

CHAPTER 2

Literature Review

2.1 Introduction

As the education system in the country moves towards wider use of national examination performance, both the positive and negative impacts of these examinations have become more and more an area of interest. Academic achievement measured by standardized examination scores indicates only certain aspects of learning (not holistic) and normally do not give a complete picture of a student's academic ability when considered alone. Critics of standardized achievement evaluation argue that their great dependence on these examinations has a negative effect on academic performance. Lipman (1987) and many others has maintain that standard achievement examinations, using a multiple choice format are not effective in measuring complex problem solving skills, divergent thinking and collaborative efforts among students, or communication skills. Despite of this drawback, educators and policy makers generally still believe that examination scores are important in measuring educational achievements.

In general, individuals are selected for further education employment and training based on their academic performance. The desire to attain a certain occupational positions further motivates students to excel academically. According to a number of authors (Elmen, 1991; Kramer, 1991; Lipsitz, 1981), early adolescences is a vulnerable period when students begin to make choices that will affect their future educational and career plans.

Several researchers have found that for many adolescents, there is a gradual decline in academic motivation, behaviour, and self-perception leading to lower academic achievement and increased rates of school dropout rates (Eccles & Midgley, 1988). For these reasons, there have been numerous studies done in identifying factors affecting academic performance. This chapter consists of a review of the research covering several topics related to this research report. Literature on determinants of student academic success and failure has not been consistent but nevertheless revolves around few important factors such as school, student and teacher characteristics, student's socioeconomic background and parental support.

2.2 Stages of Development

Arnold Gessell (1880–1961) was one of the first researchers to introduce human development stages. He observed the behaviour patterns of children at different ages and outlined human development. This study increases our understanding of which behaviors can be expected of children at various ages. The theories of cognitive, social, and moral development describe developmental trends, the rates and types of changes seen in average children. While these theories explain changes that occur to the majority of children, in reality the rate of development varies greatly among children. Some may excel academically and lag behind socially. Mathematical ability may be seen in some but these children may not have reading or writing skills. As such, the needs and abilities should be evaluated as individually possible. This proves to be the greatest challenge to most educators today as it is not a simple task to provide for students at different development levels in one classroom.

2.2.1 Cognitive Development

Cognitive development refers to the ability to think, learn, remember, perceive, and solve problems. Cognitive style can be described as the way an individual responds perceptually, intellectually and socially to different situations. Study of cognitive style allows a better understanding of how an individual learn and how this affects their academic performance. Theories of cognitive help educators to identify the appropriate academic activities for specific age groups. Piaget (1952) provided a comprehensive theory of cognitive development. He believed that the cognitive development progresses through four stages of growth.

The first stage is known as the sensorimotor, begins at birth ends approximately at age 2. In this stage, children explore the world through their senses and motor skills. The preoperational stage begins from age 2 and lasts till about 7. At these stage children have the ability to reason (although may often be illogical), use language and understand concepts. Concrete operational stage, which begins at the age of 6 to 7, makes a child capable of working through task that requires the ability to conserve. The ability to classify items according to size, color or characteristics and to be able to make logical inference increases during this stage. The fourth stage begins at the age of 11 and continues through adulthood. This stage is called the formal operational stage during which children begin to think abstractly and deal with hypothetical situations.

Previous studies reveal that a substantial percentage of high school students had not attained the formal operational level at or beyond the age of 11–15. Kenner and Strafford (1972) assessed the cognitive level of 209 students in the state of Oklahoma and found that 66% of the students operating at the concrete operational level, 17% at post concrete operational level and only 14% at the formal operational level. Cheah (1994)

studied cognitive attainment of 271 of Form IV and V in relation to the conceptual demands of the Malaysian Chemistry curriculum. She found that the distribution of student at Early Concrete, Late Concrete, Early Formal and Late Formal levels were 3.7, 39.9, 47.6, and 8.9 percent respectively.

