of student academic achievement in French and mathematics. The key findings were:

- The significant predictors for students' academic achievement were teachers' initial education, regular training, absenteeism, their job satisfaction and their knowledge of the local language. In contrast, teachers' knowledge of French, the language for instruction, had no significant effect.
- The written homework correction by the teachers' did not show any significant effects.
- The availability of textbooks and classroom equipments (i.e. desks, blackboard, chalk and teachers' manuals) had strong positive impact on learning outcomes, though the effect of classroom equipments was less pronounced than availability of textbooks.
- A positive relationship was noted for class size but multiple school moves had significant negative impact on learning outcomes.
- Multi-grading had positive and significant impact on learning outcomes.
- The effects of active school association were not clear. Students achieved significantly higher scores when their schools were visited by the inspectors.
- The contract status of the teachers (for example, a civil servant or a teacher engaged on a 'voluntary' basis) had a significant effect suggesting that despite low payment, 'voluntary' contract teachers were more effective for students' academic achievements.

Michaelowa (2001) analysed the effects of a few rather simplified indicators of national characteristics (for example, public primary education expenditure per student, GNP per capita and overall illiteracy level of a country) on students'

academic achievement. The overall illiteracy level of a country showed a significant and negative effect on the students' achievement. As for the effects of the other two indicators, the findings were not that convincing.

Lee *et al.* (2005) analysed the effects of school-level factors on reading achievement of sixth grade students, using the SACMEQ II (Southern and Eastern Africa Consortium for Monitoring Educational Quality) data collected from around 42,000 students in 2,294 schools in 14 countries of Africa. Standard reading comprehension tests in English or their native language were employed to measure students' reading achievement. Information on school characteristics was collected from subject teachers and head teachers through questionnaires. Although many school-level measures were collected in SACMEQ II, the authors of this study focused on only three measures, such as: (a) school composition, (b) school context and (c) physical and human resources. Two-level modelling (i.e. school and student), using HLM, was used to analyse the school effects for each country. The main findings found from the study are:

- In all countries, student SES was strongly and positively associated with literacy achievement. In 8 out of the 14 countries, school composition (i.e. school's average SES) was significantly and positively linked to school average literacy achievement.

- In all countries (except Seychelles and Mozambique), a statistically significant and negative association was found between grade repetition and achievement in literacy. The insignificant relationships were found in case of Seychelles and Mozambique, probably due to the fact that very few Seychelles students repeated a grade, whereas most students repeated in Mozambique.

- Inconsistent findings were found for class size. Higher achievement was found in Kenya, Botswana, Namibia and Swaziland, when the class size of grade six was smaller. In Mauritius, however, larger grade size evidenced higher achievement. In other countries, grade size was not significantly related to students' achievement.

- A consistent pattern of lower achievement was found for schools practising shifts. More specifically, larger schools, offered education in shifts and located in rural areas, tended to have lower average literacy achievement than schools that were smaller, operating full-day programmes and located in urban areas (i.e. towns and cities).

- Schools located in urban areas had higher average achievement, compared to rural areas and this was the case in Botswana, Zambia, Namibia, South Africa and Lesotho.
- Student achievement was higher in schools that were better physically resourced. However, teaching resources were not associated with achievement.
- A strong and positive association was found between the quality of teachers and student achievement in Botswana, Mozambique, Namibia and Seychelles.

In conclusion, we can learn from the findings of SER that context does matter in developing countries. As many researchers argued (e.g. Creemers 1994b; Fuller and Clarke 1994; Sammons *et al.,* 1995), it is important to recognise that SER findings do not provide a blueprint or recipe for the creation of more effective schools and, therefore, should not be generalised mechanically without reference to the particular contexts of a school or a country. Every country has its own educational policies and goals; and the difference in educational goals, therefore, emphasises that the criteria for determining school effectiveness should pay more attention on the complexity of local or context factors, where the school of a country operates.

3.6.1. Status of SER in Bangladesh

In Bangladesh SER is still a new concept. Researchers are now taking more interest in this field, after the government taking a number of national initiatives with international partners to improve the quality of primary and secondary education (discussed in Chapter 1). Few studies were conducted related to student achievement, teachers and teaching effectiveness, but there are no similar SER studies in Bangladesh compare to those conducted in industrialised and developing countries, for example, in the UK (i.e. Rutter *et al.*, 1979; Mortimore *et al.*, 1988 and Sammons, 1998a & b; 1999) and in the USA (e.g. Coleman *et al.*, 1966; and Edmond, 1979), in Botswana (i.e. Fuller *et al.*, 1994), in Latin America, Murillo (2007), in Asia (Chang, 2005, Change & Tam, 2007). However, the intention of this section is to discuss some studies conducted in Bangladesh. Most of the studies collected data from single level (either from students or teachers) and only in one study the researcher tried to explore the factors which influence student academic achievement from student and class levels. However, these studies did not address school effects (SE), rather than most of the studies as presented here tried to contrast high and low achieving students. The studies conducted in Bangladesh were cross sectional. Another

important difference is that these studies did not use regression analysis, except the Education Watch report (2007) that used multi-variate regression analysis. I will outline some of these studies in the following section.

Khanam (1989) explored the relationship of creativity and self-concept to academic achievement at secondary schools. This involved 102 year nine girls, whose ages ranged from 14 to 16, selected at random from two schools in Dhaka city. The outcomes were self-concept measured by Piers-Herri's self-concept scale and the average of total marks of the students in the last three final examinations. High-achieving students had a higher self-concept than low-achieving students, as suggested by the research findings.

Begum (1996) conducted a study to measure whether there is any correlation between parental involvement and children's academic achievement. Therefore, 69 high and 69 low achieving children of class five were selected from different schools of Dhaka city. On the basis of the Teacher's Report Form (TRF), high and low achieving children were selected and the outcome variable of the study was percentage of last annual examination's total marks of the students. Results indicated that the parents of high-achieving children showed more interest in their academic activities, supervised and helped more than parents of low-achievers.

Morshed (2007) designed a study to compare academic and non-academic performances of high and low achieving students in the primary schools. For this purpose, a total of 90 high and 90 low achieving students of grade five from 18 primary schools of 6 different locations in Bangladesh were selected on the basis of the average total score in the last two terminal examinations. Chosen at random schools were distributed as urban and rural, government and registered non-government primary schools. Information was collected from student and class levels, using interview and observation. Output measures were summative (subject specific score) and formative (classroom performance) academic performance and non-academic performance (co-curricular activities). The input variables were achievement level (i.e. high and low), parental and teachers support and parental reaction to the engagement of their children in non-academic activities. The findings revealed a significant difference in summative performance of two groups, while, in formative performance, high-performing students were significantly higher than low-achievers. For providing support, teachers did not show any difference in explaining concepts, though they differed

in addressing, engaging and providing feedback where high-achievers were more favoured than low-achievers. High-achievers also received more parental support for their academic performance and parental reaction was positive for non-academic activities for both groups.

The Education Watch (2007) explored the issues related to secondary education in Bangladesh, under the title '*The State of Secondary Education: Quality and Equity Challenges*'. The main intention of this study was to compare the origin, development and curriculum of general and madrasa streams and to explore the upward movement of students to post-secondary and availability of employment opportunities for secondary graduates and its relationship. They also tried to test the extent of attainment of the students of the two streams for identifying factors affecting their attainment. Reviews of curriculum, textbooks and related secondary documents, workshop with teachers of the two streams and consultation with the experts in the field generated the necessary data to complete the first part of the study. A uniform test was developed on four subject areas (Bangla, English, Mathematics and Everyday Science) and was administered to grade ten students. Over 3000 grade ten students from 192 schools and madrasas were randomly selected. 2,887 students from 246 schools and madrasas, graduated from the same institutions in 1997 were traced at random 10 years after graduation. Information related to their background and current occupation was generated. In addition, 148 heads and 1,478 teachers were interviewed. The claim of this study was that it generated some new findings, which were not available earlier in Bangladesh. The key messages found in this study were:

1. There is inequality between the educational institutions (i.e. urban/rural, state/private or general stream/madrasa) depending on their management responsibility and location. Schools run by government located in urban areas were better endowed in respect of facilities, personnel and learning provisions.

2. A poorly implemented curriculum and inadequate teacher training had led to poor learning outcomes. There were other factors, which affect learning achievement of the students that included- student age, parental education, economic background of household and access to media and private tutors.

3. There was a huge difference between general and madrasa streams in terms of what is taught.

4. The girls, who enrolled in secondary education equally with the boys, quickly find it difficult to move with similar enthusiasm after grade VII. Although there is a special stipend programme to encourage girls, this might not be enough to learn equally well as the boys. Socio-economic barriers like marriage and poverty pull them away from further education and job market.

5. Due to the prevailing hierarchy of quality among institutions, a very small portion of the secondary graduates receives the education that prepares them for the workplace or further education.

6. Significantly positive correlation between the levels of education attained by the two generations indicated influence of the advantages enjoyed by parents carried over to their children.

To summarise, there are no multi-level large scale SER studies that have been conducted in Bangladesh. The present study has taken the initiative to investigate the educational influences on student academic attainment using multi-level modelling. Models of SER developed in different times and the conceptual framework of the current study are the topics of the next section.

3.7: MODELS OF SCHOOL EFFECTIVENESS RESEARCH AND THE CONCEPTUAL FRAMEWORK OF THE CURRENT STUDY

The SER field has developed different theoretical models of educational attainment, which attempt to demonstrate the nature and direction of links between different factors and pupil attainment. It should be noted that the models vary according to the theoretical background of the authors. Three different waves of school effectiveness models, directed by certain concepts and approaches, are demonstrated in the subsequent paragraph.

3.7.1: Input-output approach

The initial input-output paradigm, known as the educational production function, (EPF) was developed from the mid 1960's and until the early 1970's. Economics-related production studies, based on this model, attempted to specify the relationship between input variables (i.e. school characteristics) and attainment controlling the influence of background conditions, such as social class and pupils' intelligence. Thus, the 'Input-output approach', as shown in Figure 3.2, is very straight-forward in measuring the pupil achievement as a function of various inputs.

Figure 3.2: Input-output model

Major studies in the 1960's, for example, the Coleman report (1966) in the USA and the Plowden report (1967) in Great Britain are often included in this category, where the association between input and output was very obvious. However, some methodological flaws were also found in their report, though the major findings of Coleman's study are now widely recognised by the educational community. There are also a number of studies (e.g. Hauser, 1971; Hauser *et al.*, 1976) conducted during the same period within a sociological framework known as 'status-attainment literature'. However, these studies were strongly criticised for their conceptual and methodological deficiencies (Aitkin & Zuzovsky, 1994), such as:

- These early economic and sociological studies of SE did not include adequate measures of social and psychological climate of the school and process variables related to classroom and school (Brookover *et al.*, 1979; Miller, 1983), which underestimate the magnitude of school effects.

- In these studies, school outcomes were limited to student achievement on standardised tests (cognitive outcome), while ignoring non-cognitive outcomes. Such tests of the economic input-output models failed to find significant associations among financially driven inputs and student achievement (Geske and Teddlie, 1990; Hanushek, 1981, 1986).
- Most of the input-output studies were cross-sectional, where pupil attainment was taken into account at a single point in time.

In spite of the criticisms, economically driven input-output studies have made a remarkable contribution in the development of SER.

3.7.2: Process-product approach

The second model is known as the process-product approach. Carroll's teaching-learning model is regarded as the pioneer of the process aspects of education (Creemers, 1994; Scheerens & Bosker, 1997). This model consisted of five sets of components (Carroll, 1963) as shown in Table 3.19.

Table 3.19: Carroll's teaching and learning process model

Descriptions	Components
Actual net learning time as a result of	• Perseverance • Opportunity to learn
Necessary net learning time as a result of	• Pupil Aptitude • Quality of education • Pupil ability to understand instruction

Following Carroll's model, a nine factors model was formulated by Walberg (1981, 1983) as given in Table 3.20, which requires optimisation to increase three domains of learning, i.e. affective, behavioural and cognitive.

Table 3.20: Walberg's nine factors model

Variables	Factors
Student Aptitude	a. Ability or prior achievement, as measured by the usual standardised test b. Development, as an index by chronological age or stage of maturation. c. Motivation or self-concept, as indicated by personality tests or the student's willingness to persevere intensively on learning tasks.
Instruction	d. Quantity of instruction, i.e. amount of time students engage in learning. e. Quality of instruction, including psychological (method) and curricular (content) aspects.
Educationally stimulating psychological environment	a. Home environment. b. Classroom or school environment. c. Peer group environment outside the school. d. Mass media environment, especially amount of leisure-time television viewing.

Concerning the processes and characteristics of more effective schools, a number of reviews identified some common features (e.g. Purkey & Smith, 1983; Mortimore 1991a & b, 1995b). From the 1970's methodological advance in SER made it possible to measure the educational processes ongoing at the school and classroom levels. Brookover *et al.* (1978) and Brookover & Lezotte (1979), for example, designed their survey to measure student, teacher and principal perceptions of the school climate and its relationship to achievement. Edmonds (1979) identified five characteristics (see in Section 3.3.1). Reynolds and Teddlie (2000b:144) derived nine overall processes of effective school, encapsulating nine characteristics of effective schooling postulated by Levin and Lezotte (1990) and 11 factors by Sammons *et al.* (1995). Five of these processes (italics) are directly related to teachers' work (Schaffer *et al.*, 2007) presented in Table 3.21:

Table 3.21: The processes of effective schools

Original correlate	Effective school process	Sub-components of the process
1. Strong principal leadership	1. The processes of effective leadership	a. Being firm and purposeful b. Involving others in the process c. Exhibiting instructional leadership d. Frequent personal monitoring e. Selecting and replacing staff
2. Pervasive and broadly understood instructional focus	2. *Developing and maintaining a pervasive focus on learning*	a. Focusing on academics b. Maximising school learning time
3. Safe and orderly school climate	3. Producing a positive school culture	a. Creating a shared vision b. Creating an orderly environment c. Emphasising positive reinforcement
4. High expectations for student achievement	*4. Creating high (and appropriate) expectations for all*	a. For students b. For staff
5. Student achievement data used for evaluating programme success	5. Monitoring progress at all levels	a. At the school level b. At the classroom level c. At the student level
	6.The processes of effective teaching	a. Maximising class time b. Successful grouping and organisation c. Exhibiting best teaching practice d. Adapting practice to particulars of classroom
	7.Involving parents in productive and appropriate ways	a. Buffering negative influences b. Encouraging productive interactions with parents
	8.Developing staff skills at the school site	a. Site based b. Integrated with ongoing professional development
	9. Emphasising student responsibilities and rights	a. Responsibilities b. Rights

Note: The five original correlates they collected from a publication of the General Accounting Office (1989).

[Source: Teddlie & Stringfield, (2007:143); adopted from Reynold & teddlie (2000b)]

A major criticism of process-product research tradition was that school/classroom processes were not adequately measured and school variance accounted for family background factors rather than educational processes (Brookover *et al.*, 1978, 1979). The results of this research tradition had also been challenged by the more recently developed cognitive and particularly constructivist perspectives on learning and instruction (e.g. Scheerens, 1994; Brophy, 1996). The constructivist approach pointed out that other forms of learning, i.e. independent learning, meta-cognition, 'active learning', learning to model the behaviour of

experts (cognitive apprenticeship) and learning from real life situations (situated cognition) were not considered in this research tradition and, according to this view, teaching and learning effectiveness has not been firmly established yet (Scheerens, 1999).

3.7.3: Integrated or hierarchical approach

In recent SE studies, various approaches to educational effectiveness have become integrated. The trend of integration in SER is known as the integrated or hierarchical model, where integration was manifested in the conceptual modelling and the choice of variables. In contributions to the conceptual modelling of SE, schools are seen as a set of 'nested layers' (Purkey and Smith, 1983). In the literature of SER, different integrated models were designed as illustrated in the following section.

3.7.3.1: Scheerens (1990) integrated model of school effectiveness

This model is based on a review of the instructional and SER literature. The central assumption of this model is that higher organisational levels facilitated effectiveness enhancing conditions at lower levels, as shown in Figure 3.3.

3.7.3.2: QAIT/MACRO model

This elementary school-effects model designed by Stringfield & Slavin (1992) is based on Slavin's earlier QAIT model. The authors summarised the factors as QAIT: Quality, Appropriateness, Incentives and Time for instruction at the classroom level. They also contain five important factors at school level, known as MACRO, which refers to: Meaningful goal, Attention to academic functioning, Co-ordination, Removal of unsuccessful teacher and organisation. This model did not specify the interaction with the factors at the levels above the school, which includes community, district, state and federal government (Creemers *et al.*, 2000).

3.7.3.3: Creemer's (1994) comprehensive model of educational effectiveness

The model is closely related to the well-known Carroll model (Carroll, 1989), which distinguished between school curriculum variables and other variables presented in Figure 3.4. According to the author, the national and school levels can support the instructional level, where learning ultimately occurs and outcomes are achieved. The influence of most was either strong or moderate at class level (Creemers, 1994) and factors at school level were sufficient

(Scheerens, 1992; Levine and Lezotte, 1990), as provided by empirical evidence. Little empirical support has been found for the factors at contextual level in educational effectiveness studies and international comparative research is needed to conduct these factors properly (Creemers *et al.*, 2000).

3.7.3.4: Sammons *et al.* (1997) integrated model of secondary school academic effectiveness

The special characteristic of this model is the existence of variables at a departmental level, as shown in Figure 3.5, which was drawn on the basis of findings from a longitudinal study. They built on and extended existing models by Creemers (1994) and Scheerens (1990).

3.7.3.5: Dynamic model of educational effectiveness

The dynamic model as shown in Figure 3.6 is designed by Creemers and Kyriakides (2006), where the teaching-learning situation is emphasised and the roles of teacher and learner are analysed. The dynamic model also includes the effectiveness factors at school and context levels. This model focused on school level factors, which influence the teaching-learning situation by developing and evaluating the school policy on teaching and the policy, which creates a learning environment at school. The context level refers to the influence of the education system through more formal channels, i.e. developing and evaluating the education policy at the national or regional level. It is important to note that this dynamic model takes into account the fact that the influences on student achievement are multi-level (Teddlie and Reynolds, 2000). The argument of the authors was that this model was not only multi-level in structure and parsimonious, also considered the following aspects:

- takes into account the new goals of education and their implications for teaching;
- searches for interaction among factors operating at the same level;
- investigates the extent to which non-linear relations among some factors and student achievement may exist;
- uses different measurement dimensions to define the functioning of each effectiveness factor; and
- describes the complex nature of educational effectiveness.

Context

- Achievement stimulants from higher administrational
- Development of educational consumerism.
- 'Co-variables', such as school size, student-body composition, school category, urban/rural

School level

- degree of achievement-oriented policy
- educational leadership
- consensus, co-operative planning of teachers
- quality of school curricula in terms of content covered and formal structure
- orderly atmosphere
- evaluative potential

Inputs

- teacher experience
- per pupil expenditure
- parent support

Outputs

- student achievement adjusted for previous achievement
- intelligence
- SES

Classroom level

- time on task (including homework)
- structured teaching
- opportunity to learn
- high expectations of pupils' progress
- degree of evaluation and monitoring of pupil's progress
- reinforcement

Figure 3.3: An integrated model of school effectiveness

[**Source:** Scheerens, 1999:20; adopted from Scheerens, 1990]

Figure 3.4: Creemer's comprehensive model of educational effectiveness

LEVEL   CONTEXT

National   National Curriculum/Assessment framework
           Accountability framework - League table – OFSTED - - - - - --
                              - High stakes public examinations

Local   LEA influence
           Student body composition   - - - - -
           Parental support for education

                INPUT
Individual   Prior Attainments
Student   Gender
           SES

Teacher   Qualification and experience ---

              PROCESS

School   C o n t e x t u a l   Clear leadership of HT
                      Effective SMT
                      Academic emphasis
                      Shared vision/goals
                      High expectations - - - - - - - -
                      Consistency in approach
                      Parental support/involvement
                      Student-centred approach

Department   E f f e c t s   Clear leadership of HoD
                      Academic emphasis
                      Shared vision/goals
                      Consistency in approach

                      Student-centred approach
                      Quality of teaching
                      Academic emphasis
                      High expectations

                      Via student learning, motivation, attendance & behaviour

                      OUTPUT
Individual Student   Students' GCSE attainment (adjusted for impact of prior attainment gender, SES and composition of student body)

Figure 3.5: Secondary school academic effectiveness model by Sammons *et al. (1997)*

Figure 3.6: The dynamic model of educational effectiveness
[Source: Creemers and Kyriakides, 2008: 150]

Integrated models contributions in SER are important as the development of multi-level mathematical models can assess the effect of all the units of analysis associated with schooling more accurately. Despite the advantages of integrated models, according to Bosker & Scheerens (1997), there are two main sources of uncertainty in the models: (a) the lack of consistency in the research findings that support the models and (b) difficulties in the interpretation and formal specification of the cross-level interrelationships within the models. A number of explanations were given by Bosker & Scheeren (1997) introducing five 'alternative' models of school effectiveness, namely:

- Additive versus interactive models

- Contextual versus genuine multi-level effects
- Direct versus indirect models
- Additive versus synergetic interpretations
- Recursive versus non-recursive models

3.7.4. Conceptual framework of the current study

The conceptual framework is a research tool, which assists the researchers to develop awareness and understanding of the situation under scrutiny and to communicate this (Smyth, 2004). Therefore, in all investigation in the social world, the framework itself forms the agenda for negotiation to be scrutinised and tested, reviewed and reformed as a result of investigation (Guba & Lincoln, 1989; cited in Smyth, 2004). The conceptual framework used in the current study is derived from the integrated models of school effectiveness, which incorporate three levels: student, classroom and school. These three levels were investigated in this study, using multi-level modelling with a value-added approach and large-scale survey data. The basic conceptual model of the current study is shown in Figure 3.7.

Input ⟶ Process/context ⟶ Output
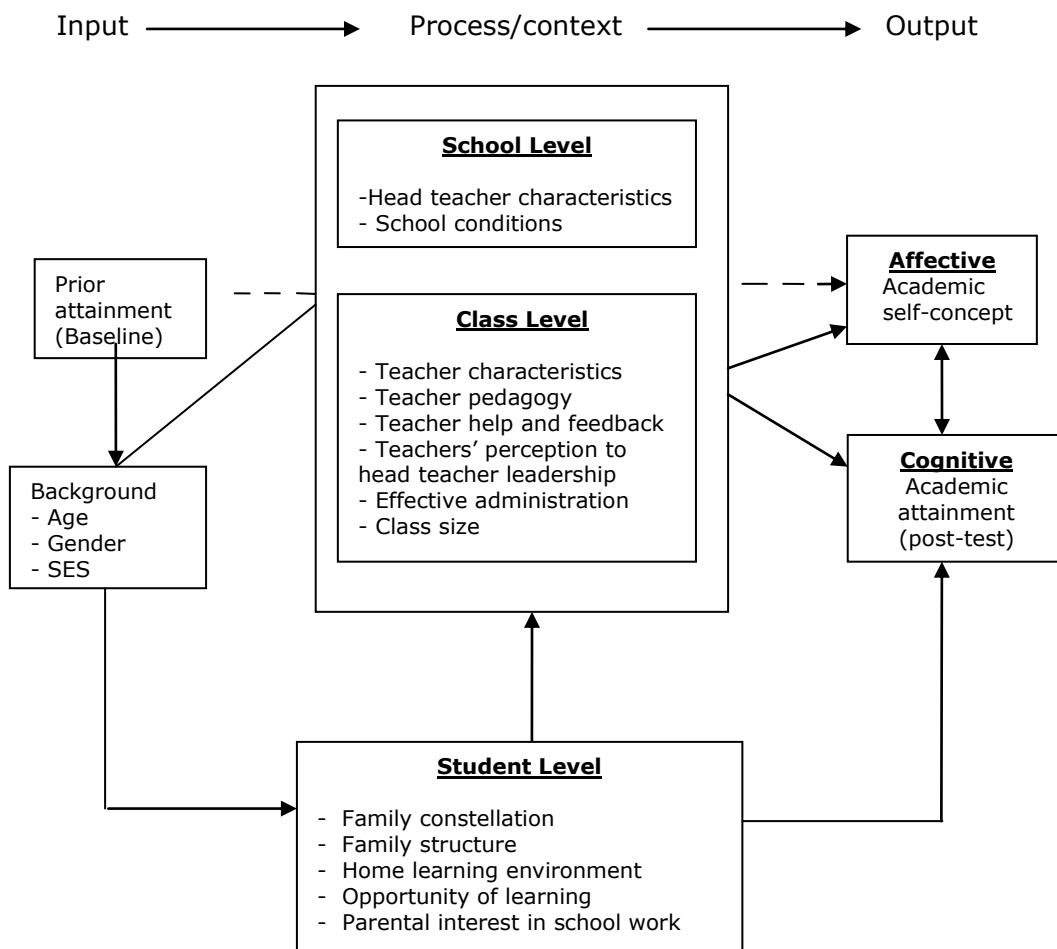
Figure 3.7: Conceptual framework of the current study

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The conceptual framework of this study illustrates the relationship among the different variables considered in the present study. The framework shows the two major sets of variables, which were assumed to be related. One cluster consists of output variables, such as academic attainment (post-test) and academic self-concept, which are regarded as dependent variables in the present study. The second set of variables consists of independent or predicted variables. These exploratory variables were served as adjustment for differences in the intake between schools.

Generally, the input/output or production function research tradition is more common in SER in developing countries. This is because it is less extensive, less rigorous and more difficult to interpret in developing countries than that of well developed countries (Hanushek, 1994). Therefore, it is important to examine the differences in the level of educational support provided by the family, class and schools. In the current study, the process and context variables were included in all levels. Individual learning opportunity, home learning environment and parental interest in school work, family structure, family constellation, teacher/head teacher characteristics, teacher pedagogy, teacher help and feedback, teachers' perception to head teacher leadership and effective administration were considered as part of the process components in the model. On the other hand, class and school conditions were constituted the context component.

Most of the variables, either exploratory or process, included in the conceptual model of the present study have been adopted as a result of the above literature review. In bringing the review together I will outline the predictors chosen for the current research in the following section.

3.7.5: Student level variables

A strong relationship between student school attainment and variables related to the student characteristics is observed from the relevant literature of SE. The variables used at student level in this study are clustered into two groups, namely, student background and family related factors.

Student background factors

Student attributes, like- age, gender and self-concept are assumed to be important determinants of their academic attainment. In addition to prior attainment (baseline), SE studies like to include such factors in assessing school

effectiveness. Significant gender difference in students' attainment is evident from the SER literature. Findings indicated that girls outperformed the boys in academic attainment (Mortimore *et al.*, 1988; Sammons, 1995; Sammons *et al.*, 1993a & Marjoribanks, 2003 and Strand, 1997). It has been well documented that age differences within a year group affect pupil attainment; those who are young for their year usually perform less well than older students (see Mortimore *et al.*, 1988; Thomas 1995; Sammons and Smees 1998a; Strand, 1997, 1999 & 2010). A number of articles documented the relationship between socio-economic status and academic attainment (Sammons, 1995; Biggart, 2000; Tinklin, 2000). Socio-economic status has a strong exploratory predictive power in student attainment (Mortimore *et al.*, 1988; Nuttall *et al.*, 1989; Sammons *et al.*, 1993; Sammons, 1995; Strand, 2010).

Academic self-concept

Given emphasis on the significance influence of self-concept construct on school outcomes, Branden (1994: xv) stated:

> I cannot think of a single psychological problem- from anxiety to depression, to under-achievement at school or at work, to fear of intimacy, happiness or success, to alcohol or drug abuses, to spouse battering or child molestation, to co-dependency and sexual disorders, to passivity and chronic aimlessness, to suicide and crimes of violence – that is not traceable, at least in part, to the problem of deficient self- esteem.

Self-concept is related to achievement and certain classroom environments enhance both aspects (Hattie, 1992; see also Marsh, 2004; Marsh and Craven, 2006; Rutter *et al.*, 1979; Smyth 1999). The findings of the study by Marjoribanks (2003) indicated that Year 9 students' academic self-concept had a significant association with their later educational attainment. Marsh *et al.* (2005) found a reciprocal relation between academic self-concept and achievement, showing that academic self-concept has both a cause and an effect of achievement.

Family related factors

Family related variables included in this study, were students' home learning environment, learning opportunity, parental interest in school work, family structure and family constellation. Home-learning environment and learning opportunity are important for student attainment. Enriched home and school environment, sufficient assistance provided by parents (e.g. books, computers and internet at home, private tutors, newspapers), good study environment and

high self-concept were found to be powerful predictors for student attainment (Shinha, 1993; Kaluge, 1998; Strand, 2010 & Education Watch, 2007). Significant effects on student achievement and aspiration were found for parental involvement, supervision, home discussion, aspiration and encouragement (Sui-Chu & Willms 1996; Singh, *et al.*, 1995; Sammons *et al.*, 1995; Desforges & Abouchaar, 2003 and Strand, 2010). In this study, the family constellation refers to family type, birth order and number of siblings. It is evident from SER literature that small family size and the child's birth order (particularly first and last child) had a positive influence on student attainment (Nuttall *et al.*, 1976; Olneck & Bills, 1979; Paulhus *et al.*, 1999; Iacovou, 2001). Opposite findings were found by Joseph (2009), showing that family size and birth order had no influence on student academic performance in Nigeria.

Parent-child relationships, which permit the child to participate in decision-making (i.e. democratic) has more impact on achievement than little opportunity to participate (i.e. autocratic). Bernstein's (1970) findings provide a theoretical base for the link between discipline techniques in the family and cognitive development. Morrow and Robert (1961:508), for example, observed in their study of intrafamilial determinants of academic performance that the parents of:

> bright high-achievers reportedly engage in more sharing of activities, ideas and confidences; are more approving and trusting, affectionate and encouraging with respect to achievement.

3.7.6: Class level variables

A number of studies in the UK and in the USA have investigated classroom practice and pupil attainment (Muijs and Reynolds, 2005). The ORACLE study (Galton & Croll, 1980; Galton & Simon, 1980) and *School Matters* (Mortimore *et al.*, 1988) are the classic examples of this research tradition. Sammons (1996) also pointed out that the differences in pupil attainment may be related to variation in the classroom. Class level variables included in this research are discussed below.

Teacher characteristics

Teacher characteristics considered in this study were age, gender, qualifications, experience, education training, in-service training, job rank and salary. Research evidence indicates that teacher qualifications and participation in in-service training make teachers effective (Agrawal, 1969; Arora, 1978, Chowdhury, 1985 & Kaluge, 1998). Background characteristics, such as teachers' gender, teaching

experience and qualifications have been shown to be important factors in student achievement (Larkin & Keeves, 1984; Anderson *et al.*, 1989).

Teaching pedagogy

Teaching pedagogy refers to the model of the current study, preparing a lesson plan, assigne and correction of homework, teaching methods, teacher's support and feedback. Teaching approaches can influence a range of outcomes in both the cognitive and the affective domains (Mortimore *et al.*, 1988). In a Dutch study, Westerhof (1989) found that factors, like correcting answers and feedback, contributed significantly to learning outcomes. Mortimore *et al.* (*ibid.*) concluded that structured sessions, intellectually challenging teaching, a work-orientated environment and communication between teacher and pupils were the key factors contributing to affective outcomes. Pianta *et al.* (2008) found from their review that provision of feedback had a strong positive effect on student learning outcome. Quality of pedagogy (for example, richness of instructional method, a positive climate, productive use of instructional time, the use of evaluative feedback, teacher sensitivity and lack of teacher detachment) was found to be as significant predictor for progress in mathematics (Sammons *et al.*, 2008).

Teacher in-service training has a positive effect on their teaching and student attainment (Halpin *et al.*, 1990; Kaluge, 1998). Recently, in Bangladesh, a well planned and organised in-service training programme has been undertaken under the 'Teacher Quality Improvement-Secondary Education Project (TQI-SEP)' to improve the teaching-learning process and it is hypothesised that, the more often the teachers participate in in-service training, the better the attainment of their students would be.

Leadership perceived by the teachers

Leadership is a central factor in school performance (Mortimore *et al.*, 1988; Sammons *et al.,* 1995). Head teacher leadership has an important direct effect on teachers' perception of the leadership and management of their teaching-learning process, which has an indirect effect on student attainment (Day *et al.*, 2007; Krüger *et al.*, 1998, cited in Maeyer *et al.*, 2007). Dimensions of leadership in this study were considered as: a) co-operation and communicating the school's mission, b) teachers' engagement and c) leading professionally, which were assumed to be associated with achievement.

Effective administrational management and classroom condition

In this study, class size represents the classroom condition. SER evidence reveals that smaller classes do make some difference and have beneficial effects on quality of teaching (Mortimore *et al.*, 1988; Slavin, 1989; Blatchford *et al.*, 2007). Different evidence was also found, indicating that achievements were higher in large classes (Burstall, 1979; Mortimore & Blatchford, 1993, cited in Bennett, 1996). Witziers (1992) found that an active role of school management in policy and planning of the instruction system were important for student outcome. Thus, it is hypothesised that classroom condition and administrational management have a significant impact on effective teaching, which is important for students' good performance.

3.7.7: School level variables

Head teacher characteristics and school conditions constituted the school level variables in this study, which are explained as follows:

Head teacher characteristics

Gender, age, qualifications, teaching experience, experience as head and pedagogical knowledge are described as the head teacher's characteristics in this study. The head teacher characteristics, i.e. age and gender (Sembring and Livingstone, 1981, cited in Kaluge, 1998) and training level (Fuller and Clarke, 1994) have a positive association with student attainment, though there is no strong evidence of causal links as stated by Carron & Chau (1996).

School conditions

School conditions in this study are described as teacher-student ratio, parent-teacher meeting (PTA), school category, school size and the facilities of library and laboratory. Teacher-student ratio (Taylor *et al.*, 2003; Hanushek, 1995 and Fuller and Clarke, 1994) and quality of school facilities, library and science laboratory facilities have a positive association with student achievement (Fuller and Clarke, 1994). Some school contexts, for example, school type (i.e. state or private) and locations (i.e. urban or rural) are important for school performance (Young, 1994d; Young, 1998). Thus, it was hypothesised that school category (i.e. high, medium or low performance) might have significant effect on students' learning outcomes. The predictors used in this study to explore their relation with student attainment are described in this section. It is expected that the factors considered in the current study would able to constitute a model for effective schools in a Bangladeshi setting.

In this chapter, I have discussed the definition of school effectiveness, its movement in developed and developing countries, effective school enhancing conditions, criticisms and models of SER and status of SER in Bangladesh. It is clear from the literature review that this would be the first SE study in Bangladesh using multi-level modelling to explore the education system of Bangladesh, in particular which factors have an impact on student academic attainment. It is important to note that most SER was conducted at primary and lower secondary schools (Mortimore *et al.*, 1988; Scheerens *et al.*, 2000), though there is evidence of SER at the secondary education (Sammons, 1995; Sammons *et al.*, 1993a). The target of this study is the secondary level and the main reason for this preference is discussed in the methodology chapter (see Section 4.2.5.1).

CHAPTER VI

4. METHODOLOGY: RESEARCH DESIGN, INSTRUMENTS AND PROCEDURES

The aim of the present study is to explore the educational influences on student academic attainment of grade ten (X) Bangladeshi students using multi-level modelling. This chapter describes the research methodology used in this study, which includes research design, research type and setting, sample and sampling techniques. This chapter also illustrates the preparation of data collection instruments, the baseline (pilot) study, the strategies of data generation, the research procedure, the data processing and data analysis procedure.

4.1: PHILOSOPHICAL UNDERPINNING OF THE CURRENT STUDY

School effectiveness and school improvement research is regarded as an interesting field for philosophical debate. Educational research has been dominated by two different philosophical traditions (Carr, 1995). The earlier tradition views the social sciences in the same manner as the natural sciences, since both are concerned with discovering natural and universal laws regulating individual and social behaviour. In contrast, the latter paradigm emphasises how people differ from inanimate natural phenomena, while describing and explaining human behaviour. Following the two paradigms of social science, educational research explores and interprets reality in different ways. Pring (2000) discussed several interrelated philosophical issues including 'objectivity' versus 'subjectivity', 'reality' versus 'multiple realities', 'truth' versus 'verification' and 'knowledge' versus 'meaning'. The author (*ibid*) elsewhere describes two 'paradigms' for educational research: the 'scientific' paradigm (Paradigm A) and the 'constructivist' paradigm (Paradigm B). Before going through the different paradigms and explaining the methods used for the current research, I should provide my understanding of some philosophical concepts. This helped me to make appropriate choices of methods used in the research. Firstly, a '*paradigm*' is a basic system of ideas and beliefs that are based on ontological, epistemological and methodological assumptions (Kuhn, 1970). Secondly, '*ontological'* assumptions are concerned with the form and nature of reality or social phenomena being investigated. According to Guba & Lincoln (1994), if a 'real' world is assumed, then what can be known about it is 'how things really are' or 'how things really work'. Thirdly, '*epistemological*' assumptions refer to the very basis of knowledge, its nature and forms, and how it can be acquired and

communicated to other human beings (Cohen *et al.,* 2000:6). Finally, '*methodological*' assumptions concern the techniques the inquirers use to explore their environment, that is, mechanistically (quantitative method) or perceive as initiators of their own actions (qualitative method). These issues are important to education researchers, as the researchers' ontological, epistemological and methodological assumptions are interrelated (Crotty, 1998).

