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THE RELATIONSHIPS AMONG STUDENTS' SOCIO-ECONOMIC BACKGROUND, TEACHERS' ACADEMIC BAGKGROUND, SEX DIFFERENCE AND THEIR ACADEMIC ACHIEVEMENT IN SCIENCE EDUCATION FOR THE SIXTH GRADE IN BAGHDAD (IRAQ)

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# THE RELATIONSHIPS AMONG STUDENTS'S SOCIO-ECONOMIC BACKGROUND, TEACHERS' ACADEMIC BACKGROUND, SEX DIFFERENCE, AND THEIR ACADEMIC ACHIEVEMENT IN SCIENCE EDUCATION AT SIXTH GRADE LEVEL IN BAGHDAD (IRAQ)

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## ABSTRACT

### THE RELATIONSHIPS AMONG STUDENTS' SOCIO-ECONOMIC BACKGROUND, TEACHERS' ACADEMIC BACKGROUND, SEX DIFFERENCE, AND THEIR ACADEMIC ACHIEVEMENT IN SCIENCE EDUCATION AT SIXTH GRADE LEVEL IN BAGHDAD (IRAQ)

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This study was aimed at building an achievement test in elementary science education for the sixth grade in Iraq as a first step in an attempt to build files of standardized achievement tests in the elementary school; and to give, in the long run, an alternative to the Baccalaureate Examination in the sixth grade, which the Iraqi government deleted several years ago. Also, the study analyzed the data and information obtained by applying the test in various schools in Baghdad in order to test the relationships between the student's socio-economic background, sex, their teachers' academic background and their effect on academic achievement of sixth grade children.

Baghdad Western County was selected as the population for this study, and 3 different districts representing 3 different socio-economic levels were defined to be the areas of schools and students sampled in this study.

A simple questionnaire was used to get information about student socio-economic background (SEB). This study has considered the monthly income per person, number of

people in family, and parents educational level as the factors of the student's SEB. The results showed significant differences between the students in the 3 different districts and in all the three factors of SEB.

The Alani Science Achievement Test (ASAT) was constructed to cover the first 2 units of the Iraqi science sixth grade textbook and has been developed by using different statistical procedures and techniques.

The test analysis of the final edition of ASAT, which has been applied to the sample total group, showed that all test items (74 items) are good items, statistically, except item 46 which was deleted when this study design was analyzed.

All correlations between the subtests themselves, between the 2 units, between the subtests and the total test, and between the 2 units and the total test ranged from .422 to .927, which for the most part, are high correlations. Cronbach's Alpha for composite between the 4 subtests was .81 and between the 2 units was .80. Alpha between the odd-even items was .765 with a ($<$.0001) level of significance; equal length Spearman-Brown Correlation was .867 and Gutman Split-half Correlation was .867. The total test ANOVA showed a high level of significance between measures ($<$.001) and a .921 standardized item Alpha. The z-scores' distribution for the total test looks more like a normal than a skewed distribution.

The tests of hypotheses concerning students'

achievements on ASAT were performed by the multivariate repeated measure analysis. The hypotheses about SEB, SEX, TAB and the interaction among them were tested by the univariate F ratio while the hypotheses about the subtests and interaction with it were tested by the multivariate F ratio. The three way factorial design ( 3 x 2 x 3 ) with four repeated measures were analyzed by the FINN program. The design was crossed and balanced.

The study design analysis showed that the student's socio-economic background (SEB) main effect, interaction between student's SEB and their SEX, between SEX and students' teacher academic background (TAB), between student's SEB and their TAB, and between student's SEB, SEX and their TAB, the subtest's main effect and the subtests by student's SEB by TAB interaction were significant at $\alpha = .05$.

There was a difference in students' achievement according to their socio-economic background (SEB): the higher the class, the higher the achievement. There were also significant differences between each of the three classes (UMC, MC and LMC).

There was a disordinal interaction between students' SEB and their SEX; boys did better than girls at the UMC and LMC levels, while girls did better than boys at the MC level. Another disordinal interaction was between students' SEX and their TAB; girls having teachers with a science or art background did better than boys, while boys having teachers with a teaching diploma did better than girls. There was an

ordinal interaction between students' SEB and their TAB; students at the UMC level did better than at the MC level, and students at the MC level did better than those at the LMC level, on all levels of the TAB. Within the interaction between students' SEB, SEX and their TAB; boys at the UMC did better than boys at either the MC or LMC levels, on all levels of the TAB. Boys at the MC level with teachers holding a teaching diploma did better than those at the LMC level. On the other hand, girls at the UMC and MC level did better than girls at the LMC level on all levels of TAB, and girls at the UMC level with teachers having an art or teaching diploma background did better than those at the MC level.

There was a difference in students' achievement among the ASAT's 4 subtests (RM); students in both units did significantly better in recall-type items than in understanding-type items, and also did better in unit 1 than in unit 2 in both types of items. Finally the interaction between RM, SEB, and TAB shows the superiority of students at the UMC level over those at either the MC or LMC level in nearly every subtests and with all teacher backgrounds. At the MC level, students did better in all 4 subtests than those at the LMC level when they had teachers with a teaching diploma, and in 3 subtests when they had teachers with the other backgrounds.

In the name of God,

Most Gracious, Most Merciful

"O my Lord!

Advance me in Knowledge"

The Holy Qur'an

Ta-Ha, 114

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# THE PROBLEM

## Introduction

Achievement tests play an important role in the school. Standardized versions are used by administrators to section classes, place transfer students, evaluate the curriculum, identify exceptional children, and interpret the schools to the community. Guidance counselors use them as one basis for assisting students to make more realistic educational and vocational decisions. However, their most significant role is in the instructional program of the school. Here, achievement testing becomes an integral part of the teaching-learning process and has the most direct influence on student development.

Testing can improve the effectiveness of the instructional decisions by providing more objective information on which to base the judgments. In addition, the use of tests can have an immediate and direct effect on the learning of students. Tests can improve student motivation, increase retention and transfer of learning, and contribute to greater self-understanding (Gronlund 1968).

The trend in recent research studies on academic achievement, mostly provided by the achievement tests,

appears to be toward investigating not just the intellectual variables in explaining differences in academic achievement, but non-intellectual variables as important variables as well.

Significant findings have indicated that intellectual measures account for only 35 to 45 percent of the variation in academic performance (McClelland 1969).

Researchers who have focused on the individual learner appear unable to account for the variations in learning that may be due to the social environment. Therefore, after providing good and trustable instruments to measure a student's performance, it is necessary to come to a fresh understanding of the individual's environment and the relationship between his performance and his environment. As Davis has mentioned, for example, social classes form the structure of the social "maze" in which the child learns his habits and meanings (Davis 1960).

## Need For The Study

The educational system in Iraq is a very strong centralized system. National educational objectives have been drafted by the Ministry of Education. There is one textbook for each subject in each grade which is required for all the students in Iraq, and all the teachers must cover their grade's textbook during the academic year.

There are four kinds of examinations in Iraq:

a. The weekly quizzes and monthly examinations -

These are tests that are formulated by the teacher and should not be the same for all sections of that grade in a particular school. These are usually scored by the individual teacher.

b. The mid-year examination - This is formulated by the teachers in a particular school from the subject matter taught there. This examination is for all sections of that academic grade and is usually scored by the teacher of each individual section.

c. The final examination - This exam is made by all the subject matter teachers in the school, and is the same for all the students in each academic grade. It is controlled by the final examination subject matter committee.

d. The baccalaureate examination (B.Ex.) - This exam is required for all the students in Iraq in the sixth, ninth, and twelfth grades. It is a one form test which is made and controlled by the Higher Central Committee of Testing and Grading, and is scored by the Central Subject Matter Committee in the Ministry of Education.

All or most of the test forms for the four kinds of examinations (all of them in the Baccalaureate Examination) are in

essay form and are almost always structured according to the contents of the textbook in that particular subject.

If a student fails on the final examination at the end of the school year (except the early elementary school years), he has to remain in the same grade for another year with the label "repeater." Passing the baccalaureate examination is the student's green card which enables the student to transfer from the elementary school to the middle school, to the high school, and finally to finish high school and receive the certificate which is necessary to gain admission to the university based only on his total score on this examination. Again, without passing this examination the student will stay in his grade and not finish high school regardless of any other criteria.

An issue that comes up every year in Iraq is in regard to the Baccalaureate Examination results and about other criterion which should guide the prediction of the student's academic success at the different levels. There is a considerable conflict over this matter which is expressed through many complaints commonly heard, especially every summer from students, parents, administrators, educators and even the political decision makers. Newspapers, television and radio stations are almost always involved in this conflict.

Some Iraqi educators think that the Baccalaureate Examination in Iraq, especially in the 12th grade, is not very dependable or reliable to be the only criteria on which to

base our students' transfer and admission policy. Since all the B.Ex.'s are in essay form, it is not easy to get a fair correction of all the students' answer sheets. In addition, not all the students in the seventeen states in Iraq have the same chance to finish all the textbooks or all requirements in the same way.

Tests have become an integral part of our academic life and many, if not all, decisions are often made on the basis of a student's score. So it is very essential that we recognize the value that test results may play in the lives of the students.

Since 1972 the Iraqi Ministry of Education had been thinking seriously about deleting the Baccalaureate Examination in the sixth grade, and advising and training teachers to use objective tests rather than the essay form test. In 1975 the Iraqi Ministry of Education deleted the B.Ex. in the sixth grade, and the problem of searching for an alternative criterion at this level and other levels has been given and is still being given much attention.

One of the major goals of the Iraqi Ministry of Education is to build files of standardized achievement tests beginning with the elementary school as a first step. It is not easy to build a national standardized achievement test for all subject matters and for all school levels at one time. It takes a long time and requires many professional scholars. The greatest amount of attention should be given to the most important subjects and levels than the less

important ones. Science is one of the most important subjects to which the Iraqi Ministry of Education gives much attention.

This study will be a small part of the educator's efforts in Iraq to improve our testing and grading system, and to answer some questions which we have discussed as problems. However, this research and more is needed to answer or solve these problems.

## Purpose Of Study

This study is aimed at building an achievement test in Elementary Science Education for the sixth grade in Iraq. Moreover, the test will be analyzed with respect to validity, reliability, discriminability, and all other statistical properties.

Secondly, it will be an attempt to give an alternative to the Baccalaureate Examination in the sixth grade which the Iraqi Government deleted several years ago. Thus, it will be just the first step in an attempt to build files of standardized achievement tests in the elementary schools.

At the same time, this study will have the opportunity to use the data and information which will be obtained from applying the test in various schools in Baghdad in order to answer some important questions which we have discussed as problems in Iraq. Furthermore, the study will test the relationships between the student's socio-economic background, the teacher's academic background, the student's sex

difference and their effect on acedemic achievement of sixth grade children in Baghdad, Iraq, during the first half of the 1976-1977 school year.

Hypotheses

The major hypotheses to be examined in this study are the following:

1. The students' socio-economic backgrounds does not affect their achievement in science education.
2. The teacher's academic backgrounds does not affect the students' achievement.
3. The student's sex difference does not affect student achievement.
4. There are no differences in content and understanding of objectives between the two types of test items (recall and understanding) which will be covered by the researcher's test.

The following interactions will be tested:

a. The interactions between the first three variables.
b. The interactions between the first three variables and the repeated measure variable (the content and understanding of objectives).

## Limitations Of The Study

This study is based on a sample of sixth grade students attending school during the 1976-1977 school year. The sample includes only those schools which are located in three neighborhood districts in one county in the city of Baghdad (Almansor, Hay Dragh and Alhay Alarabi, and Alsalam districts). Therefore, generalizations to other geographical counties or cities, or to other grade levels within the same county, should be made only if the reader is willing to take the responsibility for the validity of such extended generalizations.

## Definition Of Terms

For clarity of understanding, the following terms are defined either because of their specialized meaning or because of the operational definition which is used in this study.

Socio-Economic Background is defined as the student's socio-economic background according to his school area. This background will be one of three levels: upper middle class (Almansoor district); middle class (Hay Dragh and Alhay Alarabi districts); or lower middle class (Alsalam district).

Teacher's Academic Background is defined as the teacher's high school background. It will be one of three levels: science background (if the teacher has graduated

from a science-section high school); art background (if the teacher has graduated from an art-section high school); or, a teaching certificate background (if the teacher attended the "Elementary Teachers School" after the middle school for three academic years and graduated).

Sex Difference is defined as student's sex difference (male or female).

Academic Achievement is defined as the student's total score on the test to which this study is going to apply.

Elementary School is defined as a public school which provides six years of education for children between the ages of six and fourteen. This formal schooling is compulsory for all Iraqi children.

## Overview

In Chapter I the introduction, need for the study, purpose of the study, hypotheses, limitations of the study, and definition of terms used in this thesis were presented.

Chapter II contains a review of the literature concerning the relationship of students' academic achievement to their socio-economic background, sex difference, and teacher's academic background.

The design of the study is the topic of Chapter III which includes a definition of the population and the sample's description, the test that has been used in the study, design of the study, testable hypotheses and analysis.

Chapter IV contains the analysis of the data and a

discussion of the research findings.

The summary, conclusions and recommendations for further research are included in Chapter V.

# CHAPTER II

## REVIEW OF LITERATURE

This review presents the findings of studies focusing on the relationship between student's socio-economic backgrounds, sex differences, their teachers academic backgrounds and their achievement in elementary science education. This review will not examine literature previous to 1965 or which studied the relationships of the factors of this study and students academic achievement in subjects other than science. It may touch some studies (i.e., studies that do not relate to science) when it talks about any factor in general.

### Socio - Economic Background (SEB)

The relationship between students' socio-economic background and their academic achievement is significant in most of the research findings. The evidence obtained from research has indicated that the student's family background has played a very important role in students academic achievement specially in the early years of school. As Jenks (1972, p. 143) has pointed out:

> On almost any reasonable set of assumptions family background explains nearly half the variation in education attainment. A family's economic status is, of course, a major determinant of its overall impact on

its children. But noneconomic factors also account for a significant fraction of family's overall effect on its children's attainment.

One can enumerate a number of factors which may contribute to the socio-economic status of a child; there seems to be common agreement to use: parent's educational attainment; parent's occupation; total family income; the area which the family lives in; and even, sometimes, the number of people in a student's family. All of these can be considered as SEB factors which contribute to the child's achievement at school.

Parental education is frequently chosen as the sole indicator of the socio-economic status of a child. Mayeske (n.d.), Hood (1968), Lowe (1968) and Coleman (1966) indicated in their studies that the attained educational levels of parent's and student's performance at college were correlated significantly, and the parent's educational level has the highest contribution to the student's achievement.

One of many studies which used the parent's occupational level as the social class index of the student was done by Wilson (1969). The research findings indicated that a parent's occupation was the single factor most related to the academic achievement of the children. Davres (1967) did a comparative study of the performance of pupils from low, high, and economically diversified socio-economic areas in Kansas City, Kansas. The scores of children representing the low-income areas were different significantly (lower) from scores of children representing the high-income area.

In comparison to the relationship between student's SEB and their academic achievement in elementary science education, we can see the same trend of relationship with the student's academic achievement in general.

In Iraq the relationship between socio-economic variables and academic achievement of sixth grade pupils in Baghdad has been studied by Alnasery (1975). Studied were the relationship between the academic achievement and the father's monthly income, family size and father's education. The academic achievement is measured by the Baccalaureate Examination (B.Ex.) for the primary school level. (B.Ex. is given in five subjects; Arabic, English, Arithmetic, Social Studies and Science). From the sixth graders who took the B.Ex. for the academic year 1972-1973 a stratified random sample of 1620 students was drawn. Three groups representing three levels of economic status were identified and 40 primary schools from each group were randomly selected. An ANOVA model ( 3 x 3 x 6 x 5 ) was used to analyze the B.Ex. grades. The relationships between students' achievement in science, father's monthly income and family size were significant.

In an attempt to determine the commonalities of science interest held by intermediate grade children in inner-city, suburban, and rural schools, Clarke (1972) investigated relationships between their interests in particular areas of science and, place of residence, intelligence quotient, social class, grade level and sex. The results of

this investigation show that the achievement pattern in science was significantly related to the community in which the student lived. Suburban children reported the highest mean score, followed by rural and urban children, respectively. The mean score of the suburban children closely approximated that of the rural children. Neither grade level, social class status nor IQ had any significant influence on the student's science interest.

The effects of a supplemental science program on achievement of students with different socio-economic and ethnic backgrounds have been studied by Kral (1972). This study investigated the effects of the addition of a supplemental science program to existing curricula in selected elementary schools. A supplemental science program, the Elementary Science Study (ESS), was introduced to the treatment group (four of eight classes randomly selected, with a total population of 189 sixth-grade students) and a placebo treatment consisting of films, current events, and discussions was given to the control group for one hour a week, during a twelve week period. The Stanford Achievement Test, The Home Index Scale and The Reed Science Activities Inventory were administered at the end of the study. Analysis of the data was accomplished using factorial 2 x 2 analysis of variance on each of the four variables. It was found that the supplemental science program made a difference in science achievement favoring the experimental group. Non-Indian students scored higher in science achievement.

Students with a high socio-economic background did better than did those with a low socio-economic background. The effect of science attitude on achievement was non-significant.