Individual differences in learning have been explored by Entwistle (1979) in his article titled "Student Learning In It's Natural Setting". According to Entwistle, some students attempt academic task at surface level where by they rote-learn (memorizing) without acquiring a deeper conceptual understanding while some others follow the deep level approach whereby they thoroughly understand the concept and integrate what has been learned. This distinctive process of learning in turn may affect the level of understanding attained. Students employing a deep approach tended to have intrinsic motivation and preferred courses, which catered to personal interest and encouraged further reading around the subject.

2.2.2 Social Development

While children grow cognitively, they also mature socially. The common social changes seen in children are self-concept, interpersonal skills, and attitudes. These types of changes have great influence on student's behaviour in classroom and academic ability. Teachers model appropriate behaviour and teach students what is generally accepted by society. Peers are known to influence students' preferences, attitudes, and values. Nevertheless, different social groups become important at various stages of psychosocial growth. Erik Erikson introduced the concept of psychosocial theory, which is a combination of psychological aspects and social development. Erikson described eight stages of psychosocial growth, which starts at the birth and last through late adulthood.

As did Piaget in his cognitive development theory, Erikson describes events at each stage. The earliest stage concerns the child's need to trust the world, and the last crisis is related to the adult's need to achieve integrity, satisfaction with one's life as it has been lived.

2.2.3 Intellectual Development

Age-level characteristics can be used to explain intellectual development. By learning the expected developmental level for different age groups, teachers can identify students who are performing significantly behind or ahead of other students and thus help them to catch up or more fully develop their abilities. During primary grade, children are eager to learn. They are eager to talk, write and to report, all the more when a significant adult in their life is listening.

Gender related differences in intellectual abilities become more apparent at the elementary level (Pamela, 1990). Girls tend to do better in verbal tasks such as reading, spelling and mathematics computation. Boys tend show ability in mathematical reasoning and spatial problems. At this stage, girls tend to earn higher grades than boys. Between the ages 12 and 15, students go through various transitions in cognitive development although it varies from student to student. As students become more capable of formal thought, they get involved in current events such as political issues which are stimulating for this group. Children this age have increased concentration spans relative to elementary students, but preoccupation with other concerns, such as puberty and self-identity, sometimes make concentration difficult. Students aged 16 to 18 demonstrate increased ability to work with formal thought although not exercised well all the time.

2.3 Motivation Factors

Motivation, a prerequisite to learning, is the influence of needs and preference on behaviour. It affects the direction a student takes, activities a student chooses, and the intensity with which a student engages in an activity. Behavioral learning theorist (Skinner, 1968) and social learning theorist (Bandura, 1986) believe that people are motivated to obtain reinforcers and avoid punishment. Some students are unlikely to learn unless they are motivated to do so. Behaviorists explain the relationship between learning and motivation in terms of extrinsic motivator such as money, free time, praise and special privileges at home and school.

Cognitive theorists incorporate the concept of intrinsic reinforcements, specifically that people are motivated to do things based on inner preference. The more students are motivated by intrinsic factors, the less motivation the teacher has to supplement. McClelland and Atkinson (1948) are of the opinion that there is a tendency for people to achieve success and avoid failure. This motivational tendency further plays an important role in the choice of study pattern and groups, the amount of time students persists on a task and the activities they choose. Students who are motivated to avoid failure are likely to choose task that are either too difficult or too easy for their current skill level. Besides being motivated for success or to avoid failure, students are motivated by what they think caused the success or failure.

Students who attribute success to random chances or luck will not be highly motivated to attempt the same task again but students who achieve success as a result of hard work and natural ability will be able to attempt the same task again.