According to Pring (2000:48), the researchers who belong to 'paradigm A' would seem to be in possession of the following characteristics:

> 1. There is a world which exists independently and which is made up of 'objects' interacting causally with each other.
>
> 2. There are different sciences of that world, partly depending on what is to count as an object (a 'behaviour', a 'physical object' or even a 'social event').
>
> 3. However, there is agreement on what is to count as an 'object' (e.g. behaviour); such objects can be studied, their interrelations noted, regularities discovered, causal explanations given and tested and the result quantified.
>
> 4. Other observers can check the conclusions through repeated experiments under similar conditions.
>
> 5. Thus, from many carefully conducted observations and experiments, following critical checking from others, a scientifically based body of knowledge can be built up.
>
> 6. That body of knowledge reflects the world as it is; the statements within it are true or false depending on their corresponding to the world as it is.

In contrast, researchers who belong to 'paradigm B' go behind the characteristics as follows (Pring, 2000:50):

> 1. Each person lives in a 'world of ideas', and it is through those ideas that the world (physical and social) is constructed. There is no way that one could step outside this world of ideas to check whether or not they accurately represent a world existing independently of the ideas themselves.
>
> 2. Communication with other people, therefore, lies in a 'negotiation' of their respective worlds of ideas, whereby, often for practical reasons (they need to live and work together), they come to share the same ideas. A consensus is reached.
>
> 3. New situations arise and new people have to be accommodated with different ideas, so that negotiation within 'a marketplace of ideas' never

ceases and new consensuses have constantly to be reached.

4. Such notions as 'truth', therefore, need to be eliminated or redefined in terms of 'consensus', because, given (A) above, there can be no correspondence between our conceptions of reality and that reality itself.

5. Furthermore, the distinction between 'objective' and 'subjective' needs to be redefined, since there can be nothing 'objective' in the sense of that which exists independently of the world of ideas which, either privately or in consensus with others, has been constructed.

6. Development of our thinking (e.g. about educational problems and their solutions) lies in the constant negotiation of meanings between people who only partly share each other's ideas but who, either in order to get on practically or in order to accommodate new ideas, create new agreements, that is, new ways of conceiving reality. Since there is no sense in talking of reality independently of our conceiving it, therefore there are as many realities as there are conceptions of it- multiple realities (Pring, 2000:50).

The concept of 'dualism' in educational research (i.e. paradigm A and paradigm B) is illustrated by many authors. Crotty (2003) suggested the following points should be addrsseed to clarify the underpinning the philosophical position in any research.

> What methods do we propose to use? What methodology governs out choice and use of methods? What theoretical perspective lies behind the methodology in questions? What epistemology informs this theoretical perspective? (Crotty, 2003:2).

Three epistemological positions, such as- objectivism, constructionism and subjectivism were illustrated by Crotty (2003) shown in Figure 4.1 below:
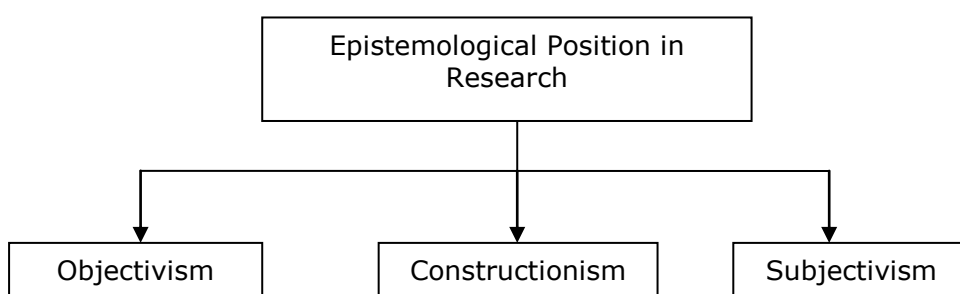
Figure 4.1: Major epistemological position in research

Guba & Lincoln (1994 & 1998) clarified the philosophical basis of the social research more broadly and systematically in term of ontology, epistemology and methodology. In their book 'Fourth Generation Evaluation', they distinguished

between different generations of research. The paradigms were explained by Guba & Lincoln (*op. cit.*) as shown in Table 4.1.

Table 4.1: Basic beliefs of alternative inquiry paradigms

Components	Positivism	Post-positivism	Critical theory	Constructi-vism
Ontology	Naïve realism 'real' reality but apprehendable	Critical realism- 'real' reality but only imperfectly apprehendable	Historical realism virtual reality shaped by social, political, cultural, economic, ethnic, and gender values; crystallised over time	Relativism-local and specific constructed realities.
Epistemology	Dualist-objectivist; finding true	Modified dualist-objectivist; critical tradition/ community; findings probably true	Transactional-subjectivist; value-mediated findings.	Transactional-subjectivist; created findings.
Methodology	Experimental/ manipulative; verification of hypotheses; chiefly quantitative methods	Modified experimental-manipulative; critical multiplism; falsification of hypotheses; may include qualitative method	Dialogic-dialectical	Hermeneutical - dialectical

[Source: Guba and Lincoln, 1994: 109 & 1998: 20]

As shown from Table 4.1, the meanings of different concepts, that is, 'reality', 'objectivity', 'fact' and 'knowledge', are changed from the evaluation of the first generation to the fourth generation (i.e. positivist to constructivism). The positivists (column 1) believe that one reality exists, driven by immutable laws and mechanisms, commonly known as 'naïve realism'. According to this paradigm, the researcher and the research 'object' are assumed to be independent entities and do not influence each other (Guba & Lincoln, 1994). The post-positivists (column 2) think that reality is assumed in a state of existence known as 'critical realism' (Cook & Campbell, 1979) and can be only imperfectly apprehended because of the researcher's human limitations. Post-positivists recognised that the theories, the hypotheses and the background knowledge held by the researchers could strongly influence what was observed (Reichard & Rallis, 1994). The researchers try to limit the influence of values or biases, in order to increase the objectivity of the research. Therefore, researchers explore the 'reality' within a certain realm of probability. The 'third and fourth generation' of evaluation (i.e. paradigms 3 and 4), on the other hand, argues that 'realities' do not exist objectively but are socially constructed to make sense. Therefore,

multiple mental constructions can be achieved and perceptions or meaning of the reality may be changed throughout the process of the investigation. Paradigms 3 and 4 assume that the researcher and researched object are interactively linked.

As we move from column 1 (positivism) to column 4 (Constructivism), the notion of 'realism' changes in the 'ontology' row of Table 4.1. In the first three columns, it is described as 'naïve', 'critical', or 'historical' realism. However, in the final column, there is no 'single' reality; rather, there are many realities or 'multiple realities', which are socially and experientially constructed and which are focused upon people's 'perception of realities'. Given the emphasis on the very existence of human beings or persons that makes the distinction between reality and people's views of reality, Pring (2000:52) argued:

> the very possibility of the social interactions, through which social reality is constructed, depends upon a shared understanding (howsoever vague and general) of what it is to be a person a centre of consciousness capable of intentional action, rational behaviour, emotional response and potential for assuming some level of responsibility.

According to Pring (*op. cit.*), the very possibility of the negotiation of meanings presupposes the existence of persons. Realism, therefore, should not be confused with naïve realism, that is the view that there is a one-to-one relation between our perception of reality and reality itself. Therefore, the educational researchers should reclaim reality and make a distinction between reality *per se* and people's view of it.

The educational researchers believe that there is regularity in the way a specific phenomenon can be observed (Cohen *et al.*, 2000) and this view is linked to a positivist (more specifically post-positivist for SER) and realist epistemology. Though SER was criticised for adopting more positivist epistemology (Thrupp, 2000; see details of criticism in Section 3.4), the researchers and scholars concerned with SER have never adopted naïve positivistic approach and did not claim that research findings mirror the reality. Instead, the SER researchers are constantly stressing that the statistical models can never be perfect, thus the 'real' reality can only be imperfectly apprehendable. Goldstein (1998, cited in Verdis, 2002:174) stated, in his professional lecture at the London Institute of Education, that SE researchers try to construct models, which provide 'a measure of our knowledge and a measure of our ignorance'. My position can be regarded as more towards a post-positvist paradigm, where I seek to explore the educational influences of student academic attainment to gain an understanding of the characteristics of effective schools in Bangladeshi secondary schools.

The question can be raised how the researcher's own values and their potential influence on the research process and outcomes were controlled to maintain the objectivity of the research. The answer is that a representative large sample (N=2462) selected from 45 secondary schools, where the schools were selected using a stratified simple random technique, would be helpful to estimate the less biased relationship between two sets of variables (i.e. outcome and exploratory) and to generalise the findings of this study to the population of year ten students. A pilot study was conducted before administering the main study to develop, adapt or check the feasibility of techniques, to determine the reliability of measures. Additionally, the validity of the research tools and the internal consistency of the SDQ II questionnaires were also measured in the initial phase of the main study (see details in Chapter IV in Sections 4.3.2 and 4.3.3).

In conclusion, it can be said that research methods are closely related to different views of how social reality should be studied. My view is that in order to see what is going on in a school, one can use quantitative or qualitative or mixed (both of the methods) methods, as the selection of method totally depends on the research purposes. The justification of our choice and particular use of methodology and methods is something that reaches into the assumption about the reality that we bring to our work (Crotty, 1998:2). I shall end my discussion of research paradigms using the words of Teddlie and Sammons (2010:124), who stated:

> We do not want to rehash the paradigm wars any more than is necessary, since we agree with the following paraphrased sentiment given by Smith (1996:163): ' *most researchers (have) become bored with philosophical discussion and (are) more interested in getting on with the task of doing their research*'.

In this section, the philosophical position of the current study is discussed. The content of the following section is the research design and methodology followed for the current study.

4.2: THE RESEARCH DESIGN OF FIRST SCHOOL EFFECTIVENESS RESEARCH IN BANGLADESH

The aim of this section is to describe the research design, which is centred on multi-level modelling. This section includes the research objectives and questions used in the current study and describes the research setting, samples and sample techniques and the instruments utilised.

4.2.1: Research objectives and questions

The broad objectives of the current study were to –

- assess the academic attainment and academic self-concept of year 10 students and determine the interrelationship between the attainment and the self-concept.
- examine the student background factors and relate these variables to their attainment and self-concept.
- analyse the student attainment and self-concept in relation to teacher characteristics.
- relate the student attainment to the student, class and school level variables.

In the light of multi-level perspectives, the research questions addressed in this study were as follows:

- i) How much variation in student academic attainment and in academic self-concept exists; and ii) what is the interrelation between the attainment and self-concept of the students at an individual and at school level?
- How much do student background factors influence- i) grade 10 student attainment and academic self-concept and ii) progress (taking account of prior attainment)?
- How much do teacher characteristics influence student attainment or self-concept controlling for the influence of prior attainment and background factors?
- After taking into account prior attainment, which school, class and pupil characteristics contribute to student attainment in grade 10?

Thus, the four research questions addressed in this study are related to the area of school effectiveness, which deals with the quality of the school, the extent to which schools achieve their goals and the characteristics of those schools in which students make greater progress (Hill *et al.,* 1995).

4.2.2: The research type of the current study

A longitudinal approach was adopted in the current study to assess students' progress over an extended period of time (Cohen *et al* 2000). That is, information was collected at more than one point in time, for example, one school year considering pre-test (baseline) and post-test, to measure the change over time or 'progress effects' on pupil attainment (Keeves, 1997; Ai, 2002 and Gustafsson, 2010). The research design was based upon a survey, since the nature of the study was intended to be descriptive and exploratory, focusing on naturally-occurring variation and obtaining a great deal of information from a 'key informant' (Robson, 2000); and there was no attempt to manipulate variables or control conditions, which is usual in an experiment (Rosier, 1997; Robson, 2000). Descriptive research is concerned with:

> condition or relationships that exist; practices that prevail; beliefs, points of views, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are developing. At times, descriptive research is concerned with how what is or what exists is related to some preceding event that has influenced or affected a present condition or event (Best, 1970; cited in Cohen *et al.,* 2000:169).

Typically, using survey design allows the researcher to-

> gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events (Cohen *et al.,* 2000:169).

The current research was not just looking at outcomes but was also focusing on predictors, such as school, class and pupil level factors which have great effects on student academic attainment. Surveys are useful for exploring situations across large populations and developing explanations and data for testing hypotheses. One advantage of a survey is that it is economical in terms of time and money, whilst simultaneously providing data from a large number of respondents in a short period of time. Another inherent strength of survey is the potential for generalisation that could be achieved by rigorous sampling techniques and appropriate statistical techniques. Furthermore, survey work is based on the real situation, in contrast to many experimental research designs where the focus is on controlling the research situation with pre-determined variables. Additionally, the survey instruments may be pre-tested before administration and the necessary corrective measures can be undertaken. The advantages were demonstrated in this study, where a large sample was used to arrive at generalised conclusions.On the other hand, there were some limitations

in using survey research in the current study. The economic nature of the survey brings with it the disadvantage of the distance of the research setting. This 'distance' increases the problem of uncertainty for the researcher because the participants may hold different perceptions or biased perceptions, which the survey instrument cannot detect. Another problem is the lack of similarity between what they write in surveys in response to items and what they really do. A final difficulty of using the survey technique is that the respondent may sometimes feel that the questionnaire is impersonal, mechanical and demeaning and the response categories are limited, artificial and constraining (Sommer & Sommer, 1980; cited in Kalug, 1998). As for technically-based criticisms, some argue that the nature of surveys is too statistical and ignores the qualitative dimension (de Vaus, 1996).   Summing up both the pro's and con's of questionnaire survey, Walker (1985a:91; cited in Wellington, 2006:102) stated:

> it offers considerable advantages in administration – it presents an even stimulus, potentially to large numbers of people simultaneously, and provides the investigator with an easy (relatively easy) accumulation of data though it suffers from mass production and lack of interpretative opportunity.

Thus, keeping in mind the positive and negative sides of the survey method, I designed my study carefully. Experts' advices were taken and substantial piloting of instruments was conducted before collecting the final data.

4.2.3. Research setting

This study was carried out only in Dhaka, the metropolitan city capital of Bangladesh. There are six divisions in Bangladesh. Dhaka city belongs to the Dhaka division, which covers a total land mass of 350 square kilometres. It is one of the most densely populated cities in the world. According to the 2001 census, Dhaka has a population of over 12 million, making it the largest city in Bangladesh (statistical pocket book, 2008). The maps of Dhaka metropolitan city with school (which participated in the study) locations and the map of Bangladesh are presented in the Appendices 8.3 and 8.4. The demographic and secondary educational features of Bangladesh and Dhaka city are presented in the following Tables 4.2 and 4.3.

Table 4.2: Demographic and educational features of Banglades

Description	Bangladesh
Total population (2009 estimated)*	162,221,000
Population density per square kilometers *	1,099.3
Land area in square kilometers*	1,47,570
Number of divisions**	6
Number of districts**	64
Number of secondary schools*** • State • Private • Total	 317[27] 13861 14178
Number of secondary school students*** • State • Private • Total	 221887 6265751 6487638
Number of secondary school teachers*** • State • Private • Total	 7452 194584 202036
Efficiency indicators*** • Drop-out rate • Repetition rate • Promotion rate • Completion rate	 34.85% 11.21% 49.89% 19.98%
Teacher-student ratio***	1:33

Source: *Department of Economic and Social Affairs Population (2009);

** (Statistical Pocket Book, 2008) & *** BANBEIS (2006)

Table 4.3: Demographic and educational features of
Dhaka metropolitan city

Description	Dhaka city
Total population (2009 estimated)*	7 million
Population density per square kilometers *	45,500
Land area in square kilometers**	350
Number of secondary schools*** • State • Private • Total	 24 452 476
Number of secondary school students*** • Total (state and private)	 322683
Number of secondary school teachers*** • Total (state and private)	 12408

1. **Source:** * http://www.tt-wiki.com/index.php?title=World TOP 10 Highest
   Population Density by City
   ** Statistical pocket book (2008); & Pocket book on educational statistics
   (2009).
   ***Pocket book on educational statistics (BANBEIS, 2009).
2. **Note:** During data collection phase in 2008, number of schools was 377 (state= 24 and
   private= 353) in the book list supplied by the District Education Office. Probably 99 schools
   obtained government approval after that period or some new police stations added with
   Dhaka city as the area of the capital city is expanded.

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[27] 98.5% secondary schools are privately managed in Bangladesh (Education Watch, 2007).

The main reason for choosing Dhaka city to conduct this study was the fact that it is the largest city and the capital of Bangladesh. The nature of primary and secondary education system around the city is heterogeneous. Most of the high-performing schools are located in the centre of the city. In addition, many medium and low-performing schools are also situated in this area. Thus, it was easier to obtain access to all kinds of schools: high, medium and low-performing, state and private. Another important consideration for choosing this setting was to avoid the transportation logistics of obtaining official permission from different levels of offices and consent from the selected schools. The choice of Dhaka city, therefore, allowed easy access to different institutions and was effective in terms of money and time.

4.2.4. Sampling technique used in the current study

A stratified random sampling technique was used for selecting schools. In stratified sampling, the population of *N* units is first divided into non-overlapping sub-populations known as '*strata*'. If sampling from the strata is simple random sampling, then the whole procedure is known as stratified random sampling. Thus, in the present study, the schools were categorised into strata according to academic performance of the schools, such as- high, medium and low-performing schools. Stratified sampling was preferred in this study for selecting schools over simple random sampling because of the heterogenic nature of the secondary schools with regard to their effectiveness. Randomised stratification was also used to improve population representativeness by reducing sampling error. It was assumed that stratification would almost certainly produce a gain in precision or accuracy in the estimates of the whole population, splitting the heterogeneous population into fairly homogeneous subgroups or strata. The limitation of using stratified sampling was selecting the schools on the basis of school performance, which provided the strata for this study and the whole procedure was time-consuming.

Initially, the total number of secondary schools located in Dhaka City was obtained from the DG (Director General in Education) office and District Education office. It is important to note that there was no category either for primary or secondary schools in Bangladesh. After some consideration of this problem it was decided to establish a school category on the basis of the last three years Secondary School Certificate (SSC) examination results (2005, 2006 & 2007). In addition to the quality of results, the number of students who took part in SSC examination was also considered while generating school category. The justification for this was that in some newly established schools the pass rate was

almost 100% but the number of student completing the SSC examination was negligible, i.e. 20 or less than 20. Combining the two criteria results in a sampling approach that combines quality and quantity of results as shown in Table 4.4.

Table 4.4: Process of making school category

School category	Student appeared in SSC exam(N)	Pass rate (%)
High	>80	≥ 80
Medium	41-80	60-79
Low	<40	35-59

The schools were again stratified according to school's geographical location. The schools in Dhaka Metropolitan City were located under the police stations of four different zones, such as: East, West, North and South. Firstly, on the basis of category (i.e. high, medium and low performing) the number of schools was identified according to Dhaka Metropolitan city zone. The number of the schools and police stations in each of the zones is presented in the following Table 4.5. In the next step, the police stations were selected proportionately from each of the zones (i.e. 2: 2: 3: 4).

Table 4.5: Number of schools and police stations in
Dhaka Metropolitan City by zones

	East	West	North	South	Total
Police Station	4	4	5	8	21
School	65	62	104	146	377

Finally, 45 schools as shown in Table 4.6 were selected by manipulating a random sample from each of the categories (i.e. 15 schools from each strata or category: 15 high, 15 medium and 15 low performing schools), rather than just selecting a simple random sample from the entire group. A simple random technique is one in which each individual is chosen randomly and entirely by chance, so that each individual of the population has the equal probability of being chosen at any stage during the sampling process (Yates *et al.,* 2008). Its advantages are the simplicity of the process and the fact that it is very likely to procedure a representative sample (Fraenkel and Norman, 1993). In contrast, the limitations are that a complete list of the population might not be available or become difficult to manage and that the sub-population of interest might not be equally represented in the population. The list of 45 schools is given in Appendix 8.5.

Table 4.6: Distribution schools in Dhaka Metropolitan
City by Zones and categories of school

Zone / School	East	West	North	South	Total Schools	Sample schools
High performing	16	24	30	36	106	15
Medium Performing	27	18	46	64	155	15
Low Performing	22	20	28	46	116	15
Total schools	65	62	104	146	377	45

It is important to note that my sampling is a little biased as the financial and practical constraints made it impossible for me to consider the whole region of Bangladesh. Therefore, the capital city of Bangladesh was only chosen for conducting the current study. For class, two classes, i.e. science and commerce groups were selected from each school. The reason for not including the humanities groups is described in following Section 4.2.5. Sampling strategy for the selection of class was dependent on the number of the classes of each group. If the number of classes was more than one, then a simple random technique was adopted for selecting the class of each group. When there was only one science or commerce class in any school, then that particular class was chosen purposively. The purposive sampling technique was also followed for the selection of the student sample, since all students from each class (i.e. science or commerce) were participants in this study.

In Bangladesh, year nine and ten is divided into three groups, namely science, humanities and commerce and they are taught in three separate classes. In fact, different subject teachers teach their concern science, commerce and humanities subjects for the three classes. The core subjects (i.e. Bengali, English and mathematics) are taught by the same teachers for all groups. Purposive sampling mainly was chosen for the teachers in the sample, where the number of teachers was one. In my study most of the teachers were selected purposively. Importantly, in a few large schools (3 or 4) in the sample, more than one teacher teaches the core subjects but they teach their concern part of the core subjects (for example, Bengali I or Bengali II; English I or English II) in all the classes (i.e. science, commerce and humanities). Therefore, in that case random sampling technique was used, where the teachers were responsible to teach the core subjects to the two groups. Finally, head teachers were purposively selected. It is important to note that this might be affected by the extent to which teachers

agreed to take part in the study. The situation was considered, when any school or any sub-group refused to participate in the study. In this case, another teacher or school from the list was chosen using purposive sampling procedure as per research requirement.

4.2.5. Sample of the study

The total of 90 classes of year ten was drawn from 45 selected secondary schools for data generation. Data was gathered from different sources, i.e. students, parents, teachers and head-teachers though the students of year ten constituted the main sample for the study. 2462 students of year ten (X) composed the main sample selected from 45 schools. The full range of the students' age was 15 to 17 years old or sometimes more. All students of science and commerce groups from each school constituted the student sample. All students of the same group (i.e. science or commerce) in terms of their academic potential were included in the research, as it seemed that collectively the findings would represent school effectiveness in Bangladesh more precisely. The students from the science group are considered to be those with the most potential in academic ability among the different groups in the schools. In Bangladesh, the selection criteria for the science group are very competitive, particularly in high-performing schools. Generally, the school sets up a standard mark on the basis of year eight results, upon which the pupils are likely to gain admission to a science group. However, the prescribed marks vary from year to year and from school to school. To be selected for the science group, generally a student needs to obtain 60-65%, particularly in mathematics and science subjects in the final examination of year eight and a good range of marks (50-60%) in other school subjects. It is important to note that, in some schools, students can automatically be admitted to the science group. On the other hand, in the case of the humanities or the commerce group, they can choose either of the groups easily, as there are no hard and fast rules for those groupings. The number of students in humanities group was noticeably lower in high-performing schools and especially in boys' schools and, moreover, in some schools, there were no humanities groups. They had only two groups: science and commerce. Therefore, considering the limitation of humanities group, only science and commerce groups were selected from each school. It is expected that these two groups could represent all ability groups of students of each school to measure school effectiveness in the Bangladeshi setting.

Family background related data were generated from the parents of 2462 students of 45 schools. Three teachers from each school, who teach Bengali, English and Mathematics at grade ten in two classes (i.e. science and commerce), were asked to participate in this study. Importantly, 13 teachers did not participate in this study. Thus, class and school level information was acquired, finally from the total of 122 teachers and 45 head-teachers from 45 schools respectively. The data collection sources of the current study are presented in Table 4.7.

Table 4.7: Sources of information in the current study

Sources of information	Number of participants	Information generated from the target groups
Student[28] (main sample)	2462 Year ten students (science and commerce groups) from 45 secondary schools of Dhaka city, who constituted the main sample.	Cognitive outcomes, as a measures of baseline and post academic attainment, basic information of students (gender, age, home learning environment and learning opportunities, parental interest in school work), affective outcome (self-concept), information related to family structure and teacher support and feedback derived from the student questionnaires and the SDQ-II * scale.
Parent	Parents of 2462 students.	Information related to family constellation, parents' qualification, occupation and household income (to measure SES) derived from the parent questionnaire.
Teacher	122 teachers from 45 secondary schools.	Information related to teacher characteristics, pedagogy practice, teachers' perception of head teacher leadership and administrational effectiveness derived from the teacher questionnaire.
Head teacher	45 head teachers from 45 secondary schools.	Head teacher characteristics and school context-related information collected from the head teacher questionnaire.

*SDQ-II: Self Description Questionnaire II

Sample size is a basic influence on statistical significance (Thompson, 1992), as large sample size provides more statistically significant findings. However, the sampling techniques and sample size are important for exploring hierarchically structured data. If the research requirements are for a sample of students from a sample of schools, one of the key questions is about the optimal number of schools in the sample. The issues of sample sizes and statistical power in two-level analysis have been discussed by Snijders & Bosker (1993), who point out

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[28]   Population= All Year ten students (2661457) of secondary schools in 2008-2009
   [Source: BANBEIS website]

that the researcher should make a reasonable guess at the estimators of the fixed regression co-efficient (the variables at the lower and the higher level) and thus make a choice of sample size at either level. Afshartous's (1995) guidelines are very useful for designing multi-level studies. The author (*ibid.*) claimed that for the estimation of the regression coefficients, the number of schools should be at least 40 but, if the focus of the study is on the estimation of the variance component, the minimum school size of the sample should be 320. According to Cohen (1998), in the cases where it is important to estimate the variance components, then more students per school and fewer schools are needed. From that point of view, the sample sizes used in the current study (either level) were adequate as shown in Table 4.7. One of the important features of using a large number of representative samples is that it helps to strengthen the validity and reliability of the research findings. Another advantage of the large sample size is that the larger the sample, the lower the error in generalising.The number of schools (45) and classes (90) was chosen to achieve a statistically useful sample of students (n=2462) and to cover a range of year ten student populations.

4.2.6: Data collection instruments

The following data collection techniques and tools were adopted according to research requirements (see appendix 6).

4.2.6a: Academic attainments as baseline and outcome measures

The major challenge in SER is to select the most appropriate academic outcomes, as this is critical for the fairness, the validity and the economy of the result (Scheerens & Bosker, 1997). According to Hill (1996), the choice of outcome measure has major implications for the conclusions that one might draw measuring the student, class and school-level effects. Two possible types of school outcome measures in school effectiveness studies have been distinguished by Scheerens & Bosker (*op. cit.:51*):

> Attainment measures are close to the economic notion of effectiveness as maximisation of outputs, where output is measured as the amount of product resulting from a particular production process. (….) Achievement, in contrast, fits more neatly into an interpretation of effectiveness in terms of 'quality'. Achievement tests as effectiveness criteria capitalise on more fine-grained quality differences of the units of outputs.

In the current study, two different sets of pupil academic attainments were considered as indicators of learning outcomes for measuring school effectiveness in Bangladesh. These attainments were the result of summative tests and easily available in Bangladesh. Any standardised achievement test was avoided, since

no other reliable standardised tests were readily available in Bangladesh. Additionally, any standardised achievement test was avoided in this study. If I would like to use standarised test, then I would have to either buy the test or develop a standardised test, which was, indeed, a financial constraint for me. Apart from this, translating the test was another constraint, as it was time consuming and sometimes difficult to convey the meaning of the test items. Furthermore, the contextual aspects of the test were considered as they might not be culturally appropriate for the current research setting and target group (i.e. students).

In Bangladesh, generally, two public examinations take place every year. The first public examination is held after year ten (X), known as the Secondary School Certificate (SSC) examination and another one is the Higher Secondary Certificate (HSC), which is held after completion of grade twelve (XII). The prior attainment was students' final examination scores of year nine (IX). The outcome variable was the final examination scores of the same group of students achieved in the public examination (SSC) at the end of year ten in 2009 (post-test). The prior attainment was the internally assessed examination scores and the schools set up the questionnaires individually for the year end examination following the same syllabus and subjects. This was one of the limitations of my study as described later (see Section 6.2.4). In contrast, the same questionnaires were administered in the National Secondary School Certificate Examination, developed by a special team at national level, which could be considered as more reliable than the baseline test scores. Therefore, the base line was administered at the start of grade nine, 2008 and the post-test, i.e. SSC examination was held up at the end of grade ten, 2009.

4.2.6b: Self-concept scale

The most important but controversial construct used in the field of education and psychology is the self-concept and educational policy-makers throughout the world have paid attention to the enhancement of self-concept, considering it a central goal of education (Marsh, 2005). In their model of effective schools, Brookover and Lezotte (1979) also highlighted that maximising academic self-concept, self-reliance and academic achievement should be major outcome goals of schooling. In the current study, Marsh's (1992) Self Description Questionnaire (SDQ) II was used to measure the student academic self-concept.

A number of studies were found in the area of self-concept. The major focus of these studies was on other constructs, such as- academic achievement, school persistence, bullying and drug problems, where this measure (i.e. self-concept)

was included because of its assumed relevance. Weak theoretical basis, poor quality of measurement instruments, methodological shortcoming and a lack of consistent findings were found from the review of early studies (e.g. Byrne, 1984; Burns, 1982; Shavelson *et al.,* 1976), which Hattie (1992; cited in Marsh, 2005:6) described as:

> one of 'dustbowl empiricism' where the pre-dominant research design of self-concept studies was to 'throw it in and see what happens' following the similar observation.

Apart from the above drawbacks, a uni-dimensional perspective of self-concept (i.e. Rosenberg, 1965) was adopted in previous research. Now, it is evident that self-concept is multi-dimensional and, in support of the multi-dimensional nature of self-concept, Marsh (2005:24) stated in his 25th Vernon-Wall Lecture on 'Self-concept theory, measurement and research into practice: The role of self-concept in educational psychology':

> our results strongly supported our claim of multi-dimensional perspective of self-concept. The diversity of specific self-concept domains and their relation to different criteria and outcomes cannot be adequately reflected by such a uni-dimensional approach. A multi-dimensional perspective to self-concept can guide to a better understanding of the complexity of self in different contexts, to more accurate predictions of a wide variety of behaviours as well as appropriate outcome measures for diverse interventions, and a deeper understanding of how self-concept relates to other constructs.

The multi-dimensional structure of self-concept is supported by a range of research, where researchers used the Self Description questionnaire (SDQ) and demonstrated that self-concept cannot be adequately understood if its multi-dimensionality is ignored (Byrne, 1984; Hattie, 1992; Marsh & Shavelson, 1985; Marsh, 1990c, 1993a). Moreover, the multi-dimensionality of self-concept increases along with age, that is, as the individual moves from infancy to adulthood, self-concept become increasingly multi-dimensional (Shavelson *et al*., 1976). Emphasising continuous debate on uni-dimensional perspectives (single domain of self-concept i.e. self-esteem) and multi-dimensional perspectives (based on multiple, relatively distinct components of self-concept) of self-concept, Marsh and Craven (1997:191) also argued:

> if the role of self-concept research is to better understand the complexity of self in different contexts, to predict a wide variety of behaviours, to provide outcome measures for diverse interventions, and to relate self-concept to other constructs, then the specific domains of self-concept are more useful than a general domain.

According to Marsh (2005), SDQ scales were developed on the basis of the Shavelson *et al.* (1976) model, where (a) item pools were constructed for each

scale, and (b) factor and item analysis were used to select and refine the items, which finally represented each scale. The internal consistency of the scales derived from the three SDQ instruments was significantly high – ranging from 0.80 to 0.90. The result of the factor analyses of more than 1,200 sets of responses from the normative archives of the three SDQ instruments also indicates that the domains of self-concept are remarkably distinct (Marsh, 1989). Marsh (2005:24) also recommended, on the basis of his research:

> social science researchers abandon uni-dimensional perspectives of self-concept that are still prevalent in some areas of research, instead embracing a multi-dimensional perspective that has been productive in many areas of psychological research.

Following the review of the early studies, the multi-faceted nature of self-concept and the recommendation of Marsh (*ibid.*), Marsh's SDQ II scale was used to measure the adolescence self-concept as that scale would relate academic self-concept perfectly (specific domain of self-concept) to academic attainment. Moreover, academic self-concept and academic achievement are reciprocally related and mutually reinforcing and therefore, improved academic self-concepts will lead to better attainment and finally, improved academic attainment will lead to better academic self-concept (Marsh, 2005:39), which Byrne (1984; cited in Marsh, 2005:25) noted as:

> much of the interest in the self-concept/achievement relation stems from the belief that academic self-concept has motivational properties such that changes in academic self-concept will lead to changes in subsequent academic achievement.

Although the longitudinal panel designs are the strongest approach to testing the causal ordering of academic self-concept and achievement (Marsh and Craven 1997), the Self-Description Questionnaire II (SDQ) was employed in this study once, because of some practical constraints. Data on academic self-cocnept was collected in 2008 along with all baseline data. The SDQ II could not be applied at two different points, as it was difficult to trace the same students who constituted the main sample after their public examination. To apply the scale a second time, then the addresses of the students would need to be collected either from the register of the schools or the Board of Intermediate and Secondary Education (BISE). It was certainly difficult to make personal contact with all the participants (2462) of the study after one year. It obviously would involve not only financial constraint for me but mental stress as well. Therefore, the scale was used only once to measure its association with prior and post-academic attainments. Part D of the student questionnaire used in this study was composed of 10 items to measure student academic self-concept, as shown in Table 4.8.

Table 4.8: Description of items of academic self-concept

Variable	Description
Academic self-concept	• People come to me for help in most school subjects. • I am too stupid at school to get into a good university. • If I work really hard, I could be one of the best students in my school year. • I get bad marks in most school subjects. • I learn things quickly in most school subjects. • I am stupid at most school subjects. • I do well in tests in most school subjects. • I have trouble with most school subjects. • I am good at most school subjects. • Most school subjects are just too hard for me.

4.2.6c: Research questionnaires

Four questionnaires were developed for generating data from students, parents, teachers and head teachers (see Appendices 8.6.1 and 8.6.2). The development of the questionnaires was based on the main exploratory variables, which were derived from the SER literatures and then elaborated into more specific measurable descriptions. The description of the questionnaires is given in the following section.

4.2.6c.1: Student questionnaire

Information related to students' background characteristics (e.g. age, gender), teachers' feedback and support, home learning environment and learning opportunity and leisure activities was generated, applying the student questionnaire. The student questionnaire was divided into three parts. The police station code, school name, students' name, class roll number and parents' name were addressed as identifiers at the beginning of the questionnaire. In Part A, the items of the questionnaire reflected the students' study time, study place, learning opportunity at home, the availability of educational materials, parental interest on school work and family structure, which might have an influence on student academic attainment, were employed in order to measure the home learning atmosphere. Variables and indicators of home learning atmosphere are presented in Table 4.9:

Table 4.9: Variables and indicators of home learning atmosphere

Variables	Indicators
Home learning environment	• Hours spent on study everyday outside of school. • Have separate study place. • Number of textbooks at home. • Availability of other educational materials at home along with textbooks.
Learning opportunity	• Facility of private tutors or coaching. • Subjects study at the coaching centre or to the private tutors. • Access to computer, internet and newspapers at home.
Parental interest on school work and encouragement	• Frequency of parental and other family member's assistance for the child's study. • Parental rewards for excellent school performance. • Parents' discussion with their child about the school and school work. • Parents' encouragement to participate in other extracurricular activities.
Leisure time	• Hours of watching TV per day
Family structure	• Way of participating in decision making, i.e. autocratic, democratic or laissez-faire.