Klein (1969) studied the differences in science concepts held by children from three social-economic levels. Studied were third and fourth grade children, from schools designated as exclusively serving low, middle, or high social-economic areas in St. Paul, Minnesota, to determine differences in understanding of science concepts and methods. Test items were administered orally and included fifteen questions selected from the school system basic science test plus items on how to find out answers to the questions. For the pilot study, responses from third graders were compared in tape recorded and written form. Three-hundred-ten fourth graders in fifteen classes from nine schools were given the written test. Test scores were treated using analysis of variance and covariance with adjustments for IQ differences. It was concluded that differences in understanding science were associated with materials with all groups may not be an effective teaching method. Lower social-economic groups may need more experimentation and observation.

An assessment of science achievement of five- and six-year old students of contrasting socio-economic background has been done by McGlathery (1968). Assessed was the science achievement of five- and six - year- olds from different socio-economic backgrounds. Classes included both a

middle-class and lower-class pre-school class and a middle-class and a lower-class first grade class. Four additional classes, which were studying a local science curriculum, were chosen to match these same grade-level and socio-economic criteria. Instruction was given in the experimental and control classes from September, 1966 through May, 1967. Achievement was assessed by administering competency measures to five randomly selected students from each class after the completion of each of eight exercises. Students in the experimental group scored higher than students in the control group indicating that the impact of a curriculum structure is measurable. Five-year-olds scored as well as six-year-olds indicating that age was not a factor in science achievement with this sample. When evidence of science achievement required verbalization, middle-class students did better than lower-class children. When non-verbal behaviors were required no achievement differences were recognized.

Further research (Bozarth 1968) has studied the ability to conserve quantities of liquid and its relationship to achievement among selected fourth grade pupils. Studied were the relationships between children's attainment of the concept of conservation of liquid and certain student characteristics. Student factors investigated were socio-economic background (high and low), status levels (conservers and non-conservers), verbal and non-verbal achievement, and science achievement. Classification of subjects by status

produced significant differences in favor of conservers, and by socio-economic level (high and low) produced significant differences in favor of high on the intelligence and achievement tests used.

Thus, the overall review of literature indicates that a student's family background has a substantial effect on his academic performance at school.

Teacher Academic Background (TAB)

The teacher's academic background has been identified in the American literature in different ways; the college's teacher program, courses which the student teacher has selected or taken in his program, teaching experience, teachers training programs and in-service education being some of them. The general trend in the review of literature is the non-significant relationship between teacher's academic backgrounds and either their achievement or their student achievement in science. However, some results show the opposite.

To investigate the influence of science training on student achievement, a study has been done by Harvey (1977) on how science training of the teacher, type of school, and student age effects the science performance of children aged 5-11. Teachers were classified as either science-trained or nonscience-trained. The author chose to define science teachers as those having one year or more of science during their teacher-training period. This somewhat arbitrary definition was supported by the results of a survey of primary

school teachers in the south-west of England relating their attitudes towards science and science teaching. The 5 schools involved in the experiment were all primary schools (i.e., they catered to children in the age range 5-11). In these schools, all the children were always in year groups. No attempt was made to classify the schools; however, it was noted that they were situated in different parts of the city thus, each school was regarded as a separate entity. The various children within any school were divided randomly into the appropriate number of groups with the restriction that the resident teachers, in all cases, were teaching groups taken only from their own classes. The instrument chosen to measure the performance of the children was an objective-type written test. All of the groups were given the test a week after the completion of the teaching session. The statistical analysis employed in making the various comparisons was ANOVA. The analysis indicated that there were no differences between the performance of the science-trained and nonscience-trained teachers; implying that the amount of science training is unimportant, provided that the specially structured material is being used. The study showed student age as the only factor that significantly influenced student achievement.

Shanks (1975) attempted to determine if there was a stable and preferred mode of perceptual organization and conceptual classification of stimuli which influenced the ability of female pre-service elementary teachers to acquire the

science concepts presented in a general elementary credential preparation course. A significant contrast in SCST (Sigel Cognitive Style Test) occurred with only the achievement-in-science factor. For high and low achievers of science concepts, the findings indicated that a person's cognitive style influences his intellectual ability to grasp and understand new meanings.

To determine the effects of self-pacing instruction in a science methods course on teacher's achievement and attitudes toward science, Campbell and Martinez-Perez (1975) have indicated that teachers who were taught utilizing a self-pacing technique did not achieve significantly better or have attitudes that were different from those who were not self-paced.

Another study, by Riley (1975), investigated the effect of science process training on pre-service elementary teacher's process skill abilities, understanding of science, and attitudes toward science and science teaching. The results indicate the efficacy of process training in terms of improved process skill abilities. The study did not indicate any significant increase in the understanding of science nor any significant change in overall attitudes toward science teaching as a result of training in process skills.

Oberlin and Sanders (1973) compared the science content knowledge of graduates from Florida's New Elementary Program and graduates who had their science education in a traditional course. The comparison of science content

achievement between the new and traditional student groups shows the absence of any significant differences; however, about 11% of the college students scored lower than the top 10% of the sixth graders.

Pinkall (1973) studied the effects of a teacher in-service education program on fifth and sixth grade teachers, and the students whom they teach, in their knowledge of scientific processes, scientific content and attitudes toward science and scientists. The purpose of this study was to determine the effects of a teacher in-service education program of workshops in Elementary Science Study (ESS) and Process Science on (1) the fifth- and sixth-grade teachers who participated in the workshops, and (2) students of teachers who participated in these workshops. A Posttest-Only Control group design was used to test six research hypotheses. Randomization was used to insure the lack of initial bias between experimental and control groups for both teachers and students. In experimental and control groups (each comprised of twenty-five teachers), comparisons were made on knowledge of scientific processes, knowledge of scientific content, and attitude toward science and scientists using three instruments. A total of 150 students in the control group and 150 students in the experimental group were tested on the same three criteria, also by using three instruments. The analysis of the teacher data revealed no significant difference between the experimental and control groups on any of the instruments. Analysis of the student data revealed

that the experimental group scored significantly higher (at the .05 level) than did the control group on all three instruments.

"Modern Elementary Science Curricula and Student Achievement" is a Ph.D. dissertation done by Smith (1972). In this study, comparisons of the growth in science achievement of 2,000 elementary science students in six elementary science programs used in Southwestern Michigan were made. Relationships between students' ranking in class, the type of school, sex and growth in achievement were sought, as well as relationships among teacher variables (pre-service science training, post-baccalaureate training in science, perception of an experience with curriculum, experience in teaching and growth in student achievement. Data were obtained with pre- and post-tests, using the science section of the Educational Development Series of the Scholastic Testing Service. Significant relationships were identified between growth in science achievement and type of curricula used, students' ranking in class, teachers' pre-service science training, teachers' post-baccalaureate training in science, and teaching experience.

Does previous teaching experience effect a teacher's competency in science? Does previous science training effect a teacher's competency in science? These two questions have been answered with six more questions raised in White's study (1969) of contrasting patterns of in-service education. Previous teaching experience appears to have no relevance to

a teacher's competency in science, but the amount of previous science training appears to be a significant contributor to the effect of the teacher education program.

Another Ph.D. dissertation (Shanks 1969) focuses on concept achievement in science and its relationship to some non-intellectual characteristics of prospective elementary teachers. It revealed that high achievers of concepts of science demonstrated an analytical cognitive style, were described as goal oriented, self-directed women with a firmness of character and above average intelligence, but produced the lowest scores on the Elementary Teacher Scale of the Strong Vocational Interest Blank (SVIB).

Finally, O'Toole's study (1966) was an attempt to determine whether fifth grade children can learn certain selected problem solving abilities through individualized instruction. The purpose of this study was to determine the effects of an individualized instruction approach and a teacher centered approach on student achievement of science content and problem solving skills, science interest, and self concept. Eighty-one fifth grade pupils were divided into three classes of 27 each: a teacher-centered active control group, an individualized experimental group both taught by the researchers, and a teacher-centered passive control group taught by their classroom teacher. Course content was based on "Today's Basic Science" and AAAS Science - A Process Approach. Among the findings were (1) that the individualized method of instruction did not prove superior to

the teacher-centered approach in achievement of science content, over all problem solving ability, increased science interest, or the attainment of a more positive self concept, and (2) that the teacher-centered program stressing problem solving as its major objective was significantly more effective in achieving the ability to identify valid conclusions than both the individualized program and the teacher-centered passive program.

## Sex Differences

The earliest measures of some aspect of quantitative ability begin at about age 3 with measures of number conservation, soon followed by enumeration. There appear to be no sex differences in performance on these tasks (except in disadvantaged populations) during the preschool years; or in mastery of numerical operations and concepts during the early school years. MacCoby and Jacklin (1974, p. 85) have mentioned that:

> The data from the large studies conducted with Head Start and Follow-Through children show the girls to be ahead. The majority of studies on more representative samples show no sex differences up to adolescence, but when differences are found in the age range 9-13, they tend to favor boys. After this age, boys move ahead, and the sex differences become somewhat more consistant from one study to another, though there is great variation in the degree of male advantage reported.

There is agreement about boys' superiority in math, which in turn tends to be accompanied by a better mastery of scientific subject matter and a greater interest in science. The two disciplines are of course closely linked in

that science relies heavily upon math in formulating its problems and finding solutions. MacCoby and Jacklin raise the question about whether male superiority in science is a derivative of greater math abilities or whether both are a function of a third factor.

The review of literature in the area of sex differences relating to science education shows some differences in their results and conclusions. Results of the National Assessment of Educational Progress are examined by Herman (1975), in the context of male and female achievement differences in 8 learning areas. In the science area 2 questions have been raised by this study: Do boys and girls perform equally well on science exercises? and if not, do differences appear for all science exercises, or only for certain kinds of exercises? The findings of this study show that with increasing age there is an increasing tendency for males to perform better than females on science exercises. For exercises assessing knowledge of biological science the typical male-female difference is small. On some biological science exercises, performance of females is better than that of males.

When the National Assessment of Educational Progress released (in past years) results from a variety of learning areas, a paper in the same field written by Mullis (1975) attempted to point out male-female differences in achievement across several learning areas. Results show that male and female performance in social sciences, mathematics, and

science, including numerical operation, geometry and measurement, are nearly equal at age nine; but males gain a substantial advantage over females by adulthood.

Since 1969, the National Assessment of Educational Progress has gathered census-like information about levels of educational achievement across the country and reported its' findings to the nation. Individuals were selected for examination so that the levels of achievement they demonstrated would be representative of the achievement of the entire country (Johnson 1975). Individuals were selected from four age levels--9, 13, 17 and 26 through 35--which correspond to 4 key stages in the education of most individuals: the end of primary school, junior high school, high school and a few years past the end of formal schooling. The individuals were also classified according to region of the country, sex, race, parental education and size and type of community to provide additional information about types of schools and students. Achievement levels of young Americans in 7 assessment areas are described in this volume--science, social studies, music, literature, reading, writing, and citizenship. Results of the 7 assessments indicate that there are serious disparities in the achievement levels of various groups within the nation. Science is the only area of all learning areas assessed in which males almost consistently out performed females. At every age and in almost every aspect the levels of achievement were higher than those of females, except in knowledge of health and human

reproduction. The author indicated that the science assessment provides further evidence, if such were needed, that science is a male-dominated field, even at the elementary school level; and the most striking finding of the assessment is the relatively poor performance of females compared to males.

In Clarke's study (1972), which has been described in the SEB section, interest in particular areas of science was found to be significantly related to sex. For example boys were mostly interested in the earth sciences and the physical sciences, whereas girls were found to be most keenly interested in the biological sciences. According to student's achievements, and for the study sample as a whole, sex differences did not significantly effect achievement in science, but boys showed a more favorable attitude toward science than did girls. When the school subjects were ranked, the order of preference for boys was: (1) science, (2) mathematics, (3) social studies, and (4) English; for girls the preference was: (1) social studies, (2) English, (3) science, and (4) mathematics.

The same results have been indicated by Smith (1969) in that there was no significant differences of achievement between boys and girls in the elementary science program.

Finally, MacDougall (1968) has also indicated in her final report about the teaching of upper elementary school science using programed materials coupled with student performed experiments, that the percentage of boys and girls is

nearly the same in each group.

Summary

The relationship between a student's socio-economic background (which includes the parent's educational attainment, parent's occupation, total family income, the area in which the family lives, etc.) and their academic achievement in general (specifically, their achievement in science), shows significant differences in most of the research findings. The overall review of literature indicates that a student's family background has a substantial effect on his academic performance at school; and in fact, the school factors themselves do not have as much effect as do the student's socio-economic background factors.

The college's teacher program, courses which the student teacher has selected or taken in his program, teaching experience, teachers' training program and in-service education are some of the many different ways in which the teachers' academic backgrounds have been identified. In general, there is little evidence to show any TAB effect on either their achievement as a teacher or their students' achievements in science; however, some results show the opposite.

There are two different points of view, according to the different results of many studies, when one looks at the relationship between students' sex differences and their achievement in elementary science education. The first one

concludes that there was no effect by sex differences on the student's performance at the elementary level up to adolescence. On the other hand, the second point of view considers science as a male-dominated field, even at the elementary school level, because of the females' poor performance in comparison to the males'.

# CHAPTER III

# PROCEDURE

This study can be classified as a comparative study. It is aimed at building an achievement test in elementary science education for the Iraqi sixth graders, and to have the opportunity to use the data and information which will be obtained from applying the test in various schools in Baghdad in order to answer some important questions which we have discussed as problems in Iraq.

In Chapter IV, the findings for the study are presented and conclusions are given in Chapter V.

## Population

Baghdad, the capital of Iraq, is a big city which has a population of more than 3 million. It is the largest city in Iraq, containing 28% of the Iraqi population and about 40% of the Iraqi student population.

Because it is a big and very old city, there are many different areas in Baghdad which differ widely in their socio-economic status and levels. The lower middle class people, for example, as well as other classes, do not live in the same area in Baghdad. They live in many separate and different areas. So, there are many different areas for

each different class and there are some areas where it is difficult to name them by definite class or level. At the same time there are many areas that are easy to classify under such classes or levels.

This study is aimed at applying the test in different areas which obviously differ in their socio-economic classes. However, it is preferable to take these areas in one geographical area as close to each other as possible.

The advice of the Iraqi Ministry of Planning's expert to the author was to take the western county of the city of Baghdad as the population for this study. The western county contains Al-mansoor District which is classified as an upper middle socio-economic class district (UMC); Al-hay, Al-arabi and Hay Dragh districts[1] which are classified as middle class districts (MC), and Al-salam and Al-washash districts[2] which are classified as lower middle class districts. All these above districts are located in one area as in well-to-do neighborhoods and there is no other district located between any two of them.

There are 7 elementary schools in Al-mansoor District, 10 in Dragh District and 12 an Al-salam District. Each of these schools in all three districts contain all six grades (1-6), and there is just one sixth grade science teacher in each school. Any other elementary school in these districts

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[1]In this study they will be named as one district under the name of "Dragh District."

[2]As in #1 they will be named "Al-salam District."

which does not have the two above restrictions (i.e., school which has all the six grades (1-6) and one science teacher for all sixth graders) is not considered in the population of this study.

Of the 29 science teachers in the three districts, there are 21 female and 8 male teachers; no males and 7 females in Al-mansoor, 3 males and 7 females in Dragh, and 5 males and 7 females in Al-salam respectively. There are 5 science teachers with science backgrounds in the three districts, 8 with art backgrounds and 16 with a teacher diploma; (1,2,4) in Al-mansoor, (2,2,6) in Dragh and (2,4,6) in Al-salam respectively.

There are 2191 sixth graders in all the 29 schools, 1212 males and 979 females. According to the district, there are 628 sixth graders in Al-mansoor District (306 males and 322 females), and 759 in Dragh District (428 males and 331 females), and 804 sixth graders in Al-salam District (478 males and 326 females). Table (3-1) shows the distribution of the population by district, student, science teacher's academic background, and sex.

## The Sample

This planned study is designed to choose 6 groups from each district (i.e., 18 groups from the county) which differ according to their socio-economic background, sex difference and their science teacher's academic background (3 x 2 x 3 factorial design). Because of these restrictions and a

TABLE 3-1

DISTRIBUTION OF POPULATION

| | | District | | | |
|---|---|---|---|---|---|
| | | Al-Mansoor | Dragh | Al-Salem | Total |
| Students | male | 306 | 428 | 478 | 1212 |
| | female | 322 | 331 | 326 | 979 |
| | total | 628 | 759 | 804 | 2191 |
| Science Teacher's Sex | male | 0 | 3 | 5 | 8 |
| | female | 7 | 7 | 7 | 21 |
| | total | 7 | 10 | 12 | 29 |
| Science Teacher's Academic Back-ground | Science | 1 | 2 | 2 | 5 |
| | Art | 2 | 2 | 4 | 8 |
| | T. Diploma | 4 | 6 | 6 | 16 |
| | Total | | | | 29 |

limited number of alternatives, the sampling procedure of this study was to select the 18 groups, 6 from each district, randomly whenever that selection is available or possible. Otherwise, when the group(s) which this study is intended to sample cannot be included through random selection from a study district (i.e., if the group is the only available group in the district) that group will be included in the sample without randomization. The co-educational schools (all the schools in Al-mansoor, most of them in Dragh and some in Al-salam Districts) are considered as two groups if there are more than 20 males and 20 females in that school. Thirteen schools have been selected in the sample (containing 18 groups); 3 schools from Al-mansoor, 4 from Dragh and 6 from Al-salam Districts. The sampling procedure for students was to select them randomly from each group (20 students, either male or female for each group) if the group which has been selected has more than 30 students. If there are more than 20 and less than 30 students in the group, all the students (in that group) have been given the test first, and 20 answer sheets are selected randomly from that group.