Irving B. Weiner (1979) found that high-achieving students are successful because of their effort and ability, and fail because of lack of hard work. In contrast, low achievers succeed because of luck and fail due to lack of ability. Asian-American children are more likely to believe that effort and hard work are the ways to achieve success, compared to white, who were more likely to see success as a function of ability according to Ryckman et al, (1988). In general, research shows that students achieve academic success when they are raised in homes characterized by supporting and demanding parents who are involved in their schooling and who encourage and expect academic achievement. (Steinberg, et. al.,)

2.4 Study Habits and Academic Achievement

Study habits refers to preferred styles of learning covering aspects such as study techniques, organization of learning material, reading, note-taking, essay writing and quality of learning environment. Studies done by Gadzella ad Williamsen (1984) reported a positive correlation between study skills and academic achievements. Their findings suggest that students who are more aware of appropriate and effective study strategies are likely to be successful.

Capela, Wagner and Kusmierz (1982) analyzed the study habits and attitudes of second and third year college students and found that the study behavior is positively related (Pearson correlation of 0.46) with grade point average. This simply means that students with good study habits will produce good results.

Zimmerman, Gladstone and Gadzella (1977) found that study habits as indicated in the survey "Study Habits and Attitudes" conducted by Brown and Holtzman (1967) was a better predictor of academic performance than standardized intelligence test for socioeconomically and educationally disadvantaged black males. According to Zimmerman et al. (1977) standardized test were not good predictors of academic performance for students with limited background.

However, Levine (1976) found that study habits were not related to grades for black male college students. This suggest that it is not lack of study skills which hinders performance but characteristics connected with psychological difference. Matt, Pechersky and Carvantes (1991) were of the opinion that although study habits contribute to success in high school but it becomes unrelated to academic achievement at during the 1st semester of college. This finding leads to conclusion that study habits of student vary at high school and college.

Studies in relation to study habits and academic achievement done in Malaysia, mainly used secondary school students as their subjects (Chan Lai Ngoh, 1984, Mohd. Nasir Khalid, 1998, Sim Chzia Poaw, 1999). Abdul Hamid Awang (1978) observed that lack of basic knowledge in mathematics and science, poor study habits and attitudes as important factors, which weakened university students' academic achievement. His findings were based on 123 male and 36 female undergraduates of engineering discipline.

2.5 Factors Affecting Academic Achievement

The number of studies done on academic performance of students in selected subjects is limited. However there are numerous studies done on analyzing the factors affecting the overall performance of students with no emphasis on any subject areas. Four important organizing factors related to school and student characteristics, which affect student achievement, are discussed below.

2.5.1 School Characteristics

Research conducted over the years has indicated that several school related variables could affect student learning. These variables include size and type of school attended, teacher behaviors, teaching techniques designed for various groups of students and teaching strategies applied to different academic subjects. Rutter et al. (1979), cited in Saha (1983), concluded that schools play a strong role in student achievement and attainment in Britain. James Coleman investigated the availability of educational opportunities in the public school systems in United States.

The results of his investigation, which emphasizes the inequalities based on students' race, color, religion or national origin were published in 1966 as "Equality of Educational Opportunity" which is usually referred to as the Coleman report. (Coleman et.al.1966). This report claimed that student achievement is not associated with any particular school related factors such as teacher's educational background and salary or duration of school hours.

The Coleman report argued that the quality of a child's school has less effect than his or her family background on academic achievements. The Coleman report also suggested that social class of students is related to academic achievement, students from upper and middle class homes seem to perform better academically. One other report that was influenced by the Coleman report is Goodlad's report (in *A Place Called School*, 1983) in which it was found that the quality of instruction is poorer in classes for academically weak students than in classes for higher ability students indicating a relationship between the quality of instruction and student achievement.

Herbert Walberg (1984) provided more evidence of the relationship between teaching and student achievement. Walberg compiled the results of more than 3000 studies and found that teachers have some control of the many factors that affect student learning. Teachers should facilitate learning with positive reinforcement. Positive reinforcement is the presentation of a pleasant stimulus after a behavior occurs which increases the chances that the behavior will occur in future.