To measure the family structure, the categories of the items (see question no 15 in student questionnaire in Appendix 8.6.1) were built following the procedure used by Rehberg *et al.* (1970). The items 1 and 2 were broken up into 'laissez faire'; 3, 4 and 5 into 'democratic' and 6 and 7 into 'autocratic'.

Factor identified as teacher's support and feedback as shown in Table 4.10 was included in Part B, which was composed of nine indicators.

Table 4.10: Description of items of teachers' support and feedback factor

Factor	Description
Teacher's support and feedback	• The way teachers treat me is fair. • Teachers praise me when I work hard. • If I do not do my homework, teachers notice it. • Teachers help me to understand my lesson. • Teachers listen to what I say. • Teachers encourage me to produce good performance. • In my view, teacher-given home-work is useful. • Teachers give me feedback about the quality of my work. • Teaching learning activities in school seem to me boring.

Two straightforward items of Part C were related to student characteristics, namely, gender and age and another was student prior attainment. Students gave their date of birth for measuring their age. Students' grade or total GPA scores obtained in their last examination (i.e. in year IX) indicated prior or baseline attainment.

4.2.6c.2: Parent questionnaire

The parent questionnaire was designed to gather additional information about the students' socio-economic status (SES) and their family situation, such as- family type, number of the children at home and birth order of the student, as shown in Table 4.11. Family type indicates the nature of the family, which is categorised into three groups, such as- joint family, nuclear family and single family, where joint family means 'a number of married couples and their children, who live together in the same household' (Mandelbaun, 1948:93 cited in Raina, 1989:4). The number of children at home refers to the total number of siblings of the respondents. The birth order refers to the position of the child in the family.

Table 4.11: Variables and description of family level information

Variables	Description
Family constellation	• Family type. • Number of children at home. • Student birth order
Socio-economic status (SES)	• Parent education. • Parent occupation. • Household income

Controlling for SES is a challenge of school effectiveness research (Jeynes, 2002). There is a debate among social scientists about the best way to control SES, whilst examining educational outcomes. Three standard sociological measures, for example, parent occupations (carefully validated and scaled), income and educational attainments could be used as a measure of SES (Paterson, 1992). Kyriakides (2004) and Kyriakides & Creemers (2008) also considered the five variables for a measure of SES: family income, parent educations and occupations (father and mother). Nevertheless, according to the same author, the researcher may choose to exclude one of these components or exclude certain aspects of a component, for example, income could be excluded if the researchers think respondents may be sensitive to questions of this nature. Verdis (2002) used parental education and occupation as the indicators of SES.

The investigation of SES was also a big issue for the current study because no robust measure has been developed as yet in Bangladesh. The current researcher considered five components as a measure of SES, such as monthly household income of the family; parents (father and mother) educations and occupations. Family income was used in this research as it was possible to collect family income information along with parents' education and occupation.

4.2.6c.3: Teacher questionnaire

The questionnaire for teachers was developed to obtain information about teacher characteristics, use of pedagogy and teaching methods in the classroom, teacher's perceptions of head teacher leadership and administrational effectiveness. Part D of the teacher questionnaire consisted of teacher characteristics, which included gender, age, qualifications, training on pedagogy, in-service training, teaching experience, job rank and remuneration are presented in Table 4.12.

Table 4.12: Variables and description of teacher characteristics

Variables	Description
Gender	• Dichotomised by male and female
Age	• Expressed by years derived from the date of birth until 2008
Qualifications	• Formal educational qualifications or degrees
Teaching experience	• Length of teaching service in year
Training on pedagogy	• Any qualifications or diploma in pedagogy (i.e. teacher training)
In-service training	• Whether attain in any subject related training
Job rank	• Last position in the service
Income	• Monthly salary of the teacher

Part A of the questionnaire contained items related to teacher pedagogy, which refers to teaching preparation and instructional methods used by the teacher in the classroom. Two different dimensions were used to measure the pedagogical aspects. The contents of each dimension are listed below in Table 4.13.

Table 4.13: Variables and factors indicating teaching
methods and pedagogical aspects

Factor/Variable	Description
Instructional methods:	Using the following strategies in the classroom:
• Conventional	• NCTB (National Curriculum Text Board) prescribed textbooks • Note/guide books • Lecture method • Students' memorising • Not allowing students to ask questions during lesson
• Participatory	• Teaching aids i.e. pictures and charts etc. • Group discussion • Assign group project work
Teacher preparation	• Time spent for preparing lesson plan • Time spent for correcting homework • How often given homework

Teachers' perceptions of head teacher leadership constituted Part C of the questionnaire. SER literature indicates that almost every single study of school effectiveness has shown leadership to be a key factor (Sammons *et al.,* 1995). Although the direct effect of leadership was examined in most of the research (Maeyer *et al.,* 2007), educational leadership had also an indirect effect on pupils' achievement through the pedagogical and educational climate and the way in which the school was organised (Bossert *et al.,* 1982; Hallinger and Heck, 1998). Hallinger and Heck (1998) cited four domains of leadership, namely:

- Vision and goal setting
- Organisational structure and social networks
- Human capital
- Organisational culture

The empirical evidence of organisational structure and social networking within different cultural contexts illustrates the key characteristics of effective school leadership, which were teacher engagement, co-operation and participation in decision making (Heck *et al.,* 1991; Leithwood, 1994). Using Hallinger's (1983) 'Principle Instructional Management Rating Scale' (PIMRS), Witziers *et al.* (2003) identified the key characteristics of leadership from their meta-analysis as a) supervision and evaluation, b) monitoring and visibility and c) defining and communicating a school's mission. Professional leadership was identified as one of the key factors from the review of SER by Sammons *et al.* (*op.cit.*). Their review reveales that three characteristics have been found to be associated with professional leadership, such as- a) firm and purposeful; b) a participated approach and c) the leading professional. Following the literature of educational leadership the following dimensions of leadership were identified given in Table 4.14.

Table 4.14: Factors and items of leadership perception

Dimensions	Description of dimension
Co-operation and communicating school's mission	• Acts after consulting the teaching staff. • Heavily involved in what is happening with teachers and students. • Keeps everyone informed about school management procedure. • Likes to keep up-to-date with teaching/ learning outcomes in the regular official staff meeting. • Keeps the teaching staff working up to capacity. • Provides guidelines for efficient operation of the school. • Friendly when talking to the head.
Teachers' engagement in tasks	• Likes to push teachers to work hard. • Keeps constant pressure to increase effective teaching.
Leading professional	• Puts stress on teaching staff being competent. • Shares many ideas for improving teaching and learning. • Asks questions/monitors about what teachers are doing in their classrooms. • Not willing to make change in teaching learning activities. • Discusses school problems in a productive way.

Items included in Part C of the questionnaire were used as a measure of the school administrational effectiveness. Two dimensions, namely, (a) administrational expectation and encouragement and (b) availability of administrative facility and support were identified from factor analysis presented below in Table 4.15.

Table 4.15: Factors and indicators of administrational effectiveness

Factor	Items description
Availability of administrative facility and support	• The channels/links between the administration and teaching staff are not adequate. • It is difficult to obtain a review of appropriate performance. • The administration provides sufficient teaching and learning facilities (i.e. class schedule, teaching materials, teaching aids, meetings etc.). • School administration behaviour toward the staff is supportive or encouraging for effective teaching. • The administration always helps to solve instructional or class arrangement problems. • The availability of administrative facilities is adequate for teachers' professional development.
Administrational expectation and encouragement	• The availability of administrative facilities motivates the teachers to increase their teaching/learning capability. • The administration lets the teaching staff know what is expecting from them.

4.2.6c.4: Head teacher questionnaire

The head teacher questionnaire was similar to the teacher questionnaire, which collected information related to head teacher characteristics, the school context and resources. Head teacher characteristics are defined as gender, age, qualifications, knowledge of pedagogy, teaching experience and administrative experience, as shown in Table 4.16.

Table 4.16: Variables and description of head
teacher characteristics

Variables	Description
Gender	• Dichotomised into male and female
Age	• Assessed by years from the date of birth till 2008
Qualifications	• Last formal education or degree
Training on pedagogy	• Qualifications or diploma in pedagogy (i.e. teacher training)
Teaching experience	• Years of teaching service
Administrative experience	• Years of administrative experience as head teacher of the school

The school context refers to school category, the total number of teachers and students, the teacher-student ratio, the number of trained teachers and teacher-parent (PT) meetings. School resources refer to facilities such as a library and laboratory.

To summarise, this section outlined the research design, type, sample and sampling techniques and research instruments that were used for the generation of data from the informants of my research. In the next section, how these research questionnaires and data collection timetables were finalised and the research procedures used will be discussed.

4.3: FINALISING RESEARCH INSTRUMENTS AND DATA COLLECTION TIMETABLE

This section describes how the instruments were finalised; how the pilot was carried out; how access was gained to the different educational institutions; how soliciting permission and accumulating information related to secondary education and school category was achieved. In this section, the data generation procedure and ethical issues of the current study will also be presented. These points are important in providing a comprehensible picture of the research procedures for me and the readers of my study.

4.3.1: How the research questionnaires were finalised for the pilot study

The questionnaires developed for the current research were submitted for content and context validation to a panel of educationalists composed of three members from the Institute of Education and Research (IER) in the University of Dhaka and the School of Education in Bangladesh Open University. They were requested to proceed in the following manner:

- Check the clarity of the questions to identify whether there is any ambiguity of the items.
- Check the construction statements of the scale which described the latent variables.
- Improve the quality of the items.
- Suggest how to simplify the questions for the participants' comprehension.
- Give additional items if required and exclude the questions which were not relevant or had other flaws.
- Check the direction and the instructions for answering the questions.

The research tools were then revised, integrating the suggestions and corrections proposed by the experts. The following corrections were added in the questionnaires for conducting the pilot study:

- Make some of the questions or statements short, clear and specific.
- Avoid duplication of the items and their answers.
- Restructuring and rewording some of the items.
- Make the directions and instructions regarding the use of the instruments clear.
- Improve the overall formatting of the instruments where necessary.

After incorporating all the suggestions and corrections, the questionnaires were again submitted to the panel members for further comments and suggestions. The preliminary questionnaires were finally approved for the pilot by the supervisor and the committee after a series of revisions.

4.3.2: Getting access to different institutions and collection of secondary education related information

Before data generation, the researcher submitted a letter addressing to the Director General (DG) in Education, to obtain permission from the Ministry of Education (MoE) in Bangladesh. The permission letter is attached in Appendix 8.7. The Assistant Director (AD) of MoE, who was in charge of secondary education, was requested to provide a list of all secondary schools located in Dhaka metropolitan city. The AD handed over only the list of government schools and asked me to get in touch with the District Education Officer (DEO) for the list of all non-government schools. The list of non-government schools was then collected from the DEO.

Getting access to different locations is a great challenge for the educational researchers in Bangladesh. I nedded the three years SSC results (2005, 2006 and 2007) for making school category. For this purpose, access was obtained firstly to the head of the organisation (the controller of the Dhaka Examination Board[29]), who forwarded my application with all the necessary documents to the computer system analyst of the computer data entry division but access to the computer system analyst was not obtained. After several attempts, the author met him with difficulty on the way to his office but he was very reluctant to provide the results. Finally, he advised me to contact another organisation, the Bangladesh Bureau of Educational Information & Statistics (BANBEIS). The system analyst of BANBEIS was met and provided with a clear conception and the purpose of the study. The analyst asked for a meeting a week later, as their power system had broken down. After a week, the analyst provided the last three years' SSC examination results, which contained only the number of students entering the SSC examination and the pass rate.

The internal consistency of the Academic Self-concept Scale (SDQ II) was measured after consultation with the supervisor and the same panel of experts, since the scale was new to the Bangladeshi context. The Self Descriptive questionnaire (SDQ II) contained 136 items, from which 10 items were selected to measure student academic self-concept. The items of the scale were translated from English into Bengali language. The Bengali version of the scale was first administered to 25 year ten (X) students, selected from one school, after soliciting permission from the head teacher. The English version of the scale was trialed four days later on the same group of 25 students. Finally, correlation was

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[29] Students sitting in the public examinations (Secondary School Certificate and Higher Secondary Certificate at the end of grade ten and twelve respectively) under the eight Boards of Intermediate and Secondary Education (BISE).

computed between the academic self-concept scores of English and Bengali versions (Appendix 8.8). As shown in Table 4.17, the internal consistency or adaptability of the scale was significantly high, indicating that it was culturally consistent.

Table 4.17: Internal consistency of academic self-concept scale

Version of the scale	Correlation (r)
Bengali	0.79
English	

4.3.3: Piloting the questionnaires

In social science, the pilot is important, as it increases the reliability, validity and practicability of the questionnaire (Oppenheim, 1992; Morrision, 1993; Wilson and McLean, 1994). In the current study, the pilot was carried out on 110 year ten students and their parents, nine class teachers (Bengali, English and mathematics) and three head teachers, selected from three schools of three different categories (i.e. 1 high, 1 medium and 1 low performing schools). Before piloting, the English version of the questionnaires, prepared at the initial stage, was translated into the native language and instruction (Bengali) mode of the school system of Bangladesh. In translating the questionnaires, the standard of language for grade ten (x) was also taken into account. The use of appropriate Bengali terminology for technical words was verified by consulting with the experts. The Bengali version of the questionnaires was also retranslated into English (see Appendix 8.6.3) with the help of a colleague of the researcher, who is working in the similar field, to assess the content validity of my research tools.

A brief introductory instruction was delivered to the participants (i.e. students, teachers and head teachers) before administering the questionnaires. The respondents were asked to carefully read the instruction and answering procedure, which was given at the beginning of the questionnaires. The respondents were also instructed to underline the words or phrase, which were not comprehensible to them and to provide their comments, if any, in an available space of the questionnaires. Finally, one set of data-generating instruments was ready, based on reviewing and editing the comments of the respondents gained from the pilot. The process involved in the development of research tools is presented in the following Figure 4.2.

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│   Step 1: Consulting with supervisor and literature review of SER │
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                              │
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│   Step 2: Preparing first draft of research tools and submitting the │
│           questionnaire to the supervisor and the experts in │
│           Bangladesh.                                        │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
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│   Step 3: Preparing the second draft of research tools and translating │
│           the questionnaire from English to Bengali and again from │
│           Bengali to English.                                │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│   Step 4: For the pilot study, the questionnaires were administered to │
│           year ten students, parents, teachers and head teachers of │
│           three schools, each of which was selected from three │
│           different categories i.e. high, medium and low- performing │
│           schools respectively.                              │
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│   Step 5: Reviewing and editing the research instruments.    │
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│   Step 6: Informing the supervisor about the findings of the pilot. │
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│   Step 7: Finalising the research questionnaires for the     main │
│           phase of the study.                                │
└─────────────────────────────────────────────────────────────┘
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Figure 4.2: Process of developing research questionnaire

4.3.4: Findings of the pilot study

The pilot study was mainly carried out to test the consistency of the questionnaires that were used later in the main study. After conducting the pilot, some descriptive analysis and single level regression analysis was carried out. Another purpose of the pilot work was to obtain an idea of the nature of the effect of predictors on academic outcome. Noticeable differences were found for most of the variables at student, class and school level. However, factor analysis was

conducted only in the main phase of the study. Factor analysis was not possible in the pilot stage because of the sample size, particularly for the teacher sample, since only nine teachers (three from each school) participated at this stage. For factor analysis, sample size is an important issue. Although there were no generally accepted rules on sample size for factor analysis, Guildford (1956) first argued that observations should be a minimum 200 for factor analysis. According to Kline (1994a), a sample even as small as 100 is sufficient in data with a clear factor structure. Hair *et al.* (2005) argued that, preferably the sample size should be 100 or larger and a researcher should not factor analyse a sample of fewer than 50 observations. The pilot study from my view at least provided an apparent conception governing the research procedure and findings.

4.3.5: Ethical considerations

Ethical considerations are an important aspect of any research, as Wellington (2006:54) has explained:

> My own view is that the main criterion for educational research is that it should be ethical …[E]very researcher [should] place it foremost in the planning, conduct and presentation of his/her research. Ethical considerations override all others.

Thus, the confidentiality of data and participants had been maintained throughout the study to protect their right of privacy. The title and main purpose of the study, the activities which were intended to be carried out in the schools, along with the name and identities of me (the researcher) and my assistants, who would be helping to generate data, were submitted to the school authority. During administering the questionnaires, the target groups (students, class teachers and head teachers) were assured that they would be anonymous and a clear explanation about their task was provided to the participants with the sense of the utmost individual respect and co-operation. The participants were free to decide whether they would like to take part in the present research.

4.3.6: Data collection procedure of the current study

The clarification of the dependent and independent (or 'exploratory') variables of this study was achieved by means of a pilot study carried out in April, 2008. The main aspects, investigated in the pilot and the main phase of the study, are presented in Table 4.18 below.

Table 4.18: The aspects investigated in the pilot and the main phase of the current study

Aspects	Pilot Phase	Main phase
Purpose	To check the relevance of information and consistency of the research questionnaires.	To explore the answer to the four research questions set for the current research.
Sample	110 year ten students and their parents, 9 class teachers and 3 head teachers from three different categories of secondary schools (i.e. 1 high, 1 medium and 1 low-performing schools).	2462 students who were the main sample. Information was generated from 1760 parents, 122 teachers and 45 head teachers as well (see Table 4.8).
Research instruments	• SDQ II • Confidential questionnaires initially developed for the students, parents, teachers and head teachers.	• SDQ II • Confidential questionnaires for the students, parents, teachers and head teachers, which were finalised after the pilot.
Outcomes	Academic (attainment at one point) and affective (academic self-concept) outcomes.	Academic (prior and post-attainments) and affective (academic self-concept) outcomes.
Period of data collection	February-April, 2008 (administered the questionnaire and SDQ II).	• May-July, 2008 (administered the questionnaires and SDQII). • July-August, 2009 (Collected public examination result of the same group of students from 45 schools participated in the study).

As can be seen from Table 4.18, data generation was conducted in two subsequent academic years, that is, 2008 and 2009. Almost three months (February-April) of the calendar year 2008 were dedicated obtaining permission from the Education Ministry and simultaneously data generation and analysis of the pilot study were accomplished. Then, the subsequent three months - from May to July in 2008- were set aside for baseline data collection of the study. Firstly, three (3) schools for the pilot work were visited. Finally, 45 schools (15 schools from each of the categories, i.e. high, medium and low-performing schools) were visited for the main study from April to July 2008. I visited the schools in every case and kept in personal communication and co-operation with the teachers and head teachers. The questionnaires and self-concept scale (SDQ II) were administered to the students either personally or three research associates (all of whom had data collection experience as they were part-time

research workers of the research organisation the Cute Link Research Centre, Dhaka) who were appointed for the data collection of my study. The research associates were given appropriate briefing about their responsibilities and about the questionnaires before data collection. They were provided with a permission letter from the MoE and were requested to show the letter to the head teacher for smooth access to the schools. I met with the associates at the end of the working day in the research centre to discuss the possible problems and their solution for obtaining reliable and valid data. Two teams of two people collected data from two different schools, one of which was led by me. Thus the data was collected from two different classes of each school simultaneously. Therefore, it was possible to collect data from four schools every day.

The researcher allowed the students to take the parent questionnaires at home and they were asked to return the questionnaires to their class teachers. This made the data collection process easy. The teacher and the head teacher questionnaires were distributed and collected personally after they had completed the exercise. At the same time, the parent questionnaires were collected personally from the class teachers. The prior school attainments (baseline) of the students were collected in 2008 from the school result book with the help of research associates and the class teachers.

It is noteable that the researcher and her four assistants were in the classroom, when the students were engaged to fill out the questionnaires. The students were asked to doublecheck the questionnaires. Teachers and head teachers were also asked to re-check their questionnaires. This was done to avoide the problem of missing data. Unfortunately, the same procedure could not be followed for the parents as students were allowed to take their parent questionnaires at home. After that, some of the data could not be used as the students had not completed the questionnaire properly. For example, sometimes they noted down two different names (either for their name or parent's name) or class roll, so I was unable to match the student and parent questionnaires. Sometimes students did not provide any information or very few (two or three items). Considering this practical problem, students, teachers and head teachers data were only included in the datasets if they had very few missing (5%) items. For parents' data, missing data was noticeably more for different items and 29% parents did not respond. The following Table 4.19 summarised the distribution and returned pattern of questionnaires. The information in Table 4.20 indicates that 2462 students appropriately completed their questionnaires, 241 did not return

questionnaires (or were not interested to participate in the study), 525 were not considered as appropriate. In final stage (post-test), the number of students dropped to2390, where 72 students did not found in the final SSC examination list. It is important to note that in this study 86 classes were used for final analysis, since I could not trace the data of 4 classes. The list of items with missing data is given Appendix 8.9.

Table 4.19: Distribution and No.of returned questionnaires
administered at baseline level

School	No of questionnaire administered at baseline level			Final participants after post-test
	Distributed	Returned	Appropriate only	
High performing	1285	1137	1077	1063
Medium performing	1160	1072	845	814
Low performing	958	778	540	513
Total	3403	2987	2462	2390

The public assessment score (post-test) was not available before July or August in 2009, since it was published at the end of May, 2009; and it had taken more than one month for the school authority to receive the tabulation book from the examination board office. The second phase of data, i.e. the final examination results of the students were collected from the tabulation books of same 45 schools in July, 2009, who participated in the study in 2008. The public examination result was published through the website: www.educationboardresults.gov.bd/ or www.gov.bd.com (see steps of access in Appendix 8.10). Anyone has access to the students' examination result with this website but they need students' name and examination roll number. Details of one school are attached in the Appendix 8.10. Therefore, the information of the study was collected twice: the first time in 2008 (February to July) for pilot work and main study (for baseline data) and finally, for the second time in 2009 (July-August) to collect the students' Public Examination Result (post-test).

In this section, the steps of finalising of research instruments and data collection procedure and timetable were discussed.The subsequent section will present how data management was conducted; how examination scores were transformed into normal score and how data were analysed.

4.4: DATA MANAGEMENT, TRANSFORMATION AND DATA ANALYSIS PROCEDURE

The intention of this section is to clarify the process of data management and transformation of original examination scores into normal score. Furthermore, the different statistical packages and techniques used for data analysis will also be discussed in this section.

4.4.1: Data management of the current study

In order to analyse the data various quantitative techniques were used in the current study. Four statistical programmes, namely, ACCESS, SPSS and MLWin were used to manage and analyse the data sets. In order to manage large and different sets of data, ACCESS was used for data entry, as the nature of this package was simple and easy to manage, as well as checking the data process and was flexible for transferring the data to other statistical packages. Six different files for the students and parents according to school categories (i.e. high, medium and low-performing) and two files for teachers and head teachers were created during data entry. The data processing was done by seven people. Finally, data were checked by the team leader of the organisation (Cute Link research Centre, Dhaka) and all the files were merged to create four different data files: student, parent, teacher and head teacher. SPSS was used for descriptive and single level regression analysis, graphical presentation and exploratory factor analysis (EFA). Finally, MLWin, the main of my analysis, was especially used for multi-level analysis.

4.4.2: Transformation of the examination score into normal score

The multi-level analysis was conducted with a continuous variable, in my study the public examination result. The use of continuous variable needed to meet certain statistical assumptions. One of them was that the outcome measure should be normally distributed. In the current study, student prior attainment and academic self-concept followed the assumption of normality. However, the public examination result in the year 2009 in Bangladesh (for selected sample) deviated from the normality assumption, as shown in Figure 4.3. The distribution of students' GPA (grade point) was negatively skewed, where the higher scores were more frequent. In the current study 91.5% of students succeeded in the SSC examination, where 35.5% achieved GPA 5. The highest GPA in the examination was 5.00 (A+ in grade) and the minimum GPA 0.00 (F). The mean of

examination score was 4.07, with a standard deviation of 1.39 and skewness value of -2.05.

a. Academic attainment (prior)

b. Academic self-concept

c. Academic attainment (post)
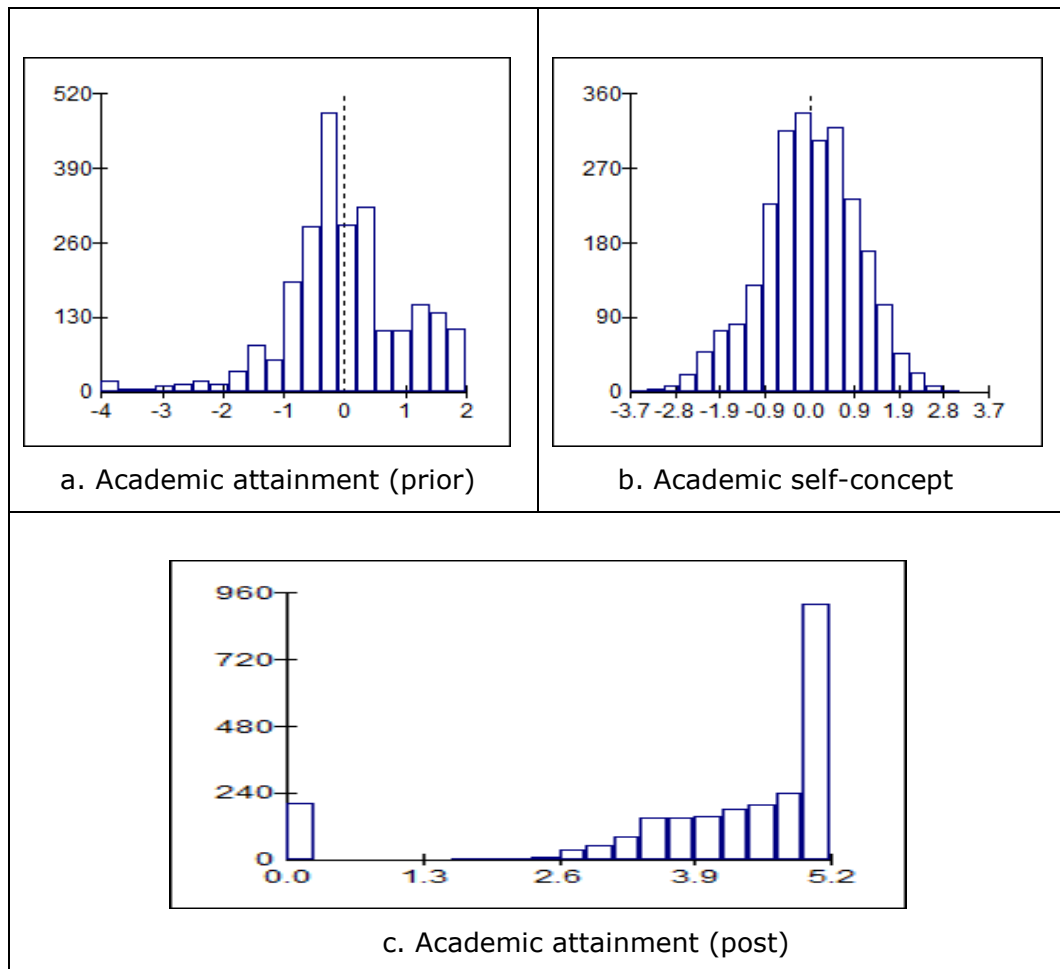
Figure 4.3: Distribution of student academic attainments and academic self-concept

The non-normality distribution of student public examination results can be explained by the nature of the examination system in Bangladesh, research-setting and the category of schools. In the examination system, the test for each subject contained two parts: multiple choice questions (MCQ 50%) and essay type questions (50%). For practical subjects (particularly science subjects), number distributions are 25% for practical, 35% for MCQ and 40% for essay type questions. The target for most students was to achieve 80% by emphasising the MCQ and practical parts. It was also seen that almost all students, particularly from high-performing schools, achieved very good grades (A+) or GPA 5 in the examination, which reduced the discriminative power of the examination. Thus, it was obvious that the number distribution of the test could be one of the main reasons for the 'overproduction' of high achievers in public examination (Verdis,

2002). Another point was that this was the first public examination, which was not only considered as the turning point of the students future career but also the criteria to obtain a place in a good institutions (i.e. engineering university, medical colleges and public universities) in Bangladesh for higher education. Moreover, the current research was only carried out in Dhaka the capital of Bangladesh. If the sample of the schools were selected from the six divisions of Bangladesh rather than from only Dhaka city different distributions of the examination score could be achieved.

In order to deal with the problem of non-normality, one possible way is to transform the original scores to normal score. This transformation assigns the value from the inverse of the standard (0, 1) normal cumulative distribution for the estimated proportion of pupils from the response variable's original distribution (Rasbash *et al.,* 2009; for further details, see also Darlintion, 1997). Different statistical procedures for analysing categorical responses, i.e. for GPA grade in this study, can be used to solve the non-normality problems (for example, Rasbash, 2009; Snijders & Bosker, 1999 and Goldstein 1995c). Firstly, assigning values to the original grade values (i.e. A+=7; A=6; A-=5; B=4, C=3; D=2 and F=0) or assigning values after regrouping the original GPA (high=3, medium=2 and low achiever=1), then these scores could be treated as if they were measurements on a continuous scale. Typically, such assigning values were arbitrary and information may be lost or distorted in the conversion (Rasbash *et al.,* 2009). The grouping of the data was difficult, as it always depends on the researcher's subjective judgment without any standard criteria. Moreover, it was hard for me to make criteria for re-grouping GPA or grade values into high, medium or poor achiever. For example, in my case the tendency was to achieve A-, A and A+ was noticeably higher than B, C, D and F grade and; students who achieved C and D were fewer than students' who obtained F grade or did not success in the examination. For this reason, I did not re-group the original scores. The second case was that, on the basis of probability, an alternative approach (i.e. ordered multi-nominal multi-level analysis) could be followed using the ordered categorical response variables (original grade values, i.e. A+, A, A-, B, C, D, and F). In that case, the interpretation of the findings using more categories would be beyond my current capability. Further, missing data also raises another problem, as the ordered multi-nominal multi-level analysis was not possible with missing data. The missing cases not for only the outcome measure (i.e. post-test GPA score) and some variables had also missing cases (see Appendix 8.9). The problem of missing data could be resolved in two ways: (a) omitting missing data or (b) data imputation. These two methods were avoided for a practical reason.

Omitting the missing data might create the greatest reduction of sample size because missing data on any variable eliminates the entire case (Hair *et al.,* 2005). In the data imputation approach, complex issues were posed for me over their implementation and interpretation. Considering the above disadvantages, the transformation of the original scores to normal score was selected as the most appropriate technique to avoid the non-normality problem. Kept in mind the limitation of ceiling effect of outrcome measure (see also in Chapter 6 in Section 6.2.4), finally I preferred to use continuously distributed normal scores as a beginner of multi-level analysis, following Fergusion & Takane (1989; cited in Verdis, 2002:200) view stated as:

> the analysis of continuously distributed data is always preferred to the analysis of ordered ones because the models that are constructed for continuous and normally distributed variables are much more powerful than the models that are constructed for ordered categories.

4.4.3: Factor analysis

The central aim of factor analysis is to develop 'orderly simplification' (Burt 1940) of several interrelated measures using specific mathematical procedures (Child, 2006). Factor analysis was used in this study to (a) identify representative variables from a much larger set of variables for use in subsequent multi-level analysis; and (b) for creating an entirely new set of variables, much smaller in number or completely to replace the original set of variables (Hair *et al.,* 2005). According to the same authors (*op. cit.: 109*):

> factor analysis provides the empirical basis for assessing the structure of variables and the potential for creating these composite measures or selecting a subset or representative variables for further analysis.

In the current study, exploratory Ffactor analysis (EFA) was conducted. The steps followed for exploratory factor analysis are discussed in the following section.

4.4.3.1. Exploratory factor analysis

Exploratory factor analysis (EFA) was conducted to determine how and to what extent the observed variables were measuring the underlying factors representing the students' family attributes (i.e. parental help in school work) and school processes. Since I had no prior knowledge about the items that represented the factors, the EFA was used to identify the underlying factors. The basic idea was that a number of common factors accounted for the variation of students and teachers answers in questionnaires. The theoretical principles of factor analysis considered in my study were- (a) the level of measurement, (b) the sample size

and (c) the reliability of estimation. The point regarding measurement, sample size and reliability will be discussed in the subsequent paragraphs, since these points are issues of great importance for exploratory factor analysis.

The issue concerning the level of measurement needs some explanation prior to using exploratory factor analysis. The controversy, essentially, evolves around the treatment of ordinally scaled variables as a continuous scale. This is because the ordinal nature of the items in the current study did not present the perfect metric base for a factor analysis to be conducted. Factor analysis requires that the variables used in factor analysis should be at least at the interval level (Stevens, 1946, cited in Kim & Mueller, 1978). Numeric values can be assigned to the ordinal variables without distorting the underlying properties of factor analysis (Kim and Mueller, 1978). Level of categories is also important, as in theory the greatest attenuation occurs, when the variables have less than five categories, which exhibit a high degree of skewness. However, the limitations of categorical data can be resolved if- (a) the sample size is very large (Byrne, 2000); and (b) continuous methods can be used with little worry, when a variable has four or more categories (Bentler and Chou, 1987).

In support of the current study, it can be said that the directional character of the items does not distort the properties of factor analysis and is consistent with the theory. For sample size, my argument is that 2464 students, who constituted the main sample of the current research, implemented the criteria of EFA. In contrast, the teacher sample was adequate, as generally there are no accepted rules on how many observations are sufficient for factor analytic design. Guildford (1956) argued that observation should be a minimum of 200 for factor analysis. Kline (1994a), however, found 200 observations to be a very 'pessimistic' number, although he (*op. cit.*) further indicated that, in data with a clear factor structure, samples even as small as 100 are sufficient. Hair, *et al.* (2005) argued that a researcher should not use factor analysis, when a sample is fewer than 50 observations and preferably the sample size should be 100 or larger. Thus, the sample size of teachers (N=122) was adequate to be used in EFA.

In this study, Cronbach's alpha reliability co-efficients were calculated for evaluating the internal reliability of the items underlying each factor. Cronbach's alpha is related to the mean correlation between each pair of items and the number of items in the scale (Brace *et al.,* 2006:331). As a measure of internal reliability, Cronbach's alpha assumes that there is a true score causing the variance in a set of items. It also assumes that the items are caused by only one underlying construct and that each item measures the underlying construct

equally. Thus, the degree to which the items are correlated is the variance of the true score.

4.4.3.1a.The extraction of the factors

Another issue of great importance for measuring the statistical structure of school effectiveness factors is the initial extraction of the factors. It was mandatory to extract the factors measuring the student level factors and school process factors because I had no prior knowledge about the underlying structure of the factors, as described in earlier section. The factors were extracted using principal component analysis (PCA), which was originally introduced by Pearson (1901) and later independently by Hotelling (1933). The basic idea of using PCA was to describe the variation of a set of multi-variate data in terms of a set of uncorrelated variables, each of which is a particular linear combination of the original variables (Brain & Dunn, 2001:48). Another reason was that it is psychometrically sound procedure and conceptually less complex (Field, 2005).

4.4.3.1b.The rotation of the factors

The rotation of the factors is a procedure to measure their relation to the directly observed variables to be simplified. By adjusting the relations between the factors and the corresponding variables, the factors are given meaning. In EFA, the rotation of the factors is achieved with special mathematical algorithms that help the analyst to choose the most appropriate factors structure from a universe of equivalent factors structure. The most common methods of rotation are orthogonal and oblique rotation. The choice of rotation depends on whether there is a good theoretical reason to suppose that the factors are related to each other or independent. The oblique rotation is probably more meaningful to use in the current study, as there are strong grounds to believe that orthogonal rotation is a complete nonsense for naturalistic data, and certainly for any data involving humans (Field, 2005: 637). No other approach of rotations, i.e. orthogonal rotation was used over oblique roation, since the pre-arranged pattern matrix of the factors, in that case was needed. Thus, I used 'direct oblimin' as a method of oblique rotation and the basic idea behind using 'direct oblimin' is that, if there are definable clustered variables representing the factors would be used in the current study, then each cluster of variables would have near-zero loadings on all the primary factors except one. The approach of oblique rotation used in this study was 'direct oblimin' developed by Jennrich & Sampson (1966).

To summarise, the factor analysis (i.e. EFA) used in the present study focused solely on how, and the extent to which the empirical data (observed variables)

are linked to their underlying factor structures. Final step of the factor analysis was to save the factor scales to be used in further multi-level analysis. The factor scales was constructed with regression method, which is commonly used by the statisticians.