According to the socio-economic level variable (SEB) a survey has been done in the three districts, in spite of the information which is available in the Ministry of Planning, becasue the population of this study is only the sixth graders in the western county and because the information which is available is not adequate to consider the student's socio-economic differences, especially their parents' educational

level.

A special questionnarie was designed by the author and distributed to the sample students just one day before giving the test. The questionnarie does not ask the student's name or any other similar information about the student. The answered questionnarie, completed by the parents, was given back to the author personally by the examinee in a closed envelope prior to the test. The envelope was immediately placed in a box.

The questionnarie asks about the monthly total income of the student's family (after the monthly home rent has been subtracted if any), the total number of people in that family, and the educational level of each parent. The educational levels which the questionnarie included are: finished Master's or Doctoral degree, finished B.A. or B.S., finished high technical diploma, finished high school (12th grade), finished middle school (9th grade), finished elementary school (6th grade), could read and/or write, and could not read nor write. The monthly income by person has been calculated in Iraqi Dinar (equals $3.334 at the time of the study), and seven educational points are given to each parent who has finished a Master's or Ph.D. degree, 6 points to those who have finished B.A. or B.S., up to a zero to those who could not read nor write. All the results which came from that survey are analyzed to test the significant differences, if any, between the three districts' students.

Table 3-2 shows the findings of the survey, and the questionnaire which was used is in Appendix C

The t-test was used to check the differences between the students in the three districts according to their monthly income (MIP) and the total number of people in their families (NPF). $\chi^2$ technique was used to check students' difference according to their parents educational levels (PEL). The two-way ANOVA was used to check student's SEB and SEX main effects and the interaction between them in all the SEB factors (MIP, NPF and PEL).

All three districts (socio-economic classes) differ from each other, according to their monthly income by person, with a high level of significance, (see table 3-3). On the other hand there is no significant difference between boys and girls (in each district individually) in both the upper middle class and the lower middle class students. There is a significant difference between boys and girls in the middle class students (see table 3-3).

The same exact thing has happened in differences according to the number of people in the student's family. There is a significant difference between the three socio-economic classes and between boys and girls in the middle class students, but no significant differences existed between boys and girls in either the upper middle or lower middle class students (see table 3-4).

According to the "parents educational levels," where $\chi^2$ is used, the three socio-economic classes differ with

TABLE 3-2

STUDENTS' SOCIO-ECONOMIC BACKGROUND

| | Sex | n | Monthly Income/ Person* | | # of People/ Family | | Parents' Educational Level** | | | | | | | | Total of Parents Educ. Points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\bar{X}$ | S. D. | $\bar{X}$ | S. D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Upper | Boys | 60 | 40.804 | 21.853 | 6.017 | 2.336 | 22 | 29 | 12 | 23 | 14 | 10 | 7 | 3 | 549 |
| Middle | Girls | 60 | 39.097 | 19.899 | 6.259 | 1.792 | 21 | 42 | 6 | 16 | 10 | 13 | 7 | 5 | 556 |
| Class | Total | 120 | 39.950 | 20.899 | 6.138 | 2.082 | 43 | 71 | 18 | 39 | 24 | 23 | 14 | 8 | 1105 |
| Middle | Boys | 60 | 17.853 | 11.779 | 8.40 | 2.625 | 5 | 17 | 4 | 19 | 14 | 12 | 23 | 26 | 322 |
| Class | Girls | 60 | 23.719 | 12.618 | 7.183 | 2.251 | 9 | 41 | 6 | 12 | 17 | 14 | 12 | 9 | 478 |
| | Total | 120 | 20.786 | 12.206 | 7.792 | 2.445 | 14 | 58 | 10 | 31 | 31 | 26 | 35 | 35 | 800 |
| Lower | Boys | 60 | 7.187 | 3.888 | 9.30 | 2.987 | 0 | 2 | 2 | 7 | 4 | 11 | 27 | 67 | 111 |
| Middle | Girls | 60 | 7.171 | 4.647 | 9.538 | 2.761 | 0 | 2 | 0 | 5 | 10 | 28 | 33 | 42 | 151 |
| Class | Total | 120 | 7.179 | 4.284 | 9.419 | 2.876 | 0 | 4 | 2 | 12 | 14 | 39 | 60 | 109 | 262 |

*Monthly income/person has been calculated in Iraqi Dinar (1 Dinar equals $3.334)

**The numbers and their points belong to the following key:

| # | Meaning | Educ. Points |
|---|---|---|
| 1 | Finished M.A., M.S. or Ph.D. | 7 |
| 2 | Finished B.A. or B.S. | 6 |
| 3 | Finished high technical diploma | 5 |
| 4 | Finished high school (12th grade) | 4 |
| 5 | Finished middle school (9th grade) | 3 |
| 6 | Finished elementary school (6th grade) | 2 |
| 7 | Could read or write | 1 |
| 8 | Could not read nor write | 0 |

TABLE 3-3

THE MONTHLY INCOME/PERSON - T-TEST DIFFERENCES BETWEEN THE THREE DISTRICTS AS A WHOLE AND BY SEX

| | Class | Sex | # | Monthly Income/ Person | | t-value | P< | Significance with 2-tail and $\alpha$ = .05 |
|---|---|---|---|---|---|---|---|---|
| | | | | $\bar{X}$ | S. D. | | | |
| 1 | U.M.C. | -- | 120 | 39.95 | 20.90 | 8.67 | 0.000 | Yes |
| | M.C. | -- | 120 | 20.79 | 12.21 | | | |
| 2 | M.C. | -- | 120 | 20.79 | 12.21 | 11.53 | 0.000 | Yes |
| | L.M.C. | -- | 120 | 7.18 | 4.28 | | | |
| 3 | U.M.C. | Boys | 60 | 40.80 | 21.85 | .45 | .34 | No |
| | U.M.C. | Girls | 60 | 39.10 | 19.90 | | | |
| 4 | M.C. | Boys | 60 | 17.85 | 11.78 | 2.57 | .007 | Yes |
| | M.C. | Girls | 60 | 23.72 | 12.62 | | | |
| 5 | L.M.C. | Boys | 60 | 7.19 | 3.89 | .01 | -- | No |
| | L.M.C. | Girls | 60 | 7.18 | 4.65 | | | |

TABLE 3-4

NUMBER OF PEOPLE/FAMILY - T-TEST DIFFERENCES BETWEEN THE THREE DISTRICTS AS A WHOLE AND BY SEX

| | Class | Sex | # | # of People per Family | | t-value | P< | Significance with 2-tail and $\alpha$ = .05 |
|---|---|---|---|---|---|---|---|---|
| | | | | $\bar{X}$ | S. D. | | | |
| | U.M.C. | -- | 120 | 6.14 | 2.08 | | | |
| 1 | | | | | | -5.5 | 0.000 | Yes |
| | M.C. | -- | 120 | 7.79 | 2.45 | | | |
| | M.C. | -- | 120 | 7.79 | 2.45 | | | |
| 2 | | | | | | -4.71 | 0.000 | Yes |
| | L.M.C. | -- | 120 | 9.42 | 2.88 | | | |
| | U.M.C. | Boys | 60 | 6.02 | 2.34 | | | |
| 3 | | | | | | -.67 | .30 | No |
| | U.M.C. | Girls | 60 | 6.26 | 1.80 | | | |
| | M.C. | Boys | 60 | 8.40 | 2.63 | | | |
| 4 | | | | | | 2.71 | .005 | Yes |
| | M.C. | Girls | 60 | 7.18 | 2.25 | | | |
| | L.M.C. | Boys | 60 | 9.3 | 2.99 | | | |
| 5 | | | | | | -.45 | .34 | No |
| | L.M.C. | Girls | 60 | 9.54 | 2.76 | | | |

very high levels of significance. To take the students by their sex in each district (class) no significant difference existed in the upper middle class, whereas the differences are significant in both the middle class and in the lower middle class (see table 3-5). Figure 3.1 shows these above differences in graphs.

Table 3-6 shows the significant main effect of student's socio-economic hackground (SEB) in all its' factors (MIP, NPF and PEL). On the other hand, SEX's main effect was not significant in MIP and NPF but it was in PEL. The SEB-SEX interaction was significant in both NPF and PEL.

The findings of the survey above show a sharp difference between the districts which were chosen to represent the students from upper middle, middle and lower middle socio-economic backgrounds. At the same time the findings show that the middle class sample, in fact, is two different subgroups (boys and girls), but in all they make a clear middle class which differs significantly from either the upper or the lower middle classes. In other words, the boys in the middle class differ significantly from boys in either the upper middle class or the lower middle class. So do girls of the middle class when they are compared to girls in the other classes.

## Instrument

The test, which is named ASAT (Alani Science Achievement Test), is the only instrument upon which all the

TABLE 3-5

$\chi^2$ TEST DIFFERENCES IN STUDENTS' PARENTS' EDUCATIONAL LEVELS IN THE THREE DISTRICTS

| Test # | Class | Sex | Sum of Educ. Points | Degrees of Freedom | $\chi^2$ Value | P< | Significant with $\alpha$=.05 |
|---|---|---|---|---|---|---|---|
| 1 | U.M.C. | -- | 1105 | 6 | 282.84 | 0.000 | Yes |
| | M.C. | -- | 800 | | | | |
| | L.M.C. | -- | 262 | | | | |
| 2 | U.M.C. | -- | 1105 | 6 | 90.69 | 0.000 | Yes |
| | M.C. | -- | 800 | | | | |
| 3 | M.C. | -- | 800 | 6 | 277.66 | 0.000 | Yes |
| | L.M.C. | -- | 262 | | | | |
| 4 | U.M.C. | Boys | 549 | 6 | 7.22 | 0.30 | No |
| | U.M.C. | Girls | 556 | | | | |
| 5 | M.C. | Boys | 322 | 6 | 23.38 | 0.001 | Yes |
| | M.C. | Girls | 478 | | | | |
| 6 | L.M.C. | Boys | 111 | 6 | 17.00 | 0.01 | Yes |
| | L.M.C. | Girls | 151 | | | | |

Figure 3-1

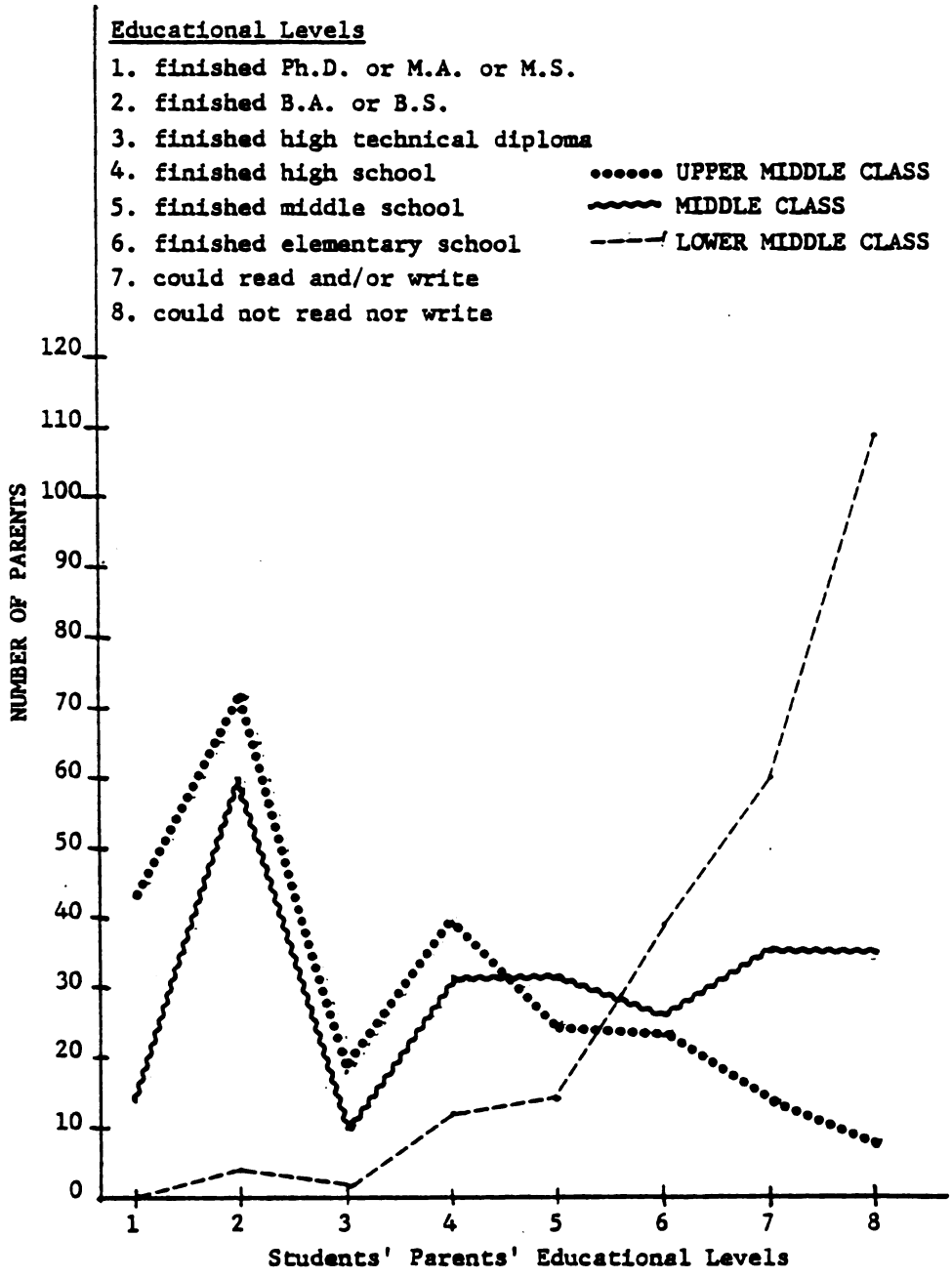
Educational Levels
1. finished Ph.D. or M.A. or M.S.
2. finished B.A. or B.S.
3. finished high technical diploma
4. finished high school
5. finished middle school
6. finished elementary school
7. could read and/or write
8. could not read nor write
UPPER MIDDLE CLASS
MIDDLE CLASS
LOWER MIDDLE CLASS
NUMBER OF PARENTS
120
110
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
Students' Parents' Educational Levels

Table 3-6

The Two-Way ANOVA Analysis for Student's Socio-Economic Background and Sex Difference

| | The Monthly Income/Person (MIP) | | | | Number of People/Family (NPF) | | | Parent's Education Level (PEL) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Source of Variation | df | mean square | F | p< | mean square | F | p< | mean square | F | p< |
| Main Effect | 3 | 21806.7 | 108.51 | .001 | 259.64 | 42.75 | .001 | 1052.23 | 108.50 | .001 |
| SEB | 2 | 32622.81 | 162.33 | .001 | 389.34 | 64.11 | .001 | 1523.33 | 157.08 | .001 |
| SEX | 1 | 174.47 | .868 | .352 | .225 | .04 | .847 | 110.00 | 11.34 | .001 |
| SEB-SEX | 2 | 471.80 | 2.35 | .097 | 33.03 | 5.439 | .005 | 50.59 | 5.22 | .006 |
| Residual | 354 | 200.96 | | | 6.073 | | | 9.698 | | |
| Total | 359 | 383.02 | | | 8.342 | | | 18.64 | | |

analysis of the students achievement scores in this study are based.

The test has been designed to be a mid-year test in science education for the Iraqi sixth graders, which covers about 48% of the textbook (the textbook covers the entire school year) and about 50% of the sixth graders' annual class hours in science subject matter. The test (ASAT) covers the first two units in the textbook (there are six units); the first unit, "My Body," covers 40% of the textbook and 40% of the annual class hours, and the second unit, "Some Popular Diseases," which covers 8% of the textbook and 10% of the annual class hours.

Two types of items have been included in the test; "content items" which directly ask about the basic concepts and facts which the units of the textbook contain (i.e., recall type), and the "understanding items" which ask indirectly about using or applying the basic concepts of the textbook (i.e., students could recognize when stated in phraseology different from that in the textbook).

The first step in building ASAT was analyzing the first two units of the textbook according to their content, questions at the end of each unit, and the objectives of the textbook. The first draft of the test, which has been written in the English language, contained 126 items to cover every single concept or important fact in the first two units at least twice. The first draft was technically revised by the author's doctoral committee. Eight items

have been deleted and 22 choices have either been deleted or rewritten. All the items are in 5 multiple choices per item.

The second draft has been translated into the Arabic language and has been revised by two of the textbook authors and 7 elementary sixth grade science teachers from different schools in Baghdad who have been recommended by the Teachers Training Headquarters in the Iraqi Ministry of Education. Nineteen items have been deleted, 4 new items were added, and many of choices were either deleted and replaced by others, or rewritten.

The third draft, which contained 103 questions with five multiple choice items each, was pilot tested in three elementary schools in the three districts. (These three schools were not used again in the final test application). Twenty-five sixth graders from each school took the test which was given by the author in the three schools. The same information and instructions were given to all the examinees. The average time for the students to finish the test was 52 minutes. One answer sheet was deleted because it was incomplete, so the sample of the pilot study was 74 students. Many notes were taken by the author during test time, and all the questions which were asked by the examinees were recorded and a table of frequencies was prepared for all these questions. The table was given to the science teacher committee and many questions were revised based on their comments and discussions.

Statistical analysis of the students' scores has been

made. The reliability of the test (split half method) was found to be (.871) before and (.899) after correction. All the items which either had an item difficulty less than 20 or more than 80 were deleted from the test except the first item of the test which has been made very easy on purpose. All the items which had an item discrimination less than 20 were deleted from the test also. All the items which either had item difficulty between 20-30 or 70-80, or an item discrimination between 20-30 have been checked according to the concept which it covers, table of student questions frequencies and science teachers comments and discussion. Some were deleted and others have been rewritten.