According to Walberg, there is some indication that efficient use of classroom time and providing feedback, comments on graded assignments affects student achievement. Spending a lot time on a task does not guarantee that it will be learned, but efficient use of learning time affects student achievement. Other factors that were identified by Walberg were concept of cooperative learning, conducive classroom environment, encourage analytical thinking and providing reading materials in advance.

Although some studies indicated that there is no significant positive relationship between class-size and achievement, Glass and Smith (1978) presented evidence for threshold effect for class-size.

These researchers found an increase in academic achievement when class size was reduced to 15 or below. Bourke (1986) found that class-size differences were related to teaching practice, which, in turn influenced achievement. Teaching practices refers to different teaching methods adopted, based on student ability. For instance, higher ability classes require less management and were more taught as a class and given additional homework.

Tennessee's Project STAR, a four-year study of class size effect, produced the most compelling information on class-size and effective teaching techniques. The longitudinal study followed students from kindergarten in 1985–1986 through third grade in 1988–1989. This study investigated the student achievement of three types of K–3 classes: small classes (13–17 student per teacher), regular classes (22–25 students per teacher), and regular classes of 22 to 25 students with a teacher and as well as an assistant teacher. (Word, et al., 1990).

The project which included 17 inner city, 16 suburban, 8 urban, and 39 rural schools involving 6500 students in 330 classes revealed a strong class size effect in all schools locations (urban, rural, inner city, and suburban) and for all students (Word, pp.10–13). Students in small classes were outperforming students in regular and regular/aide classes by a wide margin from grade one to grade three.

Simmons and Alexander (1978), Bridge et.al. (1980), explored the relationship between academic achievement and factors related to school such as class size, size of school, quality of teachers, number of library books available per child student-teacher ratio and school and classroom facilities. It was concluded that, availabilities of school facilities influenced the level of academic achievement particularly at the primary level.

Other school related variables that were suggested by Centra and Potter (1980) include the degree of control or centralization of decision making, reward mechanism, instructional organization as such tracking of stream, team teaching and student peer influence, quality of schooling and school environment. Widley and Harnischfeger (1974) noted that the number of hours in school was an important contributory factor towards academic achievement. They found that when students received 24% more of schooling, they increased their grade in reading comprehension of two thirds and in mathematics and in verbal skill by a third.

Summers and Wolfe (1975) examined the interaction between the types of students and selected school and teacher related factors and concluded that in junior high school, class size of 32 or more reduced achievement, with low-income student being most affected adversely. Theisen et al.'s (1980) review cited studies by Carnoy (Puerto Rico) and Carnoythais (Tunisia), who found "schooling variables have some effect at lower grades, but a stronger effect in upper secondary."

Kutnick & Jules (1988), studied the factors affecting science achievement in Trinidad and Tobago, and found that demographic variables (type of school, single sex or coeducational, school district, locality, management authority and class level) contributed 35 percent of the total variation in science scores at the class room level. Jencks et. al (1972) found that no measurable school resources or policy shows a consistent relationship between school effectiveness and student achievement.

Specific school resources (library and computer facilities), which had a statistically significant relationship with achievement changed from one survey to the next, depending on type of schools and students. Nevertheless it was evident from the findings of these studies that effect of school factors and resources on scholastic achievement tends to be student specific.

2.5.2 Social Economic Status (SES)

Studies on the importance of SES factors on student achievement have been summarized by Judd and Moock (1976) and Simmons and Alexander (1980). Parents occupation, income, material possession of items such as car, telephone, house were important variables in explaining educational attainment according to Isahak (1977), Scott and Tedlie (1987), Aziz (1989), Leong et.al. (1990), Holloway and Wentzel (1991). Parental motivation, education and career expectation were found to have strong and positive effects on pupil achievement in school. Major educational reports such as the Polwden Report in England, the Coleman Report in the United States and the International study of Mathematics by Husen (1967) highlighted the importance of parental encouragement and motivation over socioeconomic status of students.