4.4.4: Multi-level analysis

Multi-level modelling was used as the method of analysis, as required by the research objectives. Since the first use of multi-level analysis in School Matters (Mortimore *et al.,* 1988), this approach has been used by a number of SER researchers during the past decades (Plewis, 1997; Sammons *et al.,* 1993; Sammons *et al.,* 1995; Bryk & Raudenbush, 1986, 1989, 1992; Goldstein, 1987, 1995c). If the single-level analysis is used to treat students, ignoring the hierarchical structure of the data and considered they were independent of the class and school group, then we may overlook important relationships and draw erroneous conclusions with biased regression co-efficients and associated standard errors (Rasbash *et al.,* 2009; Snijders and Bosker, 1999; Heck and Thomas, 2000). Thus, the deficiencies of the single-level analysis can be overcome using multi-level modelling techniques, a methodology for the analysis of data with complex patterns of variability, which explicitly models how the students are nested within classes and classes are nested within schools. According to Goldstein (2003, cited in Creemers & Kyriakides, 2008:32), multi-level modelling has several advantages, such as-

- First, multi-level analysis takes into account the existence of hierarchically structured data and the variability associated with each level. As has been mentioned above, imprecision and erroneous conclusions may be drawn if any of these sources of variability is ignored (see also Raudenbush, 1988; Snijders and Bosker, 1999).

- Secondly, multi-level analysis provides a means of partitioning the outcome variables' variance into different levels (within and between units), which enables EE researchers to measure the student, the teacher (i.e. class) and school effects separately.

- Thirdly, it yields better-calibrated estimates for the variance of standard errors.

- Fourthly, it offers a single frame-work that combines the information within and across unit to produce more accurate explanations and outcomes.

- Finally, clustering information provides correct standard error, confidence intervals and significance tests, which are more conservative than the

traditional ones that are obtained simply by ignoring the presence of clustering (see Snijders and Bosker, 1999).

In the present study, the statistical package of MLwin enables more efficient estimates of school differences in pupil attainment. The use of the multi-level linear model in this study involved the longitudinal data with a three-level structures consisting of pupils nested within classes and classes nested within schools (Goldstein, 1995c; Raudenbush & Bryk, 2002). The multi-level approach would allow the determination of the extent to which the observed pattern of relations between the exploratory variables (in different models, including students, classroom and schools characteristics) and the main outcome variables (i.e. academic attainment and self-concept) generalises from school to school. In this study multi-level analysis and multi-variate multi-level analysis were used, in order to answer the four research questions. Some typical equations and their explanations are presented in the following section.

4.4.4.1: Modelling with multi-level analysis

The multi-level analysis started with a simple null model to estimate only the total variances and its components at three levels (i.e. student, class and school), using the well-known 'ordinary least squares' (OLS) technique. In this model, the overall attainment scores of public examination results were regressed on the constant term. The main aim, however, was to estimate the variations between students, between classes and between schools, in order to draw inferences about the variations in student attainment. The model was fitted using the following equation (based on MLWin package 12 version and Rasbash *et al.,* 2009):

$$Y_{ijk} = \beta_{oijk} X_o$$

$$\beta_{oijk} = \beta_o + V_{ok} + U_{ojk} + e_{oijk}$$

Where, subscripts i= student, j=class, k=school, Y_{ijk}=pupil's attainment predicted for the *i*th pupil for *j* class and *k* school (whenever an item has three subscripts *ijk*, it varies from pupil to pupil within class and school); X_o= the intercept (constant with a value of 1 for every pupil); β_o =overall mean attainment, V_{ok} =school level residual, U_{ojk} = class level residual and e_{oijk} = student level residual.

The model can now be expressed as:

$$Y_{ijk} = \beta_o + V_{ok} + U_{ojk} + e_{oijk}$$

Where, *βo* is known as 'fixed part' of the model and V_{ok}, U_{ojk} and e_{oijk} form the 'random part' of the model, whose means are equal to zero. We assume that, being at different levels, these variables are uncorrelated and they follow a normal distribution. Thus, it is sufficient to estimate their variances as σ^2_{vo} = between school variance; σ^2_{uo} = between class variance and σ^2_{eo} = between student variance (i.e. within school variance).

The intra class[30] correlation was given by the formula:

$$\rho = \sigma^2_{uo}/(\sigma^2_{uo} + \sigma^2_{eo})$$

The intra class correlation measured the extent to which the Y (outcome) values of individuals in the same group resemble each other, as compared to those from individuals in different groups. It can also be interpreted as the proportion of the total residual variation that is due to differences between groups and is also referred to as the variance partition co-efficient (VPC) (see Rasbash *et al.,* 2009:28; Goldstein, 2003).

The null model was extended by the inclusion of exploratory variables measured at pupil, class and school levels. A stepwise procedure was used

to build up a more complex model that is one or a group of related variables, which were entered at the same time with the simplest or null models. Levels of significance under the 95% confidence interval were obtained if the estimate was equal to or greater than double standard error (Woodhouse *et al.,* 1995). The purpose of fitting this model was to identify which student, class and school characteristics contribute on academic attainment. The further models were established to add exploratory variables to the following equation:

$$Y_{ijk} = \beta_{oijk}X_o + \beta_1 X_{1ijk} + \ldots\ldots\ldots\ldots\ldots\ldots + \beta_n X_{nijk}$$
$$\beta_{oijk} = \beta_o + V_{ok} + U_{ojk} + e_{oijk}$$

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[30] Where class may be replaced by whatever defines groups

Where, subscripts i= student, j= class and κ=school, Y_{ijk} = outcome variables (academic attainment or academic self-concept), X_{1ijk}........ X_{nijk} = exploratory variable (e.g. prior attainment, gender, age etc.), V_{ok} = school level residual, U_{ojk} =class level residual and e_{oijk} = student level residual, β_o = constant (intercept term), β_1 ... ... β_n = regression coefficient.

For the standard model, it was assumed that the response variable is normally distributed, which is usually written in standard notation as follows:

Y_{ijk}~(XB, Ω)

Where XB is the fixed part of the model and the symbol Ω represents the variances and co-variances of the random terms over all the levels of the data.

4.4.4.2: Multi-variate multi-level analysis

Multi-variate multi-level analysis was used in this study, in order to estimate the interrelationship between academic attainment and academic self-concept. The advantage of such a approach is that it allows the researcher to incorporate a range of different outcomes of interest and provides better estimate of the effect sizes of interventions and their statistical significance (O' Mara *et al.*, 2005, cited in Creemers *et al.,* 2010). In multi-variate analysis, the multi-variate structure was constructed, including multi-variate response data, into a multi-level model by creating an extra level 'below' the original level 1 unit (i.e. student level). Therefore, in this case, the individual student was treated as a level 2 unit and the 'within-student' measurements (i.e. either academic attainment or academic self-concept) as a level 1 unit. The multi-variate estimates are statistically efficient, even where some responses are missing and, in the case where the measurements have a multi-variate normal distribution, IGLS provides maximum likelihood estimates (Rasbash *et al.,* 2009).

The model of four levels case can be expressed by equation as follows:

$$\text{resp}_{1jkl} \sim \text{N}(XB, \Omega)$$

$$\text{resp}_{2jkl} \sim \text{N}(XB, \Omega)$$

$$\text{resp}_{1jkl} = \beta_{0jkl}\text{Cons.normalssc}_{ijkl}$$

$$\beta_{0jkl} = \beta_0 + f_{0l} + v_{0kl} + u_{0jkl}$$

$$\text{resp}_{2jkl} = \beta_{1jkl}\text{Cons.SDQ}_{ijkl}$$

$$\beta_{1jkl} = \beta_1 + f_{1l} + v_{1kl} + u_{1jkl}$$

$$\begin{bmatrix} f_{0l} \\ f_{1l} \end{bmatrix} \sim \text{N}(0, \Omega_f) \; : \; \Omega_f = \begin{bmatrix} \sigma_{f0}^2 & \\ \sigma_{f01} & \sigma_{f1}^2 \end{bmatrix}$$

$$\begin{bmatrix} v_{0kl} \\ v_{1kl} \end{bmatrix} \sim \text{N}(0, \Omega_v) \; : \; \Omega_v = \begin{bmatrix} \sigma_{v0}^2 & \\ \sigma_{v01} & \sigma_{v1}^2 \end{bmatrix}$$

$$\begin{bmatrix} u_{0jkl} \\ u_{1jkl} \end{bmatrix} \sim \text{N}(0, \Omega_u) \; : \; \Omega_u = \begin{bmatrix} \sigma_{u0}^2 & \\ \sigma_{u01} & \sigma_{u1}^2 \end{bmatrix}$$

Where subscripts j= student, k= class and l=school, resp_{1jkl} = pupil attainment score for the jth pupil for k class and l school and resp_{2jkl} = pupil academic self-concept score for the jth pupil for k class and l school, f_{0l} = school level residual for attainment and f_{1l} = school level residual for self-concept, v_{0kl} = class level residual for attainment and v_{1kl} = class level residual for self-concept, u_{0jkl} = student level residual for attainment and u_{1jkl} = student level residual for self-concept, β_o=constant (intercept term) for attainment and β_1= constant for self-concept.

In multi-variate multi-level analysis, there was no level 1 variance specified as level 1 defined the multi-variate structure. The level 2, 3 and 4 variances and co-variances were the (residual) between student, class and school variances respectively.

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4.4.5: Diagnostic for multi-level models

Diagnostics procedure to detect the more or less 'effective' schools is an important part of regression modelling. The schools performing better (i.e. effective) or worse (i.e. ineffective) than expected from their intake were detected, using the residuals estimates with 95% confidence limits (p<0.05).

4.4.6: Summary

This main focus of this chapter was to present a clear picture of the research design of the current study. This chapter was discussed under four different sections. In the first section, I tried to present my argument that reality cannot be ignored in social and educational research. The social and educational researcher concluded that realism should not be confused with naïve realism. That is the view that there is a one-to–one relation between our perception of reality and reality itself. The view of critical theory or constructivism is that the objective existence of reality is also not absolutely true. My view in this regard is that the educational researchers can explore the reality within a certain realm of probability, not undermining the objectivity of the research.

Data were generated from students, parents, teachers and head teachers, where students constituted the main sample. The sizes of the schools and classes were chosen to achieve a representative sample of the student population. The problem of the non-normality of public examination results was caused by the majority of the students' excellent result. The description of exploratory variables and outcome measures (i.e. academic and affective) was also presented subsequently for the reader's comprehension. It was not possible to measure some of the variables directly. Therefore, the factors were extracted by using exploratory factor analysis. Finally, the steps of the multi-level modelling and multi-variate multi-level modelling, with their statistical notation, were presented. Descriptive, chi-square and factors analysis and multi-level models fitted with student outcome measures will be described in the following chapter.

Chapter V

5.1: DESCRIPTIVE ANALYSIS: THE INTERPRETATION OF SCHOOL OUTCOMES AND EXPLORATORY VARIABLES AT STUDENT, CLASS AND SCHOOL LEVELS

This chapter presents the descriptive statistical analysis of the survey data on attainment, students, teachers, head teachers and the schools (see output in Appendix 8.11). The main aim of this chapter is to explore each of the variables included in the survey, in order to appraise their interrelationship and suitability for further statistical analysis. Prior to starting this analysis, special attention was given to issues related to the distribution and multicollinearity (Bryke & Raudenbush, 1992). If any problem appeared, then some solution, for example removing cases or transformation, was needed before proceeding to the next analysis. These kinds of solutions are useful to ensure that the models would provide the best-fit to the data and thus to limit the possibility of misleading conclusions.

5.1.1: Academic attainment

In my study, the overall student attainment scores were obtained at two different points for a group of year ten (X) students, i.e. prior attainment (year nine attainment) and post-test (public examination attainment). The correlation between prior and post attainment scores is shown in Table 5.1.

Table 5.1: Correlation between prior and post attainment

Attainments	N	Mean	SD	Correlation (ρ)
Prior	2462	3.63	0.77	
Post	2390	4.07	1.39	0.54

P<0.01

The distribution of the students' examination scores, GPA in this study, showed that the final attainment scores were not normally distributed due to a strong celling effect in the tests. This problem required attention for the latter analysis (see details about transformation in section 4.4.2). Findings also indicated that the mean and SD of GPA scores were higher for final attainment (4.07/1.39) than for prior attainment (3.63/0.77). The correlation between prior and post academic attainment was found to be 0.54, significant at 0.01 levels, suggesting

some consistency of the student attainment, although this figure might have been expected to be higher given that this was only a 1 year period.

5.1.2: Student level variables

Student level variables, for example, background factors, home learning environment, learning opportunity, parental interest in school work, leisure activities, family structure and family constellation were considered in this study. These variables are described in the following section.

5.1.2.1: Student background factors

There is considerable interest in the extent to which student background factors (i.e. age and gender) are related to student academic attainment (Kyriakides, 2002). SER studies suggest that age differences within a year group affect student academic attainment (Sammons and Smees, 1998a; Mortimore *et al.*, 1988). Gender difference in pupil educational achievement is also identified by a number of SER studies (Gray *et al.*, 2004; Thomas *et al.*, 2001; Sammons and Smees 1998a).

Table 5.2: Student background factors

Variables	Frequency (%)/ Average
Gender: • Boy • Girl • Total	 1395 (56.7) 1067 (43.3) 2462(100)
Age*: • Average • SD • Range • Total	 182.82 11.62 98.10 2459 (100)

* Missing cases (N) =3 (0.1%)

It is important to note that recently, in Bangladesh, the GER estimates in 2006 for girls (48.6%) were higher than for boys (44.3%) and girls' GER[31] grew at a rate of 1.9% per year, while the boys' GER grew at a lower rate of 1.61% per year (Alam, 2008:53). One possible reason for high GSR for girls is the female stipend but this is counter acted by dropout rates, which are higher for girls at secondary education (see details in chapter II). For age, average student was 182.82 months (i.e. just over 15 years) with a range of 98.1 months. This 8 year

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[31] GER=Gross Enrolment Rates

range is a striking feature of the Bangladeshi system. There are clear grounds for including gender and age as an important variable for further multi-level analysis.

5.1.2.2: Home learning environment

There are some evidences that school attainment is related to home learning environment (Shinha, 1993; Kaluge, 1998; Education Watch, 2007 and Strand, 2010). To assess the impact of the home learning environment in my context, information related to study hours outside of school, study place, number of the school prescribed textbooks student have and additional learning materials was collected. The description of each variable is presented in the following Table 5.3.

Table 5.3: Home learning environment

Variables	Frequency (%)
Study time per day: • 1-2 hours • 3-4 hours • 5-6 hours • 7-8 hours or more • Total	 155 (6.3) 836 (34) 1047 (42.5) 424 (17.2) 2462 (100)
Study place at home: • None • Share • Separate • Total	 442 (18) 1481 (60) 539 (22) 2462 (100)
Books at home: • All books • Almost all (7-10) • Few (1-6) • None • Total	 2092 (85) 290 (11.8) 64 (2.6) 16 (0.6) 2462 (100)

Most of the students (76.5%) spent 3 to 6 hours per day on average for study at home. Over 1 in 6 students (17.2%) claim to have spent 7 hours or more for their study. The majority of students share a study place with their siblings at home.

In Bangladesh, students must have to follow the education board prescribed books and the number of textbooks that students have seems to be associated with better educational performance. Most of the students (85%) had all the textbooks. It is important to note that, although the government of Bangladesh distributes free textbooks (Alam and Ahmed, 2008:34) for all students, sometimes these books haven't reached the students.

5.1.2.3: Other educational materials

Students were asked to indicate whether they used other educational materials to support their academic work, apart from textbooks. The responses are shown in Table 5.4.

Table 5.4: Use of additional educational support

Variables	Frequency (%)
Note provided by teacher/coaching: • Yes • No • Total	 1674 (68) 788 (32) 2462 (100)
Guide/Note Book: • Yes • No • Total	 1856 (75.4) 606 (24.6) 2462 (100)
Note from others: • Yes • No • Total	 1008 (40.9) 1454 (59.1) 2462 (100)
Note prepared by the student: • Yes • No • Total	 1092 (44.4) 1370 (55.6) 2462 (100)
Use reference book*: • Yes • No • Total	675 (28.6) 1684 (71.4) 2359 (100)
Encyclopedia**: • Yes • No • Total	 556 (23.6) 1796 (76.4) 2352 (100)
Dictionary***: • Yes • No • Total	 2279 (94.8) 124 (5.2) 2403 (100)
Magazine****: • Yes • No • Total	 299 (12.3) 2126 (87.7) 2425 (100)

Missing cases: *N=103 (4.2%); ** N =110 (4.5%);
*** N= 59 (2.4%) & ****N = 37 (1.5%)

Data on educational materials revealed that most of the students require or make use of different kinds of additional educational materials in order to increase their academic performance. Moreover, the tendency of using teacher/coaching notes, dictionary and guides or book of notes by the students was noticeably higher which is interesting given that the education department and schools discourage the use of teacher/coaching notes and guides or book of notes.

5.1.2.4: Learning opportunity

In line with the SER literature, student academic attainment is influenced by available learning opportunities (Kyriakides, 2005; de Jong *et al.*, 2004; Trautwein *et al.*, 2002; Kyriakides *et al.*, 2000). Variables related to learning opportunity were- access to a computer, private tutor or coaching centre, newspapers and subject study with private tutors or coaching centre, which are discussed as follows.

Table 5.5: Learning opportunities available for the student

Variables	Frequency (%)
Access to computer:	
• Computer with internet	161 (6.7)
• Computer	821 (34)
• None	1429 (59.3)
• Total	2411 (100)***
Private tutor/coaching:	
• Private tutor	509 (20.7)
• Coaching	758 (30.8)
• Both*	1137 (46.1)
• None	58 (2.4)
• Total	2462 (100)
Subjects study **:	
• Core	
• Group	523 (21.7)
• Core and group	119 (4.9)
• All	1148 (47.7)
• Total	615 (25.6)
	2405 (100)****
News Paper:	
• Yes	1550 (63)
• No	912 (37)
• Total	2462 (100)

Note: * Both = Private tutor and coaching;
Subjects = Core/Group subject (all or some), Core and group (some).
Missing N=*** 51 (2.1); **** 57 (2.3)

Access to a computer at home is quite limited. Much more important are private tutoring and coaching. Coaching centers are now playing a controversial role in the education system of Bangladesh. Parents are paying considerable sums of money for coaching or private tutors in order to ensure good academic results for their child (Verdis, 2002; Education Watch, 2008). From an economic and cultural perspective, the role of coaching centre and private tuition can be considered as a parallel activity to schools. An attempt had been taken to explore the impact of coaching centre and private tutors on student attainment in the Bangladeshi setting. Almost half of the students (46.2%) in the sample reported that they had both a private tutor and coaching. A large proportion of the students (36.8%)

stated that they only use coaching facility. This is probably the fees for some coaching centers are less than for private tutors. The percentage of the students (20.7%), who had the opportunity of private tutor only, was also noticeable. So, it is difficult to predict how these factors might affect school performance. This practice is increasing in Bangladesh and in 2008, as found from the survey report, 38% of the primary school students availed such tutoring at home or the private tutors' home or in the coaching centres (Education Watch, 2008:32). This does have implications for my modelling of school effectiveness as it seems that this extra coaching might be influential but is only included at the individual level in any modelling. Future studies might need to take account of the relative influence of school and private instruction on final outcomes.

Another indicator of learning opportunity explored in this study was access to newspapers. It is notable that in Bangladesh, some newspapers provide an educational section with good examination preparation for primary and secondary students. About two thirds of students reported that their parents subscribe to or often (at least once a week) buy a newspaper or educational magazine at home.

5.1.2.5: Leisure activities and extracurricular activities

Leisure activity refers to engagement in recreation. One of the leisure activities considered in this study is watching television. Extra-curricular activities (e.g. reading, involvement in sports and cultural activities) play a vital role in children's overall development.

Table 5.6: Spending time on leisure activity

Variables	Frequency (%)/ Average
Time spend on watching TV per day: • Not watch • 1 hour or less • 2-3 hours • 4 hours-more • Total	344 (14) 878 (35.7) 1041 (42.3) 199 (8) 2462 (100)
Extracurricular activity*: • Yes • No • Total	1572 (65.1) 841 (34.9) 2413 (100)

Missing: N= 49 (2.0%)

The findings revealed that almost half of the students in the sample spent time on average 2 to 3 hours a day watching TV (42.3%) and for extra-curricular activities, most parents encourage their children's involvement in extra-curricular activities (63.9%). From the findings, it is difficult to predict whether they are suitable predictors for students' educational performance.

5.1.2.6: Family constellation

Family constellation refers to a set of variables, such as: family type, number of siblings, birth order and family structure.

Table 5.7: Information related to student's family constellation

Variables	Frequency (%)/Average
Family type (1): • Joint • Nuclear • Single* • Total	 191 (11) 1399 (80.5) 147 (8.5) 1737 (100)
Number of siblings (2): • Average • SD • Range • Total	 3.04 1.51 9 1754 (100)
Birth order (3): • Average • SD • Range • Total	 2.05 1.33 9 1734 (100)
Family structure (4): • Laissez faire • Democratic • Autocratic • Total	 62 (2.6) 1111 (46.5) 1214 (50.9) 2387 (100)

Note: * Single=either father or mother

(1) Missing N = 20 (1.1%); Not respond (N) = 705 (28.3%); Total missing (N)=725 (29.4%)

(2) Missing N = 4 (0.2%); Not respond (N) = 704 (28.6%); Total missing (N) =708 (28.8%)

(3) Missing N = 26 (1.5%); Not respond (N) = 702 (28.1%); Total missing (N) =728(29.6%)

(4) Missing N = 75 (3.0%)

In Bangladesh, three family types are generally common. The joint family is traditional but normally found in rural areas, though a few joint families can be seen in urban areas. The findings reflect the culture of Bangladesh, where most of the small or nuclear families (56.8%) dwell in the city. The average number of siblings was about 3. In Bangladesh the family structure is traditionally more autocratic, although this pattern is changing over time particularly in urban areas. The findings reflect the changes of the family structure pattern in Bangladesh and this might account for the parents' education and their changes in attitude to education. It is hard to say whether family related variables have any influence on student academic performance but they are interesting in terms of what they say about the social stratification.

Many of the variables described above seem to be potentially useful exploratory variables, often reflecting the SES of the students and their families. It would be helpful to know whether they might be useful for modelling. The pattern of associations between outcome measure (i.e. post-attainment) and student level exploratory variables were explored. Some of the variables seem vary considerably in relation to actual grade and they can be considered for further multi-level analysis. The significant association found for the variables with examination scores are summarised in Table 5.8. (see details output in Appendix 8.11.1). The associations of outcome measure with student gender and age were not significant at initial test of significance. After that I wished to include student gender and age in modelling with other background factors.

Table 5.8: Associations between student outcome (SSC score)
and student level exploratory variables

Variables	Chi-square value	df	Mean	SD	Total (%)	Missing cases (%)
Gender*	0.51	6	4.07	1.39	2390 (97.1)	72 (2.9)
Age*	20.12	18	4.07	1.39	2378 (96.6)	84 (3.4)
Study time	226.88	18	4.07	1.39	2390 (97.1)	72 (2.9)
Study place	898.13	12	4.07	1.39	2390 (97.1)	72 (2.9)
No. of books	116.44	18	4.07	1.39	2390 (97.1)	72 (2.9)
Teacher/coaching note	49.40	6	4.07	1.39	2390 (97.1)	72 (2.9)
Note from others'	69.30	6	4.07	1.39	2390 (97.1)	72 (2.9)
Note prepared by student	76.01	6	4.07	1.39	2390 (97.1)	72 (2.9)
Use reference book(s)	56.23	6	4.05	1.40	2289 (93)	173 (7.0)
Encyclopedia	260.33	6	4.09	1.37	2284 (92.8)	178 (7.2)
Dictionary	45.52	6	4.09	1.39	2336 (94.9)	126 (5.1)
Computer at home	289.37	12	4.07	1.39	2344 (95.2)	118 (4.8)
Private tutor/coaching	75.43	18	4.07	1.39	2390 (97.1)	72 (2.9)
Subject study with private tutor/coaching	155.72	18	4.08	1.39	2336 (94.9)	126 (5.1)
Newspaper at home	228.56	6	4.07	1.39	2390 (97.1)	72 (2.9)
Extra-curricular activities	40.65	6	4.09	1.38	2344 (95.2)	118 (4.8)
Family structure***	28.16	12	4.11	1.36	2319 (94.2)	143 (5.8)
Family type **	32.73	12	4.11	1.36	1689 (68.6)	773 (31.4)
No. of siblings	167.37	18	4.10	1.36	1706 (69.3)	756 (30.7)
Birth order	169.66	54	4.11	1.36	1687 (68.5)	775 (31.5)

Note: * p< 0.998 and P<0.326 respectively; **P<0.001; *** P<0.005; Rest= P<0.000;

Parentheses represent percentage of the scores.

5.1.3: Class level variables

Teacher characteristics, qualifications, experience, job rank, salary level, educational training, in-service training and teacher pedagogy, (i.e. time spend on lesson plan and home work) were considered as class level variables in this study. The findings are described in the following section.

5.1.3a: Teacher characteristics

Table 5.9 presents frequency distribution of the 122 teachers of the sample. The table shows the common situation of Bangladesh, whereby the number of male teachers is noticeably higher than females at secondary level, though the females are higher at primary level compare to secondary schools but lower than their counterpart (see BANBEIS website).

Table 5.9: Teacher characteristics

Variables	Frequency (%)/Average
Gender: • Male • Female • Total	 83 (68) 39 (32) 122 (100)
Age: • Average • SD • Range • Total	 44.60 9.04 35.75 122 (100)

In support of the findings, it can be said that for women, looking after the family and child rearing are the social norm in Bangladeshi society although this situation is changing. Educated women from culturally well-off families, particularly in urban areas, are now enjoying a professional life. Government also implemented the programme PROMOTE (Programme to Motivate, Train and Employ Female Teachers in Rural Secondary Schools) to increase the empowerment of women, particularly by promoting and accelerating the recruitment of female teachers in rural non-government schools (see also Chapter I). Teacher age appeared to be varied over a wide range at over 35 years and the youngest teachers can be regarded as the novice and the oldest teacher as near to retirement or they join in school after their retirement. It is important to note that in Bangladesh, as most of the schools are run privately and some newly established schools are run by recently retired older teachers.

5.1.3b: Teacher qualifications and experience related information

Teacher qualifications and their teaching related information was collected, in order to assess their impact on student attainment. As shown in Table 5.10, the findings indicated that the teachers varied in terms of their qualifications, teaching experience, training (either on pedagogy or in-service), their teaching status and salary level. Majority of the teachers (67.2%) completed a post-graduate degree, which is in line with the finding of Alam (2008) and the rest had

graduate (27.9%) or other type of degree, i.e. M Phil (4.9%). In term of teaching experience, the average teaching experience of teachers was 16.98 years varying with a wide range at over 43 years, from 1 year to 44 years.

Table 5.10: Information related to teacher
qualifications and experience

Variables	Frequency (%)/Average
Educational qualification* • Graduate • Post-graduate • Others • Total	 34 (27.9) 82 (67.2) 6 (4.9) 122 (100)
Educational training**: • M. Ed • B. Ed • C in Ed • None • Total	 37 (30.3) 66 (54.1) 1 (0.8) 18 (14.8) 122 (100)
In-service training***: • Yes • No • Total	 88 (75.9) 28 (24.1) 116 (100)
Job rank****: • Assistant teacher • Senior teacher • Junior teacher • Total	 49 (40.49) 70 (57.85) 2 (1.65) 121 (100)
Teacher income: • 5,000 or less • 5,001-10,000 • 10,001-15,000 • 15,000 or more • Total	 14 (11.45) 65 (53.27) 30 (24.59) 13 (10.65) 122 (100)
Teaching experience: • Average • SD • Range • Total	 16.98 9.68 43 122 (100)

Note: * Graduate= B.A/B. Sc/B. Com; Post-graduate=M. A/M. Sc/M. Com
& Other= M. Phil etc. ** M. Ed= Master in Education; B. Ed= Bachelor
of Education; C in Ed= Certificate in Education; *** Missing N=6 (4.9%);
***** Missing N= 1 (0.8%)

It is quite interesting that the percentage of teachers who had B.Ed degree was higher than the teachers who had an M.Ed degree. The school authority pays their attention only to this degree, so teachers are not motivated to obtain another degree on pedagogy. Findings also indicated that 14.8% of teachers had not yet received any training on education and almost a quarter (24.1%) of the

teachers had no in-service training. It is important to note that the MoE[32] in Bangladesh has placed emphasis on pre-service and in-service training on pedagogy in primary and secondary educations to secure quality in education. Teaching Quality Improvement in Secondary Education Project (TQI-SEP) is a very promising project in Bangladesh, which started in 2005. The aim of this project is to address the long-felt demand for training on education and in-service training, as there is a great dearth of subject teachers, particularly for mathematics, science and English language (Alam, 2008).

For job rank, the highest proportion of teachers (57.4%) was senior teachers. There are clear variations in teacher salary levels. For most of the teachers, the salary range was between 5,000 to 15,000 TK (53.3+24.6=77.9%), though a small number of the teachers had high (10.7%) and low (11.5%) range of salary respectively. The variation in teachers' salary may be for their rank position. Another reason may be, as in Bangladesh, most of the schools are run privately, with a partial government subsidy and therefore, the schools do not follow the same salary structure.

5.1.3c: Teacher Pedagogy

A number of pedagogy-related variables were included in this study to investigate the use of pedagogy inside and outside of the classroom, i.e. which instructional strategies are used, how often do they assign homework, how much time do they spend for preparing lesson plan and correcting homework outside of classroom. Findings related to instructional strategy are discussed in later section (see factor analysis in section 5.3.2.1). Findings on lesson plan and home work are presented in Table 5.11 as follows.

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[32] MoE =Ministry of Education

Table 5.11: Information related to lesson plan and home work

Variables	Average/ Frequency (%)
Lesson planning (hour per week):	
• Average	1.83
• SD	1.54
• Range	6
• Total	122 (100)
Correcting home work (hours in per week):	
• Average	1.62
• SD	0.65
• Range	2
• Total	122 (100)
Assign homework:	
• Everyday	35 (28.7)
• Frequently	61 (50)
• Sometimes	26 (21.3)
• Total	122 (100)

Most teachers spent more than one hour in a week for checking homework and two hours for preparing lesson plans. The lesson plan is a vital part of the teaching process but few teachers of high performing school said (verbally to the researcher, not on the questionnaire), they do not use lesson plans in a formal way. They prepare lesson plans in an informal way with a mental plan. Data on homework reveals that, in total, 50% of teachers assign homework frequently, while a significant percentage of teachers assigned homework every day (28.7%) and sometimes (21.3%) respectively. It is important to note that some teachers also asserted (verbally, not on questionnaire) that they place more attention on homework for the junior classes rather than this level (grade nine and ten). At this stage, they place more emphasis on preparing the students' for the public examination by frequent model tests, pre-test and test.

5.1.3d: Classroom context

In this study, class size was considered as classroom context. It is evident that smaller classes should lead to improvement in the quality of education that children experience (Bennett, 1996), whilst the opposite picture can be found in Bangladesh, as shown in Table 5.12. Although the government rule for class size is 33, the schools are not all following this rule, owing to the demands of shortage of school places considering the size of the population. To provide education for all children to achieve the millennium goal of this century, schools are running

with a large number of students. Moreover, to reduce the pressure of this large student population, most of the schools operate two shifts.

Table 5.12: The classroom context

Variable	Average
Class size: • Average • SD • Range • Total (%)	54.15 12.68 60 120 (100)

Missing cases (N) = 2 (1.6%)

The relationship of class level variables

Bi-variate analyses were conducted to identify the pattern of associations between outcome measures (i.e. academic attainment) and class level exploratory variables. The main intention to examine these associations was to assess their suitability for further multi-level analysis. The significant associations found from bi-variate analysis are summarised in Table 5.13 with mean and SD of outcome measures for each of the exploratory variables (see details output in Appendix 8.11.2). The significant associations indicated meaningful relationships between factors and outcomes and therefore, the variables might be worth including in subsequent modelling. In general the correlations are not high but they are mostly significant.

Table 5.13: Bi-variate by student outcome (SSC score)
and class level exploratory variables

Variables	Correlation	Mean	SD	Total (%)	Missing cases
Gender	0.12	4.06	1.41	2308 (93.7)	154 (6.3)
Age*	0.04	4.07	1.39	2390 (97.1)	72 (2.9)
Lesson plan	0.33	4.07	1.39	2390 (97.1)	72 (2.9)
Assign homework	0.06	4.07	1.39	2390 (97.1)	72 (2.9)
Time spent on homework	0.27	4.07	1.39	2390 (97.1)	72 (2.9)
Qualifications	0.14	4.07	1.39	2390 (97.1)	72 (2.9)
Experience	0.13	4.07	1.39	2390 (97.1)	72 (2.9)
Job rank	0.11	4.07	1.39	2390 (97.1)	72 (2.9)
Salary	0.30	4.07	1.39	2390 (97.1)	72 (2.9)
No of student	0.23	4.07	1.39	2390 (97.1)	72 (2.9)
Conventional teaching approach	0.51	4.07	1.39	2390 (97.1)	72 (2.9)
Participatory teaching approach	-0.27	4.07	1.39	2390 (97.1)	72 (2.9)
Communication	-0.31	4.07	1.39	2390 (97.1)	72 (2.9)
Teacher engagement in work	-0.061	4.07	1.39	2390 (97.1)	72 (2.9)
Leading professional	0.49	4.07	1.39	2390 (97.1)	72 (2.9)
Administrational facility and support	0.34	4.07	1.39	2390 (97.1)	72 (2.9)
Administrational expectation	-0.19	4.07	1.39	2390 (97.1)	72 (2.9)

Note: a. $p < 0.01$;   *$P < 0.05$; b. Parentheses represent percentage of the scores.

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5.1.4: School level variables:

School context refers to school conditions (i.e. total number of teachers, number of trained teachers, the teacher-student ratio, teacher-parent meeting and school category) and resources (i.e. laboratory facility, number of books in the school library). School variables included head teacher characteristics and these are discussed in the following section.

5.1.4a: Head teacher characteristics:

Data about head teachers included their personal, educational and professional characteristics. Table 5.14 presents the frequency distribution of gender and average age of head teacher. Two thirds of the head teachers were male which is similar to the gender balance of teachers. The average age of the head teacher was 52.5 years

Table 5.14: Head teacher characteristics

Variables	Frequency (%)/Average
Gender:	
• Male	30 (66.7)
• Female	15 (33.3)
• Total (%)	45 (100)
Age*:	
• Average	52.53
• SD	6.04
• Range	23.39
• Total (%)	44 (100)

* Missing N=1 (2.2%)

5.1.4b: Information related to head teacher qualifications and experience

Table 5.15 shows that the majority of the teachers completed a post-graduate degree (71.1%) followed by graduation degree (24.4%). In Bangladesh head teachers also need their degree on pedagogy along with their tertiary level education. Findings show that 11.4% teachers did not have any training on pedagogy. This might be because some of the good quality schools are run by head teachers from the defense department and some government schools appointed head teachers directly from the Bangladesh Cadre Service (BCS) after their BCS examination.

Table 5.15: Head teacher's qualifications and experiences

Variables	Frequency (%)/Average
Educational qualification*:	
• Graduate	11 (24.4)
• Post-graduate	32 (71.1)
• Others	2 (4.4)
• Total (%)	45 (100)
Educational training**:	
• M. Ed	16 (36.36)
• B. Ed	23 (52.27)
• None	5 (11.36)
• Total (%)	44 (100)
Teaching experience:	
• Average	26.07
• SD	7.60
• Range	28
• Total (%)	44 (100)
Experience as head:	
• Average	12.16
• SD	8.20
• Range	27
• Total (%)	44 (100)

Note: * Graduate= B. A/B.Sc./B.Com; Post-graduate=M. A/M. Sc./M. Com
& Other= M. Phil etc. ** M. Ed= Master in Education; B. Ed= Bachelor of
Education; C in Ed= Certificate in Education.
Missing cases: (N) = 1 (2.2%) for three variables.

The findings indicated that the heads had teaching experience of between 10 to 38 years (i.e. range=28). As with teaching experience, variation with a wide range was found for experience as head variable, where the shortest tenure of head teacher was 1 year and highest was 28 years.

5.1.4c: School context

Schools in the survey had an average of almost 50 teachers. For number of trained teachers, average was 38 and average students in the sample schools were 1580.