The final draft of the test contained 74 questions with five multiple choices items; 60 items cover the first unit of the textbook and 14 items cover the second unit. Forty items in the first unit and 7 items in the second unit are of the "recall" type, others are of the "understanding" type.

The final draft of ASAT was given to the 18 different groups which contained the sample for this test. All the tests (to the 18 groups) were given by the author personally with help from two research assistants from the Psychological and Educational Research Center at Baghdad University. In addition to the first page of the information which was attached to ASAT, the author gave all the examinees more details about the test and how to answer it for 5 minutes, and another 5 minutes were left to the students questions, if any. All the examinees were given an open ended time to

finish the test; all the answer sheets were checked before each student left. The test was returned to the student if some of the items were unanswered. All teachers for each group were asked to leave the classroom during the test time.

More complicated statistical analysis was completed on the test items after the final application, which will be covered in more detail in Chapter IV.

## Design

The design of this study is described as a 3 x 2 x 3 factorial design with four repeated measures, two in each unit - one for recall items and the other for understanding items. Table 3-7 presents the layout of the three independent variables: Students' socio-economic background; students' sex differences; and, teachers academic background. The design is crossed, though the three independent variables are balanced with 20 observations per cell.

The following null hypotheses were tested:

1. There are no differences in students' achievement according to their socio-economic background (SEB).
2. There are no differences in students' achievement according to their sex differences (SEX).
3. There are no differences in students' achievement according to their teacher's academic background (TAB).
4. There are no differences in students' achievement among the four different measures (RM).

TABLE 3-7

DESIGN OF THE STUDY

| Socio-Economic Background | Sex | Teachers Academic Background | Sub-jects | M1 | M2 | M3 | M4 |
|---|---|---|---|---|---|---|---|
| UPPER MIDDLE CLASS | Boys | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |
| | Girls | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |
| MIDDLE CLASS | Boys | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |
| | Girls | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |
| LOWER MIDDLE CLASS | Boys | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |
| | Girls | Science | 20 | | | | |
| | | Art | 20 | | | | |
| | | T. Diploma | 20 | | | | |

5. There is no SEB by SEX interaction.
6. There is no SEB by TAB interaction.
7. There is no SEX by TAB interaction.
8. There is no SEB by SEX by TAB interaction.
9. There is no RM by SEB interaction.
10. There is no RM by SEX interaction.
11. There is no RM by TAB interaction.
12. There is no RM by SEB by SEX interaction.
13. There is no RM by SEB by TAB interaction.
14. There is no RM by SEX by TAB interaction.
15. There is no RM by SEB by SEX by TAB interaction.

Analysis

First, the Hoyt estimate of reliability, standard error of measurement, and distribution histogram for each subtest and for the entire test has been calculated. Cronbach's Alpha for composite, Alpha and standardized item Alpha for the entire test has been computed also. For each item the mean, standard deviation, item difficulty, Point-Biserial Correlation, Biserial Correlation, Pearson Correlation Coefficients and its levels of significance, covariance matrix, correlation matrix, scale mean if item deleted, scale variance if item deleted, corrected item - total correlation, and Alpha if item deleted has been analyzed and the test items have been evaluated according to the above analysis.

Second, all the hypotheses of this study will be tested by three way ANOVA with student total score in ASAT

as the dependent variable first and with student score on each subtest as four repeated measures secondly, and finally, the Tuckey technique will be used to test the differences between the groups.

In addition to these hypotheses testings, descriptive data are provided to serve as a detailed investigation of some relevant information such as mean, standard deviation and variance for each group, or for each variable levels.

## Summary

Baghdad Western County has been selected as the population for this study and three different districts representing three different socio-economic levels were defined to be the areas of schools and students to be sampled in this study.

A simple questionnarie has been used to get information about student socio-economic background and the results show a significant difference between the students in the three different districts.

A test has been built to cover the first two units of the Iraqi Science sixth grade textbook, and it has been developed by using different statistical procedures and tachniques.

The final edition of the test has been applied to 18 different groups which represent the sample of this study (20 students in each group) to test many hypotheses according to the variables of the study.

Chapter IV will contain two parts; the first part will cover the statistical analysis of ASAT items, subtests and the entire test, and the second part will show the study hypothesis testing. Graphic presentation will be considered when there is a significance of interaction and descriptive data along with null hypotheses will also be presented.

# CHAPTER IV

## ANALYSIS AND RESULTS

The final edition of ASAT was administered the last week of December, 1976. In March, 1977, all the information about every student in the sample and the responses to each item of the test were transferred to the data cards.

Five different programs were used in data analyzation study. The "LERTAP 2.0" program was used to get the item difficulty (mean), item standard deviation, Point-Biserial Correlation and Biserial Correlation for each item. It was also used to get the mean, standard deviation, minimum and maximum scores, standard error of measurement, Hoyt's estimation of reliability, z-scores, distribution of scores, subtest-total test correlation, unit-total test correlation, and total test correlation. Cronbach's Alpha for composite (4 subtests and 2 units) were found by the same program.

The LERTAP 2.0 program was executed at the Computer Center, Ingham Intermediate School District, in Mason. All other programs were executed by the CDC-6500 at the Computer Center, Michigan State University.

The SPSS program was used to analyze test items for variance - covariance matrices, Pearson coefficient of correlation (and its level of significance), scale mean

(if item deleted), scale variance (if item deleted), corrected item-total correlation, Alpha (if item deleted), total test ANOVA, Tukey estimation of power, odd-even items analysis, equal length Spearman-Brown Correlation, and Gutman Split-half Correlation. SPSS was also used in factorial analysis on ASAT total scores to get the study cells statistics, study main effects, and Tukey ranges for each significant main effect.

A FORTRAN program was written to run a special file for obtaining data which helped to get the repeated measure analysis.

The FINN[1] program used to perform cell means, standard deviations for each subtest, and univariate and multivariate repeated measure analysis.

Finally, the ANOVAH[2] program was used to check the repeated measure analysis results.

In this chapter, the results of the data analysis are presented in two parts: the first part covers ASAT analysis, and the second part covers the study design analysis, which deals with the hypothesis of interest as tested by repeated measure analysis.

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[1]Jeremy D. Finn's Multivariance-Univariate and Multivariate Analysis of Variance, Covariance, and Regression Modified, and adapted for use on the CDC-6500.

[2]ANOVAH: A Fortran IV program to perform N-Way analysis of variance which was originally programmed by Tom Houston in FORTRAN-3 for the CDC-1604 at the Laboratory of Experimental Design of the Wisconsin Research and Development Center for Cognitive Learning.

The Test Analysis

Chapter III has covered the procedures of building the ASAT and the analysis of its application to the first sample, which was chosen the pilot study. The analysis of the final edition, which has been applied to the 18 groups of the final sample of the study, shows that all the test items (74 items) are good items, statistically, except item 46, which was deleted when the design of the study was analyzed.

The item difficulties ranged from .23 to .85 with a standard deviation of .22 and a mean of .55. Three items have item difficulties above .80 (items 1, 3 and 51 with item difficulties of .85, .82 and .82, respectively) and 3 items have item difficulties below .30 (items 33, 39 and 64 with item difficulties of .28, .23 and .27, respectively). The test items show a clear homogenity of variances and the standard deviations ranged from .38 to .50.

All item discrimination indices (Point-Biserial Correlations) of the test are positive[1] and range from .16 to .54; all Biserial Correlations, which are positive, range from .20 to .70. All ASAT items have positive Pearson Correlations with a level of ($<.001$) of significance, and range from .18 to .56[2]. The scale mean is not effected if any

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[1]The test item analysis does not include item 46's statistics because of its deletion, but they are included in Table 4-1.

[2]There are some small differences between the Point-Biserial Correlation and Pearson Correlation values. They should be the same but the differences came because of using two different programs in test analysis.

TABLE 4.1.--ASAT's Item Analysis

| Item No. | Unit No. | Type of Item* | Mean = Item Difficulty | S.D. | Point-Biser. Correlation | Biserial Correlation | Variance-Covariance | Pearson Correlation "r" | "r"'s Level of Significance | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | $R^2$** | Alpha if Item Deleted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | R | .85 | .53 | .33 | .49 | 1.54 | .34 | .001 | 40.04 | 178.2 | .32 | .35 | .919 |
| 2 | 1 | R | .73 | .44 | .32 | .42 | 2.08 | .35 | .001 | 40.16 | 177.4 | .32 | .32 | .919 |
| 3 | 1 | R | .82 | .39 | .43 | .62 | 2.47 | .48 | .001 | 40.07 | 176.6 | .45 | .44 | .918 |
| 4 | 1 | U | .67 | .47 | .44 | .57 | 2.89 | .46 | .001 | 40.22 | 175.8 | .42 | .33 | .918 |
| 5 | 1 | R | .71 | .46 | .47 | .62 | 3.10 | .51 | .001 | 40.18 | 175.4 | .48 | .45 | .918 |
| 6 | 1 | U | .78 | .42 | .41 | .57 | 2.42 | .43 | .001 | 40.11 | 176.7 | .40 | .37 | .919 |
| 7 | 1 | R | .47 | .50 | .22 | .28 | 1.81 | .27 | .001 | 40.42 | 178.0 | .23 | .30 | .920 |
| 8 | 1 | R | .57 | .50 | .23 | .29 | 1.93 | .29 | .001 | 40.32 | 177.8 | .25 | .40 | .920 |
| 9 | 1 | R | .75 | .43 | .22 | .30 | 1.51 | .26 | .001 | 40.14 | 178.5 | .23 | .36 | .920 |
| 10 | 1 | R | .67 | .47 | .36 | .47 | 2.52 | .40 | .001 | 40.22 | 176.5 | .37 | .30 | .919 |
| 11 | 1 | R | .74 | .44 | .35 | .47 | 2.39 | .41 | .001 | 40.15 | 176.8 | .38 | .37 | .919 |
| 12 | 1 | R | .70 | .46 | .39 | .51 | 2.76 | .45 | .001 | 40.19 | 176.1 | .42 | .43 | .918 |
| 13 | 1 | R | .45 | .50 | .26 | .33 | 1.88 | .28 | .001 | 40.44 | 177.8 | .24 | .39 | .920 |
| 14 | 1 | R | .46 | .50 | .31 | .39 | 2.20 | .33 | .001 | 40.43 | 177.2 | .29 | .43 | .919 |
| 15 | 1 | U | .72 | .44 | .25 | .33 | 1.75 | .29 | .001 | 40.17 | 178.1 | .25 | .23 | .919 |
| 16 | 1 | R | .60 | .49 | .24 | .31 | 1.83 | .28 | .001 | 40.29 | 177.9 | .24 | .32 | .920 |
| 17 | 1 | R | .36 | .48 | .35 | .45 | 2.39 | .37 | .001 | 40.53 | 176.8 | .33 | .30 | .919 |
| 18 | 1 | R | .36 | .48 | .18 | .23 | 1.24 | .19 | .001 | 40.51 | 179.1 | .15 | .26 | .920 |
| 19 | 1 | R | .50 | .50 | .42 | .53 | 3.17 | .47 | .001 | 40.39 | 175.3 | .44 | .45 | .918 |
| 20 | 1 | R | .76 | .43 | .42 | .58 | 2.70 | .47 | .001 | 40.13 | 176.1 | .44 | .48 | .918 |
| 21 | 1 | R | .61 | .49 | .46 | .58 | 3.38 | .51 | .001 | 40.28 | 174.8 | .48 | .50 | .918 |
| 22 | 1 | R | .76 | .43 | .43 | .59 | 2.72 | .47 | .001 | 40.13 | 176.1 | .44 | .47 | .918 |
| 23 | 1 | R | .48 | .50 | .46 | .57 | 3.40 | .51 | .001 | 40.41 | 174.8 | .47 | .42 | .918 |
| 24 | 1 | R | .63 | .48 | .42 | .54 | 3.15 | .48 | .001 | 40.26 | 175.3 | .45 | .45 | .918 |
| 25 | 1 | R | .70 | .46 | .47 | .61 | 3.11 | .51 | .001 | 40.19 | 175.3 | .47 | .43 | .918 |
| 26 | 1 | R | .50 | .50 | .43 | .54 | 3.06 | .45 | .001 | 40.39 | 175.5 | .42 | .35 | .918 |
| 27 | 1 | R | .62 | .49 | .49 | .62 | 3.41 | .52 | .001 | 40.27 | 174.8 | .49 | .49 | .918 |
| 28 | 1 | R | .49 | .50 | .51 | .64 | 3.80 | .56 | .001 | 40.40 | 174.0 | .53 | .58 | .918 |
| 29 | 1 | R | .55 | .50 | .42 | .52 | 3.09 | .46 | .001 | 40.34 | 175.4 | .43 | .36 | .918 |
| 30 | 1 | U | .48 | .50 | .37 | .47 | 2.78 | .41 | .001 | 40.41 | 176.1 | .38 | .43 | .919 |
| 31 | 1 | U | .51 | .50 | .33 | .41 | 2.43 | .36 | .001 | 40.38 | 176.8 | .32 | .35 | .919 |
| 32 | 1 | U | .40 | .49 | .23 | .29 | 1.79 | .27 | .001 | 40.49 | 178.0 | .23 | .38 | .920 |
| 33 | 1 | U | .28 | .45 | .26 | .35 | 1.85 | .31 | .001 | 40.61 | 177.9 | .27 | .41 | .919 |
| 34 | 1 | U | .47 | .50 | .30 | .38 | 2.29 | .34 | .001 | 40.42 | 177.0 | .30 | .31 | .919 |
| 35 | 1 | R | .36 | .48 | .38 | .48 | 2.77 | .43 | .001 | 40.26 | 176.1 | .39 | .39 | .919 |
| 36 | 1 | R | .75 | .43 | .40 | .55 | 2.53 | .44 | .001 | 40.14 | 176.5 | .40 | .40 | .918 |
| 37 | 1 | R | .59 | .49 | .38 | .34 | 2.85 | .43 | .001 | 40.30 | 175.9 | .39 | .50 | .919 |
| 38 | 1 | R | .58 | .49 | .44 | .56 | 3.25 | .49 | .001 | 40.31 | 175.1 | .45 | .49 | .918 |
| 39 | 1 | U | .23 | .42 | .47 | .65 | 2.84 | .50 | .001 | 40.66 | 175.9 | .47 | .38 | .918 |
| 40 | 1 | U | .36 | .48 | .43 | .56 | 2.98 | .46 | .001 | 40.53 | 175.6 | .43 | .40 | .918 |
| 41 | 1 | U | .50 | .50 | .41 | .51 | 2.97 | .44 | .001 | 40.39 | 175.7 | .41 | .34 | .918 |
| 42 | 1 | U | .46 | .50 | .36 | .45 | 2.51 | .37 | .001 | 40.43 | 176.6 | .34 | .29 | .919 |
| 43 | 1 | U | .36 | .48 | .32 | .41 | 2.21 | .34 | .001 | 40.53 | 177.2 | .30 | .30 | .919 |
| 44 | 1 | R | .64 | .48 | .34 | .43 | 2.30 | .36 | .001 | 40.25 | 177.0 | .32 | .34 | .919 |
| 45 | 1 | R | .67 | .47 | .45 | .58 | 3.06 | .48 | .001 | 40.22 | 175.5 | .45 | .49 | .918 |
| 46 | 1 | U | .45 | .50 | -0.0 | -0.0 | .21 | .03 | .550 | 40.44 | 171.2 | -.01 | .19 | .921 |
| 47 | 1 | U | .43 | .50 | .32 | .41 | 2.39 | .36 | .001 | 40.46 | 176.8 | .32 | .26 | .919 |
| 48 | 1 | U | .48 | .50 | .16 | .20 | 1.20 | .18 | .001 | 40.41 | 179.2 | .14 | .23 | .920 |
| 49 | 1 | U | .59 | .49 | .30 | .38 | 2.11 | .32 | .001 | 40.30 | 177.4 | .28 | .30 | .919 |
| 50 | 1 | U | .48 | .50 | .30 | .38 | 2.15 | .32 | .001 | 40.41 | 177.3 | .28 | .28 | .919 |
| 51 | 1 | R | .82 | .38 | .34 | .49 | 1.97 | .38 | .001 | 10.07 | 177.6 | .35 | .33 | .919 |
| 52 | 1 | U | .67 | .47 | .38 | .49 | 2.56 | .40 | .001 | 40.22 | 176.5 | .37 | .38 | .919 |
| 53 | 1 | R | .74 | .44 | .39 | .53 | 2.46 | .42 | .001 | 40.15 | 176.6 | .39 | .41 | .919 |
| 54 | 1 | R | .47 | .50 | .40 | .50 | 2.85 | .42 | .001 | 40.42 | 175.9 | .39 | .36 | .919 |
| 55 | 1 | R | .49 | .50 | .31 | .39 | 2.21 | .33 | .001 | 40.40 | 177.2 | .29 | .31 | .919 |
| 56 | 1 | R | .55 | .50 | .34 | .43 | 2.34 | .35 | .001 | 40.34 | 176.9 | .31 | .27 | .918 |
| 57 | 1 | U | .60 | .49 | .42 | .53 | 3.01 | .46 | .001 | 40.29 | 175.6 | .42 | .37 | .918 |
| 58 | 1 | R | .44 | .50 | .49 | .61 | 3.57 | .53 | .001 | 40.45 | 174.5 | .50 | .44 | .918 |
| 59 | 1 | R | .51 | .50 | .43 | .55 | 3.13 | .46 | .001 | 40.38 | 175.3 | .43 | .40 | .918 |
| 60 | 1 | R | .54 | .50 | .28 | .36 | 1.92 | .29 | .001 | 40.35 | 177.8 | .25 | .25 | .920 |
| 61 | 2 | R | .65 | .48 | .34 | .44 | 1.78 | .28 | .001 | 40.24 | 178.0 | .24 | .30 | .920 |
| 62 | 2 | R | .38 | .49 | .37 | .47 | 2.06 | .32 | .001 | 40.51 | 177.5 | .28 | .29 | .919 |
| 63 | 2 | R | .37 | .48 | .54 | .70 | 3.12 | .48 | .001 | 40.52 | 175.4 | .45 | .38 | .918 |
| 64 | 2 | U | .27 | .44 | .32 | .43 | 1.62 | .27 | .001 | 40.62 | 178.3 | .23 | .28 | .920 |
| 65 | 2 | R | .77 | .42 | .38 | .52 | 1.84 | .32 | .001 | 40.12 | 177.9 | .29 | .36 | .919 |
| 66 | 2 | U | .30 | .46 | .38 | .51 | 2.05 | .33 | .001 | 40.59 | 177.5 | .30 | .30 | .919 |
| 67 | 2 | R | .67 | .47 | .47 | .61 | 2.55 | .42 | .001 | 40.22 | 176.3 | .38 | .42 | .919 |
| 68 | 2 | R | .41 | .49 | .45 | .57 | 2.47 | .37 | .001 | 40.48 | .76.7 | .33 | .33 | .919 |
| 69 | 2 | U | .46 | .50 | .31 | .39 | 1.46 | .28 | .001 | 40.43 | 178.7 | .18 | .35 | .920 |
| 70 | 2 | U | .66 | .47 | .52 | .67 | 2.84 | .44 | .001 | 40.23 | 175.9 | .41 | .40 | .918 |
| 71 | 2 | U | .47 | .50 | .45 | .56 | 2.47 | .37 | .001 | 40.42 | 176.7 | .33 | .33 | .919 |
| 72 | 2 | R | .59 | .49 | .46 | .58 | 2.75 | .41 | .001 | 40.30 | 176.1 | .38 | .32 | .919 |
| 73 | 2 | U | .31 | .46 | .37 | .48 | 2.06 | .32 | .001 | 40.58 | 177.5 | .29 | .30 | .919 |
| 74 | 2 | U | .37 | .48 | .49 | .62 | 2.85 | .44 | .001 | 40.52 | 175.9 | .40 | .37 | .918 |