Most studies conducted in Malaysia indicate that SES is an important factor in determining the student academic performance. Ishak (1977) found that academic performance of students is largely depended on SES and background of the students. In a study conducted on 626 Standard IV pupils from sixteen schools in the district of Kuala Kangsar, Aziz (1989) investigated the relationship between student background variables such as gender, ethnicity, parental support (both monetary and moral) for education, home environment and student` academic aspirations influenced academic achievement.

Aziz identified that 4.5% of the variations in academic achievement of primary school students is explained by background variables. Indirect effect of SES, namely parental involvement in the home environment and the availability of reading materials and tuition affects academic achievement. Leong et. al. (1990) had similar conclusion as Aziz. He reported that SES explained 29.0% of the total variation in academic achievement and that socio-economic origin of pupil as measured by combining father's occupation and educational status was the most important factors influencing academic achievement.

2.5.3 Parents' Influence

When children are surrounded by caring, capable parents, and are able to enjoy nurturing and moderately competitive kinship relationships, a foundation for literacy is built with no difficulty. Such people provide children with the security they will need for learning (Holdaway, 1979, 1984).

Hendrickson (1987) concludes that *".... For now the evidence is beyond dispute: parent involvement improves student achievement. When parents are involved, children tend to do better in school. The family provides the primary education environment. Parent involvement is effective when it is comprehensive, long lasting, and well planned, she says"*.

An interest in reading and learning can be improved by reading aloud to children; holding family discussion about reading materials, school work and current events, according to Mullis, et al., (1990). Likewise, Swap (1990) concludes that parent involvement is especially crucial for children who are at risk of not performing well academically. In fact she argues, that parent involvement is not frill but a necessity.

Grissmer et al., (1994) reported that parent's level of education was an important factor affecting student achievement. Thus, students with parents who were both college educated tended to achieve highest level of education. The effect of income, family size and the mother's age when the child was born on academic achievement were small. Single-parent status was by itself not significantly related to achievement levels. Grissmer suggested that the performance gap between one-and two- parent families is due to other factors, including family income, family size, and or the parents' education levels.

2.5.4 Responsibility of the Student

Ultimately, success or failure in school becomes personal responsibility of the student. Too little effort and time spent for studies combined with too much television or other non-academic activities have a negative effect on student's academic success. Stigler, Lee, and Stevenson (1990) report that Japanese fifth graders spend an average of 32.6 hours a week on academic activities, while the American youngsters devote only 19.6 hours to their studies. National Assessment (NAEP) results in United States show a consistent, positive relationship between proficiency and the amount of time spent on homework. "The startling fact remains, however, that more than two thirds (71%) of the high school seniors typically do one hour or less of homework each day" (Mullis, et al., 1990). U.S students were more likely to watch more television than their counterparts in the other countries according to Lopointe, Mead, and Phillips (1989). 31 percent of these students watch more than five hour of television daily. Studies of Asian-American students have shown them to perform better in schools, with scores in Mathematics and science as high as, or higher than, those of white students.