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Table 5.16: Information related to school context

Variables	Average/Frequency (%)
Number of teachers:	
• Average	49.76
• SD	28.49
• Range	151
• Total schools (%)	45 (100)
Trained teachers*:	
• Average	38.30
• SD	24.82
• Range	151
• Total schools (%)	44 (100)
Total students:	
• Average	1580.04
• SD	1023.32
• Range	4200
• Total schools (%)	45 (100)
Teacher-student ratio:	
• Average	31.20
• SD	7.49
• Range	30
• Total schools (%)	45 (100)
Total books at library:	
• Average	2515.18
• SD	4178.84
• Range	26000
• Total schools (%)	45 (100)
Laboratory facility:	
• No	4 (8.9)
• Yes, not good	22 (48.9)
• Yes, with modern equipment	19 (42.2)
• Total schools (%)	45 (100)
PTA meeting:	
• Once (in month)	6 (13.3)
• Once/twice (in six month)	18 (40)
• Once/twice (in a year)	21 (46.7)
• Total schools (%)	45 (100)
School category (based on performance):	
• High	1077 (43.7)
• Medium	845 (34.3)
• Low	540 (21.9)
• Total students (%)	2462 (100)

*Missing (N) =1 (2.2%)

Data on school resources, that is, books in the library, showed wide variation. Laboratory facilities are considered an important factor for academic progress in science. Over 90% of the schools had a laboratory, nearly half of these including modern equipments. A considerable variation was found in PTA meeting. The schools arrange PTA meetings after every monthly or term examination to provide feedback to the parents about their children's progress. It is important to note that, few head teachers said (not on the questionnaire) that many parents never attend in a meeting and sometimes they send home tutor as their representative.

The relationship of school level variables

The pattern of associations between outcome measure and school level exploratory variables was examined to assess their suitability for further analysis. The significant associations found from the test are given in Table 5.17 with mean and SD of outcome measure for each of the exploratory variables (see details output in Appendix 8.11.3). The significant association indicated that they could be accounted for multi-level analysis.

Table 5.17: Chi-values by student outcome (SSC score)
and school level exploratory variables

Variables	Chi-Value	df	Mean	SD	N (%)	Missing Case (%)
Gender	64.80	6	4.07	1.39	2390 (97.1)	72 (2.9)
Age	233.52	24	4.08	1.38	2378 (96.6)	84 (3.4)
Qualifications	270.59	12	4.07	1.39	2390 (97.1)	72 (2.9)
Teaching experience	368.83	24	4.06	1.40	2348 (95.4)	114 (4.6)
Experience as head	247.21	18	4.06	1.40	2348 (95.4)	114 (4.6)
Training in pedagogy	131.43	12	4.09	1.37	2372 (96.3)	90 (3.7)
Total teacher	648.76	24	4.07	1.39	2390 (97.1)	72 (2.9)
Total student	828.82	24	4.07	1.39	2390 (97.1)	72 (2.9)
Teacher-student ratio	202.54	18	4.07	1.39	2390 (97.1)	72 (2.9)
Laboratory facility	396.25	24	4.07	1.39	2390 (97.1)	72 (2.9)
PTA meeting	521.369	12	4.07	1.39	2390 (97.1)	72 (2.9)
Books in library	967.60	18	4.07	1.39	2390 (97.1)	72 (2.9)
Total trained teacher	456.92	12	4.09	1.38	2351 (95.5)	111(4.5)
School category	1263.33	12	4.07	1.39	2390 (97.1)	72 (2.9)

Note: a. P<0.000; b. Parentheses represent percentage of the scores.

To summarise, this section presented a descriptive analysis of student, class and school related variables in the survey. In general, student home learning variables, learning opportunity and family constellations were potential variables at student level. At class level, teacher characteristics, such as: gender, age, qualifications, teaching experience, job rank, salary, class size and pedagogy used in the classroom (i.e. lesson plan, assign homework and time spend on homework) were found to be as potential predictors for student academic performance. Variables related to school level, i.e. head teacher characteristics and school context were also explored. However, the significant association between outcome measure and exploratory variables indicated that these variables could be added in the analysis of hierarchical modelling. In the next section, student SES and its association with learning opportunity of students and school category will be presented.

5.2: CHI-SQUARE ANALYSIS TO EXPLORE THE ASSOCIATION BETWEEN SOCIO-ECONOMIC STATUS AND HOME LEARNING OPPORTUNITY AND SCHOOL CATEGORY

The educational attainment of the students in Bangladesh, as elsewhere, depends on their socio-economic status. The main focus of this section is to explore the pattern of associations between students' socio-economic status and learning opportunities (i.e. access to a computer at home, private tutors or coaching facilities); and the category of the school students are attending.

I used chi-square test to construct two way contingency table in order to test the association between student's socio-economic status and the variables (i.e. learning opportunity and school category), used in the current study. It is important to note that the value of the chi-square test only conveys the existence of or non-existence of the relationship between the variables investigated but does not provide evidence of the strength of the association. Therefore, additional statistics, such as phi, Cramer's V, or a contingency co-efficient are used to establish the extent and nature of the association (Brockopp & Hastings, 2003). In this study, the strength of association was measured, using Cramer's V co-efficient. The observed and expected values with adjusted residuals for each of the variables can be seen in Appendix 8.12.

5.2.1: Socio-economic status and learning opportunity

The extent of learning opportunities is a key factor for achieving good academic outcome and this opportunity largely depends on family's SES. It was hypothesised that using private tutors or coaching centre likely to be associated with student's SES. No study, however, has yet been carried out in Bangladesh to investigate this hypothetical association. Hence, the current study has attempted to present some evidence of the strength of association between SES and student's access to private tutors or coaching centre and access to educational resources e.g. a computer at home.

Firstly, I tested the hypothesis that there is no relation between student SES and access to a computer at home. In order to test the statistical significance, a two-way contingency table was constructed, as shown in Table 5.18.

Table 5.18: Chi-square and Cramer's V values by student
SES and access to computer

| Variables | Value | | Total (N) | df | Significant |
	Chi-Square	Cramer's V			
Access to computer SES	198.35	0.242	1697	8	0.000

Total missing cases (N) = 765 (31.1%); actual missing cases (N) =78 (4.4%)
& did not respond (N) = 687 (26.7%)

The data revealed that having access to a computer at home was not independent from students SES. It was established that students' access to a computer at home is significantly associated with their background factors.

It is very common feature in Bangladesh that parents pay huge amounts of money to provide private tutors or coaching facilities to support their children. The educated parents are more likely to be economically better-off and they are more likely to look after their children's education and/or provide private tutors (Nath 2008:122). Accordingly, in this study, I tried to examine the association between student SES and opportunity of learning (i.e. the opportunity of private tutor, coaching facility, both of the facilities or none of the facilities), provided by the parents' for their children's good academic performance. The hypothesis that student background factor is independent from providing the opportunity of having a private tutor was tested, using the chi-square statistics. The findings of the test are shown in Table 5.19.

Table 5.19: Chi-square and Cramer's V values by student
SES and private tutor/coaching facility

| Variables | Value | | Total (N) | df | Significant |
	Chi-Square	Cramer's V			
Private tutoring facility SES	26.91	0.072	1732	12	0.008

Total missing cases (N) = 730 (29.7%); actual missing cases (N) = 43 (2.4%)
& did not respond (N) = 687 (27.3%)

The result indicated that student SES was strongly associated with the opportunity for a private tutor or coaching facility. Importantly, year nine and ten are deemed as a very critical moment for students' life, because it is the foundation of their future career. Parents are, therefore, more likely to provide extra educational support, such as a private tutor, coaching or both of the facilities for each of the school subjects for better attainment in the public examination. It is important to note that, the study was carried out only in the

largest metropolitan city, different results might have emerged if rural or disadvantaged areas were also considered in this study.

5.2.2. Socio-economic status and school category

Many parents assume that there is an academic benefit with their child attending a good quality school, as the student's aspirations and subsequent school attainment are typically higher in these schools. Parents, particularly in urban areas in Bangladesh, are increasingly concerned to find a place in a high-performing school. There is no empirical evidence in Bangladeshi context that has explored the association between SES and attending in different categories of schools. The chi-square test, as given in Table 5.20 indicated a statistically significant association between the two variables.

Table 5.20: Chi-square and Cramer's V values by student
SES and school category

Variables	Value		Total (N)	df	Significant
	Chi-Square	Cramer's V			
School category SES	539.09	0.39	1732	8	0.000

Total Missing cases (N) = 730 (29.7%); actual Missing cases (N) = 43 (2.4%)
& did not respond (N) = 687 (27.3%)

This suggests that 15.2% of the variation in frequencies of school category was explained by students' social background. It is, therefore, concluded that students' enrolment in different categories of schools was not independent from their SES.

The conclusion of the current section is that access to 'cultural goods' or learning opportunities (Rego and Sousa, 1999, Verdis 2002) and school category were strongly associated with students' socio-economic status (see Young, 1998). The sizeable and statistically significant associations found in all cases implied that the associations of access to educational facilities and school category with SES are likely to affect students' subsequent attainment. In the next chapter, scales and exploratory factor analysis will be described to explore the underlying dimensions of the students and teachers responses.

5.3. SCALES AND EXPLORATORY FACTOR ANALYSIS: For Exploring the Underlying Dimensions of the Student and Teacher Responses

In this section the construction of scales and exploratory factor analysis of the survey data are discussed. Data reduction techniques are used to explore possible underlying dimensions in students' responses and to establish whether robust scales for academic self concept, socio-economic status, parental interest in school work and teacher's interaction with their student can be identified to use in later modelling. The same techniques were used to explore the underlying structures of the teachers' responses to establish whether the scales designed into the research instruments did give statistically robust factors. It is important to note that following Kaiser's criterion, only factors with an eigen-value greater than one will be used in this study as factor. The sampling adequacy assumptions for factor analysis with the preliminary analysis were determined before conducting EFA by dimension reduction procedure with SPSS. The values of the sampling adequacy assumptions of factor analysis can be found in Appendix 8.13. Moreover, the oblimal rotation procedure was used to extract the factors, as it is believed that the factors are not independent from each other.

5.3.1. Student level variables

5.3.1.1. Academic self-concept

Self-concept has been found to be related to student academic achievement and teacher effectiveness research indicates that certain classroom environments tend to enhance both aspects (Hattie, 1992:197; cited in Young, 1998:395). In the current study, the academic components of the scale developed by Marsh (1992) had been the focus of attention. I included one component of the Marsh Self Description Questionnaires (SDQ II), designed to measure adolescents' academic self-concept (*op. cit.*). In this study, the scale comprises ten items intended to measure the students' perception of their academic ability and potential to be successful at school (Young, 1998:395). The items description of the academic self-concept scale and scale reliability are described below in Table 5.21.

Table 5.21: Items description and scale reliability of
academic self-concept scale

Item no	Items descriptions	Scale reliability
SDQ1	People come to me for help in most school subjects.	
SDQ 2	I am too stupid at school to get into a good university.	
SDQ 3	If I work really hard, I could be one of the best students in my school year.	
SDQ 4	I get bad marks in most school subjects.	0.80
SDQ 5	I learn things quickly in most school subjects.	
SDQ 6	I am stupid at most school subjects.	
SDQ 7	I do well in tests in most school subjects.	
SDQ 8	I have trouble with most school subjects.	

N=2462; School=45

 The internal correlations for item 9 and 10 were noticeably low, i.e. <3 (see Appendix 8.14). These two items were eliminated from the final scale for their low values. Finally, eight items of the highly-regarded Self-Description Questionnaire II formed a robust scale for academic self-concept. It is expected that these eight items can represent student academic self-concept properly, since Marsh (2004) used only three items in his Big Fish Little Pond Effect (BFLPE) project to assess student academic self-concept. The internal consistency of the academic self-concept scale (α =0.80) was significantly reliable implying that the scale is satisfactorily defined by the items. That is, the items of the scales are correlated and consistent in meaning.

5.3.1.2: Parental interest in school work

Parental interest in the child's school work is considered an integral part of the home learning environment that has significant influence on students' learning outcomes (Sammons *et al.*, 1995; Sui-Chu & Willms 1996; Desforges & Abouchaar, 2003 and Strand, 2010). This variable is used as separate pre-determined factor consisting of items that represent how parents helped the child with homework and study; whether they discussed the school related work; and how they rewarded their child for good academic performance.

Table 5.22: Item base description of parental interest in school work

Item no	Items descriptions	Factor loading	Communalities (h²)	Cronbach's Alpha
7R	How often do your parents talk to you about your school or school work?	0.703	0.494	0.347
8	How many hours does your father help you in your studies per week on average?	0.699	0.489	
9	How many hours does your mother help you in your studies per week on average?	0.486	0.236	
12	What do your parents (or others at home) do, when you achieve a good result at your school examination?	0.420	0.177	

Note: 7R = Recoded this item; N=2462; School=45

Four items were used for factor analysis excluding item no 10, as shown in Table 5.22. The findings show that out of four items, two indicators had significant loading and rest two had reasonable loading, ranging from 0.420 to 0.486. Further, the communalities of two items out of four were very low, though communalities were reasonably acceptable for item no 7R and 8. The internal consistency was also remarkably low for the four indicators (0.347). The conclusion is that the underlying dimension of items related to parental interest in school work neither constituted a factor nor a valid scale, which could not be considered for further analysis. On reflection, item 12 is quite different from the other two as it has more to do with reward than support and this might be the reason for this lack of consistency. However, the two indicators (i.e. item no 7R and 8) regarding parental interest in school work might be useful in multi-level analysis.

5.3.1.3: Teacher's interaction with their students

In the SER literature, effective teacher support and constructive feedback have positive implications for teaching and learning (Bennetts, 2005; Brookhart, 2004). In the current study, student's perception of teacher interaction with them was measured, asking the students whether the teachers help and praise them, encourage them to obtain good results, give feedback for their quality of work and teachers treat them well. Item no. 24 was excluded from the scale as it showed negative and low correlation (see Appendix 8.14). Finally, eight items formed a robust scale for representing teacher's interaction with their students.

Table 5.23: Items description and scale reliability
of teacher's interaction with their students

Item no.	Items descriptions	Scale reliability
16	The way teachers treat me is fair.	
17	Teachers praise me when I work hard.	
18	If I do not do my homework, the teachers notice it.	
19	Teachers help me to understand my lesson.	0.826
20	Teachers listen to what I say.	
21	Teachers encourage me to perform well.	
22	In my view teacher given home work is useful.	
23	Teachers give me feedback about the quality of my work.	

N=2462; School=45

The internal consistency was significantly high (α =0.826). Thus, the dimension of teacher's interaction composed of eight items indicated a valid scale in this study.

5.3.1.4: Student socio-economic status

There is evidence in the SER literature that socio-economic status affects pupil educational outcome (Sammons *et al.,* 1993; Sammons, 1995; Mortimore and Mortimore, 1999). Socio-economic status is represented in this study by parent's education, occupations and household income. These five items are used as separate pre-determined scale in this study. Item no. 5b (mother occupation) was removed from the scale (see Appendix 8.13) due to its low correlation (r=0.239). My reason for removing this item from the scale is that mother's education is more important for children's achievement than their occupation, since most of the mothers are housewives in Bangladesh. It is important to note that, the women of Bangladesh are not encouraged to work and the view of women is 'the good women stay at home and look after her husband and her children' (Islam and Sultana, 2006:61), although this cultural pattern is changing in recent years. Finally, 4 items (i.e. father education and occupation, mother education and family income) formed a strong scale to measure the socio-economic status of the students in this study. Table 5.24 shows that the scale reliability (α =0.80) was good.

Table 5.24: Items description and scale reliability
of student socio-economic status

Item no	Items descriptions	Scale reliability
4a	Father education	
4b	Mother education	0.795
5aR	Father occupation	
6	Family income	

Note: 5aR: Recoded this item; N= 1732 (70.3%); School =45.
Total Missing cases (N) = 730 (29.7%).

5.3.2: Class level variables

5.3.2.1: Instructional approaches used in the classroom

Nine items made a single scale, representing the instructional approaches used in the classroom. Two different instructional dimensions were identified from the scale, for example, (a) conventional and (b) participatory teaching approaches. Factor 1 indicated conventional approach and factor 2 represented participatory approach. The findings of EFA showed that for instructional approaches, two factors had an eigen-value greater than 1. All indicators of the conventional and the participatory dimensions, as shown in Table 5.25, indicated significant and positive loading, ranging from 0.433 to 0.829 and reasonable communalities. The internal consistency was reasonable for both of the approaches, where the reliability of the conventional approach (α =0.68) was slightly higher than the participatory approach (α =0.65).

Table 5.25: Results of factor analysis of instructional
approaches used in the classroom

Factor	Item No	Items descriptions	Factor Loading	Commun-alities (h²)	Cronbach's Alpha
Conventional approach (F-1)	3	In my classes, I use only prescribed text books	0.685	0.491	0.68
	4	In my class, I use note/guide books along with prescribed text books.	0.599	0.449	
	6a	I use only lecture method in my classes.	0.513	0.338	
	6d	I use only memorisation method in my classes.	0.829	0.667	
	7R	I do not allow the students to ask questions during lesson.	0.631	0.407	
Participatory approach (F-2)	5a	I use charts in my classes.	0.694	0.462	0.65
	5b	I use pictures in my classes.	0.800	0.631	
	6b	I use group discussion in my classes.	0.433	0.397	
	6c	I assign group projects in my classes.	0.675	0.407	

Note: 7R = Recoded this item; N=122; School=45

5.3.2.2: Teachers' perception of leadership

It is assumed that head teacher leadership produces an effect through other processes taking place in the school and the class; and contributes to the effectiveness of schools (Maeyer *et al.*, 2007). Three dimensions of leadership perception appeared from fourteen indicators of the scale were: (a) co-operation and communicating the school's mission (Factor 1); (b) teachers' engagement (Factor 2) and (c) leading professional (Factor 3). The internal consistency was more reliable for factor 1 (α =0.77) and factor 3 (α =0.70) but not that strong for factor 2 (α =0.49). Although these two items appear to be related, being limited to two components means that it is probably not a useful factor measure.

Table 5.26: Results of factor analysis of leadership
perception by the teachers

Factor	Item No	Items descriptions	Factor	Commu-nalities (h²)	Cronbach's Alpha
Co-operation and communicating school's mission (F 1)	8	Friendly when talk to him/her.	0.467	0.293	0.77
	11	Keeps everyone informed about school management procedure.	0.629	0.439	
	12	Heavily involved in what is happening with teachers and students.	0.758	0.500	
	14	Provides guidelines for efficient operation of the school.	0.544	0.470	
	17	Likes to keep up-to-date teaching learning outcomes in the regular official meeting.	0.622	0.545	
	18	Acts with consulting the teaching staff.	0.777	0.556	
	19	Keeps the teaching staff working up to capacity.	0.576	0.341	
Teachers' engagement (F 2)	21	Likes to push teachers to work hard.	0.822	0.679	0.49
	15	Keeps constant pressure to increase effective teaching.	0.631	0.671	
Leading professional (F 3)	9	Discusses school problems in a productive way.	0.477	0.577	0.70
	10	Shares many ideas for improving teaching and learning activities.	0.646	0.608	
	13	Asks questions/monitor about what teachers are doing in their classrooms.	0.606	0.515	
	16	Put stress on teaching staff being competent.	0.703	0.511	
	20R	Not willing to make change in teaching learning activities.	0.534	0.318	

Note: 20R: Recoded this item; N=122; School=45

5.3.2.3: Effective administrational management

It is assumed that active school management in policy and planning related to teaching and learning and support is important for student outcomes (Witziers, 1992). In the current study, seven items were used to measure administrational effectiveness, which identified two factors, namely, (a) availability of administrative facility and support (F1) and (b) administrational expectation and encouragement (F 2).

Table 5.27.: Result of factor analysis of effective administrational management factors

Factor	Item no	Item descriptions	Factor loading	Communa-lities (h²)	Cronbach's Alpha
Administrational facilities and support (F 1)	q25	The channels/links between the administration and teaching staffs are not adequate.	0.749	0.510	0.83
	Q26	The administration provides sufficient teaching and learning facilities (i.e. class schedule, teaching materials, teaching aids, meetings etc.)	0.845	0.737	
	Q27	The administration always helps to solve instructional or class arrangement problems.	0.862	0.771	
	Q28	School administration behaviour toward the staff is supportive or encourage for effecting teaching.	0.807	0.764	
Administrational expectation and encouragement (F 2)	q23	The availability of administrative facilities motivates the teachers to increase their teaching learning capability.	0.861	0.721	0.57
	Q24	The administration lets the teaching staff know what is expected from them.	0.797	0.673	

Teacher =122; School=45

In initial EFA showed that item no. 22 had negative and low loading with low communalities, i.e. below 0.5. Therefore, item no. 22 was excluded from the EFA for it's low factor loading and communalities. Finally, six items were used to measure administrational effectiveness. The preliminary analysis for the sample of teachers indentified that two factors had eigen-value greater than 1 for the variable called effective administrational management. The internal consistency was much more reliable for Factor 1 (α =0.83) and this can be considered for further analysis.

The relationship of student level variables with outcome measure

The pattern of associations between outcome measure and the scales identified from the student level variables (i.e. academic self-concept; teacher's interaction with students and student SES) was also assessed to identify their suitability for further multi-level analysis. The significant associations found from the analysis are summarised in Table 5.28. Strong associations were found between academic self-concept and academic attainment; and between student SES and attainment indicating that they could be accounted for multi-level analysis

Table 5.28: Bi-variate between student outcome (SSC score) and
student level exploratory variables

Variables	Correlation	Mean	SD	Total (%)	Missing cases (%)
Academic self-concept	0.452	4.07	1.39	2390 (97.1)	72 (2.9)
SES*	0.551	4.107	1.36	1686 (68.5)	773 (31.5)
Teacher's interaction	0.098	4.07	1.39	2390 (97.1)	72 (2.9)

Note: a. $p < 0.01$; b. Parenthesis represents percentage of the scores.
　　　　*Missing cases (N)= 776 (31.5%).

However, the pattern of associations was also explored between outcome measure (i.e. post-attainment) and the two items under the exploratory variable parental interest in school work as summarised in Table 5.29. Significant associations were found between the two items (i.e. parent's discussion about school work and father's help) and academic attainment indicating that they can be used in multi-level analysis.

Table 5.29: Chi-values by student outcome (SSC score)
and items represent parental interest in school work

Items	Chi-square value	df	Mean	SD	Total (%)	Missing cases (%)
*Parent discussion	62.256	24	4.07	1.39	2390 (97.1)	72 (2.9)
**Father help	37.198	24	4.07	1.39	2390 (97.1)	72 (2.9)

Note: $*P < 0.000$; $**P < 0.42$

The relationship of class level variables with outcome measure

In order to identify the suitability for further multi-level analysis, the pattern of associations between outcome measures and the factors identified from the class level variables (i.e. instructional approaches used in the classroom; teachers' perception of leadership and effective administrational management) were also assessed. The significant associations are given in Table 5.30. Strong positive associations were found for conventional teaching approach; leading professional and administrational facility and support, whilst the other factors, such as participatory teaching approach; communication; teacher engagement in work and administrational expectation were negatively associated with student academic attainment. Overall, the strong associations ranging from $r=0.51$ to $r=-0.19$ indicated that they might be useful in multi-level analysis.

Table 5.30: Bi-variate by student outcome (SSC score)
and class level exploratory variables

Factors	Correlation	Mean	SD	Total (%)	Missing cases (%)
Conventional teaching approach	0.51	4.07	1.39	2390 (97.1)	72 (2.9)
Participatory teaching approach	-0.27	4.07	1.39	2390 (97.1)	72 (2.9)
Communication	-0.31	4.07	1.39	2390 (97.1)	72 (2.9)
Teacher engagement in work	-0.061	4.07	1.39	2390 (97.1)	72 (2.9)
Leading professional	0.49	4.07	1.39	2390 (97.1)	72 (2.9)
Administrational facility and support	0.34	4.07	1.39	2390 (97.1)	72 (2.9)
Administrational expectation	-0.19	4.07	1.39	2390 (97.1)	72 (2.9)

Note: a. $p < 0.01$; b. Parenthesis represents percentage of the score.

A number of robust scales have been identified at student level, i.e. academic self-concept, teacher's interaction with their students and student socio-economic status could be considered as powerful predictors of student academic attainment. The findings of the class level factors, in general, suggested that factors identified related to teaching process (i.e. conventional and participatory teaching approaches), teachers' perception of head teacher leadership (i.e. co-operation and communicating school's mission, leading professional and teachers' engagement) and school administrational effectiveness (i.e. administrational facility and support; and administrational expectation and encouragement) may be the focal point of effective teaching, which have contribution on student academic achievement. In conclusion, therefore, it can be said that these factors could be used in further multi-level analysis to predict variation in student academic attainments. In the next section of this study, multi-level analysis will be discussed.

5.4: MULTI-LEVEL MODELLING: USING STUDENT, CLASS AND SCHOOL LEVELS EXPLORATORY VARIABLES

The main aim of this chapter is to estimate the relationship between student academic attainment and a variety of exploratory variables measured at student, class and school levels. The interrelationship between academic self-concept and some of the exploratory variables at student and class levels will also be explored. Different multi-level statistical models will be developed to answer my research questions (see output in Appendix 8.14).

Firstly, the interrelation between academic attainment and academic self-concept was estimated to answer the research question 1. In order to answer the rest of the research questions (questions 2-4) multi-level modelling was conducted initially with an empty model to estimate the variations in student academic attainment at student, class and school levels. Further models were then developed including a range of exploratory variables to get a better fitting model. It is important to note that some variables were correlated with student attainment, when investigating them in isolation. However, their effect might be trivial, while included together and could be due to multicollinearity. It is important to note that only those exploratory variables, that were significant in initial significant test (see Sections 5.1 and 5.3), were used to construct models in support of four research questions in this section. The first research question is considered in the following section.

5.4.1: ANSWERING THE FIRST RESEARCH QUESTION: i) How much variation in student academic attainment and self-concept exists and ii) what is the interrelation between attainment and self-concept of the students at an individual and at school level?

The first research question was about how much variation exists in student academic attainment and self-concept; and their interrelation at student, class and school levels. A multi-variate, in this case bi-variate, multi-level model was fitted with the students' normalised attainment score and self-concept scale scores. A bi-variate model was established at four levels, where 'within-student' measurements (either academic attainment or academic self-concept) were treated as level 1, student as level 2, class level 3 and school level 4, as shown in Table 5.31.

Table 5.31: Variance components analysis of four level models for
academic attainment and academic self-concept

Level of analysis	Estimate (SE)				
	Model 1		Model 2		
(Fixed part)					
Cons (academic attainment)	-0.187 (0.096)		-0.164 (0.075)		
Prior attainment (attainment)			0.320 (0.013)		
Cons (academic self-concept)	41.223 (0.723)		41.527 (0.499)		
Prior attainment (self-concept)			3.565 (0.145)		
-2*loglikelihood • Reduction • df • P-value	20083.079		19205.855 877.224 3 0.000		
(Random part)					
Attainment	σ²	σ² (%)	σ²	σ² (%)	Reduction (%)
• School level	0.314 (0.089)	41.05	0.180 (0.055)	33.90	42.68
• Class level	0.163 (0.040)	21.31	0.119 (0.030)	22.41	26.99
• Student level	0.288 (0.008)	37.65	0.232 (0.007)	43.69	19.44
• Total	0.765	100	0.531	100	30.59
Self-concept					
• School level	19.529 (5.033)	30.39	8.292 (2.448)	18.78	57.54
• Class level	5.278 (1.635)	8.21	3.755 (1.197)	8.50	28.86
• Student level	39.450 (1.144)	61.39	32.111 (0.931)	72.72	18.60
• Total	64.257	100	44.158	100	31.28
School (N)	45		45		
Class (N)	86		86		
Student (N)	2462		2462		
Resp_indicator (N)	4852		4852		

Note: σ²=variance

Most of the variation in academic attainment was found to be at school level (41%), opposite to most SER which had larger variance at student level (Teddlie and Reynolds, 2000; Driessen and Sleegers, 2000; Reezigt *et al.*, 1999), with 38% of total variances between students and 21% between classes. The large variation at school level implied that schools do make a difference in Bangladesh. In contrast, the largest variation in student academic self-concept was found to be at student level (61%), with 30% of total variations between schools and 8% between classes. Model 2 was produced accounting for student prior attainment,

where most of the unexplained variance remained at student level (44%), with 22% and 34% variances at class and school levels respectively for student attainment. Prior attainment explained near about 43% of the school variations in student attainment and 19% of the pupil level variances. While looking at academic self-concept, prior attainment explained slightly higher than half (58%) of the variations at school level with 29% and 19% at class and student levels respectively. In short, 31% of variations in academic attainment and academic self-concept can be explained by prior attainment. The likelihood statistics also indicated a better and significant change between the model 1 and model 2 ($p < 0.000$) implying that, as expected, prior attainment has a significant effect on students' later academic attainment and academic self-concept.

Table 5.32: Correlation between academic attainments (prior & post) and academic self-concept

	Variables	Levels		
		School	Class	Student
Model 1	Academic attainment	0.98	0.41	0.28
	Academic self-concept			
Model 2	Academic attainment	0.96	0.09	0.11
	Academic self-concept			

A positive and high correlation was found between student academic attainment and academic self-concept at school level (0.98). Moreover, the findings indicated that correlation between attainment and self-concept was three times higher at school level and almost twice at class level (0.41) in comparison to student level (0.28). Correlation between the two variables was found to be high at school level (96.0) including prior attainment in model 2, but the correlation reduced noticeably from 0.41 to 0.09 at class level and decreased almost half (0.11) at student level. The following graphs of pairwise plots also showed the high correlation between academic attainment residuals and self-concept residuals at school level than class and student levels.

Figure 5.1: Correlation between academic attainment and academic
self-concept at school, class and student levels
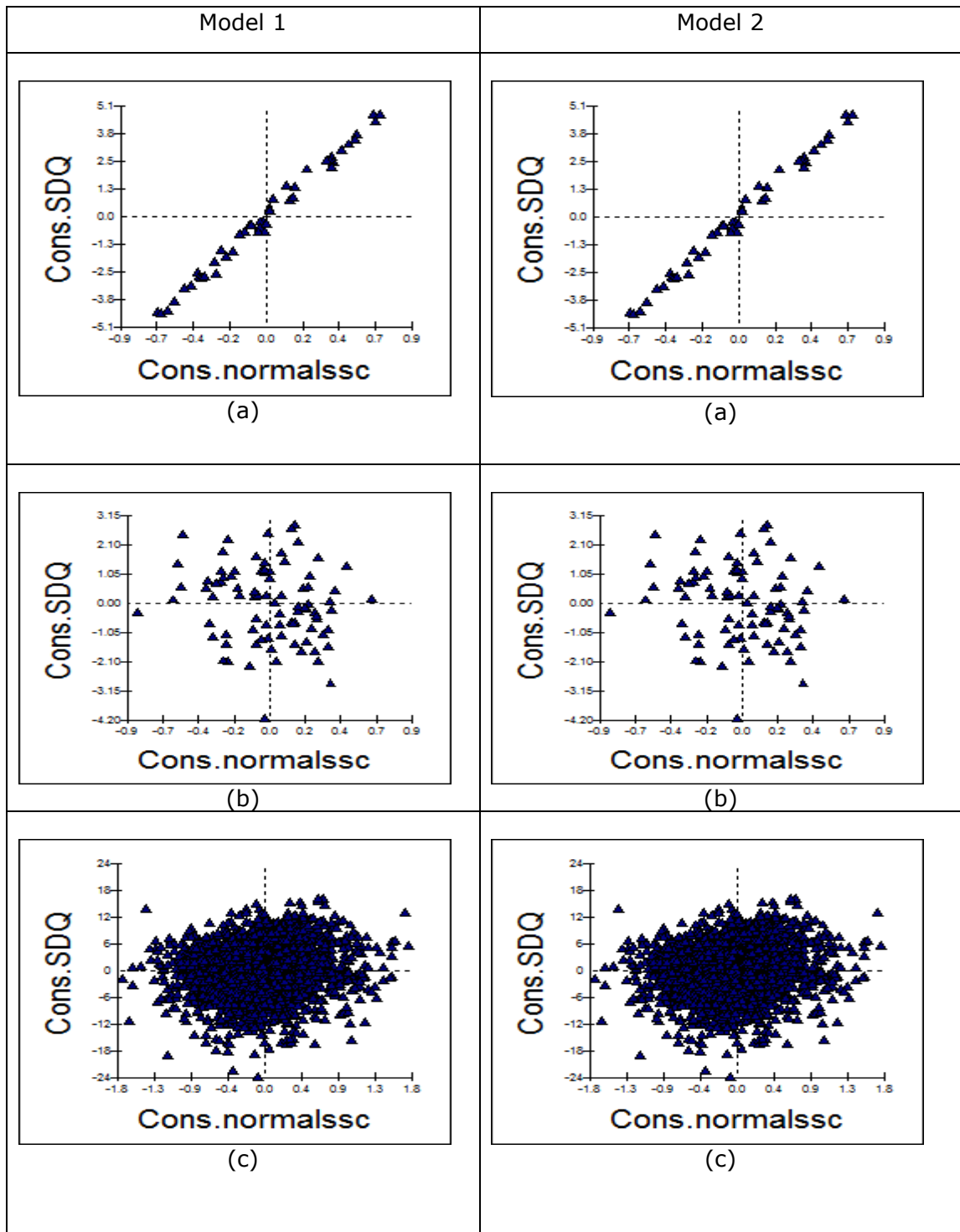
Note: (a) school level; (b) class level and (c) student level

The findings indicated a strong and positive relation between academic
attainments (i.e. prior and post) and academic self-concept implying that there is
a reciprocal relationship between student attainment and academic self-concept.
The simple conclusion is that student's previous attainment helps to boost up

their academic self-concept, which afterward leads to higher levels of later academic attainment, which is in line with the findings of O' Mara *et al.* (2005, cited in Creemers *et al.,* 2010). Additionally, the high correlation between the two variables at school level implies that school is important as it helps to develop students' positive academic self-concept, which ultimately contributes to accelerate their academic attainment.

5.4.2: ANSWERING THE SECOND RESEARCH QUESTION: How much student background characteristics influence i) grade 10 student academic attainment and academic self-concept and ii) progress (taking account of prior attainment)

The second research question contains two parts. The first part is about the effect of student background factors and the second part is about student progress. Parameter estimates are calculated to see the effects of student background factors (i.e. student gender, age and SES) on academic attainment in the following section.

5.4.2.1: Effects of student background variables on academic attainment

To answer the first part of research question 2, the variation in academic attainment was estimated at three levels: school, class and student as shown in Table 5.33. Firstly, the variation was estimated with the empty model (i.e. model 1), which only fitted the constant term, indicating that most of the variances was determined at school level (41%), with 22% and 38% variations at class and student levels respectively.

In the next step, background factors, i.e. students' gender, age and SES were added to the previous model 1 to estimate their effects on student academic attainment, which created model 2. In model 2, only significant variables at the student level in the fixed part of the model are presented (except gender, which was not significant). The finding shows that age and gender had negative effects on academic attainment and student SES was found to be a powerful predictor for student academic attainment suggesting that:

- girls were found to have poorer academic attainment than boys but that was not statistically significant.
- student's age was identified as a robust predictor for their academic attainment. The finding indicated that younger students outperformed the oldest students. This might be due to grade repetition or retention in the same class of the oldest students because of their low attainment or

students can falsify their age. It is worthwhile pointing out that no student can upgrade to the next grade in Bangladeshi education system, if they do not achieve the prescribed mark in their annual examination, held at the end of every year.

- family SES had a very strong positive significant effect on student attainment. Students whose families had a better-off socio economic position obtained significantly higher results compared to students from a lower SES.

The standard errors showed that the effect size of these variables (i.e. for age and SES) was significant and stable. Most of the unexplained variances was at the student level (46%) after adding background factors in model 2 with 37% and 17% at class and school levels respectively. Additionally, student background factors explained 36% variation in student attainment at the school level and the variations in academic attainment for family background accounted for 14% at student level and 45% at class level. In total, 29% of the variances can be explained by student background factors.

Table 5.33: Variance component analysis for academic attainment at school, class and student levels

Response (Attainment)	Estimate (SE)				
	Model 1		Model 2		
Fixed part					
Cons	-0.186 (0.095)		-0.562 (0.237)		
Gender (male)*			-0.004 (0.050)		
Age			-0.003 (0.001)		
SES			0.058 (0.004)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduction (%)
School level	0.309 (0.089)	40.50	0.199 (0.057)	36.99	35.60
Class level	0.166 (0.041)	21.76	0.091 (0.025)	16.91	45.18
Student level	0.288 (0.008)	37.75	0.248 (0.009)	46.09	13.89
Total	0.763	100	0.538	100	29.49
N (School)	45		45		
N (Class)	86		84		
N (Student)	2390		1684		
-2*log-likelihood Reduction df P-value	4095.419		2656.596 1438.823 3 0.000		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance; 3. Missing cases: 30%
        4. Coding: Gender: Boy= 0 and Girl= 1

As shown in Table 5.33, the sample size reduced 30% in model 2 while entered student background data. This reduction happened because a large number of parents did not respond or were not willing to participate in this study. Thus, in the next step, variations in academic attainment at three levels (i.e. individual, class and school) were estimated using reduced sample size as shown in Table 5.34. As a result the efficiency of these models cannot be directly compared. The empty model indicated the similar findings as found in initial analysis (see model 1 in Table 5.33). That is, most of the variances was found at the school level (40%), with 23% and 37% variations at class and student levels respectively.