*R = "Recall type, U = "understanding" type

**$R^2$= Squared Multiple Correlation.

item of the test is deleted. The scale mean ranged from 40.04 to 40.66 if any item is deleted. The scale variance ranged from 174.0 to 179.2 if any item is deleted.

The corrected item-total correlations are all positive and ranged from .14 to .50. Finally, the tests Alpha coefficient is not effected by deleting any item from the test. The Alpha values (for any item deleted) ranged from .918 to .920. All ASAT item statistics, above, are shown in Table 4-1.

The subtests analysis shows that subtest 1 (40 items of recall type-unit 1) has a mean of .608[1] and a standard deviation of .201. The minimum and maximum student scores in subtest 1 ranged from 6 to 40 with a Hoyt's estimation of reliability of .88. Subtest 2 (20 items of understanding type-unit 1) has a mean of .495 and a standard deviation of .197. Student scores in subtest 2 ranged from 2 to 20 with a Hoyt's estimation of reliability of .74. Unit 1 (which includes subtest 1 and 2) has a mean of .571 and a standard deviation of .187, with a range in student scores from 11 to 58 and a Hoyt's estimation of reliability of .91.

Subtest 3 (7 items of recall type-unit 2) has a mean of .548 and a standard deviation of .257, with a range in student scores from 0.0 to 7 and a Hoyt's estimation of reliability of .60. Subtest 4 (7 items of understanding

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[1]The percentages were used here because the subtests have different numbers of items.

type-unit 2) has a mean of .408 and a standard deviation of .252, with a range in student scores from 0.0 to 7 and Hoyt's estimation of .57. Unit 2 (total of subtests 3 and 4) has a mean of .478 and a standard deviation of .215, with a range in student scores from 0.0 to 14 and a Hoyt's estimation of reliability of .70.

Finally, the total test (74 items) has a mean of .553 and a standard deviation of .22 with a range in student total scores from 9 to 72 with a Hoyt's estimation of reliability of .92. The Cronbach's Alpha for Battery Composite is .81 for the 4 subtests and .80 for the 2 units (Table 4-2).

Table (4-3) shows the correlations between each subtest and each unit with the total test correlations between the subtests, and correlations between the units themselves. The correlations between each subtest and the total test ranged from .768 (subtest 4) to .852 (subtest 1). Between the units and the total test, the correlation with unit 1 was .903 and with unit 2 was .927. The highest correlation between the subtests themselves was between subtests 1 and 2 (.712), the lowest was between subtest 3 and 4 (.422) and the correlation between the 2 units was .678.

If the test is split into two parts (odd and even items) the correlation between the two parts is .765 with a ($<$0.001) level of significance. Alpha was .872 for the first part and .849 for the second part. The equal length Sperman-Brown Correlation was .867 and Gutman Split-half

TABLE 4.2.--Subtests, Units, and Total Test Analysis

| Test | No. of Items | Type of Items | $\bar{X}$ | S.D. | Maximum Score | Minimum Score | Hoyt's Est. of Reliability | S. E. of Measurement |
|---|---|---|---|---|---|---|---|---|
| Sub. 1 | 40 | Recall | .608 | .201 | 40 | 6 | .88 | .067 |
| Sub. 2 | 20 | Understanding | .495 | .197 | 20 | 2 | .74 | .098 |
| Unit 1 | 60 | — | .571 | .187 | 58 | 11 | .91 | .056 |
| Sub. 3 | 7 | Recall | .548 | .257 | 7 | 0.0 | .60 | .151 |
| Sub. 4 | 7 | Understanding | .408 | .252 | 7 | 0.0 | .57 | .153 |
| Unit 2 | 14 | — | .478 | .215 | 14 | 0.0 | .70 | .113 |
| Total Test | 74 | — | .553 | .22 | 72 | 9 | .92 | .038 |

NOTE: Cronbach's Alpha for Composite (4 Subtests) = 0.81.
Cronbach's Alpha for Composite (2 units) = .80.

TABLE 4.3.--Subtests, Units and Total Test Correlations

| | Sub 1 | Sub 2 | Sub 3 | Sub 4 | Total |
|---|---|---|---|---|---|
| Sub 1 | 1.00 | | | | |
| Sub 2 | .712 | 1.00 | | | |
| Sub 3 | .585 | .507 | 1.00 | | |
| Sub 4 | .516 | .492 | .422 | 1.00 | |
| Total | .852 | .814 | .796 | .768 | 1.00 |

| | Unit 1 | Unit 2 | Total |
|---|---|---|---|
| Unit 1 | 1.00 | | |
| Unit 2 | .678 | 1.00 | |
| Total | .903 | .927 | 1.00 |

TABLE 4.4.—Odd-Even Items Analysis

| Part | No. of Items | Scale $\bar{X}$ | Scale $S^2$ | Items $\bar{X}$ | Items $S^2$ | Inter-item Covariance | Inter-item Correlation | Alpha | Correlation Coefficient Between Parts | Level of Significance |
|---|---|---|---|---|---|---|---|---|---|---|
| Odd-Items | 37 | 22.16 | 53.86 | .598 | .22 | .034 | .156 | .872 | .765 | .000 |
| Even Items | 37 | 18.73 | 48.73 | .506 | .23 | .030 | .133 | .849 | | |
| Total | 74 | 40.89 | 181.41 | .553 | .22 | .030 | .136 | .920 | | |

NOTE: Equal length Spearman-Brown Correlation = .867.

Gutmann Split half correlation = .867.

TABLE 4.5.--Total Test ANOVA

| Source of Variation | SS | df | M.S. | F | P< |
|---|---|---|---|---|---|
| Between measures | 587.55 | 73 | 8.05 | 41.21 | .001 |
| Residual | 5118.56 | 26207 | .195 | | |
| Nonadditivity | .4187 | 1 | .4187 | 2.14 | .143 |
| Balance | 5118.14 | 26206 | .196 | | |

Tukey Estimate of Power to which observations must be raised to achieve additivity = .9188.

Grand mean = .5526

Reliability Coefficients: Alpha = .92033

Standardized item alpha = .92110

# Figure 4-1

## Students' Scores Distribution

LERTAP 2.0 HISTOGRAM

TEST NO 1 ALANI SCIENCE TEST TOTAL TEST

NUMBER OF OBSERVATIONS = 360 MEAN = 205.92 S.D. = 73.02 LOWEST S

| Z | LB | UB | F | P | CF | CP | EACH * REPRESENTS 1 OBS |
|---|---|---|---|---|---|---|---|
| -2.14 | 45.67 | 54.33 | 2 | 0.56 | 2 | 0.56 | ** |
| -2.02 | 54.33 | 62.98 | 2 | 0.56 | 4 | 1.11 | ** |
| -1.90 | 62.98 | 71.63 | 0 | 0.0 | 4 | 1.11 | |
| -1.78 | 71.63 | 80.29 | 3 | 0.83 | 7 | 1.94 | *** |
| -1.66 | 80.29 | 88.94 | 7 | 1.94 | 14 | 3.89 | ******* |
| -1.54 | 88.94 | 97.60 | 5 | 1.39 | 19 | 5.28 | ***** |
| -1.42 | 97.60 | 106.25 | 10 | 2.78 | 29 | 8.06 | ********** |
| -1.31 | 106.25 | 114.90 | 11 | 3.06 | 40 | 11.11 | ********** |
| -1.19 | 114.90 | 123.56 | 10 | 2.78 | 50 | 13.89 | ********** |
| -1.07 | 123.56 | 132.21 | 13 | 3.61 | 63 | 17.50 | ************* |
| -0.95 | 132.21 | 140.87 | 8 | 2.22 | 71 | 19.72 | ******** |
| -0.83 | 140.87 | 149.52 | 15 | 4.17 | 86 | 23.89 | *************** |
| -0.71 | 149.52 | 158.17 | 18 | 5.00 | 104 | 28.89 | ****************** |
| -0.59 | 158.17 | 166.83 | 11 | 3.06 | 115 | 31.94 | ********** |
| -0.48 | 166.83 | 175.48 | 18 | 5.00 | 133 | 36.94 | ****************** |
| -0.36 | 175.48 | 184.13 | 12 | 3.33 | 145 | 40.28 | ************ |
| -0.24 | 184.13 | 192.79 | 24 | 6.67 | 169 | 46.94 | ************************ |
| -0.12 | 192.79 | 201.44 | 14 | 3.89 | 183 | 50.83 | ************** |
| -0.00 | 201.44 | 210.10 | 21 | 5.83 | 204 | 56.67 | ********************* |
| 0.12 | 210.10 | 218.75 | 9 | 2.50 | 213 | 59.17 | ********* |
| 0.24 | 218.75 | 227.40 | 14 | 3.89 | 227 | 63.06 | ************** |
| 0.35 | 227.40 | 236.06 | 12 | 3.33 | 239 | 66.39 | ************ |
| 0.47 | 236.06 | 244.71 | 15 | 4.17 | 254 | 70.56 | *************** |
| 0.59 | 244.71 | 253.36 | 12 | 3.33 | 266 | 73.89 | ************ |
| 0.71 | 253.36 | 262.02 | 13 | 3.61 | 279 | 77.50 | ************* |
| 0.83 | 262.02 | 270.67 | 10 | 2.78 | 289 | 80.28 | ********** |
| 0.95 | 270.67 | 279.33 | 5 | 1.39 | 294 | 81.67 | ***** |
| 1.06 | 279.33 | 287.98 | 11 | 3.06 | 305 | 84.72 | ********** |
| 1.18 | 287.98 | 296.63 | 8 | 2.22 | 313 | 86.94 | ******** |
| 1.30 | 296.63 | 305.29 | 8 | 2.22 | 321 | 89.17 | ******** |
| 1.42 | 305.29 | 313.94 | 7 | 1.94 | 328 | 91.11 | ******* |
| 1.54 | 313.94 | 322.60 | 6 | 1.67 | 334 | 92.78 | ****** |
| 1.66 | 322.60 | 331.25 | 5 | 1.39 | 339 | 94.17 | ***** |
| 1.78 | 331.25 | 339.90 | 3 | 0.83 | 342 | 95.00 | *** |
| 1.89 | 339.90 | 348.56 | 5 | 1.39 | 347 | 96.39 | ***** |
| 2.01 | 348.56 | 357.21 | 6 | 1.67 | 353 | 98.06 | ****** |
| 2.13 | 357.21 | 365.86 | 2 | 0.56 | 355 | 98.61 | ** |
| 2.25 | 365.86 | 374.52 | 2 | 0.56 | 357 | 99.17 | ** |
| 2.37 | 374.52 | 383.17 | 2 | 0.56 | 359 | 99.72 | ** |
| 2.49 | 383.17 | 391.83 | 1 | 0.28 | 360 | 100.00 | * |

| | |
|---|---|
| LB | Lower Boundry |
| UB | Upper Boundry |
| F | Frequency |
| P | Percentage |
| CF | Cumulative Frequency |
| CP | Cumulative Percentage |

Correlation was .867. All the statistics above, the scale mean and standard deviation, inter-item covariance and inter-item correlation for the two parts (odd and even items) are in Table 4-4.

The total test "ANOVA" (see Table 4-5) shows an F value between measures of 41.21 with less than (0.001) level of significance. Chart 4-1 shows the distribution of student scores and their statistics.

From all the test analysis, above, the study design analysis (the second part of this chapter) will be calculated according to the student responses to all the ASAT items; except item 46, which has been deleted statistically from the test. In other words, the ASAT test, which the entire analysis to follow will depend on, contains 73 items (the ASAT English final edition is in Appendix A).

## Study Design Analysis

Summary data, means and standard deviations of the study's 3 independent variables, each level of the 3 variables, and the total sample are presented in Table 4-6. The F value and its level of significance between the levels of each variable is presented in the same table. The students of the upper middle class (UMC) received the highest mean score (49.65), the students at the middle class (MC) received the next highest (39.26), and the students of the lower middle class (LMC) received the lowest mean (33.89). The F value of the socio-economic background (SEB), with the

TABLE 4.6 --Study Variables Main Effects with One Measure (Student and Total Scores in ASAT)

| Variable | Variable Levels | No. of Subjects | $\bar{X}$ | S.D. | S. E. of Measurement | Variable Main Effects F | P |
|---|---|---|---|---|---|---|---|
| SEB | UMC | 120 | 49.65 | 11.60 | 1.06 | 55.048 | .0001 |
| | MC | 120 | 39.26 | 13.41 | 1.22 | | |
| | LMC | 120 | 33.89 | 9.99 | .91 | | |
| TAB | Science | 120 | 40.79 | 15.21 | 1.39 | 2.55 | .079 |
| | Art | 120 | 39.26 | 11.96 | 1.09 | | |
| | T. Diploma | 120 | 42.75 | 12.78 | 1.17 | | |
| SEX | Boys | 180 | 40.56 | 13.99 | 1.64 | .398 | .529 |
| | Girls | 180 | 41.31 | 12.86 | .96 | | |
| Total | -- | 360 | 40.93 | 13.43 | .71 | 29.149 | .000 |

3 levels above, was 55.048 ($p < .0001$).

Neither the teacher's academic background (TAB), nor sex (SEX), played the same role as SEB did with student scores in the ASAT. Students who have teachers holding a teaching diploma (TD) received the highest mean (42.75), students who have teachers with a science background (SC) received the next highest (40.79), while those with teachers having an art background (AR) received the lowest mean (39.26). F value to TAB main effect was 2.55 ($p < .079$). SEX had the lowest effect on student total scores with a F value of .398 ($p < .529$). Girls received a mean score of 41.31 while the boys received a mean score of 40.56.

Cell means and cell standard deviations of the 18 different groups ( 3 x 3 x 2 ), according to student total scores in ASAT, are presented in Table 4-7. Looking at the students SEB and SEX, boys received a higher mean than girls at the UMC and LMC level, but a lower mean than girls at the MC level.

Taking them as 2 groups, boys and girls, they scored exactly the same as the total group. Boys at the UMC level received the highest mean, followed by those in the MC level with the next highest, and finally the LMC with the lowest (51.21, 35.40 and 35.05, respectively). The trend in the girls' results followed the same pattern (48.08, 43.12 and 32.73, respectively).