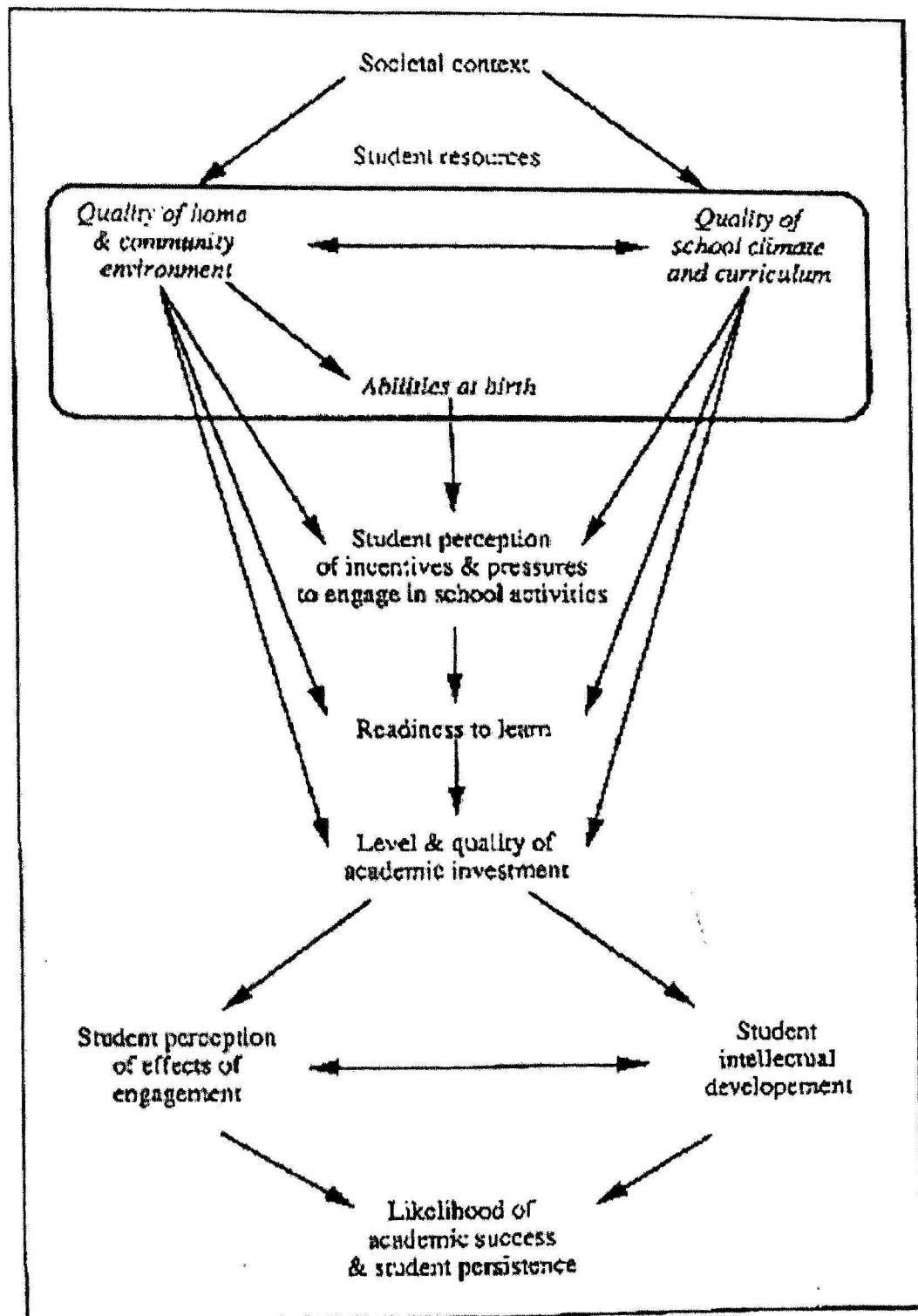
Asian- American students as a group have been shown to be more committed to academic excellence, more likely to take high-level academic courses, spend more time on homework, and to be less likely to be absent from school. They also are likely to have higher educational aspirations than other students according to Peng (1984).

A 1991 study of Wisconsin's top students—the All-State Academic Scholars showed that high achieving students to possess the following characteristics: they have positive feelings about school experiences, they attribute their success in school to hard-work, self-discipline, organization, ability, and high motivation; they tended to watch relatively little television during the school week, they tend to associate with students who also successful in school and they are avid readers. Finally, their parents exhibited high levels of interest and involvement in their education according to Allen and Kickbusch, (1991).

2.6 Model of Student Performance

Rossi and Gilmartin (1980) were of the opinion that a student's school, social status, home and personal characteristics should not be studied in isolation as all these variables contribute to student performance and that they are strongly interrelated. Rossi and Gilmartin used the following conceptual framework to explain the various reasons why some students fail and others succeed. Figure 1 shows that academic progress is primarily an ongoing function of (1) the quality of student resources (e.g., abilities, family support, educational opportunities) and (2) the incentives and pressures perceived by students to invest these resources in academic achievement. Past "returns" on educational investments have a cumulative impact on a student's ability and desire to achieve academic success and persist in school.