Table 5.34: Variance component analysis for academic attainment at school, class and student levels using reduced sample size

Response (Attainment)	Estimate (SE)				
	Model 1		Model 2		
Fixed part					
Cons	-0.183 (0.096)		-0.592 (0.238)		
Gender (male)*			-0.003 (0.050)		
Age			-0.003 (0.001)		
SES			0.058 (0.004)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduction (%)
School level	0.305 (0.091)	39.71	0.202 (0.057)	37.13	33.77
Class level	0.179 (0.046)	23.31	0.092 (0.025)	16.91	48.60
Student level	0.284 (0.010)	36.98	0.250 (0.009)	45.96	11.97
Total	0.768	100	0.544	100	29.17
N (School)	45		45		
N (Class)	85		84		
N (Student)	1727		1684		
-2*log-likelihood Reduction df P-value	2991.631		2675.445 316.186 3 0.000		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. Missing cases= less than 3%;
4. Coding (Gender): Boy= 0 and Girl= 1.

Model 2 was established with reduced sample size to identify the effects of background factors on student attainment. The findings identified that student age and SES were significant predictors for model 2, which was similar to the initial analysis in Table 5.33. Model 2 indicated that girls had poorer academic attainment than boys, though it was not statistically significant, whereas younger

students' performance was significantly better than that of older students. Model 2 also indicated that students who were from better-off families had significantly higher results than the students who were from lower SES level. For model 2, the total variation in academic attainment was 46% between students, with 17% and 37% variations at class and school levels respectively. The amount of explained variances attributed at 49% between classes, 34% between schools and only 11% remained at student level. In short, student background explained 29% variation in student academic attainment, while MLM conducted with reduced sample size.

5.4.2.2: Effects of student background variables on academic self-concept

Following the same procedure, the association between student academic self-concept and student-level exploratory variables (for example, student background factors was explored at three levels, i.e. student, class and school, as given in Table 5.35. Initially, an empty model (i.e. model 1) was established. Most of the variations for academic self-concept appeared at student level (61%) with 9% variations at class level and 30% at school level. Student background factors, i.e. gender, age and SES were included in model 1 to constitute model 2. The findings of model 2 indicated that student age and SES were found to be as strong predictors for student academic self-concept implying that-

- the negatively significant effect of age denoted that younger students had a better academic self-concept than older students. This can be explained by their academic attainment, as it was found that younger student attainment was better than older students (see Section 5.2.1) suggesting that there is a significant association between the two variables.
- for SES, a positively significant and strong effect indicated that student academic self-concept was significantly higher when they were from well-off SES background. That is, students' well-off socio economic position helps to develop their positive academic self-concept.

Table 5.35: Variance component analysis for academic self-concept at school, class and student levels

Response (Academic self-concept)	Estimate (SE)				
	Model 1		Model 2		
Fixed part					
Cons	41.253 (0.722)		43.393 (2.824)		
Gender (male)*			0.025 (0.590		
Age			-0.029 (0.014)		
SES			0.239 (0.045)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduction (%)
School level	19.201 (5.036)	29.85	14.441 (4.192)	24.42	24.79
Class level	5.719 (1.754)	8.89	5.814 (1.950)	9.83	**
Student level	39.413 (1.143)	61.27	38.885 (1.355)	65.75	1.34
Total	64.33	100	59.14	100	8.07
N (School)	45		45		
N (Class)	86		84		
N (Student)	2462		1730		
-2*log-likelihood Reduction df P-value	16238.002		11412.908 4825.094 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. ** Increase =1.63%; 4. Missing cases: 30%;
5. Coding: Gender: Boy= 0 and Girl= 1

The standard errors showed that the effect size of these variables were significant and stable. Moreover, in model 2 student background factors explain 25% of variations in student academic self-concept at school level though only 1% reduced at student level implying that school is important for developing student self-concept. Importantly, student self-concept slightly increased (2%) at class level. However, as whole, student background factors explain 8% variation in academic self-concept.

Table 5.36: Variance component analysis for academic self-concept at
school, class and student levels with reduced sample size

Response (Academic self-concept)	Estimate (SE)				
	Model 1		Model 2		
Fixed part					
Cons	41.601 (0.718)		43.393 (2.824)		
Gender (male)*			0.025 (0.590)		
Age			-0.029 (0.014)		
SES			0.239 (0.045)		
Random part	σ²	σ² (%)	σ²	σ² (%)	Reduction (%)
School level	18.096 (5.021)	28.37	14.441 (4.192)	24.42	20.20
Class level	6.415 (2.096)	10.06	5.814 (1.950)	9.83	9.37
Student level	39.274 (1.350)	61.57	38.885 (1.355)	65.75	0.99
Total	63.785	100	59.14	100	7.28
N (School)	45		45		
N (Class)	85		84		
N (Student)	1775		1730		
-2*log-likelihood Reduction df P-value	11735.057		11412.908 322.149 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ²=variance;
3. Missing cases=2.54%;
4. Coding: Gender: Boy= 0 and Girl= 1

Further analysis was conducted with the reduced sample size. Initially, the variation was estimated with the empty model (model 1). The findings indicated that variations in student academic self-concept were slightly increased from previous analysis (see model 1 in Table 5.35) at student (62%) and class (10%) levels, though reduced at school level (28%). In next step, model 2 was produced to estimate the effects of student background factors, i.e. gender, age and SES respectively. Findings showed that students' age and SES were better predictors for academic self-concept. In model 2, 20% of variances can be explained by student background factors at school level and only 1% at student level. Moreover, 9% of variances is caused by class. Overall, background factors explained 7% of variances in student academic self-concept.

For both of the analysis (initial analysis and analysis with reduced sample size), the likelihood statistics showed a significant reduction between the empty model and model 2 (p<0.000), which indicated, this fitted the models better. Therefore,

it can be concluded that there is a strong association between student background factors and their academic self-concept. The effect was significant after using reduced sample size for further analysis.

5.4.2.3: Effect of students background variables on progress (taking account of prior attainment)

In order to investigate student progress over one year whilst adequately accounting for student background variables a simple value-added analysis was conducted and is reported in this section. Variance component analysis of this part is presented in Table 5.37. Model 2 can be compared to the empty model that is described in an earlier section (see Section 5.4.2.1). Model 2 showed that variations at school, class and student levels were changed to be 34%, 23% and 44% respectively accounting for prior attainment. The amount of explained variances was 30% for the measure of prior attainment and prior attainment explains 42% of variances at school level with 28% at class and 19% at student levels. It was also observed that student prior academic attainment appeared to be a better predictor, which had a significant effect on their later attainment.

Table 5.37: Variance component analysis of student progress

Response (Attainment)	Estimate (SE)							
	Model 1		Model 2			Model 3		
Fixed part								
Cons	-0.186 (0.095)		-0.164 (0.075)			-0.633 (0.213)		
Prior attainment			0.321 (0.013)			0.279 (0.015)		
Gender (male)*						-0.001 (0.045)		
Age						-0.001 (0.001)		
SES						0.048 (0.003)		
Random part	σ²	σ² (%)	σ²	σ² (%)	Reduction (%)	σ²	σ² (%)	Reduction (%)
School level	0.309 (0.089)	40.50	0.180 (0.056)	33.83	41.75	0.122 (0.038)	30.27	60.52
Class level	0.166 (0.041)	21.76	0.120 (0.030)	22.56	27.71	0.075 (0.021)	18.61	54.82
Student level	0.288 (0.008)	37.75	0.232 (0.007)	43.61	19.44	0.206 (0.007)	51.12	28.47
Total	0.763	100	0.532	100	30.28	0.403	100	47.18
N (School)	45		45			45		
N (Class)	86		86			84		
N (Student)	2390		2390			1684		
-2*log-likelihood Reduction df P-value	4095.419		3564.712 530.707 3 0.00			2334.880 1760.539 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ² = variance;
3. Missing cases: 29.54%; 4. Coding: Gender: Boy= 0 and Girl= 1

The findings of the more complex value added analysis of model 3 adding student prior attainment and background factors (i.e. gender, age and SES) showed 51% of unexplained variances added at student level, with 30% and 19% variations at school and class levels respectively. 47% of variations (from model 1 to model 3) in academic attainment can be explained by student background factors controlling for prior attainment. Additionally, most of the variations can be explained by these variables (i.e. background factors and prior attainment) at school level (61%). The explained variance was also higher at class level (55%) than student level (28%). The significant predictors in model 3 were student prior attainment and SES. It can be said, therefore, from the above findings that students' socio-economic status had significant effect on their progress.

The relationship between prior (baseline) attainment and later attainment of student for each of the 45 schools in the sample is plotted in Figure 5.2, suggesting that the schools' effects were larger in some schools than others, with students of the same prior attainment achieving markedly higher results in public examination.

Baseline scores
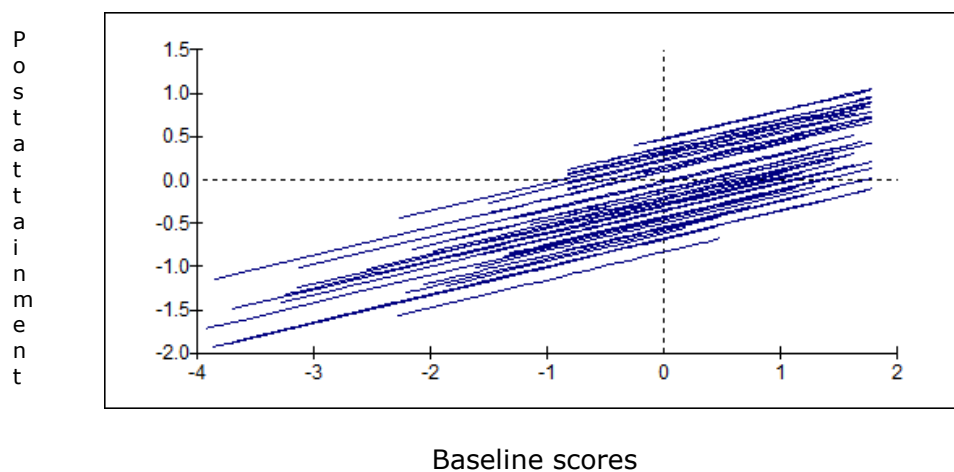
Figure 5.2: Variance in academic attainment based on
over one year student progress

The models were established in the next step with reduced sample size. The empty model was run initially, which only fitted the constant term. Interpretation of model would be begun from model 2, as the variation in academic attainment of empty model for reduced sample size can be found in part 1 (see Tables 5.4.2.2 in Section 5.4.2.1). A stepwise procedure was followed to estimate models 2 and model 3 as shown in Table 5.38, which showed only significant variables at the student level in the fixed part of the models (except gender and age, which were not significant). In model 2, most of the unexplained variances

remained at individual level (43%), while the effect of prior attainment was estimated adequately. In contrast, a 24% variation was found at class level and 33% at school level. 30% variation in attainment can be explained by prior attainment. Prior attainment explains 41% of variations at school level with 28% at class and only 18% at student levels. Model 2 pointed out that student prior attainment had a positively significant and strong effect on their later attainment. That is, students who performed well in year nine also performed better in their public examination one year later.

Table 5.38: Variance component analysis of student
progress with reduced sample size

Response (Attainment)	Estimate (SE)							
	Model 1		Model 2			Model 3		
Fixed part								
Cons	-0.183 (0.096)		-0.179 (0.076)			-0.664 (0.215)		
Prior attainment			0.313 (0.015)			0.281 (0.015)		
Gender (male)*						-0.001 (0.046)		
Age						-0.001 (0.001)		
SES						0.048 (0.004)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduction (%)	σ^2	σ^2 (%)	Reduction (%)
School level	0.305 (0.091)	39.71	0.181 (0.058)	33.46	40.66	0.124 (0.039)	30.47	59.34
Class level	0.179 (0.046)	23.31	0.128 (0.033)	23.66	28.49	0.075 (0.021)	18.43	58.10
Student level	0.284 (0.010)	36.98	0.232 (0.008)	42.88	18.31	0.208 (0.007)	51.11	26.76
Total	0.768	100	0.541	100	29.56	0.407	100	47.01
N (School)	45		45			45		
N (Class)	85		85			84		
N (Student)	1727		1727			1684		
-2*log-likelihood Reduction df P-value	2991.631		2621.183 370.448 3 0.00			2354.509 637.122 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. Missing cases = 2.49%; 4. Coding: Gender: Boy= 0 and Girl= 1

The effect of student background factors on their progress was estimated in model 3. Variances in attainment at school and class levels were 30% and 18% respectively, although a significant proportion of unexplained variances (51%) remained at student level. For reduced sample size, prior attainment and SES were identified as better indicators in model 3, which was same as in the initial ML analysis (see Table 5.38). Prior attainment, jointly with student background factors explained 47% of variances in student attainment. Large amount of reductions were found at school and class levels, where prior attainment and

student background factors explain 59% of variations at school level and 58% at class level. The reduction was also noticeable at student level (27%).

The likelihood ratio test between the empty model and model 2 (p<0.000) justifies the model's improvement and better fit (i.e. initial analysis and analysis with reduced sample size). Model 3 also looks to be an improvement but the reduced sample size means that direct comparisons cannot be made. Strong and statistically significant effects of prior attainment and SES were found in value-added analysis implying that students', who had good level of prior attainment, they achieved better in later attainment and students' attainment was better, who were from better SES background.

5.4.3: ANSWERING THE THIRD RESEARCH QUESTION: How much do teacher characteristics influence student attainment or self-concept, controlling for the influence of prior attainment and background factors?

The third research question contained two sections. An attempt had been taken to measure the effects of teacher-characteristics on student attainment in the first part of the question. Secondly, the influence of teacher characteristics on students' academic self-concept was estimated and, for both of cases, prior attainment and background factors were controlled. In the following section, the influence of teacher characteristics on student academic attainment is illustrated.

5.4.3.1: How much do teacher characteristics influence student attainment?

Firstly, the effects of teacher characteristics on academic attainment were modelled at three levels (student, class and school) as given in Table 5.39, which established the empty model. The empty model was only fitted with a constant term, showing that most of the variations in student academic attainment was found to be at school level (41%) with 22% variation at class and 38% at student levels respectively.

A stepwise procedure was followed to estimate models 2, 3 and 4, which showed only significant variables at student and class levels in the fixed part of the models (except gender, which was not significant). Model 2 was established entering prior attainment in the null model (model 1). In model 2, prior attainment was identified as a significant predictor for students' later academic attainment. Model 2, accounting for prior attainment, showed 44% of unexplained variances at student level. The reduction of variances was higher at school level.

That is, students' previous attainment explains 42% of variations at school level with 28% at class and only 19% at student levels. 30% variance in student attainment, as found from model 2, can be explained by student prior attainment. In next step, model 3 was constructed including student background factors with prior attainment. The significant predictors identified in model 3 were student prior attainment and SES. Results illustrate that

- student prior attainment had a significant effect on their later attainment. That is, students who had good results in the year nine examination were likely to achieve a good grade in later public examination.
- SES had a strongly positive and significant effect on student attainment implying that students whose families were in socio-economically better-off position obtained significantly higher results compared to students from a lower SES group.

Model 3 accounted for prior attainment and student background factors and had most of the explained variances at school level (61%). The reduction of variances was larger at class level (55%) compared to student level (28%). The model indicated that most of the unexplained variances remained at student level (51%). In general, 48% of the variances in student attainment can be explained by student prior attainment and background factors.

Finally, variables related to teacher characteristics were included to establish model 4 after adequately controlling for prior attainment and background factors. Teacher characteristics with prior attainment and background factors reduced variances 77% at school level and 61% at class level, though remained unexplained 60% at student level. Overall, teacher characteristics along with these variables explain 55% of variances in student academic attainment, where teacher characteristics individually explained 15% (reduction from model 3 to model 4) of variances in attainment. At class level, robust predictors were-

- with regards to teacher age, negatively significant association revealed that older teachers were more effective for student academic attainment than younger teachers. Student academic outcome was worse when they were taught by younger teachers. This might be older teachers are more experienced than younger or novice teachers.
- teacher experience was identified as a powerful predictor, which had a significant influence on student attainment. The findings indicated that attainment was better when students were taught by more experienced teachers.
- a significant association was found between student attainment and

teacher remuneration. Student attainment was better when teachers' remunerations were at a satisfactory level. It can be assumed that teachers' job satisfaction largely depends on their salary level, which afterword affects their professional activities and students academic performance.

- a significant positive effect was found for teachers' job position implying that teachers who had a senior position contributed more to student attainment. This might be they were more experienced as teachers' up gradation in Bangladesh depends on their length of service and teaching quality.

Table 5.39: Variance component analysis for academic attainment at school, class and student levels

Response (Attainment)	Estimate (SE)											
	Model 1		Model 2			Model 3			Model 4			
Fixed part												
Cons	-0.186 (0.095)		-0.164 (0.075)			-0.633 (0.213)			-1.689 (0.729)			
Prior attainment			0.321 (0.013)			0.279 (0.015)			0.279 (0.015)			
Student gender (male)						-0.001 (0.045)			-0.013 (0.045)			
Student age						-0.001 (0.001)			-0.001 (0.001)			
SES						0.048 (0.003)			0.047 (0.004)			
Teacher age									-0.023 (0.012)			
Teaching experience									0.020 (0.011)			
Job rank									0.276 (0.145)			
Salary									0.357 (0.110)			
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduc-tion (%)	σ^2	σ^2 (%)	Reduc-tion (%)	σ^2	σ^2 (%)	Reduct-ion (%)	
School level	0.309 (0.089)	40.50	0.180 (0.056)	33.83	41.75	0.122 (0.038)	30.27	60.52	0.072 (0.027)	20.99	76.70	
Class level	0.166 (0.041)	21.76	0.120 (0.030)	22.56	27.71	0.075 (0.021)	18.61	54.82	0.065 (0.019)	18.95	60.84	
Student level	0.288 (0.008)	37.75	0.232 (0.007)	43.61	19.44	0.206 (0.007)	51.12	28.47	0.206 (0.007)	60.06	28.47	
Total	0.763	100	0.532	100	30.28	0.403	100	47.18	0.343	100	55.05	
N (School)	45		45			45			44			
N (Class)	86		86			84			82			
N (Student)	2390		2390			1684			1632			
-2*log-likelihood Reduction df P-value	4095.419		3564.712 530.707 3 0.00			2334.880 1760.539 3 0.00			2244.389 1851.03 3 0.00			

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. Missing cases: Model 3 = 29.54% and Model 4 =32%
4. Coding: Gender: Boy= 0 and Girl= 1

The influence of teacher characteristics were next estimated with reduced sample size as shown in Table 5.40 accounting for prior attainment and background factors. Almost similar findings as previous analysis (see Table 5.40) were found from the analysis. Student prior attainment, SES, teacher age, teaching experience, remuneration and teachers' job position were identified as significant predictors for student academic performance.

Table 5.40: Variance component analysis for academic attainment at school, class and student levels with reduced sample size

Response (Attainment)	Estimate (SE)										
	Model 1		Model 2			Model 3			Model 4		
Fixed part											
Cons	-0.183 (0.096)		-0.179 (0.076)			-0.664 (0.215)			-1.724 (0.735)		
Prior attainment			0.313 (0.015)			0.281 (0.015)			0.281 (0.015)		
Studeng gender (male)						-0.001 (0.046)			-0.013 (0.045		
Student age						-0.001 (0.001)			-0.001 (0.001)		
SES						0.048 (0.004)			0.048 (0.004)		
Teacher age									-0.023 (0.013)		
Teaching experience									0.020 (0.011)		
Job rank									0.278 (0.146)		
Salary									0.359 (0.111)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Reduc-tion (%)	σ^2	σ^2 (%)	Reduc-tion (%)	σ^2	σ^2 (%)	Reduc-tion (%)
School level	0.305 (0.091)	39.71	0.181 (0.058)	33.46	40.66	0.124 (0.039)	30.47	59.34	0.073 (0.027)	21.04	76.06
Class level	0.179 (0.046)	23.31	0.128 (0.033)	23.66	28.49	0.075 (0.021)	18.43	58.10	0.065 (0.019)	18.73	63.69
Student level	0.284 (0.010)	36.98	0.232 (0.008)	42.88	18.31	0.208 (0.007)	51.11	26.76	0.209 (0.007)	60.23	26.41
Total	0.768	100	0.541	100	29.56	0.407	100	47.01	0.347	100	54.82
N (School)	45		45			45			44		
N (Class)	85		85			84			82		
N (Student)	1727		1727			1684			1632		
-2*loglikelihood: Reduction df P-value	2991.631		2621.183 370.448 3 0.00			2354.509 637.122 3 0.00			2263.352 728.28 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. Missing cases: Model 3 = 2.49% and Model 4 =5.5%
4. Coding: Gender: Boy= 0 and Girl= 1

The goodness of a model fit was determined with likelihood ratio test statistics that suggest increasingly good fit of the models, although the reduced sample size means the models are not comparing like with like, so we cannot be certain about the improvements in the models. It is important to note that the effects of teachers' characteristics were consistent across the analysis (i.e. initial analysis and analysis with reduced sample size).

5.4.3.2: How much do teacher characteristics influence student academic self-concept?

To estimate the effects of teacher characteristics on student academic self-concept, the same procedures were followed. Firstly, the empty (model 1) was established at three levels (i.e. school, class and student) as shown in Table 5.41. Most of the total variations in student academic self-concept were found to be between students (61%) with 9% and 30% variations between classes and between schools respectively. Model 2 was produced by adjusting for prior attainment. Most of the unexplained variances remained at student level (73%) with 9% at class level and 18% at school level. Prior attainment was identified as a strong predictor for academic self-concept indicating that student who had higher academic attainment tended to has stronger academic self-concept. Moreover, model 2 revealed that 32% of variances in student academic self-concept can be explained by prior attainment, where most of the explained variances remained at school level (59%) though prior attainment explains only 19% of the variances in academic self-concept at student level.

Model 3 was produced in the next step adjusting for student prior attainment and background factors. In model 3, prior attainment and SES were identified as strong predictors for academic self-concept. Prior attainment and background factors collectively explains 65% of variances at school level and 22% at class level, though reduction of unexplained variances remained only 19% at student level and as a whole, 33% of variances in student academic self-concept can be explained by prior attainment and background factors.

In the next step, model 4 was demonstrated to measure the effects of teacher characteristics on self-concept, accounting for prior attainment and background factors.

Most of the unexplained variances remained at student level (85%), with only 4% at school and 11% at class levels. Teacher characteristics explained only 15% variances for self-concept (reduction from model 3 to model 4), while 41% (from model 1 to model 4) with prior attainment and background factors. Additionally, 91% of reduction of variances can be explained by teacher characteristics with prior attainment and background factors at school level and 28% at class level and 18% at student level. Followings are the robust predictors found in model 4 -

- a strong association was found between prior attainment and academic self-concept, indicating that students, who had previously better academic attainment also, had a high academic self-concept.

- the positive and strong effect of SES indicated that student self-concept was found to be higher when their socio-economic status was in better-off position suggesting that a family's SES helps to accelerate student academic self-concept. This might be because students of well-off families receive more educational support and encouragement from their family, which increases their confidence and academic ability, as explained by Marsh (1984):

  > Students compare their own academic ability with the academic abilities of their peers and use this social comparison impression as one basis for forming their own academic self-concept (Marsh, 1984; cited from Marsh, 2005:48).

- negatively significant association between teacher age and self-concept indicated that older teachers were more effective in developing a high self-concept of students than young and novice teachers.

- negative association was found between in-service training and self-concept suggesting that teachers, who did not receive any in-service training were not as effective in developing student's academic self-concept. Perhaps teachers' learn from their in-service training how to interact with students more effectively which then helps to develop students' positive self-concept.

- the strong and positively significant association between teacher salary and student self-concept indicated that teachers, who had good salary package were more effective for developing student self-concept.

- there was a strong association between teachers' position in their job and student self-concept. Student self-concept was higher when teacher in senior rank taught them suggesting that senior teachers were more experienced and indirectly teaching experience plays an important role to develop student academic self-concept.

Table 5.41: Variance component analysis for academic
self-concept at school, class and student levels

Response (Self-concept)	Estimate (SE)										
	Model 1		Model 2			Model 3			Model 4		
Fixed part											
Cons	41.253 (0.722)		41.586 (0.494)			42.790 (2.517)			35.638 (5.380)		
Prior attainment			3.630 (0.147)			3.604 (0.176)			3.647 (0.177)		
Student Gender (male)						0.172 (0.514)			0.195 (0.494)		
Student age						-0.013 (0.013)			-0.011 (0.013)		
SES						0.092 (0.041)			0.096 (0.042)		
Teacher age									-0.198 (0.088)		
In-service									-3.064 (1.209)		
Job rank									2.190 (0.974)		
Salary									2.902 (0.738)		
Random part	σ^2	σ^2 (%)	σ^2	σ^2 (%)	Redu-ction (%)	σ^2	σ^2 (%)	Redu-ction (%)	σ^2	σ^2 (%)	Redu-ction (%)
School level	19.201 (5.036)	29.85	7.855 (2.402)	17.87	59.09	6.738 (2.343)	15.69	64.91	1.636 (1.334)	4.31	91.48
Class level	5.719 (1.754)	8.89	4.010 (1.262)	9.12	29.88	4.446 (1.505)	10.36	22.26	4.136 (1.444)	10.90	27.68
Student level	39.413 (1.143)	61.27	32.100 (0.931)	73.01	18.55	31.749 (1.106)	73.95	19.45	32.177 (1.138)	84.79	18.36
Total	64.333	100	43.965	100	31.66	42.933	100	33.26	37.949	100	41.01
N (School)	45		45			45			44		
N (Class)	86		86			84			82		
N (Student)	2462		2462			1730			1678		
-2*loglikelihood: Reduction df P-value	16238.002		15703.485 534.517 3 0.00			11042.249 5195.753 3 0.00			10699.485 55385.517 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ^2=variance;
3. Missing cases: Model 3 = 29.73% and Model 4 =32%
4. Coding: Gender: Boy= 0 and Girl= 1

Further ML analysis with reduced sample size was conducted as given in Table 5.42 and similar findings as previous analysis were found in later analysis. Prior attainment, SES, teacher age, in-service training, remuneration and job rank were identified as powerful predictors for student academic self-concept from the later analysis conducted with reduced sample size.

Table 5.42: Variance component analysis for academic self-concept at school, class and student levels with reduced sample size

Response (Self-concept)	Estimate (SE)										
	Model 1		Model 2			Model 3			Model 4		
Fixed part											
Cons	41.601 (0.718)		41.750 (0.495)			42.790 (2.517)			35.638 (5.380)		
Prior attainment			3.674 (0.171)			3.604 (0.176)			3.647 (0.177)		
Student Gender (male)						0.172 (0.514)			0.195 (0.494)		
Student age						-0.013 (0.013)			-0.011 (0.013)		
SES						0.092 (0.041)			0.096 (0.042)		
Age (teacher)									-0.198 (0.088)		
In-service training									-3.064 (1.209)		
Job rank									2.190 (0.974)		
Salary									2.902 (0.738)		
Random part	σ²	σ²(%)	σ²	σ²(%)	Reduction (%)	σ²	σ²(%)	Reduction (%)	σ²	σ²(%)	Reduction (%)
School level	18.096 (5.021)	28.37	7.368 (2.459)	16.91	59.28	6.738 (2.343)	15.69	62.77	1.636 (1.334)	4.31	90.96
Class level	6.415 (2.096)	10.06	4.405 (1.491)	10.11	31.33	4.446 (1.505)	10.36	30.69	4.136 (1.444)	10.90	35.53
Student level	39.274 (1.350)	61.57	31.796 (1.093)	72.98	19.04	31.749 (1.106)	73.95	19.16	32.177 (1.138)	84.79	18.07
Total	63.785	100	43.569	100	31.69	42.933	100	32.69	37.949	100	40.50
N (School)	45		45			45			44		
N (Class)	85		85			84			82		
N (Student)	1775		1775			1730			1678		
-2*loglikelihood: Reduction Degrees of freedom P-value	11735.057		11331.978 403.079 3 0.00			11042.249 692.808 3 0.00			10699.485 1035.572 3 0.00		

Note: 1. * Base category is in parenthesis; 2. σ²=variance;
3. Missing cases: Model 3 = 2.53% and Model 4 =5.46%
4. Coding: Gender: Boy= 0 and Girl= 1; In-service training: No= 0; Yes= 1

5.4.4: ANSWERING THE FOURTH RESEARCH QUESTION: After taking into account prior attainment, which school, class and pupil characteristics contribute to student attainment?

In order to answer research question four, parameters were estimated to identify which predictors at student, class and school levels contribute to student academic attainment. Firstly, variation in academic attainment was estimated with an empty model and in model 2, student prior attainment was adjusted (see discussion in Sections 5.2.1 & 5.2.3). Only the subsequent steps of the modelling are discussed in this section. The findings in Table 5.43 illustrate that 51% variance was explained only by student level variables though 48% unexplained variance remained at student level with 36% at school and 15% at class level. Additionally, student level variables adjusting for prior attainment explain 56% of variances at school level and 37% at student level. The reduction of variances was noticeably high at class level (65%). Statistically significant predictors at student level were-

- **Home learning environment:** Attainment was better when students spent more time on their study outside of school; they had better study place and opportunity of other educational material, such as- use of reference books and note collected from senior good students.

- **Opportunity of learning:** Students performed better when they studied all or some group subjects[33] at a coaching centre or with private tutors for extra educational support and they had access to newspapers at home.

- **Parental interest in school work:** Negatively significant association between parent discussion and attainment indicated that students' attainment was worse whose parents did not discuss about school work with their child.

The standard errors show that the effect size of these variables were significant and stable.

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[33] Subjects prescribed for Science or Commerce group students.

Table 5.43: Variance component analysis for academic attainment at school, class and student levels

Response (Attainment)	Model 1	Model 2	Model 3	Model 4	Model 5
			Estimate (SE)		
Fixed part					
Cons	-0.186 (0.095)	-0.164 (0.075)	-1.238 (0.256)	-0.957 (0.372)	-0.885 (0.727)
Prior attainment		0.321 (0.013)	0.267 (0.016)	0.279 (0.013)	0.273 (0.013)
Study time			0.113 (0.016)	0.106 (0.013)	0.107 (0.013)
Study place			0.281 (0.022)	0.283 (0.018)	0.288 (0.018)
Notes from others'			0.048 (0.026)		
Use reference books			-0.048 (0.029)		
Subject study (all subject): • Group subjects (all or some)			0.119 (0.064)		
Parent discussion			-0.033 (0.014)	-0.032 (0.011)	-0.040 (0.011)
Newspaper			0.079 (0.028)	0.043 (0.022)	0.052 (0.022)
Assign homework				-0.138 (0.073)	-0.230 (0.075)
Class size				0.005 (0.003)	
Conventional teaching approach				0.240 (0.067)	
Leading professionally				0.156 (0.070)	
Age (Head)					0.027 (0.012)
No of trained teacher					0.008 (0.003)
School category (high performing)- • Medium • Low					-0.415 (0.207) -0.542 (0.273)

Random Part	Model 1 σ²	Model 1 σ² (%)	Model 2 σ²	Model 2 σ² (%)	Model 2 Reduction (%)	Model 3 σ²	Model 3 σ² (%)	Model 3 Reduction (%)	Model 4 σ²	Model 4 σ² (%)	Model 4 Reduction (%)	Model 5 σ²	Model 5 σ² (%)	Model 5 Reduction (%)
School Level	0.309 (0.089)	40.50	0.180 (0.056)	33.83	41.75	0.136 (0.039)	36.27	55.99	0.000 (0.000)	0.000	100	0.000 (0.000)	0.000	100
Class Level	0.166 (0.041)	21.76	0.120 (0.030)	22.56	27.71	0.058 (0.017)	15.47	65.06	0.062 (0.011)	23.40	62.65	0.045 (0.009)	17.85	72.89
Student Level	0.288 (0.008)	37.75	0.232 (0.007)	43.61	19.44	0.181 (0.007)	48.27	37.15	0.203 (0.006)	76.60	29.51	0.207 (0.006)	82.14	28.13
Total	0.763	100	0.532	100	30.28	0.375	100	50.85	0.265	100	65.27	0.252	100	66.97
N (School)	45		45			45			45			41		
N (Class)	86		86			85			86			79		
N (Student)	2390		2390			1380			2238			2279		
-2*loglikelihood: Reduction df P-value	4095.419		3564.712 530.707 3 0.000			1762.964 2332.455 3 0.000			2956.911 1138.508 3 0.000			3023.917 1071.502 3 0.000		

Note: 1. * Base categories are in parenthesis; 2. σ²=variance; 3. Missing cases: Model 3= 42.23%, Model 4 = 6.36% and Model 5= 4.64%
4. Coding: (a) Note from others'/reference book/ newspaper: No= 0; Yes=1; (b)Study time:1-2 hours=1; 3-4 hours=2; 4-5 hours=3; 7-8 hours or more=4
(c) Study place: No study place=1; Yes, but share with siblings=2; Separate study place=3 (d) Subject study: All or some core subject=1; All or some group s ubject=2; Some core and some group subjects=3; All subjects=4 (e) Parent discussion: Never=0; Hardly ever=1; Several time=2; Frequently=3; Everyday=4 (f) School category: high-performing= 3; Medium-performing=2; Low- performing =1.

Class level variables were included in model 4 to investigate the effects of teaching processes on student academic attainment. The estimated values indicated that class-related variables reduced variance at school level 100% as no school level variance (0.00%) was found at school level and most of the unexplained variance remained at the student level (77%), where 23% remained at class level. The findings implied that the classroom level is more directly influential on student performance than the school level and this echoes findings elsewhere (see Scheerens, 1992; Creemers, 1994; Muijs & Reynolds, 2000; Jong *et al.,* 2004). Additionally, 65% of variance in student attainment can be explained only by classroom process related variables adjusting for prior attainment and only significant variables at student level. On the other hand, only 29% variance can be explained by class level variables (reduction from model 3 to model 4). The reduction of variances was noticeably high at class level (63%). Assign homework, class size, teaching method and leadership were identified as significant predictors in model 4 along with prior attainment and student level variables (i.e. study time, study place, parent discussion and access to news paper at home) suggesting that-

- negatively significant association between attainment and homework implied that students' attainment was worse when teachers did not assign home work.
- an interesting finding can be observed for class size. Significant positive result indicated that, when teachers dealt with large classes it produced good student performance. In support of this finding, it can be said that school size in Bangladesh is large and this size particularly large in good ranking schools. Due to high demand of younger population the schools are not following the government rule assigned for teacher student ratio. Hence, the teachers deal with large class according to the expectation of school authorities.
- Teachers were more effective when they used conventional teaching methods in their teaching-learning activities.
- Positive and strong association between student academic outcome and head teacher's leadership suggested that teachers' contributed more effectively to their students learning outcome when they perceived that head teachers were leading them more professionally.

Finally, school level variables with only significant variables found at student and class levels adjusting for prior attainment were included in model 5. Model 5 showed no variance in student attainment at school level (0%) and most of the unexplained variances was added at student level (82%) with 18% between

classes. School level variables specifically explained only 5% of variances (reduction from model 4 to model 5) and 67%, when considering prior attainment and all exploratory variables included in model 5. In model 5, robust predictors of student academic attainment were-

- **Student level:** Student prior attainment, home learning environment (study time and study place), learning opportunity (newspapers), parent interest in school work (i.e. parent discussion).
- **Class level:** Assign homework by the teachers.
- **School level:** Head teacher's age, number of trained teachers and school category were identified as robust predictors of learning outcome, showing that-
  - head teacher age had a significantly positive effect on attainment. Students' academic attainment was better when head teachers were older. This is might be because older head teachers' had more teaching experience and experience as head which indirectly influences academic performance.
  - a significant positive effect indicated a strong association between having an adequate number of trained teachers at the school and attainment. This suggests that teaching and learning activities run more effectively when schools possessed more trained teachers which lead to increased academic performance.
  - negative and strong effects of school categories on student attainment illustrates that the lower the category of school the more significantly lower was the academic attainment of students indicating that the type of school attended is important.