Adding TAB to the picture shows boys at the UMC level, with teachers holding a teaching diploma, received the

TABLE 4.7.--Study Cells Statistics of ASAT Total Scores

| SEB | SEX | TAB | No. of S's | $\bar{X}$ | S.D. | Total $\bar{X}$ | Total S.D. |
|---|---|---|---|---|---|---|---|
| UMC | Boys | Science | 20 | 48.33 | 13.36 | 51.21 | 11.65 |
| | | Art | 20 | 43.75 | 10.21 | | |
| | | T. Diploma | 20 | 58.10 | 7.83 | | |
| | Girls | Science | 20 | 51.80 | 12.12 | 48.08 | 11.44 |
| | | Art | 20 | 49.60 | 9.40 | | |
| | | T. Diploma | 20 | 49.80 | 10.36 | | |
| MC | Boys | Science | 20 | 28.85 | 11.53 | 35.40 | 12.78 |
| | | Art | 20 | 35.40 | 12.21 | | |
| | | T. Diploma | 20 | 41.95 | 11.62 | | |
| | Girls | Science | 20 | 54.45 | 12.08 | 43.12 | 12.99 |
| | | Art | 20 | 37.75 | 9.45 | | |
| | | T. Diploma | 20 | 37.15 | 9.28 | | |
| LMC | Boys | Science | 20 | 29.55 | 10.15 | 35.05 | 11.34 |
| | | Art | 20 | 37.25 | 12.31 | | |
| | | T. Diploma | 20 | 38.35 | 8.68 | | |
| | Girls | Science | 20 | 35.25 | 8.27 | 32.73 | 8.77 |
| | | Art | 20 | 31.80 | 9.94 | | |
| | | T. Diploma | 20 | 31.15 | 7.84 | | |

highest mean (58.10), while boys at the MC level, with teachers having a science background, received the lowest mean (28.85). This was true with all the 18 different groups. According to different teacher academic backgrounds, results in student means don't show stability, but there is stability if we take boys and girls separately. Boys who have teachers holding a teaching diploma received the highest mean, as compared with the boys having teachers who have either a science or art background. This was true in all socio-economic classes; on the other hand, girls having teachers with a science background received the highest mean when compared to the girls with teachers having other backgrounds. This, again, holds true in all classes.

Repeated Measure Analysis On ASAT

Table 4-8 shows means and standard deviations, for all students, according to their SEB, TAB and SEX in each subtest with the F value and its level of significance. The means and standard deviations for the total group are also presented in the same table.

As we have seen with student total scores, students at the UMC level received the highest mean in all subtests (.73, .62, .64 and .50, respectively). The student means at the MC level were next in ranking (.58, .47, .53 and .42, respectively), while those at the LMC level received the lowest (.51, .40, .47 and .31, respectively). F value of the SEB variable were significant at ($p < .0001$) in all

Table 4.8.--Study Variables Levels Statistics of Four Subtests Scores

| Variable | Level | No. of S's | Subtest 1 | | | | Subtest 2 | | | | Subtest 3 | | | | Subtest 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $\bar{X}$ | S.D. | F | P< | $\bar{X}$ | S.D. | F | P< | $\bar{X}$ | S.D. | F | P< | $\bar{X}$ | S.D. | F | P< |
| | UMC | 120 | .73 | .17 | | | .62 | .19 | | | .64 | .24 | | | .50 | .28 | | |
| SEB | MC | 120 | .58 | .20 | 49.83 | .0000 | .47 | .20 | 44.15 | .0000 | .53 | .27 | 15.72 | .0000 | .42 | .24 | 18.47 | .0000 |
| | LMC | 120 | .51 | .16 | | | .40 | .16 | | | .47 | .24 | | | .31 | .20 | | |
| | Science | 120 | .61 | .22 | | | .48 | .21 | | | .56 | .28 | | | .41 | .27 | | |
| TAB | Art | 120 | .58 | .19 | 2.067 | .128 | .48 | .19 | 2.036 | .132 | .52 | .24 | 1.073 | .343 | .39 | .22 | .654 | .520 |
| | T. Diploma | 120 | .63 | .18 | | | .52 | .22 | | | .56 | .25 | | | .43 | .26 | | |
| | Boys | 180 | .60 | .20 | | | .49 | .22 | | | .54 | .27 | | | .40 | .25 | | |
| SEX | | | | | .244 | .621 | | | .119 | .730 | | | .242 | .623 | | | .108 | .742 |
| | Girls | 180 | .61 | .20 | | | .50 | .19 | | | .55 | .25 | | | .41 | .25 | | |
| | Total | 360 | .61 | .20 | | | .48 | .21 | | | .55 | .26 | | | .41 | .25 | | |

subtests. All student means in the UMC level were above total group average in all subtests (.61, .48, .55 and .41, respectively); all means in the MC level were about even to the total average, while the means at the LMC level were below the total average, exactly as we have seen in the total scores.

The TAB variable did not influence student scores in the subtests, as SEB did. This is the same finding as we have seen before with student total scores. Students with teachers holding a teaching diploma, in general, received higher means than students with teachers having a science background, who in turn, in general, received higher means than those students with teachers having an art background. For the most part, there was a lack of any significant differences. Again, SEX had no effect on student scores in the four subtests. The differences between boy's and girl's scores were unstable and did not show any significant difference in any subtest.

Summary data, cell means and cell standard deviations for the 4 subtests in ASAT for the 18 groups are presented in Table 4-9. The picture of the table does not differ, in general, to the picture which we have seen in Table 4-7, when we looked at the 18 groups according to their total scores in ASAT. Boys received higher means than girls in all subtests at the UMC and LMC level, while girls' means were higher than boys' in all subtests at the MC level. Boys and girls at the UMC level received higher mean scores

TABLE 4.9.—Cell Means and Standard Deviations of Four Subtests Scores

| SEB | SEX | TAB | No. of S's | Subtest 1 | | Subtest 2 | | Subtest 3 | | Subtest 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. |
| UMC | Boys | Science | 20 | .773 | .161 | .613 | .176 | .707 | .256 | .551 | .271 |
| | | Art | 20 | .674 | .169 | .537 | .158 | .507 | .265 | .351 | .208 |
| | | T. Diploma | 20 | .831 | .091 | .768 | .168 | .765 | .193 | .637 | .279 |
| | Girls | Science | 20 | .671 | .221 | .531 | .178 | .621 | .208 | .471 | .304 |
| | | Art | 20 | .748 | .149 | .618 | .169 | .614 | .193 | .450 | .287 |
| | | T. Diploma | 20 | .714 | .136 | .651 | .222 | .650 | .229 | .528 | .266 |
| MC | Boys | Science | 20 | .423 | .169 | .317 | .144 | .486 | .280 | .293 | .219 |
| | | Art | 20 | .505 | .169 | .461 | .205 | .408 | .251 | .450 | .223 |
| | | T. Diploma | 20 | .624 | .178 | .505 | .194 | .514 | .262 | .464 | .216 |
| | Girls | Science | 20 | .805 | .168 | .684 | .195 | .751 | .245 | .537 | .266 |
| | | Art | 20 | .553 | .157 | .450 | .115 | .564 | .214 | .372 | .229 |
| | | T. Diploma | 20 | .569 | .168 | .417 | .134 | .478 | .241 | .380 | .215 |
| LMC | Boys | Science | 20 | .447 | .161 | .348 | .140 | .408 | .267 | .250 | .196 |
| | | Art | 20 | .543 | .179 | .469 | .232 | .529 | .222 | .315 | .164 |
| | | T. Diploma | 20 | .609 | .128 | .425 | .171 | .551 | .207 | .287 | .241 |
| | Girls | Science | 20 | .547 | .132 | .400 | .138 | .415 | .221 | .358 | .193 |
| | | Art | 20 | .463 | .183 | .356 | .132 | .500 | .246 | .358 | .199 |
| | | T. Diploma | 20 | .455 | .146 | .404 | .109 | .401 | .234 | .259 | .159 |

than boys and girls in the MC and LMC level in all subtests. Boys at the MC level received higher mean scores than boys at the LMC level in just 2 subtests, while girls at the MC level received higher mean scores than girls at the LMC level in all subtests.

As we have seen before with student total scores, boys at the UMC level having teachers with a teaching diploma received higher scores than all the other 17 groups in the subtests, while boys at the MC level who have teachers with a science background received the lowest mean scores (only for subtests 1 and 2). The other 2 lowest means were received by boys in the LMC level with science background teachers, and girls in the LMC level with teachers holding a teaching diploma (in subtests 3 and 4, respectively).

The tests of hypotheses concerning students' achievements on ASAT were performed by the multivariate repeated measure analysis. The between-subject part (i.e., hypotheses about SEB, SEX, TAB and interactions among them) was tested by the univariate F ratio, while the within-student part (i.e., hypotheses about the subtests and interactions with it) was tested by the multivariate F ratio.

All univariate F ratios and multivariate F ratios are presented in Table 4-10. A rejection of the null hypothesis was indicated, at $\alpha = .05$, on 7 of the 15 hypotheses. The following are the hypotheses which have been rejected:

- the main effect of students' SEB ($F = 55.048$, $p < .0001$)

TABLE 4.10.—Univariate and Multivariate Repeated Measures Analysis on ASAT Scores

| Sources of Variations | D.F. | Univariate | | | Multivariate | |
|---|---|---|---|---|---|---|
| | | MS | F | P< | F | P< |
| SEB | 2 | 4.993 | 55.048 | .0001 | | |
| SEX | 1 | .0361 | .398 | .5286 | | |
| TAB | 2 | .2313 | 2.5499 | .0796 | | |
| SEB-SEX | 2 | .6155 | 6.7863 | .0013 | | |
| SEX-TAB | 2 | 1.063 | 11.726 | .001 | | |
| SEB-TAB | 4 | .3683 | 4.060 | .0032 | | |
| SEB-SEX-TAB | 4 | .6294 | 6.9397 | .0001 | | |
| (R:SST) Error term within cells | 342 | .0907 | | | | |
| Subtests (RM) | 3-340 | | | | 126.763 | .0001 |
| RM-SEB | 6-680 | | | | 1.5442 | .1661 |
| RM-SEX | 3-340 | | | | .0229 | .9954 |
| RM-TAB | 6-680 | | | | .760 | .6017 |
| RM-SEB-SEX | 6-680 | | | | 1.822 | .0923 |
| RM-SEX-TAB | 6-680 | | | | 1.5953 | .1458 |
| RM-SEB-TAB | 12-900 | | | | 2.5883 | .0022 |
| RM-SEB-SEX-TAB | 12-900 | | | | .8876 | .5594 |

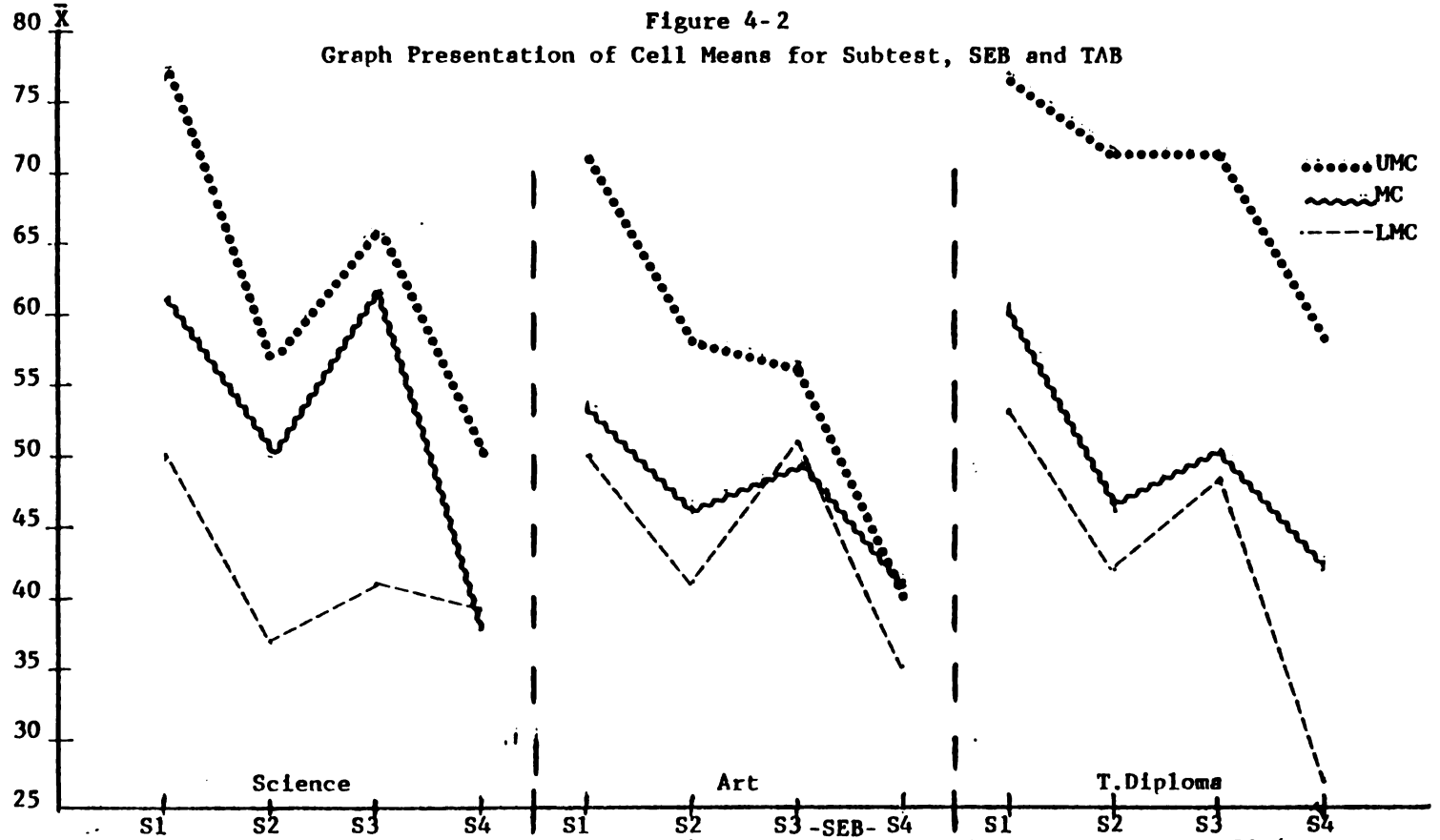
- the interaction between students' SEB and their SEX ($F = 6.7863$, $p < .0013$)
- the interaction between students' SEX and their TAB ($F = 11.726$, $p < .0001$)
- the interaction between students' SEB and their TAB ($F = 4.06$, $p < .0032$)
- the interaction between students' SEB, SEX and their TAB ($F = 6.94$, $p < .0001$)
- the subtest's main effect RM ($F = 126.763$, $p < .0001$)
- the subtests by students' SEB by TAB interaction ($F = 2.5883$, $p < .0022$)

The other 8 hypotheses were not rejected at a 95 percent level of confidence.

Since the three-way interaction, among subtests, SEB, and TAB, was significant (multivariate $F = 2.5883$, with 12 and 900 degrees of freedom; $p < .0022$) one profile was made for all students at the UMC level across all 4 subtests and for each level of TAB (i.e., 3 subprofiles). Two other profiles were made (in the same way) for all students at the MC and LMC level. Figure 4-2 presents the 3 profiles (9 subprofiles) and shows, as mentioned before, the superiority of the UMC student in comparison to the MC or the LMC students, regardless of the teacher's background (almost always an ordinal interaction between the UMC scores and either the MC or LMC scores in all subtests). Students at the MC level performed better than students at the LMC level in most areas of the three levels in TAB and in most subtests.

Figure 4-2

Graph Presentation of Cell Means for Subtest, SEB and TAB



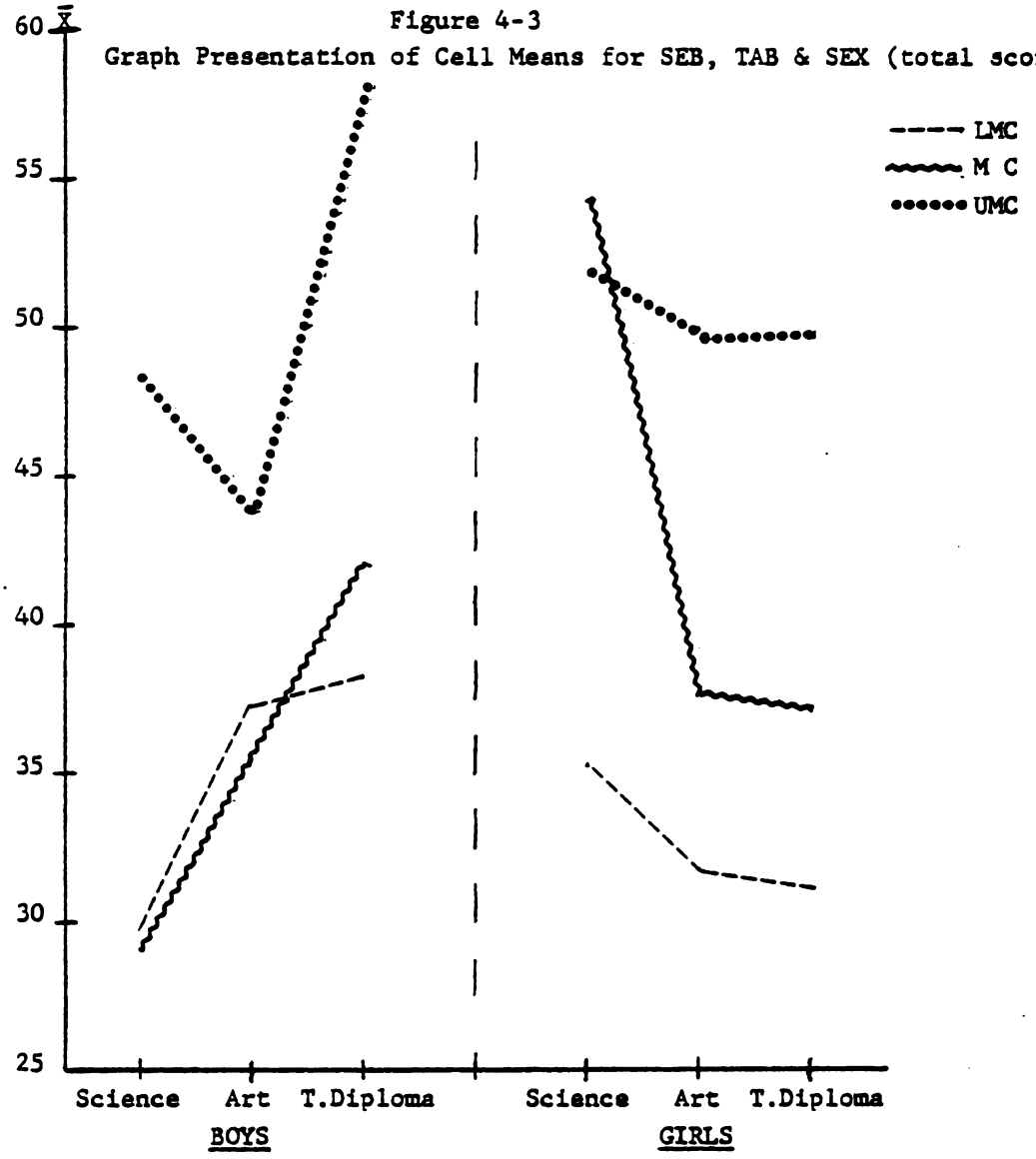

| | UMC (X̄) | | | | MC (X̄) | | | | LMC (X̄) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TAB | S 1 | S 2 | S 3 | S 4 | S 1 | S 2 | S 3 | S 4 | S 1 | S 2 | S 3 | S 4 |
| Science | .77 | .57 | .66 | .50 | .61 | .50 | .62 | .38 | .50 | .37 | .41 | .39 |
| Art | .71 | .58 | .56 | .40 | .53 | .46 | .49 | .41 | .50 | .41 | .51 | .35 |
| T.Diploma | .77 | .71 | .71 | .58 | .60 | .46 | .50 | .42 | .53 | .42 | .48 | .27 |

The univariate F ratio for the three-way interaction among SEB, SEX and TAB was significant ($F = 6.9397$, $p < .0001$) leading to 2 main profiles being made to present this interaction, as shown in Figure 4-3. One profile was made for all the boys across the 3 socio-economic classes, and for each level of their TAB (i.e., 3 subprofiles), while another was made, in the same way, for all the girls. Students at the UMC level, again, have the superiority in mean scores over the other classes, regardless of their SEX and TAB. There was an ordinal interaction between boys at the UMC level and all other classes, and disordinal interaction between the MC and LMC across all TAB levels. With girls the ordinal interaction was between the UMC and LMC levels, and between the MC and LMC levels; the disordinal interaction was between the UMC and MC levels. This holds true across all levels of the TAB.

