CHAPTER VII

SUMMARY

1. INTRODUCTION

Education is a powerful instrument used by the society to shape the future and mould the next generation of students. Of all the stages of education, namely: kindergarten, primary and secondary, secondary education plays an important and crucial role in the meaningful development of a child. Secondary education is a period of education planned especially for young people of ages approximately 15 to 18, in which the emphasis is on the basic tools of learning, expression, and understanding and their use and extension of the tools in exploring areas of thought and thinking, and in exploring and acquiring information, concepts, intellectual skills, and attitudes. It is the one which is all the more important because it lays the foundation of the individual’s future education or vocational choices, which determines the future occupational, social or economic positions in the society. Without an efficient and progressive system of secondary education, rich and forward looking university education is impossible.

The major task of school is to educate students to provide them with the fundamental knowledge and skills deemed necessary for survival and healthy development in the modern world. School achievement is of paramount importance
in the present socio-economic and cultural context. The effectiveness of any educational system is gauged to the extent the students involved in the system achieve. In general terms, achievement refers to the scholastic or academic achievement of the student at the end of an educational program. To maximize the achievement within a given set-up is therefore, the goal of every educationist. It is also believed that it is proper to focus on student achievement because this embodies the given goal of schools.

Success in school is usually conceived of as a consequence of mental ability (Brody & Brody, 1976, p.88). Jensen (1973) found that 60 percent of the true variance in individual differences in scholastic achievement is accounted for by individual differences in intelligence measures. Traditionally, intelligence has been regarded as the capacity for acquiring knowledge and skills, while achievement is the knowledge and skills. Intelligence tests measure a wider variety of skills necessary for academic success.

Mental ability test scores are useful in schools for predicting achievement, and for placing students in special classes. They can be used for vocational guidance and selection, child guidance, educational guidance, preparing a profile, and diagnosing pupil’s learning difficulties. The use of intelligence tests as a measure of mental abilities has become widespread in schools, clinics and industries, and they have been used for different purposes.
2. INTELLIGENCE (MENTAL ABILITY)

Some distinctions in terminology are warranted at this point. In educational and psychological literature use of the terms “intelligence” and “mental ability” is done in an interchangeable manner (Snyderman & Rothman, 1988).

The concept of intelligence is found in the writings of Greek Philosophers, Plato and Aristotle, and predates the birth of Jesus Christ (Walsh & Betz, 1985). The term intelligence is vague and ambiguous in its meaning. Psychologists have been interpreting the term in different ways, and are in disagreement with the meaning of the term, ‘intelligence’.

According to Cyril Burt, the word “intelligence” originally comes from Latin, and was revived by Herbert Spencer and Francis Galton in the mid nineteenth century, as a scientific term meaning “innate, general cognitive capacity” (Snyderman & Rothman, 1988). However, it must be noted that several definitions have been advanced by psychologists but no two psychologists agree on a single definition of the term (Chauhan, 1995).

Some definitions of intelligence (e.g. Stern, 1921; Pintner, 1944; Piaget, 1970) put emphasis on the adjustment ability of an individual to his environment. Other definitions (e.g. Goddard, 1946; Backingham & Woodrow, cited in Sternberg, 1982) emphasize on the importance of an individual’s ability to learn. Learning ability is an index of one’s intelligence.
Other definitions of intelligence (like Spearman, 1923; Terman, 1937) emphasize the effective use of concepts and symbols in dealing with situations, especially, in presenting a problem to be solved through the use of verbal and numerical symbols.

Few of the definitions offered by experts contain a clear commitment to the relative effects of hereditary and defining intelligence as ‘innate general cognitive ability’.

Some psychologists have attempted to adopt an operational definition of intelligence (Butcher, 1988). This view became very popular in science during the 1930. The definition presented by Boring (1923) is that “intelligence is what these tests measure”, and Sanford’s (1962) definition is “intelligence is what the intelligence tests test”. Sanford (1962) saw that an intelligence test is a device that confronts an individual with an array of tasks, and the individual responds to the test and his/her behavior is quantitatively compared with the behavior of a known population of people who have responded to the same array of problems. We take an individual score to be indicative of the intelligence that consistently characterizes the individual’s behavior (Sanford, 1962).

The term intelligence is used in many contexts, with a diversity of meanings. Although these meanings are reconcilable, they certainly emphasize different aspects of intelligent behavior (Anastasi, 1983). All these meanings have contributed to our current understanding of the nature, meaning, and measurement of intelligence.
3. NEED OF THE STUDY

It is a common knowledge that ‘education’ has a significant role to play in the development of an individual. The basic purpose of education is to draw the best out of the student in terms of his physical, mental and spiritual development. Until recently, remarkable importance had been given to the education sector by the government in Republic of Yemen. The cost of the education sector with its different levels went up from YR 89,543 billion in 2000, to YR 137,872 billion in 2003 (Educational Denoters, 2004).