Figure 1. A Conceptual Framework of Youth Development and Educational Performance



The above model combines other engagement models like Bean and Metzner (1980), Tinto (1975). The emphasis of this model is that the effects of engagement may change over time and influence subsequent engagement and also the difference between academic engagement and intellectual development. Intellectual development, which is not limited to learning language or math skills, enhances understanding of the self, environment and adds to a young person's academic proficiencies. The presence of special resources for instance, private tutoring in advanced subjects may give a child an in relation to his or her peers while the absence of basic resources like adequate nutrition may place a child at risk of threaten academic progress. (Reed, 1975)

High academic achievement is most likely when schools, homes, and communities contribute to students' willingness, and opportunities to invest in education. As Bronfenbrenner (1979) points out, academic failure is most likely when a student has few or no sources of encouragement, practical support and educational opportunities. The model however does not suggest that schools, homes and communities must all function optimally in order to avoid academic failure but the interdependence of the various resources. As shown in Figure 1, abilities at birth may influence students' perceptions of the incentives and pressures to engage in school activities. If students have strong talents in certain areas, engaging in those activities may be especially appealing and rewarding to them. Conversely, student born with conditions that make learning difficult may have little incentive to engage in activities that appear hard and unrewarding.

The model indicates that students' readiness to learn is an interaction between the environment, the school, and students' perceptions of the incentives and pressures to engage in school activities.

If student's basic needs for food, clothes, and shelter; safety and stability; adequate health care and loving support are not met, a student is at risk of being inattentive, unresponsive and uncooperative in school. Parents' interest and attention, supportive communities in turn increase the children's ability and willingness to learn, giving them an advantage in school. The level and quality of academic investment by a student is essential to academic success. Students who invest time and effort in school activities are likely to achieve academic success, while students who lack the skills or desire to engage in classroom assignment may not be successful in school. In addition, as shown in the diagram, a student's home and school may affect the level and quality of student investment. Given the same levels of student effort, the academic investment of a student with excellent educational opportunities are likely to be more productive than those of a student with poor educational opportunities.

2.7 Science and Mathematics Achievement

Many students find science subject and mathematics difficult to learn and understand and thus fail to perform well in these subjects. Research in science achievement has indicated the importance of several cognitive factors such as formal reasoning ability, prior knowledge, and memorizing ability as variables influencing science achievement. Saarni (1973) and Witkin et al., (1977) found that the ability to dissembled necessary information from an irrelevant background contributes to significant achievement in science, mathematics, engineering and architecture.

The variables that accounted for mathematics achievement appeared to be good verbal skills (Aiken, 1972; Muth, 1984). Students with good verbal skills may have the skill needed to read a mathematical problem carefully and see the relationship among information needed to solve it. Gail S. Gliner (1987) conducted a study on 95 students in grades nine through twelve in an urban high school in Denver and found that the more math courses students took, the more competent they were in mathematics. Welch Anderson (1982) and Hause (1982) were also of the same opinion as Gail S. Gliner.

Gail S. Gliner also found that verbal skills, but not sex or age, seem to be good predictors of overall Mathematics achievement among high school students taking Mathematics. However, Math anxiety although not related to Math achievement, may lead to students avoiding Mathematics.

The understanding of the meaning of words and symbols in mathematics should be given emphasis by teachers according to Call and Wiggins (1966). At the level of higher education starting in the mid – 1970's, two major approaches were developed to help particularly the female students, who lacked confidence in their mathematical abilities and lacked mathematical skills needed to take calculus. Math anxiety clinics were introduced to help students overcome their negative feeling about mathematics through counseling. In order to gain necessary skills in a non-threatening atmosphere, which stressed conceptual understanding mathematics, was using "Math With Fear" courses. Tuner (1982) developed a program, which combined these two approaches for high school students. The program was effective in influencing math avoiders to continue their study of college preparatory mathematics, but less successful in changing attitudes related to course selection.