The significant interaction between SEB and TAB ($F = 4.06$, $p < .0032$) is presented in Figure 4-4, taken from the 3 profiles made. Profiles were made for all students in the UMC level across the 3 levels of TAB, another for all students at the LMC level. Student mean scores at the UMC level were higher than either the MC or LMC level, while the MC level scores were higher than the LMC scores on all levels of the TAB (i.e., ordinal interaction between all 3 profiles).

Figure 4-5 presents the 2 profiles of boys and girls to explain the disordinal interaction between SEX and TAB,

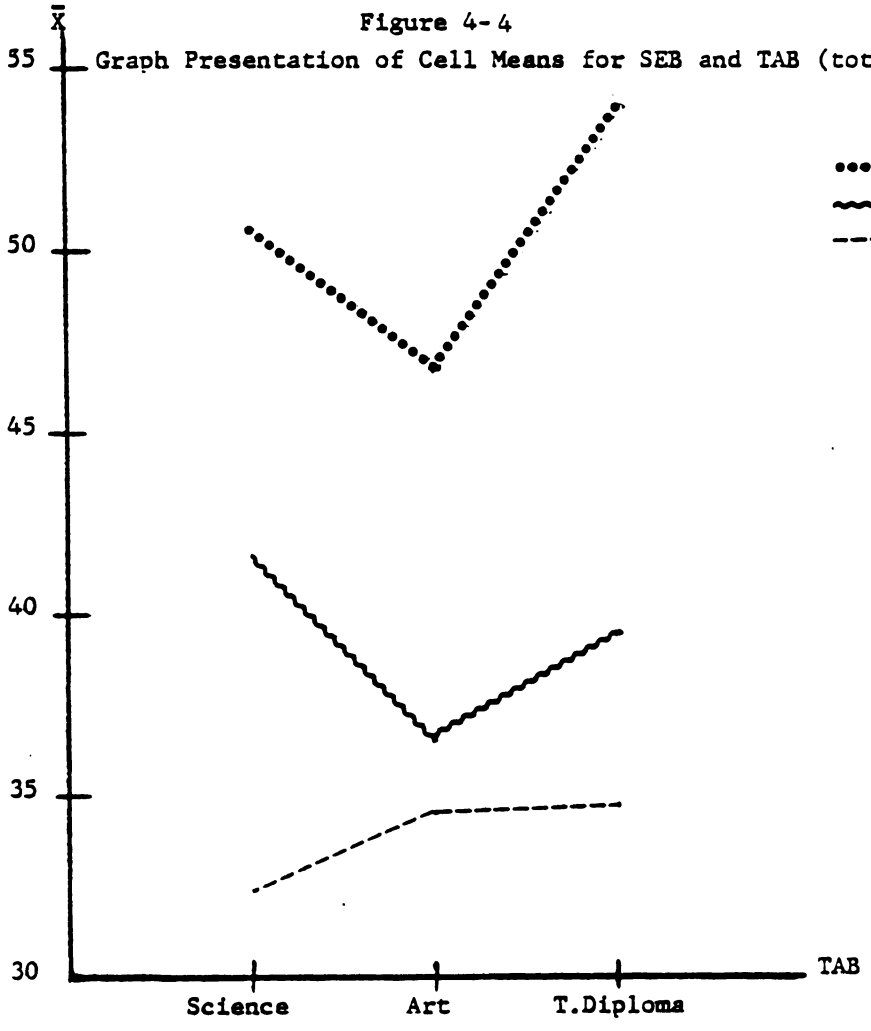
Figure 4-3
Graph Presentation of Cell Means for SEB, TAB & SEX (total score)




*All cell means for both boys and girls are presented in table 4-7, page 63.

Figure 4-4

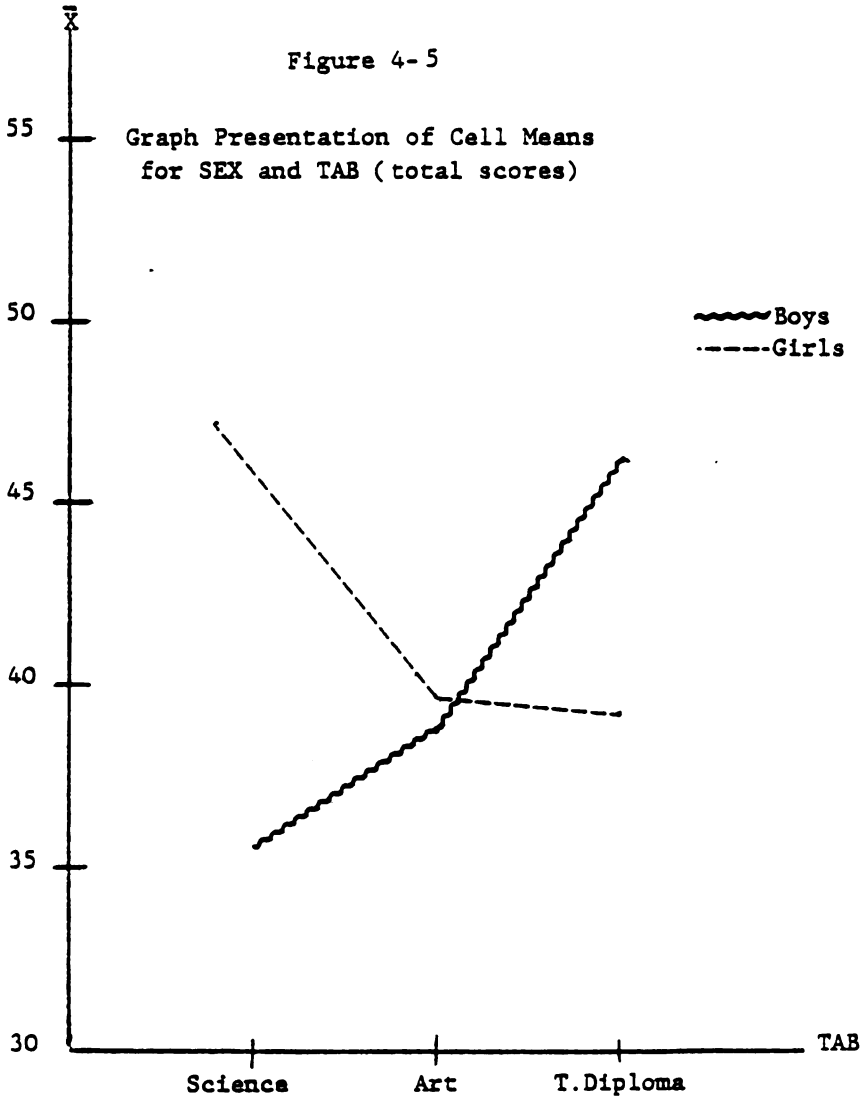
Graph Presentation of Cell Means for SEB and TAB (total score)




| | TAB | | |
|---|---|---|---|
| SEB | Science | Art | T.Diploma |
| UMC | 50.60 | 46.68 | 53.95 |
| M C | 41.65 | 36.58 | 39.55 |
| LMC | 32.40 | 34.55 | 34.75 |

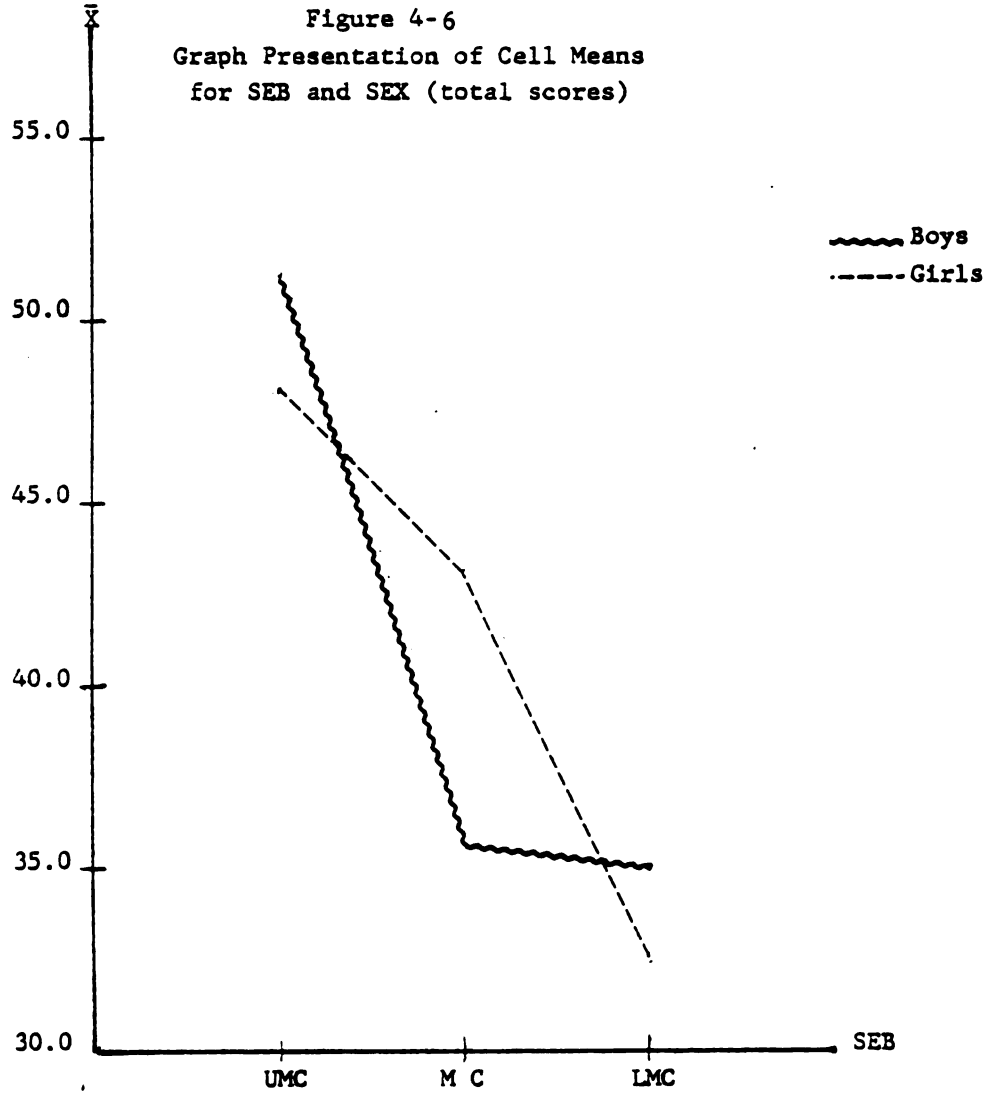
Figure 4-5

Graph Presentation of Cell Means for SEX and TAB (total scores)




| | TAB | | |
|---|---|---|---|
| SEX | Science | Art | T. Diploma |
| Boys | 35.58 | 38.80 | 46.13 |
| Girls | 47.17 | 39.72 | 39.37 |

Figure 4-6
Graph Presentation of Cell Means
for SEB and SEX (total scores)




| | SEB | | |
|---|---|---|---|
| SEX | UMC | M C | LMC |
| Boys | 51.21 | 35.40 | 35.05 |
| Girls | 48.08 | 43.12 | 32.73 |

which was significant ($F = 11.726$, $p < .0001$). The difference between boys and girls in their mean scores were -11.59, -0.92 and 6.76 on the three levels of the TAB.

Finally, the significance of the interaction between students SEB and SEX ($F = 6.7863$, $p < .0013$) is illustrated by the graph in Figure 4-6. The differences between boys and girls at the UMC, MC and LMC levels were 3.13, -7.72 and 2.32, respectively. The interaction was disordinal with respect to the student's SEX.

# CHAPTER V

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

## Summary

This study was aimed at building an achievement test in elementary science education for the sixth grade in Iraq as a first step in an attempt to build files of standardized achievement tests in the elementary school; and to give, in the long run, an alternative to the Baccalaureate Examination in the sixth grade, which the Iraqi government deleted several years ago. Also, the study analyzed the data and information obtained by applying the test in various schools in Baghdad in order to test the relationships between the student's socio-economic background, sex, their teachers' academic background and their effect on academic achievement of sixth grade children.

Baghdad Western County was selected as the population for this study, and 3 different districts representing 3 different socio-economic levels were defined to be the areas of schools and students sampled in this study.

A simple questionnarie was used to get information about student socio-economic background; and the results showed significant differences between the students in the

3 different districts.

The Alani Science Achievement Test (ASAT) was constructed to cover the first 2 units of the Iraqi science sixth grade textbook and has been developed by using different statistical procedures and techniques.

The test analysis of the final edition of ASAT, which has been applied to the sample total group, showed that all test items (74 items) are good items, statistically, except item 46 which was deleted when this study design was analyzed.

All correlations between the subtests themselves, between the 2 units, between the subtests and the total test, and between the 2 units and the total test ranged from .422 to .927, which for the most part, are high correlations. Cronbach's Alpha for composite between the 4 subtests was .81 and between the 2 units was .80. Alpha between the odd-even items was .765 with a ($<.0001$) level of significance; equal length Spearman-Brown Correlation was .867 and Gutman Split-half Correlation was .867. The total test ANOVA showed a high level of significance between measures ($p<.001$) and a .921 standardized item Alpha. The z-scores' distribution for the total test looks more like a normal than a skewed distribution.

The tests of hypotheses concerning students' achievements on ASAT were performed by the multivariate repeated measure analysis. The hypotheses about SEB, SEX, TAB and the interaction among them were tested by the univariate F

ratio, while the hypotheses about the subtests and interaction with it were tested by the multivariate F ratio. The results are as follows:

1. There was a difference in students' achievement according to their socio-economic background (SEB): the higher the class, the higher the achievement. There were also significant differences between each of the three classes (UMC, MC and LMC).
2. There was no difference in students' achievement when classified by their sex.
3. There was no difference in students' achievement according to their teachers' academic background.
4. There was a disordinal interaction between students' SEB and their SEX; boys did better than girls at the UMC and LMC levels, while girls did better than boys at the MC level.
5. There was a disordinal interaction between students' SEX and their TAB; girls having teachers with a science or art background did better than boys, while boys having teachers with a teaching diploma did better than girls.
6. There was an ordinal interaction between students' SEB and their TAB; students at the UMC level did better than at the MC level, and students at the MC level did better than those at the LMC level, on all levels of the TAB.
7. There was an interaction between students' SEB,

SEX and their TAB; boys at the UMC did better than boys at either the MC or LMC levels, on all levels of the TAB. Boys at the MC level with teachers holding a teaching diploma did better than those at the LMC level. On the other hand, girls at the UMC and MC level did better than girls at the LMC level on all levels of TAB, and girls at the UMC level with teachers having an art or teaching diploma background did better than those at the MC level.