The problem of this research was defined by the lack of an educational study on the mental ability of the secondary schools students in Yemen, by the use of solid and integrated – dimensional measurement instruments, in a time when mental ability is one of the priorities of the educational work to develop the modern society and push the wheel of advancement. There is a very close relationship between intelligence or mental abilities and the scholastic growth which the teacher is expected to induce. Over and above for its bearing on academic achievement, intelligence is most important in its own right (Stephens, 1999).

The most widespread use of intelligence tests is within the public schools (Brody & Brody, 1976). Thus, this study is concerned primarily with the students’ intelligence and its relationship with age, sex, and school achievement and secondly to adapt and verify the validity of Otis-Lennon Mental Ability Test (OLMAT) (1968) advanced level form (K) (which is one of the important group tests and is a measure of intelligence). The test can be used in the Yemeni environment due to the
fact that there are no standardized measures of intelligence, which are applicable exclusively to the Yemeni environment. Such a measure will facilitate research on intelligence in Yemeni culture. The test can be used to assess intelligence for various purposes like predicting achievement, placing students in special classes, vocational guidance and selection, child guidance, educational guidance, preparing a profile, and diagnosing pupil’s learning difficulties.

4. STATEMENT OF THE PROBLEM

Considering the background of the studies on intelligence in Yemen, the study was undertaken with the following statement: A study in the relationship of mental ability with age, sex, and school achievement of secondary school students in the republic of Yemen.

5. OBJECTIVES OF THE STUDY

1. To study the relationship between students’ mental ability (intelligence) scores and their age, sex, and school achievement.
2. To study the difference between males and females in mental ability (intelligence) scores.
3. To study the difference between mental ability (intelligence) across age.
4. To study the difference between mental ability (intelligence) of students with high and low school achievement.
5. To find out the relative significance of different subtests of mental ability (intelligence) in predicting school achievement.
6. To adapt and standardize Otis-Lennon Mental Ability Test (OLMAT) (1968) advanced level form (K) for Yemeni culture.

6. HYPOTHESES OF THE STUDY

1. There is a positive correlation between the mental ability (intelligence) scores (verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning) and age (15, 16, 17, 18, and 19 age groups) of the Yemeni secondary school students.

2. There is no significant correlation between the mental ability (intelligence) scores (verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning) and sex of the Yemeni secondary school students.

3. There is a positive correlation between the mental ability (intelligence) scores (verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning) and school achievement of the Yemeni secondary school students.

4. The older students (based on age group) have higher scores on mental ability (verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning) than the younger students (based on age group).

5. There is no sex difference on mental ability (intelligence) test scores of Yemeni secondary school students.

6. The students with high school achievement score higher on mental ability (intelligence) than the students with low school achievement.
7. REVIEW OF RELATED LITERATURE

The researcher has studied the literature and review of researches related to the development of intelligence tests, researches related to the relationship between intelligence and some related variables as school achievement, and researches related to sex differences in intelligence was taken. Some of findings of those studies showed that:

1- No comprehensive study has been conducted in Yemen to study the relationship of mental ability or intelligence with some relevant variables.

2- Antonak et al (1982) concluded that, the best predictor of achievement was the I.Q. Mahanaz (1994) found an insignificant correlation between academic achievement and IQ.

3- There are differences in intelligence between boys and girls as studies conducted by Shamshada (1988), Lynn, Fergusson and Horwood (2005). But the studies of Mahnaz (1994), Antonak et al., (1982), and Fabregat et al., (2000) showed no significant differences between boys and girls in intelligence.

8. METHOD

8.1. Sample of the Study

The sample of this study consisted of 1561 students. Of this 801 were males and 760 were females; 682 were from the tenth grade, 466 were from the eleventh, and 413 were from the twelfth grade. A total of 47 classes for both sexes were
randomly selected: 24 classes for boys, ten classes for the tenth grade, seven classes for the eleventh grade, and seven classes for the twelfth grade. Out of 23 classes for girls, nine classes were for the tenth grade, seven classes were for the eleventh grade, and seven classes were for the twelfth grade.

8.2. Study Tool:

Since there was no measure of mental ability or intelligence standardized on Yemeni population, it was planned that an appropriate tool would be developed. It is with this idea that the researcher used the Otis- Lennon Mental Ability Test (OLMAT) advanced level form (K), which was published by Harcourt Brace Jovanovich. Inc, in 1968 and developed by Arthur Otis and Roger Lennon.

The original OLMAT, Advanced level, Form K (80 items) were translated to Arabic language. Some items were changed and modified to suit the Yemeni culture.

The OLMAT was administered in a pilot study to 35 students to make sure of the time, clarity of items, and clarity of instructions. The average time which the students took to answer all the test was 45 minutes.