Joannee Rossi Becker (1987) reported that there has been substantial progress in the United States in recent years for women in quantitative fields. Although the progress is slow but there is a steady increase in the percentage of women pursuing degrees in quantitative fields. The increase in proportion of degree earning by women in the last thirty years compiled from National Sciences Foundation data (NSF, 1982) is as follows:

Table 2.1: Percentage Distribution of Degrees Earned by Women in Quantitative Fields

Year	Bachelor's		Master's		Doctorate	
	1951-52	1979-80	1951-52	1979-80	1951-52	1979-80
Chemistry	0.2	29	12	26	4	17
Physics	16	12	4	10	2	8
Biology Sciences	13	42	17	37	11	26
Computer Sciences	—	30	9	21	2	11
Mathematics	5	42	17	36	5	14
Engineering	26	9	0.4	7	0.7	4

Gender related issues for performance in mathematics have been investigated by Hyde et. al. (1990). In a meta-analysis carried out on hundred investigations into gender differences in mathematics performance for various groups of pupils and school types, Hyde found that men generally perform better than women in mathematics.

While there is no gender difference in problem solving at elementary school and middle school, performance of boys did out perform girls in high school and college. Hanna et. al. (1990) made a comparison of the mathematic achievement of boys and girls in fifteen different countries using data from the IEA Second International Mathematics Study. Boys were found to have performed better than girls in most countries although the difference in performance was not always consistent. Hanna et. al. summarized the difference between countries to teacher gender, students' stereotypical attitudes towards gender, the degree to which students aspired to more education, gender specific support from parents for their children's education and the degree of parents' support.

Baker and Perkin Jones (1993) used the same data as Hanna et.al. and found that although there is clear pattern of national difference of gender effect on achievement, the absolute size of gender difference favors neither boy of girls. The difference in these two findings can possibly explain by the difference in age of pupils. In the study done Hanna et.al. (1990) pupils in the last grade of secondary school were used as the subject of study while Baker used the eighth grade Mathematics pupils. Baker and Perkin Jones found school and family factors leading to a higher mathematical performance are less stratified by gender when women have more equal access to jobs and higher education.

2.8 Language Development

In the earliest stages of a child's oral language development and first language acquisition, "meaning" exist in the social and cultural context of interaction. Linguistic forms such as words and sentences are first ascribed meaning only because they are embedded in these contexts. With time, through further social interactional experience and cognitive development, "meaningful context" additionally comes to include the linguistic forms themselves (Nelson, 1981).

The knowledge representations which develop and are brought to bear in the communicative process have been labeled "schemata" or "Scripts" by cognitive psychologists, Bartlett (1932) Minsky (1975) and Rumelhart (1977). Scripts are organized around recurrent events or process. They may include matters related to rules of interaction, expected activity sequence and norms of interpretation.

Once they have been acquired, the schemata or scripts that are developed in this process are available for the interpretation of meaning in similar event even if the language that is being spoken by other participants cannot be completely understood. When students begin learning second language, they do not start learning all over again, but interpret meaning in terms of what they already know—not just about language but about the context in which it is being used, and about techniques for social interaction. This means that the process of second language learning is heavily depended on prior experience and apparently also on the nature and level of first language development.

In addition to the higher level of language skills required to interpret written text, it is also important to recognize that academic success requires techniques in listening or reading for the main point, generalizing, making logical inferences from known information, and constructing more complex schemata—strategies which are not specific to a particular language. Once these strategies have been developed in native language, they apparently transfer quite naturally to academic task in a different language. Academic competence requires knowing how to use language as a tool in acquiring knowledge and in performing analytical process, but these skills again appear to relate more closely to language competence in general sense, rather than any particular language.