Looking at initial models (see Table 5.43), a reduction of sample size (42%) can be observed in model 3. Thus, the effects of student, class and school characteristics were also estimated using reduced sample size after adjusting for prior attainment as shown in Table 5.44 and almost similar findings with little variation were found from the further analysis with reduced sample size. Modelling began with an empty model (discussed in Sections 5.2 and 5.3). Model 2 demonstrated controlling for prior attainment, suggesting that most of the variation was found at student level (43%), with 24% at class and 34% at school levels.

Table 5.44: Variance component analysis for academic attainment at school, class and student levels with reduced sample size

Response (Attainment)	Model-1 σ²	Model-1 σ²(%)	Model-2 σ²	Model-2 σ²(%)	Model-2 Reduction(%)	Model-3 σ²	Model-3 σ²(%)	Model-3 Reduction(%)	Model-4 σ²	Model-4 σ²(%)	Model-4 Reduction(%)	Model-5 σ²	Model-5 σ²(%)	Model-5 Reduction(%)
Fixed part														
Cons	-0.182 (0.096)		-0.178 (0.076)			-1.270 (0.257)			-0.930 (0.373)			-1.326 (0.934)		
Prior attainment			0.313 (0.015)			0.268 (0.016)			0.266 (0.015)			0.264 (0.016)		
Study time						0.114 (0.016)			0.110 (0.015)			0.112 (0.015)		
Study place						0.283 (0.022)			0.282 (0.021)			0.287 (0.022)		
Notes from others'						0.049 (0.026)								
Use reference books						-0.049 (0.029)								
Subject study (all subject): • Group subjects (all or some)						0.120 (0.064)			0.099 (0.060)			0.132 (0.062)		
Parent discussion						-0.033 (0.014)			-0.041 (0.013)			-0.047 (0.013)		
Newspaper						0.079 (0.028)			0.073 (0.026)			0.081 (0.027)		
Assign homework									-0.166 (0.073)			-0.267 (0.072)		
Class size									0.006 (0.003)					
Conventional teaching approach									0.237 (0.068)			0.196 (0.107)		
Leading professionally									0.170 (0.071)					
Age (head)												0.025 (0.013)		
No of trained teacher												0.006 (0.003)		
School category (high performing)- • Medium • Low												-0.431 (0.219) -0.502 (0.280)		
Random Part	σ²	σ² (%)	σ²	σ² (%)	Reduc-tion (%)	σ²	σ² (%)	Reduc-tion (%)	σ²	σ² (%)	Reduc-tion (%)	σ²	σ² (%)	Reduc-tion (%)
School Level	0.305 (0.091)	39.71	0.181 (0.058)	33.52	40.66	0.137 (0.039)	36.14	55.08	0.000 (0.000)	0.000	100	0.000 (0.000)	0.000	100
Class Level	0.179 (0.046)	23.31	0.128 (0.033)	23.70	28.49	0.059 (0.017)	15.57	67.04	0.058 (0.011)	22.39	67.60	0.038 (0.008)	15.38	78.77
Student Level	0.284 (0.010)	36.98	0.231 (0.008)	42.78	18.66	0.183 (0.007)	48.28	35.56	0.201 (0.007)	77.61	29.23	0.209 (0.008)	84.62	26.41
Total	0.768	100	0.540	100	29.69	0.379	100	50.65	0.259	100	66.28	0.247	100	67.84
N (School)	45		45			45			45			41		
N (Class)	85		85			85			85			78		
N (Student)	1724		1724			1380			1618			1598		
-2*loglikelihood: Reduction df P-value	2986.664		2615.072 371.592 3 0.000			1778.614 1208.05 3 0.000			2138.542 848.122 3 0.000			2141.851 844.813 3 0.000		

Note: 1. * Base categories are in parenthesis; 2. σ²=variance; 3. Missing cases: Model 3= 19.95%, Model 4 = 6.15% and Model 5= 7.30%; 4. Coding: (a) Note from others'/reference book/ newspaper: No= 0; Yes=1; (b)Study time:1-2 hours=1; 3-4 hours=2; 4-5 hours=3;7-8 hours or more=4; (c) Study place: No study place=1; Yes, but share with siblings=2; Separate study place=3; (d) Subject study: All or some core subject=2; All or some group subject=2; Some core and some group subjects=3; All subjects=4; (e)Parent discussion:Never=0;Hardly ever=1; Several time=2; Frequently=3; Everyday=4.; (f) School category: high-performing=3; Medium-performing=2; Low-performing =1.

In model 3, student level significant predictors were same as in Table 5.43, i.e. home learning environment (i.e. study time, study place, note collected from senior students and use of reference books), opportunity of learning (i.e. all or some group subjects studied at coaching centre or with private tutors, subscription to newspapers at home), parental interest in school work (parent discussion). Variance in attainment explained by student level variables was 51% including prior attainment in the model and 30% by only exploratory variables considered at student level (reduction from model 2 to model 3).

Class level variables were added in model 4, accounting for prior attainment and significant student levels variables in model 3. The powerful predictors found in model 4 were: assigned homework by teachers, class size, teaching methods (i.e. student's performance was better, when teachers used conventional methods for teaching-learning activities) and leadership perception (i.e. teachers were more effective, when head teachers lead them more professionally). Interestingly, again there was no variance found in student attainment at school level (0.00%), whereas most of unexplained variances was remained at student level (78%) with 22% at class level, after adding these variables in model 4. Exploratory variables in model 4 explained 29% of variances in attainment at student level, 68% at class and 100% at school levels. Additionally, class level variables explained 32% of variances (reduction from model 3 to model 4) and 66% while accounting for prior attainment with all exploratory variables in model 4.

Finally, school level variables with significant variables at student and class levels accounting for prior attainment were entered to established model 5, where robust predictors were –

- **Student level:** Student prior attainment, home learning environment (i.e. study time and study place), learning opportunity (i.e. studied all or some group subjects at a coaching centre or with private tutors for extra educational support and access to newspapers at home) and parental interest in school work (parent discussion).
- **Class level:** Assigned homework by the teachers and teaching method (i. e. conventional approach was effective for students' better academic performance).
- **School level:** Head teacher's age, number of trained teachers at school and school category.

In model 5, most of the variances in attainment were found at student level (85%) and significant variables of three levels (i.e. student, class and school) collectively explained 68% of variances controlling for prior attainment and only school level variables explained 5% of variances in students academic attainment. All exploratory variables in model 5 explained 100% and 79% of variances at school and class levels respectively while 26% at student level.

5.4.5: Summary of the multi-level modelling analysis

The findings of the variance components models may be summarised from the previous sections (5.4.1 to 5.4.4) that investigated the four research questions. It can be said that, at the empty level, most of the variances in academic attainment was found at school level (41%; 40% with reduced sample size), with a variance of 38% at student level (37% with reduced sample size) for academic attainment. For academic self-concept, most of the variances (61%; 62% with reduced sample size) was found at student level, with 30% (28% with reduced sample size) between schools. Importantly, a noticeable amount of variances in student attainment can be explained by the difference between individual classes (21 to 23%). In research question 4 (for model 4 and model 5), most of the unexplained variances remained at student level (77% to 82% and 78% to 85%, while used reduced sample size). Additionally, 18% to 23% of unexplained variances (15% to 22% with reduced sample size) in student academic attainment can be observed at class level and 0% at school level indicating that teacher effects on pupils are greater than schools effects. Thus it can be said, teachers 'make the difference' not the schools (see Rowe & Hill, 1994; Creemers, 1990 and Reynolds, 2007). The significant predictors of academic attainment and academic self-concept identified from multi-level analysis are presented in Table 5.45.

Table 5.45: Significant predictors found from the multi-level analysis

Exploratory variables	Academic attainment	Academic self-concept
Student level		
• Prior attainment	+	+
• Age	-	-
• SES	+	+
• Home learning environment		
- Study hour	+	****
- Study place	+	****
- Educational materials (e.g. note collection from senior students and use of reference books)	+	****
• Learning opportunity		
- Subject studied by private tutor or at coaching centre	+	****
- Subscription to newspapers		****
• Parental interest in school work	+	
- Parent discussion	+	****
Class level		
• Teacher characteristics		
- Age	-	-
- Teaching experience	+	ns
- in-service training	ns	-
- Remuneration	+	+
- Job rank	+	+
• Assigned home work		
• Class size	-	****
• Teaching method	+	****
- Conventional approach		****
• Leadership perception	+	
- Leading professional	+	****
School level		
• Head teacher		
- Age	+	****
• School context		
- Number of trained teachers	+	****
- School category	-	****

Note: + positively significant; - Negatively significant; ns = not significant; **** not used in the models

It is clear from Table 5.45 that a number of student, class and school levels variables were found to be statistically significant predictors for student academic attainment and academic self-concept in most of the analyses. While exploring the effects of 24 variables in attainment at student level, 10 variables were identified as significant predictors, such as: prior attainment, age, SES, study hours, study place, educational materials (i.e. note collected from senior students and use of reference books), subject studied at coaching center or to private tutors, access to newspapers and parental support. 17 variables were investigated to explore the teacher-characteristics and classroom processes. The significant indicators were teacher age, teaching experience, remuneration, job

rank, assign homework, class size, teaching methods (conventional approach), leadership perception (leading professional). Out of 14 variables at school level, the only significant ones were head teacher age, the total number of trained teachers and school category.

There was a positive correlation between student academic attainment and academic self-concept. The effects of some student (i.e. background factors) and class level (teacher characteristics only) variables on student self-concept were also estimated. At student level, out of 4 variables (prior attainment and background factors), the significant ones were student's age, SES and prior attainment. At class level, the significant predictors were teacher's age, in-service training, remuneration and job rank.

Predictors identified in this study are mostly external to the schools, though a number of indicators identified at class level. School level variance was also estimated after accounting for prior attainment. However, most of the school level variances disappeared after adjusting for prior attainment, student and class levels variables.

High correlation between student academic attainment and academic self-concept found at school level (see research question 1) suggesting that school is important, as good schools produce good students. The students of good schools in Bangladesh are selected by competitive entrance examination. Additionally, good teachers teach in good schools and the students know that they are the product of that particular school, which enhances their academic self-concept at entry level, which has an after-effect on their academic ability. Some robust models were identified in the above analysis and these might be usefully employed for distinguishing more effective schools from less effective schools in the Bangladesh setting. I will discuss this in the next section.

5.4.6: Diagnostic procedure for multi-level models

The diagnostics procedure is an important part of multi-level modelling for detection of outliers (Rashbash *et al.*, 2009). The main aim of this section is to detect the most effective schools from the least effective, by the diagnostic procedures as described in the following section. The diagnostic procedure was carried out firstly on the basis of prior attainment i.e. over one year student progress and, secondly, after accounting for background factors with prior attainment, as shown in model 2 and model 3 respectively in research question two (see Section 4.2.3).

5.4.6.1: Findings of diagnostic residual

The diagnostics procedure was used to identify the most and least effective schools, considering value-added of student academic attainment over one year. That is, the school's effect was estimated with the residuals of prior attainment. The important point in Figure 5.3 was that the confidence intervals in the current study have been designed to be narrower than the critical value of 1.96. The logic of this, as Goldstein & Healy (1995) and Rasbash *et al.* (2009) have shown that if the aim of the research is the simultaneous comparison of a collection means, the width of the confidence interval should be adjusted in such a way that their significance level averaged over all possible pairs is equal to the required value. On the other hand, the conventional interval (1.96) can be used when the researcher wishes to examine whether a school is significantly different from the overall mean. Therefore, in the present study, the required value of statistical significance was 5% to examine the interval comparing between pairs of schools and following the Goldstein & Healy's (*op. cit.*) formula (±1.96 x SEκ) the confidence interval for the residual of Kth schools was used as ±1.4 SD x rank (see Rasbash *et al.*, 2009).

The measure of prior attainment, before the public examination, was the student academic attainment in the final examination result of year nine. To estimate the progress of the student attainment, the year nine result statistically can be served as the perfect base line measure for value-added analysis. However, from the educational point of view, the question can be raised while detecting effective schools using examination result of year nine to predict attainment in the public examination. Firstly, the period between the two examinations was only fifteen months. It is evident from the SER literature that it is important to monitor students' performance over several years (the minimum is 3 years to identify trends) to establish whether schools are improving, declining or fairly stable in terms of effectiveness (Sammons *et al.*, 1997; Gray *et al.*, 1999). The value-added that was estimated after adjusting prior attainment in year nine in the current study can be regarded as a 'year effect' rather than a 'school effect' (Verdis, 2002). Secondly, the use of attainment in year nine for predicting attainment in the public examination as the criteria of measuring student progress and effective schools in Bangladesh is quite critical. Usually, in Bangladesh, the most effective schools (particularly those gaining the top 10 positions) are measured on the basis of how many students achieved A+, including the pass rate in the public examination, rather than estimating the progress of the schools and the students over time. Moreover, the trend of

progress of high-performing school students does not vary much over time. Nonetheless, considering the above caveats, the academic attainment in year nine was finally used as a predictor of measuring progress in public examination in this study. It can be expected that the 'value-added' concept used in this study can be seen as a mile stone by the practitioners and the educational researchers in the context of Bangladesh, while measuring effective or good schools rather than the percentage of pass rate or achieving A+ in the public examination. The graphical presentation of identifying more or less effective schools is shown in Figure 5.3. Specifically, each one of the 45 small triangles and lines in figure represents the residuals under the model 2 of research question two, which measures the one-year progress of the students using value-added analysis. The space over and below each triangle represent the 5% confidence intervals.
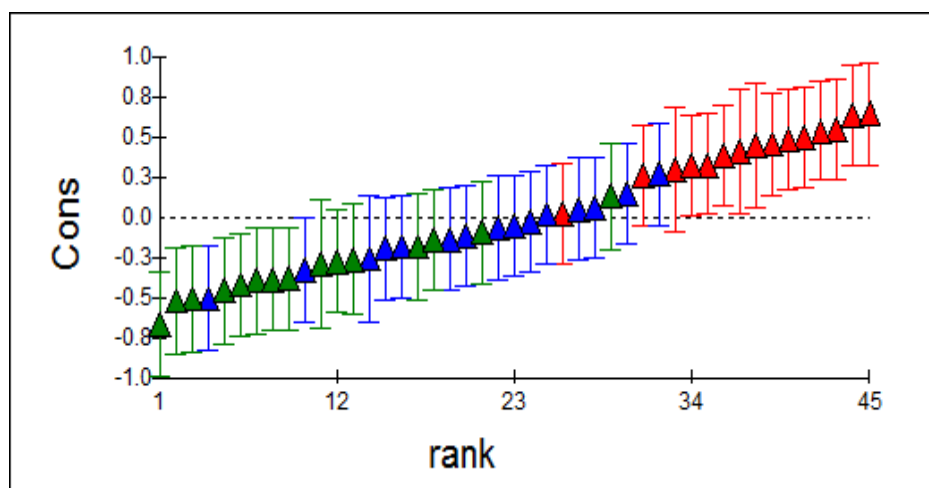
Legend: Red triangle= high-performing school; Blue triangle= medium-performing school and Green triangle= low-performing school

Figure 5.3: Identifying more and less effective schools by student progress.

As shown in Figure 5.3, the last seven triangles or schools on the top right hand side represent the most effective schools, whereas, on the bottom left hand side, the last six schools represent the least effective schools. It is, therefore, clear that, as a whole, all of the effective schools are high-performing schools. In contrast, most of the least effective schools are low-performing school except one (i.e. B 17 medium-performing school). Almost all the medium-performing schools and some high-performing schools are average.

In the next step, the more and less effective schools were detected, controlling for student background factors along with the value-added model (see model 3 in Section 4.2.3). The graphical presentation is given in Figure 5.4.
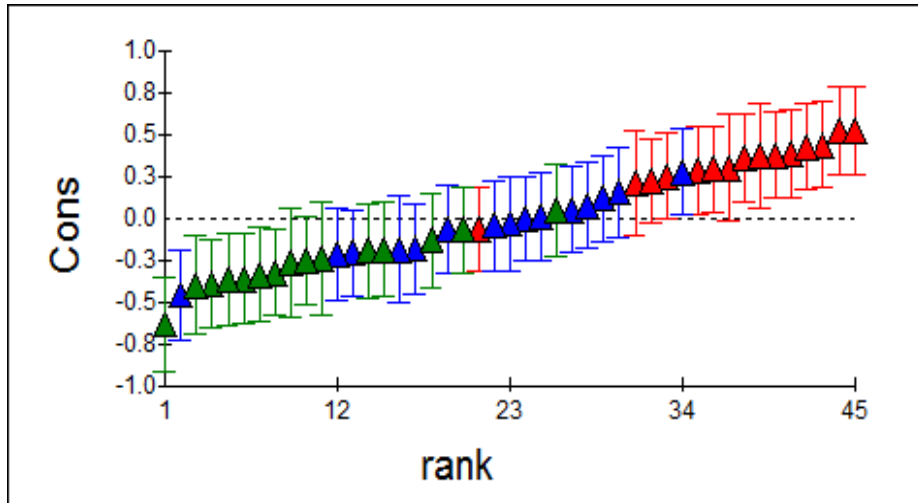
Legend: Red triangle= high-performing school; Blue triangle= medium-performing school and Green triangle= low-performing school

Figure 5.4: Identifying more and less effective schools by student progress and background factors

On the basis of one year progress, accounting for student background factors, Figure 5.4 indicated that the more effective schools are also high-performing schools, though one from medium-performing school (B 27). Again, low-performing schools were found as the least effective schools, along with one medium-performing school (B 17).

5.4.6.2: Findings of diagnostic model using normal plot

The diagnostics residuals as shown in Figure 5.5 were plotted using their normal scores of standard error on the assumption is that the residual at each level follows the normal distribution (Rasbash *et al.*, 2009). Again, the same high-performing schools were the most effective schools, as shown in the top right hand side of the graph and low-performing schools were less effective schools in the bottom left of the graph.
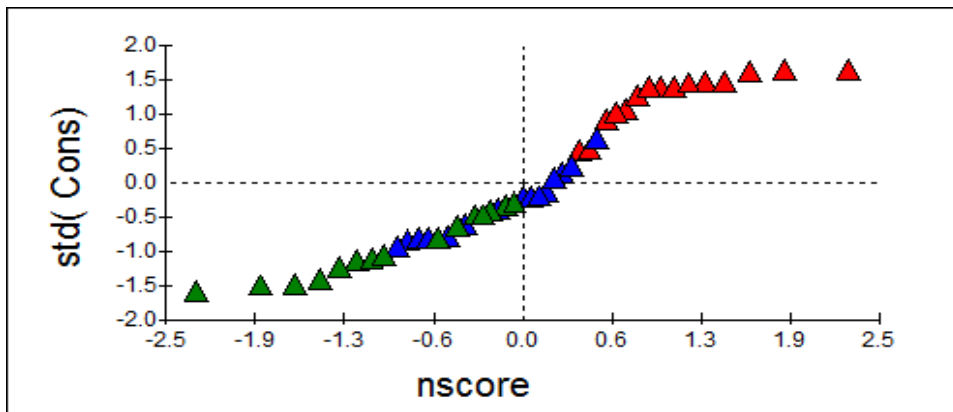
Figure 5.5: Identifying more and less effective schools using normal plot by student progress

The graphical presentation appeared fairly linear, as a criterion for the normal distribution. The Figures 5.5 did not show extreme school outliers, except for five outlying schools. These schools (A 14, A6, A7, C41 and C37) did not maintain the straight line because of the greater magnitude of their residuals.

To summarise, it can be said that almost consistent findings were produced from the estimation of diagnostic residuals. For all cases, schools A 14 and A 6 (accounting for background factors) were identified as the most effective schools and C 37 was as the least effective school. It would be interesting to explore these individual schools in more depth as case studies but this was outside of the scope of this present study. Moreover, while accounting for student background factors, along with prior attainment, one medium performing school (B 27) was also detected as the effective school. However, the detailed discussion of the findings derived from the multi-level analysis, the limitations, the implications of the current study for secondary educational policy and recommendations for further study to estimate school progress or effective schools, using value-added model, rather than only the percentage base pass rate or A+ achieved by the students in the public examination is discussed in the next chapter.

CHAPTER VI

6: DISCUSSION: EFFECTIVE SCHOOLS IN BANGALDESH IDENTIFYING WITH A SET OF INDICATORS

In Chapter V I attempted to answer the four research questions to identify the more or less effective schools in Bangladesh, along with the school effects and the indicators that influence student attainment. The aim of the present chapter is to discuss the findings of the current study. The findings of this study suggest that a model can be constructed for effective schooling in the Bangladeshi setting. The research questions taken for the current study are:

- i) How much variation in student academic attainment and in academic self-concept exists and ii) what is the interrelation between the attainment and self-concept of the students at an individual and at school level?
- How much do student characteristics and background factors influence- i) grade 10 student attainment and academic self-concept and ii) progress (taking account of prior attainment)?
- How much do teacher characteristics influence student attainment or self-concept, controlling for the influence of prior attainment and background factors?
- After taking into account prior attainment which school, class and pupil characteristics contribute to student attainment in grade 10?

The first part of this chapter presents my salient findings. The contents in the subsequent sections of this chapter are the implications and limitations of the research.

6.1: SALIENT FINDINGS OF THE STUDY

Multi-level analysis was carried out to find out the predictors of student academic attainment because the SER literature makes it clear that the influences on student achievement are multi-level (de Jong *et al.*, 2004; Kyriakides, 2005a). My findings indicated that a number of predictors of attainment were external to the school. Some other factors were internal to the school, and on the whole class level factors were more prominent than the school level factors, in accordance with the SER literature. The following section presents the key findings that had significant effects on student academic attainment and the variances in student academic attainment and academic self-concept.

6.1.1: Factors external to the school

A number of factors related to student level was identified as the most powerful indicators for better student academic attainment as presented follows.

6.1.1a: Student background factors

Negative finding was observed in the current study for student age implying that attainment significantly declined for older students compared to younger students. The findings differ from other SER researches, where young students for their 'year' usually perform less well than older students (see Mortimore *et al.,* 1988; Thomas 1995; Sammons and Smees 1998a; Strand, 1997, 1999, 2010). In contrast, similar findings were reported by Education Watch (2007). In support of my finding, it can be said that student retention is common in Bangladesh as in other developing countries. In Bangladesh, students can not start their next grade until they attain the prescribed school marks in their examination at the end of every school year. It is important to keep in mind the context while comparing SER findings and literature. Interestingly, the current study showed that students' age did not predict pupil attainment after prior attainment is accounted for, which is in line with the finding of Sammons *et al.* (1995b) but this might be because of the relatively short period between the two assessment points. For gender, findings indicated that boys out-performed girls, although this was not statistically significant and similar findings can be found in the SER literature, where boys tended to show higher attainment than girls in Mathematics (Sammons *et al.,* 2008; Day *et al., 2006*). Controversial findings can be found in the SER literature around the influence of students' gender, whereby girls' performance was better than boys' (see Chapter 3). Moreover, in Bangladesh the pass rate was higher for girls than for boys in the public examination results for the last few years, e.g. 57.32% in 2006; 54.74% in 2007; 68.90% in 2008; and 65.50% in 2009 (see BANBEIS website). In contrast, the SSC examination results for 2010 showed that the pass rate of female students under five general education boards is lower by 5.58 percentage points than that of the male students (The Daily Star, 2010).

In terms of predictive power, findings revealed that student SES played a significant positive role in obtaining better academic attainment, which is in line with other SER studies, where SES had strong exploratory predictive power in student attainment (details can be found in Chapter 3).

6.1.1b: Student's family-related factors

Student attainment is largely influenced by the home learning environment and learning opportunities. The home learning factors that had strong and significant effects in this study were students' study hours outside of schooling, the study place (e.g. separate study place or sharing with other siblings) and educational materials (e.g. note collection from senior good students and using reference book). Moreover, students who studied subjects (all or some group subjects) in the coaching centre or with the private tutors as an extra educational support and access to newspapers at home, performed significantly better than students, who did not have such learning facilities. The SER literature also supports these findings, namely, that an enriched home environment, sufficient assistance provided by parents (e.g. books, computers and internet at home, private tutors and newspapers) had an influence on student attainment (for example, Shinha, 1993, Kaluge, 1998; Strand, 2010; Education Watch, 2007 and reviews by Marzano, 2007 and Taylor, 2007). Parental interest in school work plays a vital role in student academic performance. Students' attainment was better when their parents discussed school work with them. The findings are in line with those of other SE studies that identified that parental involvement, supervision and home discussion were robust predictors for students' achievement and aspiration (see Chapter 3).

6.1.1c: Student academic self-concept

The results of the present investigation provide strong support for the interrelation between academic attainment and academic self-concept. Positive correlation was found between the two variables. Academic self-concept is now one of the most controversial, important and widely studied constructs in social science (Marsh, 2005), as it is well established by a number of researchers that there is a correlation between academic self-concept and academic attainment and certain classroom environments enhance both aspects (see more details in Chapter 3). In addition, most of the correlation was found at school level. At the individual level, the correlation was less, which indicated that studentaca demic self-concept was similar when students were attending in the same school. It is clear from the findings that school quality is important for the students. Attending a particular school, i.e. a good, mediocre or low quality school, provides a label for the students which has an impact on student academic self-concept and academic attainment. Labelling theory suggests that, when a student attends a low category school with other low-achieving students, that leads to a lower self-concept and can create a long-lasting stigmatisation, while attending a good

school enhances student academic self-concept and usually leads to better achievement (Marsh, 2005).

The effects of some student-level variables on academic self-concept were also estimated in the present study. The robust predictors were student's age and SES. With regard to age, academic self-concept of younger student was higher than that of the older students. Eventually, their high academic self-concept kept its impact on their academic attainment, as was found in this study. For example, Skaalvik and Hagtvet's (1990) reciprocal effects model found support for older students, but, in their skill-development model, younger students had high academic self-concept (see also Mujis, 1997). However, there was insufficient research to determine the interrelation over age (Marsh *et al.,* 1999; Valentine and Dubious, 2005). Clear support for a link between academic self-concept and academic achievement for young children was found by Guay *et al.* (2003). For student socio-economic status, the findings were in line with Maqsud & Rouhani (1991), where socio-economic status was significantly and positively associated with academic self-concept and academic achievement in English.

6.1.2: Factors internal to the schools

The contents of the following sections are the explanations of my findings found from the class and school levels variables.

6.1.2a: Teacher characteristics

17 variables were investigated to explore the teacher characteristics and classroom processes. For teacher characteristics, robust predictors for academic attainment were teacher age, teaching experience, remuneration and job rank. With regard to age, negative association indicated that younger teachers were less effective and their students' performance was worse compared to older teachers. The finding was opposite to the findings by Kaluge (1998), who found that younger teachers were associated with better student attainment.

Teacher's teaching experience, remuneration and job rank were also identified as strong predictors for student attainment. Teaching experience was shown to be an important factor in student achievement, which was in line with the findings of Larkin & Keeves, (1984); Anderson *et al.,* (1989) and a review by Murillo (2007). In the current study, teachers' job rank was identified as a strong predictor for student academic performance. Teachers in senior positions were more effective than junior teachers and the finding was opposite to the finding of Kaluge (1998), who did not find any relation between teachers' job rank and student attainment.

Teachers' good salaries range were identified as another powerful predictor in my research, which was in line with the meta-analysis and re-analysis by Scheeren and Bosker (1997) and Hanushek (1995). Positive association suggested that teachers' effective teaching largely depends on the amount of salary they received, which indirectly influenced students' better achievement. Importantly, an inconsistent effect for teacher salaries was found by Fuller and Clarke (1994). It is important to note that Kyriakides (2006a) did not find significant effects of teacher background factors (i.e. age, experience and pedagogical knowledge etc.) on student attainment.

6.1.2b: Pedagogy used in the classroom

A number of class process related factors were measured in this study to identify their effects on student attainment. Teacher pedagogy, homework and instructional strategy were found to be robust predictors for student academic attainment, which were similar to other SER findings (Rutter *et al.*, 1979; Mortimore *et al.*, 1988; Westerhof, 1989; de Jong *et al.,* 2004 and Sammons *et al.*, 2008). For teaching methods, students' performance was better, when teachers used conventional teaching method. This differs from other SE studies which suggested that intellectually challenging teaching was a significant predictor for student attainment (Mortimore *et al.*, 1988; Kyriakides, 2006a and a review by Marzano, 2007). Sammons *et al.* (2008) showed that quality of pedagogy, for example, richness of instructional method was found to be a significant predictor of progress in mathematics. In support of my findings, it can be said that in Bangladesh context, teachers, generally, use conventional teaching approach. Recently, GoB (Government of Bangladesh) has adopted a new project known as 'The Teacher Quality Improvement in Secondary Education Project (TQI-SEP)', which is working on teachers' continuous professional development (CPD). The aim of this project is to provide in-service training to all secondary school teachers, regardless of their subjects and the main focus of this training programme is to use participatory teaching and learning activities in classroom. It is important to note that when data was collected for the current research, the project just implemented their in-service training for their target groups. The impact of this in-service training would be a good focus for future SE studies.

6.1.2c: Head teacher leadership and classroom condition

Head teacher leadership had a significant effect on student attainment, which is considered as a central factor in school performance (Purkey & Smith, 1983;

Levine & Lezotte, 1990; Cotton, 1995; Mortimore *et al.*, 1988; Sammons *et al.* 1995a and a review by Murillo, 2007) and the findings of SER showed that head teacher leadership has an important direct effect on teachers' perceptions about the leadership and management of their teaching and learning process, which have indirect effects on student attainment (Day *et al.* 2007; Krüger *et al.*, 1998). In the current study, when teachers perceived that head teachers lead them professionally they were more motivated, which indirectly effects their teaching-learning activities and learning outcomes.

The common view was not supported by the findings of this study which tend to showed that larger classes do make some differences and have an effect on the quality of teaching, which was opposite to other SER findings (for example, Mortimore *et al.,* 1988; Blatchford *et al.*, 2007; Slavin, 1989). Different evidence was also found indicating that achievement was higher in large classes (see Burstall, 1979; Mortimore & Blatchford, 1993; cited from Bennett, 1996).

6.1.2d: Effects of teacher characteristics on student academic self-concept

While assessing the effects of teacher characteristics on student academic self-concept teacher age, in-service training, remuneration and job rank were found to be significant indicators for student academic self-concept. The positive side of my study is to identify the effects of teacher characteristics on academic self-concept and the findings were similar to student academic attainment obtained from this study. It is expected that the teacher characteristics can enhance student academic self-concept and better self-concept can lead to better academic performance. Emphasising the teacher's role in the classroom, Purkey (1970:14) states:

> Wise teachers have sensed the significant and positive relationship between a student's concept of himself and his performance in school. Academic success or failure appears to be as deeply rooted in concepts of the self as it is in measures of mental ability, if not deeper.

6.1.2e: Head teacher characteristics and school conditions

At school level, the head teacher's age was identified as a significant indicator for student attainment and this is in line with the findings of Sembring and Livingstone (1981, cited in Kaluge, 1998). Kaluge (1998) did not find any significant associations between the head teacher characteristics and student achievement. Teacher's educational training (Scheeren and Bosker, 1997) and school type, i.e. state/private or urban/rural or school categories (Scheerens,

1990), where students attend, are important for school performance (Young, 1994d; Young, 1998). Regarding school conditions, the findings of this study showed that an adequate number of trained teachers in the school and school category had a significant effect on student attainment.

6.1.3: The value-added analysis: progress and background effects
The value-added analysis was carried out to measure the student progress over a fifteen months period. Significant positive associations indicated that prior attainment had a strong effect on their later attainment and the use of student prior attainment reduced estimate of variances (30%) in attainment. Similar findings were found from the study by Sammons *et al.* (1993) & Sammons (1995). The impact of student background factors was also investigated in value-added analysis to examine their effects on students' relative progress. In terms of relative progress in student academic attainment, background factors were more important. Thus, disparity in attainment related to student age and socio-economic status increased over time. After including background factors in the model, the statistical explanation level was raised 47% adjusting for prior attainment (see Section 5.4.2.3). Similar findings of a strong relationship were demonstrated by other SE studies (Mortimore *et al.,* 1988; Sammons, 1995).

6.1.4: Variation in student attainment and effective schools
The contribution of school, class and student effects on the total variance in academic attainment was estimated with a null or empty model before including any intake variables. Most of the variances in attainment was found to be at the school level, with 38% at student level (37% with reduced sample size) for academic attainment, which was opposite to the findings of other SE researchers (see Reynolds, 2007; Driessen and Sleegers, 2000; Teddlie and Reynols, 2000; Reezigt *et al.*, 1999). For academic self-concept 61% variance was found between students, with a 30% variance between schools. It is obvious that school level variance in attainment is quite large as evidences from SE studies suggesting that a 12-15% variance in individual student achievement is due to schools (Teddlie, Reynolds & Sammons, 2000). The evidence also reveals that the variance varies by country, for example, in the USA, the range is somewhat higher (15-20%) and somewhat lower in Europe (8-12%). The proportion of the variances at the school level found in the current study is not surprising as this has been found to be large in the studies of Third World countries (Scheerens & Bosher, 1997; Riddell, 1997). Riddell (*op.sit.*) concluded that schools in developing countries vary on average by 40% (raw scores) and 30% (scores

adjusted for intake variables). Hill & Row (1995) also argued that class and school effects combine to account for around 30-40% of variances. Thus, the variance found at school level in this study is in line with other Third World country studies.

A significant amount of variances was also found to be at class level (21% to 23%) and including all pupil, class and school levels exploratory variables 18% to 23% of unexplained variances (15% to 22% with reduced sample size) in academic attainment remained at class level indicating that teachers in the individual classroom are the key factors for effective learning, which is line in the findings by Rowe & Hill (1994) and Creemers (1990), who stated that class or teacher effects on pupils are greater than school effects. Caution is needed in interpreting and generalising the school variation in the Bangladeshi context, since the current study is based on only a few schools (45) located at the Dhaka Metropolitan city. If larger samples representing more geographical areas (e.g. all divisions or urban and rural schools in Bangladesh) were considered, the variance could be different.

The most and least effective schools were identified, firstly with the residuals ($p > 0.05$) based on student prior attainment. My findings suggested that the effective schools belong to high performing schools, whilst most of the least effective schools were low performing schools. In other words, high performing or effective schools boost the students' later attainment with different levels of prior attainment, whereas attainment gains were lower in low performing schools identified as less effective schools. This conclusion was echoed by the works of Jesson & Gray (1991) and Sammons *et al.*, (1993). Effective and least effective schools were also detected, controlling for student background factors, along with the value-added model. Again, the findings indicated that the most effective schools were high-performing schools, whereas low-performing schools were found to be the least effective schools. Having summarised the findings of my study the following section will present and discuss the implications and limitations of my research findings.

6.2: IMPLICATIONS AND LIMITATIONS OF THE STUDY

The implications of my findings are multifaceted and could contribute to the improvement of secondary schools in Bangladesh. Therefore, the implications of the study are discussed in the next section from different point of views, such as the methodological, theoretical and policy implications.

6.2.1: Methodological implications

The use of a multi-level approach is one of the significant achievements of the current study. The multi-level approach allowed me to determine the extent of variations in academic attainment and academic self-concept and their interrelations from different levels. One of the most important aspects of multi-level analysis is that it takes into account the existence of hierarchical data structure and the variability associated with each level. If any of these sources of variability is ignored, it may lead to erroneous conclusions (Snijders and Bosker, 1999). Hence, the multi-level approach provides a richer and more appropriate approach to investigate school effects than traditional single-level approach. School effects could be investigated with traditional single-level approaches, but these would ignore the fact that students are clustered within classes and that classes are clustered within schools (Goldstein, 1995; Raudenbush & Bryk, 2002). Additionally, the methodological advances, particularly the availability of appropriate statistical software (e.g. MLWin used in this study) have enabled me to make more efficient estimates of student, class and school differences in student attainment (Goldstein, 2003). To date, multi-level analysis of school effectiveness has provided strong evidence of the existence of difference between schools (primary and secondary) in promoting pupils academic attainment (see Mortimore *et al.*, 1988; Sammons *et al.*, 1993; Sammons, 1995 on primary schools and Jesson & Gray, 1991; Sammons, 1995 on secondary schools).