For item analysis the test was administered to 252 students; 150 males and 102 females, in which 106 were from the tenth grade, 78 were from the eleventh grade, and 68 were from the twelfth grade. The item difficulty was calculated and it ranged from 0.15 to 0.91 with a mean of 0.40. The item discrimination ranged from 0.09 to 0.59 with a mean 0.47. The results of the item analysis showed that the items’ difficulty and items’ discrimination were suitable for the students.

The administration of the test started on 28th November 2004 and continued till 6th January 2005. The researcher administered the test to the students in groups of 158
25-50 in one session. The teacher of the respective class helped the researcher to conduct the test.

The responses were scored by using the scoring key developed for this purpose by the authors of the scale, giving a one score to correct response, and zero to a wrong response. A student’s score is the sum of the correct responses. As the test consisted of 80 items, the students’ scores ranged from minimum 0 to maximum 80.

8.2.1. Standardization of the Test (OLMAT)

1. Item Analysis

   The item difficulty for the entire sample ranged from 0.25 to 0.81 with a mean of 0.50. The items’ difficulty in grade tenth ranged from 0.21 to 0.75 with a mean of 0.41, in grade eleventh ranged from 0.21 to 0.83 with a mean of 0.51, twelfth grade ranged from 0.32 to 0.92 with a mean of 0.62.

   The item difficulty means for the entire sample and for different subtests, increase with increase in grades.

   The item discrimination for the entire sample ranged from 0.24 to 0.78 with a mean of 0.44. The item discriminations in grade tenth ranged from 0.24 to 0.75 with a mean of 0.41, in grade eleventh it ranged from 0.35 to 0.83 with a mean of 0.51, and in grade twelfth ranged from 0.34 to 0.88 with a mean of 0.53.

2. Test Reliability
The reliability coefficients were obtained by the test-retest method and split-half method for the entire sample and for different grade levels. All the values of the reliability were satisfactory.

3. Test Validity

The test validity was established by construct validity, concurrent validity and discriminant validity. The construct validity was established by correlating the items scores with total test scores, and with subtests. Also the correlations between the total test and each subtest and between the subtests were calculated. The results of those correlations revealed that the construct validity coefficients were fairly high.

The concurrent validity was established by correlating the test scores with the school achievement for each subtest and for the total test. All of those correlations were significant at the 0.01 level. It is clear that the test has fairly high concurrent validity.

The discriminant validity was established by one way analysis of variance of the intelligence test scores for different levels of grade, and the results showed that there were significant differences in the mean scores of different grades at 0.000 level.

The findings of this study lend a support to the view that the test was capable of discriminating different levels of grades and that the findings were consistent with an assumption that mental ability increases with increasing age and grade levels.
The OLMAT advanced level form K, Arabic adaptation, has satisfactory reliability and validity to use in the Yemeni environment. The eighty items of the test have fairly moderate degree of difficulty and moderate degree of discrimination. The overall test also has fairly moderate degree of difficulty and moderate degree of discrimination.

4. The Norms

The norms for grades tenth, eleventh, twelfth and age groups of 15, 16, 17, 18 and 19 were established in the form of percentile ranks, z-scores, T-scores, DIQ, and Stanines.

8.3. School achievement scores

The results (school examination marks) of the tenth and eleventh grades students were obtained from the school records affairs at the end of the school year (2004-2005) as an index of their school achievement. The uniform and standard results of twelfth grade students were collected from office of Examination Public Center in the Ministry of Education as an index of their school achievement at the end of the school year (2004-2005).

9. STATISTICAL ANALYSIS

The following statistical techniques were used for data analysis.
Descriptive statistics, analysis of variance (ANOVA), t-test to compare means, Pearson correlation coefficient, Point-Biseral correlations coefficient, and Regression analysis.

10. THE RESULTS

10.1. Relationship between mental ability (intelligence) scores and students’ age and differences between mental ability (intelligence) scores across age.

The finding of this study was that there were significant positive correlations between students’ mental ability (intelligence) scores and their age in total test and in all subtests and in the entire sample as well as in grade levels (X, XI, XII), at the 0.05 level, except the correlation between age and verbal reasoning subtest in XI grade, there is positive correlation but not significant.

The results of the differences between mental ability (intelligence) scores of students according to their age show that there were significant differences between all of mean scores for all age levels except between 15 and 16 year old students in subtests of verbal comprehension and figural reasoning. The possibility for this result may be due to the fact that most of the 15 and 16 years old students are in tenth grade, the total number of the students in both 15 and 16 years old are 696 in the sample of the study and that 476 of them were in tenth grade. Also the results of differences between mean mental ability (intelligence) scores according to students’ age showed that there were no significant differences between intelligence scores of 18 and 19 years old students for the total test and each subtest. It is plausible to
reason that most of the 19 years old students have learning difficulties that is why they are still in the secondary school.

This result assumes that the mental ability increases with increasing age. The means of intelligence scores for total test and for each subtest increased with increasing age. These results of study are consistent with earlier studies as those of Ahuja (1971), Sharma (1972), Dolke (1975), Pillai (1987), Chakraborty (1979), Patel (1981), Al-Kofahi (1997), Lee and Lam, (1988), Codorniu-Raga and Vigil-Colet (2003).

10.2. Relationship between mental ability (intelligence) scores and students’ sex and differences between males and females in intelligences scores.

The results of the relationship between intelligence scores and students’ sex indicated that there were no significant correlations between intelligence scores and students’ sex in the total test and in all subtests for the entire sample except for quantitative reasoning subtest. There is a significant correlation between students’ quantitative reasoning scores and their sex. In grade tenth there were no significant correlations between intelligence scores and students’ sex in the total test and in two subtests: verbal reasoning and figural reasoning but there were significant correlations between verbal comprehension and students’ sex and between quantitative reasoning and students’ sex at the 0.05 level. There were no significant correlations between intelligence scores and students’ sex in grade eleventh in the total test and all subtests. There were significant correlations between intelligence
scores and students’ sex in grade twelfth in the total test and in each subtest at the 0.01 level.

The finding of the differences between males and females in the intelligence scores in the entire sample showed that there were no significant differences between males and females in the intelligence scores in the total test and in all subtests, except for quantitative reasoning subtest. There was a significant difference between male and female subjects in quantitative reasoning scores. The mean of quantitative reasoning scores 7.45 for males was higher than mean score of 6.94 for females. In grade tenth there were no significant differences between males and females in the total test and in two subtests verbal reasoning and figural reasoning but there were significant differences in verbal comprehension subtest and quantitative reasoning subtest (p< 0.05). The mean of verbal comprehension scores 12.55 for males was higher than mean score of 11.90 for females, and the mean of quantitative reasoning scores 5.90 for males was higher than mean score of 5.15 for females. In grade eleventh, there were no significant differences between males and females in the intelligence scores for the total test and for all subtests. In grade twelfth there were significant differences between males and females in the total test and in all subtests (p < 0.01), the means of the total test and all subtests scores for males were higher than mean scores of females.

The result of that no significant correlation between intelligence scores and students sex in the total test and in each subtest, and the fact that there are no differences between males and females in the total tests has been supported by many researchers (Aluja al et, 2000; Colom and Garcia-Lopez, 2002; Codorniu-Raga &
Vigil-Colet, 2003) have studied sex differences in intelligence and they found sex differences in certain abilities, particularly spatial ones, but not in general intelligence.

The males scored significantly higher than females on the subtest of quantitative reasoning in the entire sample and in grade tenth. The males scored significantly higher than females on the subtest of verbal comprehension in grade tenth, this result is consistent with Maniam and Feroze (1973), who found that boys were better in reasoning ability than girls. Allik et al., (1999); and Lynn, (1994), and (1998) maintained that the I.Q. of adult males is more than 4 points higher than that of adult females: for verbal and reasoning abilities the difference is slight but for spatial ability it is quite considerable.

In grade twelfth the males scored significantly higher than females in the total test and in different subtests. It is plausible to reason that the Yemeni society does not encourage the females to study or work.

**10.3. Relationship between mental ability (intelligence) scores and students’ school achievement and differences between intelligence scores with high and low school achievement**

The results of the relationship between intelligence scores and school achievement are that there is a significant relationship between students’ intelligence scores and their school achievement in the total test and each subtest for entire sample and for all grade levels.
The results of the differences between intelligence scores with high and low school achievement showed that there was a significance difference between intelligence scores of students with high and low school achievement in the total test and in each subtest for entire sample and for all grade levels.

10.4. Predicting School Achievement by Different Subtests of mental ability (intelligence).

The stepwise multiple regression analyses with school achievement (dependent) and different subtests (verbal comprehension, verbal reasoning, figural reasoning and quantitative reasoning) (independent) showed 56.4 percent variation in school achievement explained by the verbal comprehension, verbal reasoning and figural reasoning. The 55.2 per cent of the variance is explained by verbal comprehension and verbal reasoning and 48 percent of the variance is explained by verbal comprehension alone. The beta coefficient indicated that the three subtests (verbal comprehension, verbal reasoning and figural reasoning had significant effect on school achievement (p<.01) but the fourth subtest (quantitative reasoning) did not have any significant effect on school achievement. The highest beta weight is that of the verbal comprehension subtest which contributed most to the school achievement and is therefore, the best predictor.

The findings of this study are consistent with earlier studies as those of Thakur (1979), Grossman et al (1983), Antonak et al (1982) and Cooper and Fraboni (1988). However, the present study produced results that are different from other earlier studies as those of Mahanaz (1994) Diseth (2002).

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