Given the importance of multi-level analysis with a 'value-added' approach, this study can be regarded as a new approach to assessing educational quality in the Bangladeshi school context. In the Bangladeshi setting (as I mentioned in Chapter 1 and Chapter 3), the SER approach is not as familiar as it is in developed and other Asian countries (i.e. China, Hong Kong, Indonesia and India) and studies in the SE field are very few but they did not use multi-level modelling technique. The contribution of this study is the improvement of a conceptual model (i.e. a hierarchical model) for measuring secondary school effects in the Bangladeshi context and the findings have some theoretical and practical implications. The empirical evidence of the current study suggested that the influences on student achievement are multi-level (Teddlie and Reynolds, 2000;

de Jong *et al.*, 2004 and Kyriakides, 2005a) and the statistical interpretation of educational attainments and student progress (value-added approach), accounting for prior attainments, followed by student background characteristics and other exploratory variables at student, class and school levels have some verifiable empirical validity. From the multi-level perspective, it is possible to measure the contributions of student, class and school characteristics on academic attainments and academic self-concept in the Bangladeshi setting. Significant effects were derived at all levels of analysis. Therefore, it can be strongly said that the findings are useful and significant as a first multi-level analysis identifying the indicators of effective schools in Bangladesh. The evidence strongly suggested that intake differences, mostly external to school, are considerably more important in accounting for differences in student outcome. The indicators related to class level were also found to be more important than the school level factors, as the findings clearly showed. Hence, the class factors are the key to identifying effective schools in the Bangladeshi setting, along with student characteristics and the findings are quite consistent with other classical SE research (Creemers, 1994; Creemers & Kyriakides, 2006; Cheng & Mok, 2008).

6.2.2: The theoretical implications

The theory and model development is important as it allows researchers to ground the educational development, setting out the relationship between levels and factors in SER. The current study has attempted to construct a model reviewing the indicators of previously developed models by other SE researchers. It is evident from the findings of the current study that secondary schools in Bangladesh are differentially effective and I have identified a set of indicators that make the school effective. This list of school-enhancing conditions could be included in an integrated model of school effectiveness in the Bangladeshi context, where the correlates of student outcomes could be connected to a number of school effective conditions at different levels.

In order to a construct a model of school effectiveness for Bangladeshi secondary schools, the systematic approach in this study was derived from the integrated model of school effectiveness developed by Scheerens (1990). The basic assumption of the integrated model is that higher organisational levels facilitated effectiveness, enhancing conditions at lower levels (*ibid.*). Some features of the dynamic model proposed by Creemers and Kyriakides (2006) were also considered in this study, as there were similarities. The factors of the dynamic model reconfigured in this study at student level were: time on task, opportunity

to learn, SES and gender. Another similarity between the dynamic model and the present study was the outcome measures, since both models used the cognitive and affective domains as outcome measures. Additionally, some similarities can also be found with other models, for example, the comprehensive model designed by Cremers (1994) and the QAIT/MACRO model developed by Stringfield & Slavin (1992). A comparative picture of the conceptual map of the current study with other model of SER is shown in the following Table 6.1.

Table 6.1: Comparison of conceptual models

Model of this study (significant result only)	Integrated model (Scheerens)	Comprehensive model (Creemers)	QAIT/MACRO model (Stringfield & Slavin)*	Dynamic model (Creemers & Kyriakides)
Pupil level: - Prior attainment - Academic self-concept - Background factors (i.e. age and SES) - Home learning environment - Learning opportunity - Parental interest in school work	**Pupil level:** - Per pupil expenditure - Parent support	**Pupil level:** - Time on task - Opportunity used - Motivation - Aptitude - Social background	**Pupil level:** - Aptitude - Time for learning - Perseverance - Ability to understand instructions	**Pupil level:** - Attitude - Perseverance - Time on task - Opportunity to learn - SES - Gender - Ethnicity - Personality traits - Expectations - Thinking style - Subject motivation
Class level: - Teacher characteristics (age, experience, job rank and remuneration) - Process (assign homework, teaching method and leadership perception)	**Class level:** - Teacher experience - Time on task - Structured teaching - Opportunity to learn - Expectations of pupils' progress - Evaluation & monitoring -Reinforcement	**Class level:** - Quality of instruction (curriculum, grouping, teacher behaviour) - Time for learning - Opportunity to learn	**Class level:** (QAIT) - Teachers' presentation, feedback, guidance, assignments - Difficulty of subject - Stimulus for learning - Actual teaching time & schedule time	**Class level:** - Quality of teaching - Orientation - Structuring - Modelling - Application - Questioning - Assessment - Management of time - Classroom as a learning environment
School level: - Head teacher characteristics (i.e. age)	**School level:** - Achievement policy - Consensus, co-operative planning - Quality of schools curricula - Orderly atmosphere - Evaluative potential	**School level:** - School work plan - School organisation - Material conditions	**School level:** (MACRO) - Meaningful goals - Attention to academic function - Coordinator - Recruitment & training - Organisation in school level (related to school culture/ethos)	**School level:** - School policy - Evaluation of school policy
Context level: - total number of trained teachers - School category	**Context level:** - Achievement stimulants - Development of educational consumerism - 'co-variables' (school size, student body, school category, urban/rural)	**Context level:** - Education board - Policy on attainment target - Financial/ material conditions		**Context level:** - National / Regional Policy for education - Evaluation of policy - The educational environment

Note: * 3 first levels only

A list of student level factors, for example, prior attainment, academic self-concept, age, SES, home learning environment and learning opportunity were identified as powerful predictors for academic attainment. Strong effects of student background factors and their prior attainment over one year were also found from the study. Importantly, these characteristics have been found in the previous models and international SER literature to be robust predictors for student attainment irrespective of the school and the classroom processes. The significant contribution of this study is to identify a number of class level predictors, which were correlated significantly with academic attainment. Thus, the findings of this study suggested that the classroom related variables were more important than the school level variables.

In short, the empirical findings of this study correspond to well-established SER models (i.e. the Scheerens model, the dynamic model, the comprehensive model and the QAIT/MACRO model). In order to construct a model of school effectiveness in the context of Bangladesh, the significant contribution of this study is to interpret the influence of student attainment, taking account of variables from different levels: student, class and schools. Moreover, from a statistical point of view, this study also demonstrates that a multi-level model can be developed in the Bangladeshi context to measure school effectiveness.

6.2.3: Policy implications for secondary education in Bangladesh

A number of initiatives at government and non-government levels have been taken in Bangladesh to improve the quality of education (see Chapters 1 & 2). The progress and quality of education in Bangladesh is explained by the indicators, such as- enrolment, promotion, repetition rate, drop-out rate and public examination result. There is currently no empirical evidence from SER of school performance progress in Bangladesh. This study was designed to identify the more or less effective schools by using various performance indicators at different levels (i.e. students, class and school). The findings of my SER in the Bangladeshi context lead me to propose some policy recommendations for improving the quality of education, which are described in the following section.

6.2.3a: First proposal: criteria for good or bad schools

The results of the current study have some policy implications for the publication of school examination result and the evaluation of the school quality on the basis of the public examination pass rate and students' achievement of GPA 5. Comparing the top ten schools position in Bangladesh or ranking of the schools in term of 'raw' public examination results rather than 'value-added' results, has a

marked impact upon the evaluation of the schools quality. Given the emphasis on student progress over time (in this study, one year three months time) and the strength of the relationships between prior attainment, background factors and later attainment in public examinations, it is clearly misleading to use 'raw' results of the public examination as a measure of school effectiveness in promoting student academic attainment. The 'raw' public examination results can allegedly be an appropriate means of evaluating school performance, so that the education purchasers, particularly parents can select a good quality school for their children. It is well established now that the value-added approach can be a useful approach for policy makers and the practitioners (Sammons *et al.*, 1993; Sammons, 1996) for identifying effective schools from less effective schools. It is clear from the present study that multi-level analysis with a 'value-added' approach of student attainment can provide more valid estimates of school effectiveness. The contribution of the present study is to introduce a new dimension in the Bangladeshi setting to differentiate more effective schools from less effective schools for quality secondary education on the basis of progress, rather than the public examination results as only indicator. In a nutshell, value-added approach can be considered as a criterion for measuring good or bad schools in Bangladesh.

6.2.3b: Second proposal: children have to equal access to the schools in the catchment area

Another implication of this study is to identify schools as more or less effective, rather than by school category or top ranking schools, on the basis of school performance. In this study, in null model most of the variances in attainment can be observed at school level (41%; 40% while reduced sample size was used for further analysis). More importantly, the correlation between academic attainment and academic self-concept was found very high at school level (r=0.98 in model 1 and 0.96 accounting for prior attainment in model 2) than at class or student levels. Hence, it is clear from my findings that school quality is important and the good quality school not only boosts up their academic attainment, it also helps to make students' feel positive about their academic ability.

In Bangladesh the criterion for obtaining a place in a top ranking school is the highly competitive admission test result at the starting point of schooling (i.e. most of the cases grade one). Thus, the tendency for parents to pay large amounts of money, to secure access at a so called good school has been increasing over the last two decades. It is very common in Bangladesh for children at the age of 5 or 6 to start their special coaching for the admission test

for these schools. Moreover, if the student doesn't gain the chance to attend this type of schools first time round, he/she can resit for admission in the next one or two years. In that case, parents hide their original age, as the birth registration system is not strictly implemented by the government. It is clear that high-performing or top ranking schools are the most effective schools (identified from the study), as they are filled by the most able students with the most ambitious and financially well-off parents and so attract some of the best teachers. Ultimately most of the students of these schools achieve very good results in the public examinations. Thus, the educational inequality among the different categories of schools has become the focus of educational development strategies and plans. The education authority should pay attention to this point and abolish the entry level admission test for children at this stage. There should be provision for all students to obtain access to the schools in their catchment areas. It would be helpful to reduce the labelling of schools and the school authorities should be accountable for access, equity and quality of education in respect of students' ability and their socio-economic status. Moreover, it would be helpful to reduce the pressure on the parents and the children to gain a place in a very good quality school, so parents would not have to pay a huge amount of money for admissions-test coaching. Importantly, this type of admission test may have a long-term negative impact on students' academic ability at the beginning of their schooling, when they do not have the chance to go to their chosen schools. It is important to note that from 2010 a lottery system will be introduced for school admission and admission tests are now strictly prohibited in Bangaldesh according the command of the education minister. Hence, the chidren gain a place in a school if their name is announced in lottery system for their chosen schools.

6.2.3c: Third proposal: initiatives for reducing the gaps in the external factors of the schools

The schools are supposed to play the most important role in the advancement of the learning of the young learners. Multi-level analysis of the student academic attainment in this study revealed that this was not happening in the case of secondary schools in Bangladesh. The findings of this study indicated a significant proportion of variances in academic attainment that was produced by the factors external to the school. In terms of predictive power students' age, academic self-concept, SES, home learning environment, learning opportunity and parental interest in school work were identified as the most influential factors in explaining the learning outcome and, to some extent, their progress over fifteen months. All these clearly indicated that the student level inputs play a significant role in

students' learning competencies. The findings related to the student level have implications for secondary education development. Firstly, the schools in general are not fulfilling their roles appropriately, and these findings are also supported by the Education Watch report (2008). Secondly, in this study, SES had a vital role in the variation of academic attainment. The parents in economically better-off position are more likely to give their children more educational support by providing an opportunity to learn, for example, a good study place at home, educational materials, private tutors or a coaching centre facility and access to newspaper at home. Moreover, the findings (Section 5.2 in Chapter 5) of the current study revealed that student background factors influence access to 'cultural goods', for example, access to a computer at home, private tutoring and coaching centre facilities for additional educational support (Rego and Sousa, 1999 and Verdis, 2002), which have significant effects on academic performance. Therefore, it is difficult for the students, whose families do not have a good level of SES, to attain better academic performance without support from the schools.

In the Bangladesh education system, shadow education, for example, private tutoring and the use of coaching centres, is playing an important role in student performance. Importantly, it is a burning issue in Bangladesh and comments are often published in the national newspapers from the reader forum: what are schools doing if students need to go to private tutors or are more dependent on coaching centres? The tendency to engage private tutors or use coaching centres for educational support among all levels of students (primary, secondary and higher secondary) has increased noticeably and students are increasingly dependent on private tutoring. In the current study, number of subjects studied in coaching centres or to private tutors was distinguished as a strong predictors, which reflects the important role of the private tutoring and coaching centres on students' school performance (Education Watch, 2008; Verdis, 2002). It is public belief that the shadow education system is trying to compensate for the inefficiencies of the mainstream schools in Bangladesh by offering a good package of educational support and the stakeholders (i.e. parents) are becoming more involved in the coaching centres or with private tutors, as they think schools are not providing their children with adequate education support. A similar view is identified by the Education Watch report (2007:128):

> The well-to-do families and educated parents engaged more tutors and invested more in these facilities and hence their children secured better results. Although, the different education commission reports urged parents to stop the provision of private tutoring, the education ministry did not take any action against this. As a result, the provision spread day by day and now has become an integral part of our education system. Nonetheless, the

provision improves the learning achievement of the tutees and contributes as well to the increasing inequity in the education system.

Experience in other countries that have both low and high levels of income shows that it is difficult to remove private tutoring from the education system for many reasons in this competitive society and era of globalisation (Bray and Kwok, 2003; Bray, 2006; cited from the Educational Watch, 2008). Therefore, it is hard to identify how the government of Bangladesh might change the student level factors with intervention programmes. Given the reality in Bangladesh of the level of poverty and students' low socio-economic status, it is important to emphasise the responsibility of schools and the following possibilities can be considered from the governmental level to reduce the variation of the student level factors:

1. The school can take initiatives for extra educational support, for example, after school study club can help the students outside of school hours with free or a minimum level of charge, so that the students do not need to pay huge amounts of money for private tutors or a coaching centre for additional help. Private tuition by school teachers, which is common practice in Bangladesh, should be strictly prohibited. School authorities should take disciplinary actions against teachers, who are violating the school's rules and regulations to earn extra money by means of private tuition or coaching centres.

2. Schools should identify the students who are from disadvantaged backgrounds and after school study club can begin to compensate for this group of children providing additional educational support and access to educational materials, such as text books, reference books, dictionaries, computer and newspapers etc.

3. It is important to encourage parents to become involved in school activities, for example, providing counselling to the parents to discuss school work with their child regularly and to help their child to complete homework successfully. It is important to note that it is often difficult for the parents, particularly for the mother, to participate in their children's education at this level (i.e. after grade Eight), because of their own academic background. There are no quick solutions to this problem.

4. In this study, older students' attainment was poor compared to their younger classmates, suggesting that the teachers should provide special attention and assistance for older children, who are lagging behind younger children in their classroom and are kept back in the same class because of their poor attainment. School authorities and teachers should

keep in mind that repeating a grade does not necessarily promote student achievement; rather, it can develop negative self-concept and a negative attitude toward school increasing the dropout rate. Different kinds of intervention programme can be introduced for this group of students. For example, they can be moved to vocational education, so that, if they give up their schooling after year ten, they have at least a minimum level of qualifications to enter the job market with a certain level of vocational skill.

5. In the present study, a positive correlation was found between student academic attainment and academic self-concept. It is important to emphasise that reciprocal relation between academic self-concept and achievement has very important practical implication not only for the educators but also for the teacher, who can play an important role in increasing student academic self-concept at class level, as Marsh (2005:36) states:

> If the direction of causality were from academic self-concept to achievement, then teachers might be justified in placing more effort into enhancing students' self-concepts rather than fostering achievement. On the other hand, if the direction of causality were from achievement to self-concept, then teachers should focus primarily on improving academic skills as the best way to improve self-concept.

Guay *et al.* (2003) also suggested that, with young children, teachers should strive to improve simultaneously both academic self-concept and achievement in order to produce positive changes in both the constructs. It is particularly important for the medium and low-performing school students and repeated grade students.

6.2.3d: Fourth proposal: initiatives for improving the quality of teaching learning aspects and school conditions

If education is considered as the backbone of the nation, then the teachers would be the backbone of the education system, as they interact directly with the students in the classroom. Therefore, the characteristics of the teachers, i.e. their qualifications, experience, age, overall pedagogical knowledge and preparation are exceedingly important for quality education (Education Watch, 2008). This study indicated that classroom factors were the key area for quality education. For example, at class level, the powerful predictors identified from the empirical evidence of this study were teacher's age, teaching experience, remuneration and their job rank. The research findings might be useful in improving the quality of

teaching and learning. It is important to note that the suggested areas would not only improve the quality of education, they would also be effective for the student's academic self-concept, a reciprocal interrelation between student academic attainment and academic self-concept as was found in this study. The following measures can be considered to improve the quality of education making classroom and school more effective.

1. The older teachers were associated with better attainment, as found from the findings of the current study, probably because they were more experienced. Therefore, the findings suggested that it is important to keep balance the teachers in terms of age, length of service and experience within the school and to encourage experienced and older teaching staff to share their professional understanding of good practice with young and novice teachers. Moreover, the school authority should identify teachers who need professional development irrespective of their age and experience. The school can arrange teacher development programmes or INSET (in-service training) day on a regular basis, with the help of more efficient and experienced teachers.

2. The empirical findings suggested that teachers required in-service training for developing student academic self-concept and they rarely received enough of it. Provisions for a good level of academic attainment largely depend on the use of more effective pedagogies (i.e. lesson planning and homework). These aspects had an influence on student attainment as shown from the findings of my study. Other research findings based on classroom observations also indicated that there was a serious problem in classroom teaching in Bangladesh (Nath *et al.,* 2005; Nath and Mahbub, 2008). Such a situation is obviously related to teachers' pedagogical knowledge, everyday preparation for teaching, assigning home work and largely to a commitment to quality teaching. Thus, in order to improve student learning competencies, more emphasis on teachers' pedagogical use and creative teaching-learning in the classroom is an imperative. It is worthwhile to mention here that GoB has paid attention to this point and under the TQI-SEP all secondary teachers in Bangladesh have already received subject-based in-service training. It is hoped that this in-service training programme will help to improve the teachers' teaching-learning quality, which will help to increase academic performance and to develop students' positive self-concept.

3. In this study, remuneration and job rank were found to be significant factors for teachers. Quality teaching largely depends on teacher job

satisfaction (Michaelowa, 2001). Teachers' satisfaction can be at an optimum level when they will receive a generous salary and other financial benefits. Additionally, it can be assumed that teachers' salary level is associated with their job rank. When teachers do not obtain promotion in due time because of bureaucratic complexities and other internal school politics, that can demoralise teachers and reduce the effectiveness of their teaching. Therefore, for quality teaching, the government should take appropriate steps for teachers' welfare proving good financial incentives. Attention also needs to be paid to teachers' career progression.

4. The leadership qualities of head teachers should be improved. Teachers should lead professionally, irrespective of all school subjects, under the head teacher's democratic and efficient leadership. The school authority needs to say what the school is expecting from the school staff at meetings on a regular basis and there should be a school monitoring body to ensure teachers are working in accordance with the school instructions and expectations. On the basis of this report, teachers should be rewarded for their work, which obviously will increase their motivation in their profession.

5. For class size, it is hard to make any comments as large class size was effective for better student attainment, as shown from the findings. Controversial support was found from the research evidences in this regard, where some studies indicated that a small class is better for good attainment (i.e. Mortimore *et al.*, 1988; Blatchford *et al.*, 2007, Slavin, 1989), whereas different evidences were also found indicating that achievement was higher in large classes (i.e. Burstall, 1979; Mortimore & Blatchford, 1993; cited from Bennett, 1996). From the MoE level, the rule for teacher-student ratio is 1:33 (BANBEIS, 2006) in Bangladesh. But the schools are not following this rule. It is important to mention that, during my data collection, I found 60 to 65 students in each class (though all students were not present that day) of one school and the teacher was teaching using a microphone. This was the case for one of the most famous girls' schools in Bangladesh and parents are paying a great deal of money for their children to have the chance to go to this school. Therefore, my question is- how does effective teaching and learning are possible with this big class? and how does a high proportion of the students of this school achieve GPA 5? The education authority should monitor this issue strictly, as the small classes have the following impacts on students' overall educational outcome (Bennett, 1996:47):

- provide more individual attention
- recognise the classroom and teaching space
- do more group work
- more individual assessment and task matching
- more practical activities
- create smaller working groups

6. At school level, the school category was identified as a powerful predictor as the findings indicated that academic performance was worse when students were attending medium or low-performing schools. Thus, the suggestion is that the labelling of schools by category or top ranking schoosl should be abolished and effective schools should be identified on the basis of student progress over time, which I described in Section 6.2.3a and 6.2.3b.

7. Older head teachers were more effective as found from the findings. Head teacher's age is directly related to their teaching experience, experience as head and management skills and all of these qualities are important for running a school effectively.

8. The findings also revealed the importance of trained teachers in the school for quality teaching. The school authority needs to improve pedagogical and in-service training, which is important for teachers' professional development and the quality teaching. The research and writing on SE states that the classroom level is more directly influential on student performance than the school level (e.g. Scheerens, 1992; Creemers, 1994; Muijs & Reynolds, 2000). Hence, the classroom can be made effective with quality teaching and quality teaching possible appointing trained and skilled teachers in the school.

6.2.3e: Fifth proposal: appropriate measures of cognitive outcome

The nature of the cognitive outcomes is the main concern for SER in Bangladesh context that could be used as an indicator of school quality. In this study, public examination results were used to evaluate school effectiveness in Bangladesh and I explained the reason for using this measure in Chapter 4 (see Section 4.2.5). The use of public examination scores is reliable, as the examination papers are curriculum embedded and developed by a special team at national level. Since the public examination is serving certification purposes, the students dedicate their full effort and do their level best to achieve good results. The over-production of GPA 5 can be found only in the very good schools, whereas, in some schools, the pass rate is very low, as is the case of some of the sample

groups of this study. Therefore, it is difficult to estimate the school differences efficiently, when the examination results lose their discriminative power. The following quotation depicts the reality of the wide variation in school performance in Bangladesh:

> There is little question that the results of this year's Secondary School Certificate examinations have been remarkable. With as many as 78 per cent of students qualifying in the examinations and with a clear jump in the number of those who have scored GPA 5, one cannot be in any doubt about the nature of the success. There are, of course, some institutions, 49 in all, which have had zero success (The Daily Star, May 17, 2010).

The issue of school effectiveness for different subjects and kinds of educational outcomes is clearly important (Sammons *et al.*, 1993). Therefore, there is a need to develop standardised tests covering different areas of knowledge to assess the students' cognitive ability with regard to the student's age and school year.

6.2.3f: Sixth proposal: provision for a quality database at student and school levels and easy access to research setting for the educational researchers

Some of the practical impediments for conducting educational research in Bangladesh were discussed in Chapter 1. The problems are: a) availability of educational statistics and b) soliciting permission from the Ministry and obtaining access to research setting (i.e. schools). Though BANBEIS (Bangladesh Bureau of Educational Information and Statistics) is providing educational data, there is still a need to do more to make a quality database from the national level, including students' year-to-year performance, background-related information and school level information. Such a database should be accessible by educational researchers, teachers and parents. Getting access is also an important issue for conducting educational research in Bangladesh. Without detail educational statistics and easy access to these, the progress of educational research and educational policy will be limited.

6.2.4: Limitations of the study:

While interpreting and generalising the findings, I kept in mind the limitations of my study as regards the theoretical, methodological and analytical aspects. The theoretical model for this study was constructed, following the well-established hierarchical models of SER (see Chapter 3), for example, the Scheerens model (1990), the Creemers model (1994), the QAIT/MACRO models by Stringfield & Slavin (1992) and the dynamic model by Creemers and Kyriakides (2006). A

most important point is that not all of the exploratory variables of previous models were used in the current study, which might have significant contribution for the variation in school effectiveness. Moreover, this study measured only the direct additive effects of the different levels: student, class and schools on student attainment. Though the effects of student prior attainment and background factors were accounted for prior to the different levels of analysis, the possible existence of interaction and indirect effects of the variables of different level should not be considered too lightly (Kaluge, 1998).

Sample size was a big issue in this study, since the student participation of medium and low-performing schools was not sufficient in comparing high-performing schools. Measures of student attainment were another limitation for the study, although the standardised test might have served the purpose better, it was not possible because of some practical constraints (see explanation in Section 4.2.5.1).

In the current study, teachers assessed summative test scores of year nine (baseline attainment) and public examination results served the purpose of learning outcomes. One of the great limitations of my study is the distribution of outcome measures. Since, the study was conducted in the capital city of Bangaladesh, where most of the students achieved highest GPA scores in their public examination. This over production of GPA 5 made the distribution negatively skewed (the mean of examination score was 4.07, with SD= 1.39 and skewness = -2.05). Inspite of this celling effect of the outcome measure, I used the normalised GPA scores in my ML analysis and explained this decision in Chapter 4 (see Section 4.4.2). It is hoped that some robust predictors were identified from this study with this celling effect of outcome measure. Additionally, the internal score might not be reliable, unlike the public examination result. This is because the assessment system varies from school to school and the criterion of assessment is not same for all schools. Moreover, there are also individual differences in teachers' assessment of answering books. However, public examination results are much more reliable, as the evaluators must have to follow the same instruction provided by the Board of Intermediate and Secondary Education (BISE).

Selecting grade ten (X) as a research sample created another problem because it was really hard for any researcher to achieve the 100% participation of the students. The attendance rate of the students was between 60% -80%. If another grade (i.e. I-IX) had been chosen, then the percentage could be higher, but this was not possible, as there was no public examination till 2008 at any of these stages and there was no available standardised test in Bangladesh. It is

important to note that the government of Bangladesh introduced a public examination after primary school (i.e. grade 5) in 2009 and another one is going to be introduced after junior secondary school (i.e. grade 8) from this year (i.e. 2010). Establishing school category on the basis of only two criteria, namely, the number of students sitting the public examination and pass rate was also a limitation for this study and my point for using this two criteria was described in earlier in Chapter 4 (see Section 4.2.4).

The scope of this study was limited to only the urban schools located in the metropolitan city in the Dhaka division of Bangladesh. It did not encapsulate the whole picture of secondary schools of Bangladesh, since the secondary schools located in other divisions and rural areas were not investigated. Using a survey approach was another limitation of this study. Questionnaires were used for data generation; therefore, more details of process-characteristics at class level were not possible to explore. Other methods, for example, observation (Teddlie and Liu, 2008); case study (Haydn, 2001) or a mixed method (Teddlie & Stringfield, 1993; Day *et al.,* 2006; Sammons *et al.,* 2007) can be used to explore the effects of the school and classroom process. However, I carried out the study keeping all of these limitations in mind.

6.2.5: Hindrances of the study:

I also confronted a number of difficulties in carrying out the study. As far as possible, I tried my level best to make the study both credible and functional but there were some practical constraints, which were beyond my control. These are –

- Some of the respondents were not interested in participating in the study. Their participation could have increased the sample size.
- Many parents did not return the questionnaires. Although the reasons for this are not clear, it is important to note that the literacy rate[34] in Bangladesh is still less than 50%. As a consequence, I found 30% missing data in my study because of parents' non-participation, which was a big limitation for my study. To overcome this shortcoming, I had to run further ML analysis with reduced sample size (see Section 5.4). Nonetheless, for one model (see model 3 conducted with reduced sample size in Section 5.4.4) there is still 20% missing cases.
- The same picture was found for the teachers. One part of the teacher questionnaire contained the items related to head teacher leadership and school administration. Understandably the teachers were very careful

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[34] According to UNESCO's standard definition.

when responding to that part of the questionnaire and were requested not to disclose their answer to others.

- Information like students' age and parents' qualifications, occupations and household income could be collected from the schools or the organisation BANBEIS quickly. In Bangladesh it is not possible to generate all this information from the schools or any other organisation like BANBEIS as they do not have comprehensive database related to students personal information.

- Getting access to the Ministry of Education, computer data entry centre and schools caused the most problems. Some schools initially gave permission, when they saw the permission letter from the Ministry of Education but, when the research team went to the school for data collection, some of the head teachers were so reluctant that they did not give access to the school. In that case, I excluded that school and contacted another school from the alternative list.

6.3 Summary

In this chapter I have described the salient findings of my research. On the basis of my findings, I have also illustrated the implications of my research for the Bangladeshi schooling system. The implications were explained from three points of views: methodological, theoretical and policy. Based on my findings I have proposed some policy recommendations for improving the quality of education in Bangladesh. I have shown how multi-level models can be developed in the Bangladeshi context to measure school effectiveness. Finally, since no research is perfect I have also described the limitations of my research. All that remains are my conclusion and these are presented in the final chapter 7.

CHAPTER VII

7: CONCLUSION

This study has explored the educational influences that make schools effective in Bangladesh and that have an impact on students' academic attainment. The study is the first school effectiveness study that used multi-level analysis in Bangladesh. The use of multi-level methods makes a major contribution to the knowledge base of school effectiveness research and could be a basis for further SER in the Bangladeshi setting.

In order to answer the four research questions, a longitudinal and quantitative analysis of data collected from 45 schools of three different categories (high performing=15, medium performing=15 and low performing=15) was conducted to assess school effectiveness in Bangladesh. The findings showed that the amount of unexplained variances in student attainment was larger at school level than at student level. The school level variance found in this study is larger (40 to 41%) than found by other SE researchers in developed and developing countries. While measuring the student progress with value-added analysis adjusting for background factors, 30% of the variation in student attainment was at the school level, which is similar to the previous research implying that schools do make a difference in Bangladesh (e.g. Mortimore *et al.,* 1988; Teddlie & Reynolds, 2001; Sammons, 2007).

The variations in student attainment can largely be explained by factors which are external to the schools. Student's age, prior attainment, academic self-concept, SES, study hours, study place, educational materials (i.e. use of reference books and note collected from other students), number of subjects studies in the coaching centre or with the private tutors, subscription to newspapers at home and parent discussion were all important predictors at student level. A significant proportion of variations were found to be at class level. After including all exploratory variables in the models (see research questions 3 and 4) results indicated that teachers make more difference to student progress than schools. The powerful indicators found at class level were teacher's age, teaching experience, remuneration, job rank, use of pedagogy in the classroom (i.e. assigned homework), class size, teaching method (i.e. conventional teaching approach) and teachers' perception to head teacher's leadership (i.e. leading professional). At school level, the only significant ones were head teacher's age, total number of trained teachers in the school and school category. Therefore, it

is clearly seen from the findings that effects from the student and class levels factors were very influential on student academic attainment. Certainly, the effects of school regarding the class level conditions, should not be undervalued as their effect, are also significant for effective teaching.

7.1: Contribution of knowledge

The most significant part of my thesis is the use of advance methodological and a conceptual models (i.e. a hierarchical model, where students are nested in classes, classes are nested in schools) for measuring secondary school effect in the Bangladeshi context. The use of multi-level analysis with a 'value-added' approach in my study can be regarded as a new approach to assessing educational quality in Bangladesh. The detailed description of the methodological and theoretical implications of the study can be found in previous chapter (see Chapter 6).

The most important contribution of my study is identifying the predictors that make schools effective in Bangladesh using statistical modelling techniques with a contextual value-added approach. The factors have influence at different levels (i.e. student, class and school) and combine to impact upon student progress and attainment. I have made the case that the findings have some clear educational policy implications. In respect of education policy, my voice will echo the comment of Rahman (2008), who states, in the preface of the Education Watch Report (2007):

> Our sincere request to the policy makers for their careful look at the findings of this study and to take advantage of such readily available information and analyses. If we do not give adequate attention to the preparation of our youth they will not be able to keep space in the era of globalisation.

Another significant contribution of my study is measuring of non-cognitive outcome, i.e. academic self-concept. The findings revealed that for both constructs (i.e. academic attainment and academic self-concept) schools seemed to be important. Therefore, the school and teachers would be well advised to improve their students' perception of their own academic abilities, known as academic self-concept, as it has been demonstrated that academic self-concept has a strong, positive and direct effect on their later academic attainment. It is also clear that the social background of students, in particular the financial resources and educational level of parents, has a strong influence on self-concept.

In the education sector as described in earlier chapters (see Chapters 1 and 2), Bangladesh has made good progress, even though the main concern still is quality of education at both the primary and secondary levels of education. The performance indicators used in most of the initiatives to assess the general quality of educational institutes are access and gender parity, pass rate in public examination, the dropout and retention rate, physical and financial facilities, teacher qualification, pedagogical training and so on. The issue of educational quality and the reform of education on the basis of sociological, political, and philosophical point of views are raised by the academics, researchers, educationalists and practitioners from the round-table discussions, educational seminars, symposium and policy dialogues. As part of the public interest, the daily newspapers also published the debates on education reform from time to time. Priority has been given by the Bangladesh government to improve the quality of education, as the Education Minister mentioned in the National Consultation under the title of 'Students Facing Challenges in the SSC Examination' organised by the Campaign for Popular Education (CAMPE, 8 August, 2010):

> the entire education system is responsible for the failure of students and we want a system where no students will remain challenged. Only classroom judgment is not enough to declare a student successful or challenged sharing the governments plan to make the education system effective combining the spirit of science, responsibility and moral codes among the new generation. Teachers are the main weapons in ensuring quality education and the government is working for a gradual increase in their benefit and capacity.

Unfortunately, no one has tried to systematically identify the characteristics of effective schools or to see how ineffective schools differ from effective schools. The idea, that variation in student performance is due to schools intake or individual differences in the socio-economic status of the students, is not taken into account. It is important to note that only the students of top-ranking schools are highlighted for their excellent performance, as the newspapers focus on the public examination results of the top-ranking schools. There are other types of schools i.e. medium and low-performing schools but they do not get public attention for their public examination results. Measuring school quality, therefore, on the basis of student progress over time using a value-added approach rather than with 'raw' scores of public examination should be the more appropriate technique. From my side, it can be said that multi-level modelling school effectiveness research has just started its journey in Bangladesh. It is expected that this new concept of measuring student progress and school quality can draw

the attention of the educationalist, practitioners and the policy makers for further SE research in Bangladesh. It is important to note that the findings of my study have been presented to a student conference '*Navigating the Boundaries of Educational Research',* organised by the School of Education in the University of Nottingham and in the XXIV CESE Conference organised by Uppsala University in Sweden.

7.2: Final remarks and recommendations for future SER in Bangladeshi context

The results of this longitudinal study provide a useful starting point for further SER in Bangladesh. Caution is needed for generalisation of findings, since the current sample was limited to urban schools in the metropolitan city. The need for further detailed longitudinal research is crucial to establish the findings reported in my study, using a larger sample drawn from a variety of areas (i.e. divisions, districts and rural) and type of schools (i.e. state, private and English medium schools, cadet collages, madrasha) in Bangladesh.

This study provides the foundation for knowledge base of SER in Bangladesh showing which student, class and school characteristics contribute to year ten (X) students' cognitive and affective outcomes and their progress over a year, following the influence of student background factors on their academic progress. This research approach can be used by other researchers in different educational settings. Student progress was measured only for one year in this study, if better datasets are available in Bangladesh, stronger studies of progress over time will be possible. In the construction of such datasets it would be important for statisticians to consider what fields would be useful when trying to develop multi-level analyses of school effectiveness. All of the classroom process measures were not possible to identify with this survey. Other research methods, for example, observation with better measures of 'school processes' can be employed in future SER in Bangladesh from a different points of time to investigate the issue of consistency over time, as SER evidence suggests monitoring outcomes over several years (3 is the minimum to identify trends) to establish whether schools are improving, declining or are fairly stable in terms of their effectiveness (Sammons *et al.,* 1997).

It is evident that schools may vary in their effects on cognitive, as compared with social/affective outcomes (Mortimore *et al.,* 1988). Though a significant aspect of my study was to explore non-cognitive outcome (i.e. academic self-concept) a

single wave of data on academic self-concept is not ideal for an efficient estimate of correlation. There is an urgent need for longitudinal panel data, where academic self-concept should be measured on at least two different occasions, like the prior and later academic attainment used in this study. Marsh and Craven (2006) argued that longitudinal panel design can be the strongest approach to testing the reciprocal relationship of academic self-concept and achievement. Above all, the impact of the student academic self-concept upon academic attainments needs to be recognised and addressed, and further research is needed to inform policy and practice effectively in the Bangladesh context. Moreover, future SER in Bangladesh can be expanded to explore other dimensions of non-cognitive or behavioural outcomes, like personality, student motivation, learning style and attitudes toward schooling.

In this study, a limited number of school factors were measured and other organisational measures, which might have a significant effect on student attainment, have not been used. Therefore, in future SER, attention needs to be paid to other aspects of organization, such as- school management, finance, ethos and policy. These might throw further light on the question of the nature of the impact of school processes on student outcomes. Though the null model shows that a larger proportion of the unexplained variance was at school level, the findings of this study also indicated that teachers are key factors for effective teaching and learning. For this reason SE researchers should conduct further study on these issues in order to strengthen my analysis. This is the end of my thesis.

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