8. There was a difference in students' achievement among the ASAT's 4 subtests (RM); students in both units did significantly better in recall-type items than in understanding-type items, and also did better in unit 1 than in unit 2 in both types of items.
9. There was no RM by SEB interaction.
10. There was no RM by SEX interaction.
11. There was no RM by TAB interaction.
12. There was no RM by SEB by SEX interaction.
13. There was no RM by TAB by SEX interaction.
14. There was an interaction between RM, SEB, and TAB. The interaction shows the superiority of students at the UMC level over those at either the MC or LMC level in nearly every subtests and with all teacher backgrounds. At the MC level, students did better in all 4 subtests than those at the LMC

level when they had teachers with a teaching diploma, and in 3 subtests when they had teachers with other backgrounds.

15. There was no interaction between RM, SEB, SEX and TAB.

## Conclusion and Implication

This study showed that the student's socio-economic background has the most effect on student achievement according to their performance in ASAT. This effect could be seen both with student scores in the total test and in subtests and units which ASAT contained regardless of student sex or teacher academic background.

This finding is consistent with previous research results, within the United States or other countries, which show that the student's achievement is markedly affected by his socio-economic background.

Parents at a high class level typically received a high level of education, which in turn is seen as very helpful to their children, especially at the elementary school level. With this level of education, parents can do many good things for their children. Good housing, food, health, private teachers (tutors), counseling and other like facilities affect student achievement indirectly or, sometimes, even directly. Parents with a high level of education may expect their children to do well at school, more than do other parents, and they may reflect a high level of

aspiration for their children. Family experience, as Dorothy Rogers (1969) thinks, throughout the ages and in both subtle and obvious ways, leaves its imprint on each family member.

Thus, we cannot infer that students who got high marks, on ASAT or any other achievement test, are more worthy than students who got lower scores, if they come from different socio-economic backgrounds. With such different backgrounds, students performance on the achievement tests may not give all the students the same chance to show what they really could do rather than what they are doing now. Finally, if the students' evaluation depends completely on their achievement on some test or tests, which in turn would be used to reward them or admit them to college at the end of high school, without taking into consideration what variables besides achievement affect the evaluation, this will be far from what we usually call in Iraq "equal-chances"[1] education. In other words, the student's chances for success will be "unequal" without taking these other factors into account.

One possible implication of this study is that the schools should consider offering to the poor students, in an attempt to "equalize" the chances, free tutors, counselors, educational TV's and, especially, good places for reading at night. Schools should try, also, to make all facilities

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[1]The "equal-chances" education is a translation of a special Arabic phrase which means giving all students the same chance in their competition for success.

that contribute to a student's academic performance, which some students have at home and others don't, available at schools.

Sex, in this study, did not show any effect on student's achievement with either student's total scores or subtest scores, but there was a significant SEX by SEB interaction. Boys did better than girls at the UMC and LMC levels while girls did better than boys at the MC level. The differences in means between boys and girls were 3.13, -7.72 and 2.32, at UMC, MC and LMC respectively (Figure 4-6). The superiority of girls at the MC may reflect the significant differences between boys and girls, of the middle class, in all socio-economic level factors; the monthly income per person (MIP), the number of people in family (NPF) and parents' educational level (PEL) (Tables 3-2, 3-3, 3-4 and 3-5). On the other hand, there were no significant differences between boys and girls at either UMC or LMC in all SEB factors except in PEL at the LMC. As was mentioned in chapter III, the middle class sample, in fact, is two different subgroups (girls and boys), but together they make a class which differs from UMC and LMC.

One may infer from the above that the high achievement of girls at the MC level is caused by the higher level of their socio-economic background factors than the boys' background factors. Also, the nonsignificant effect of SEX in this study may be caused by this conflict in that the effects at the three levels tend to cancel each other out. In other words, boys did better than girls at the UMC and LMC when

they were homogeneous with respect to various SEB factors. And because girls did better than boys at the MC, possibly because of their high SEB, neither the SEX effect nor the ordinal SEX-SEB interaction have been shown. Assuming a homogeneous group of boys and girls at the MC, boys may well have done better than girls, as they did in both UMC and LMC when they were homogeneous groups. Thus, in turn, a significant SEX difference, in favor of boys, and an ordinal SEB-SEX interaction may have existed had the students in all three levels of SEB been part of homogeneous groups.

Teacher's academic background has some effect on students' achievements in this study (F value to TAB main effect was 2.55, $p < .079$). Students who have teachers holding a teaching diploma did better than students who have teachers with either science or art backgrounds, in both the total test and in all the subtests. At the same time, students with science background teachers did better than students with art background teachers, in both total scores and all subtests. In general, there is no doubt that teachers who graduated from a high school's science section relate to science subjects and know more about them than teachers who graduated from an art section. But without having a teaching diploma will be less effective than those who require a teaching diploma. Knowing about subjects which the textbooks contain isn't enough to make him/her a good teacher or even a teacher at all. To be teachers, they should know about teaching techniques and prepare themselves for this kind of job.

Another possible implication of this study is that the teaching institutions should consider offering different courses in their programs, through the 2 or 3 year programs, to give their students a chance to select the subjects which they are interested in. One can suggest to the institutions that they give students who are interested in science, for example, especially in the last year of the program, some different science courses (either science subjects or science teaching methods and techniques). Make their school visits to the science classes in the first half of the last year, and to be science teacher-assistants in the second half. In this or in any other way the prospective teachers will know much more about science and science teaching, and in the future they should be able to effect their students' achievements in a good way.

The variable of the subtests' main effect was very significant in this study ($F = 126.763$, $p < .0001$). Subtests of ASAT differ in two ways; first they differ according to their type of items (recall or understanding-type) and secondly according to the textbook's units (unit 1 "My Body"; unit 2 "Some Popular Diseases"). The first 2 subtests were built to cover unit 1 and the other 2 were built to cover the second unit. The first and the third subtests are in recall-type and the second and the fourth subtests are in understanding-type items.

Students did better in the first unit than in the second unit, and they did better in recall-type than in

understanding-type items in the 2 units (all the differences were significant at $<.05$ level). As has been mentioned in Chapter III, the first unit covers 40% of the textbook and 40% of the annual class hours, and the second unit covers 8% of the textbook and 10% of the annual class hours.

Unit 1 has been written in simple wording and with more explanations and charts (there are 43 pictures and charts) while the second unit, which covered more than 15% of the text at its first edition and after 2 summarizations and rewritings, is still difficult for the sixth graders to understand; as it contains some facts and ambiguous guidelines about 4 diseases, using only 4 charts. In 1970-1971, in different areas of Baghdad and in many Iraqi cities, meetings[1] were held with science teachers to get the teacher's ideas and impressions on the new textbook after one year of teaching it. Most of the teachers' suggestions were about unit 2. In the author's opinion, the rewritings and summarizations of unit 2 did not help to make it easier and simpler to be understood by students. Educators, science teachers and physicians should share in rewriting it again with more explanations, charts and practical implications.

It is understandable that Iraqi sixth graders received higher scores in items of recall-type than in

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[1]The author participated with some of the textbook authors and supervisors in holding those meetings and writing the recommendations to the Ministry of Education.

understanding-type. All the 16 questions at the end of unit 1 and the 10 questions at the end of unit 2 are in recall-type. They ask about some facts which the two units contain directly. Most or all teacher-made tests are of the same type and all the questions of the past Baccalaureate Examinations were in the same type.

Science teachers should start changing the type of questions on tests, which they prepare for their students, with the help and supervision of the Ministry of Education. Tests should contain all or most types of items, and student's evaluation should be done according to their abilities to understand and apply what they have learned in their daily life.

Finally, and before using ASAT in the elementary schools, the author wants to give some guidelines about using it:

- The ASAT covers only the first half of the year (i.e., a mid-year examination) and two units of the textbook.
- Students should be familiar with multiple-choice items before taking this test.
- The first two items of ASAT are very easy and almost all students should be able to answer them. They have been put in the test as examples to help students understand how they should answer the test items. Teachers can keep them in the test without consideration for their students' scores.

- If the ASAT will be available, teachers can use it as a helper in their task or add and subtract some or many items from ASAT when they want to make their own teacher-made tests. Teachers should build their own items and tests, and they should have a lot of items to cover every single-concept in the textbook; in this way, they will start building an item bank, which makes their tasks easier and more accurate.
- Teachers building their own tests need not be aware of the statistical techniques which have been used in this study in building ASAT items. Rather, they could concentrate on the basic techniques of measurement to insure their items' goodness (i.e., item difficulty and item discrimination). They should know what the differences are between the teacher-made test and the standardized achievement test.
- If the teachers want to use the entire ASAT, if it is available, as a mid-year examination at their schools, they should be aware of the security of the test.
- Supervisors could use ASAT as criteria in their educational areas by giving it to all sixth graders in their areas, either as a single test or as two parts (i.e., as two units).

Suggestions For Further Study

Since the ASAT is considered a mid-year examination, efforts should go immediately into building a test which covers the second half of the year. The two parts could be combined into one test that would cover the entire textbook, and could be given as a final examination to the students at the end of the sixth grade.

As was mentioned in Chapter I, the test is just one step in building a file of standardized achievement tests for all subjects in the sixth grade, which in turn could go further in building these files for the ninth and twelfth grades. All such files should be a ready alternative before thinking of deleting the Baccalaureate Examinations in the ninth or twelfth grades.

The ASAT has been applied in only one area in Baghdad. To standardize it to all Iraqi students, more studies should be done on the usefulness and goodness of ASAT before considering its standardization. The test can be applied, for example, in the north, middle and south of Iraq to get more information before accepting it as a criterion, or as a science standardized achievement test for Iraqi sixth graders.

The potential impact of the school on student achievement could be another suggestion for further study after completion of unit 1 study. ASAT - unit 1 could be given to students at two different schools: one located at an UMC and the other at a LMC level. If there is any significant

differences between students in both schools, a special program at the LMC's school could be prepared to help it's students. Offer free tutors, open the school library at night for them to read and offer some helpful books and magazines related to science would be some suggestions for that special program. At the end of unit 2, ASAT could be given again, to both schools as a mid-year examination. Student's performance in the two times could be compared and school effect on poor student achievement could be studied.

# APPENDIX A

## ALANI SCIENCE ACHIEVEMENT TEST

## "ASAT"

The Final English Edition

APPENDIX A

ALANI SCIENCE ACHIEVEMENT TEST

"ASAT"

The Final English Edition

Dear Student

What you are reading now is an achievement test for the first two units of your sixth grade's science textbook.

The test items are in two types:

1. Sets; which each contains several items. All the items of each set have the same five multiple choices (A→E). You should choose the correct answer (only one of the five choices is correct to each item) and mark an (X) in front of the number of each item on the answer sheet. (The first item in Set # 1 is an example of the first type of items)
2. Individual items; with five different multiple choices (A→E) for each item. You should again choose just one choice as a correct answer (the other four choices are incorrect) and mark an (X) in front of the number of each item on the answer sheet.
"Do not write or mark anything on the test sheets"

Steps for how to answer the test items:

1. Read the item well; think to choose the correct answer for that item.
2. After you make your decision about the correct answer, or the best answer, go to the answer sheet and mark an (X) under only one of the letters (A→E) as the correct answer, and in front of the item which you are answering. For example:

| item # | choices A | B | C | D | E | |
|---|---|---|---|---|---|---|
| - | | | | | | |
| - | | | | | | |
| 13 | _ | X | _ | _ | _ | (if B is the correct answer) |
| 14 | _ | _ | _ | _ | X | (if E is the correct answer) |
| 15 | _ | _ | X | _ | _ | (if C is the correct answer |
| - | | | | | | |
| - | | | | | | |
| - | | | | | | |

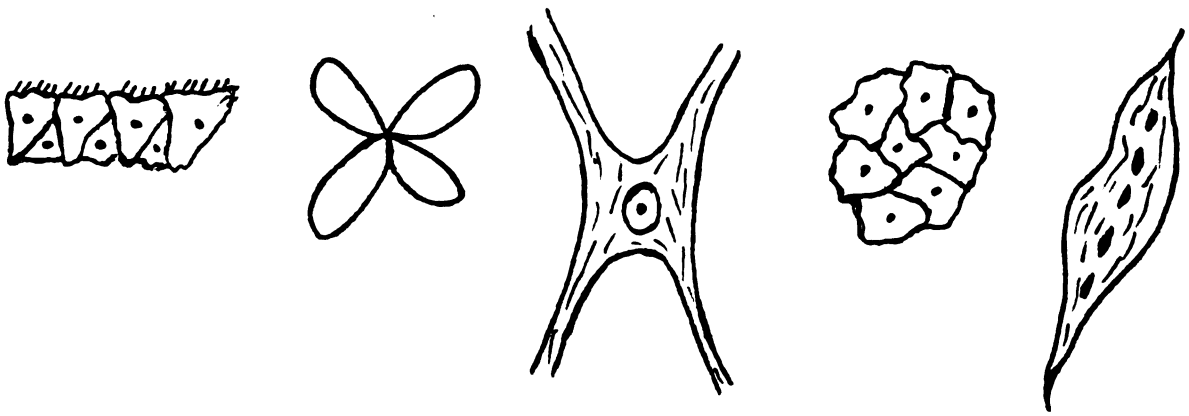
## Set I (Q's 1→6)

A: Skeletal System B: Digestive System C: Nervous System
D: Circulatory System E: Breathing System

Of which of the systems, above, is each one of the following a part?

| | A | B | C | D | E |
|---|---|---|---|---|---|
| Ex. - Spinal Column | X | _ | _ | _ | _ |
| 1 - bile duct | _ | _ | _ | _ | _ |
| 2 - spinal cord | _ | _ | _ | _ | _ |
| 3 - ankle joint | _ | _ | _ | _ | _ |
| 4 - pulse | _ | _ | _ | _ | _ |
| 5 - plasma | _ | _ | _ | _ | _ |
| 6 - ankle bones | _ | _ | _ | _ | _ |

## Set II (Q's 7→9)



A B C D E

In the illustration, above, which picture would represent . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 7 - the check cell | _ | _ | _ | _ | _ |
| 8 - the muscle cell | _ | _ | _ | _ | _ |
| 9 - the nerve cell | _ | _ | _ | _ | _ |

## Set III (Q's 10→12)

A: Blood B: Stomach C: Insulin D: Liver E: Heart

Each of the following is a function of one of the above. Which of the above is . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 10 - carrying the supplies that all parts of the body need to stay alive? | | | | | |
| 11 - manufacturing bile? | – | – | – | – | – |
| 12 - regulating the level of sugar in the blood? | – | – | – | – | – |
| | – | – | – | – | – |

---

Set IV (Q's 13→18)

A: Carbohydrates B: Proteins C: Oils and Fats D: Vitamins
E: Minerals

To which of the above could be classified to each one of the following? (On the basis of highest percentage)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 13 - egg | – | – | – | – | – |
| 14 - corn | – | – | – | – | – |
| 15 - cream | – | – | – | – | – |

Which one of the above (A→E) could be concidered . . .

| | | | | | |
|---|---|---|---|---|---|
| 16 - that its first purpose in the body is the formation of bones and teeth? | – | – | – | – | – |
| 17 - the best for more new building blocks? | – | – | – | – | – |
| 18 - as stimulating growth and other body activities? | – | – | – | – | – |

---

Set V (Q's 19→29)

A: Vitamin A B: Vitamin B C: Vitamin C D: Vitamin D
E: Vitamin E

(Q's 19→23)

The lack of which vitamin causes . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 19 - weak nerves? | – | – | – | – | – |
| 20 - rickets? | – | – | – | – | – |
| 21 - scurvy? | – | – | – | – | – |
| 22 - blindness? | – | – | – | – | – |
| 23 - gums becoming swollen and bleeding? | – | – | – | – | – |

(Q's 24→26)

Which major vitamin (A→E) could we get from . . .

| | | | | | |
|---|---|---|---|---|---|
| 24 - citrus fruits? | – | – | – | – | – |

25 - sunlight? _ _ _ _ _
26 - carrots and liver? _ _ _ _ _

(Q's 27 29)

Which major vitamin is needed in our bodies . . .

27 - to protect our eyes and keep the skin and mucous lining? _ _ _ _ _
28 - to have a good appetite, keep our nerves healthy and to promote growth? _ _ _ _ _
29 - for our bones to grow and be healthy? _ _ _ _ _

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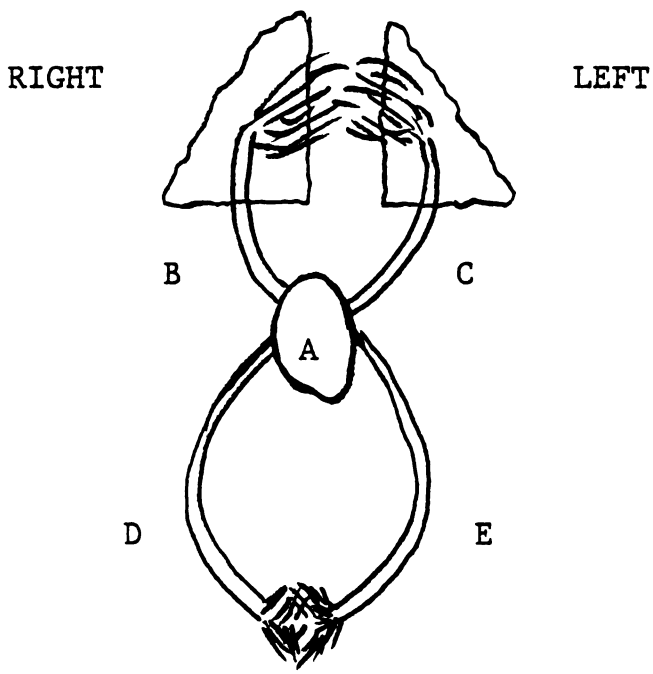
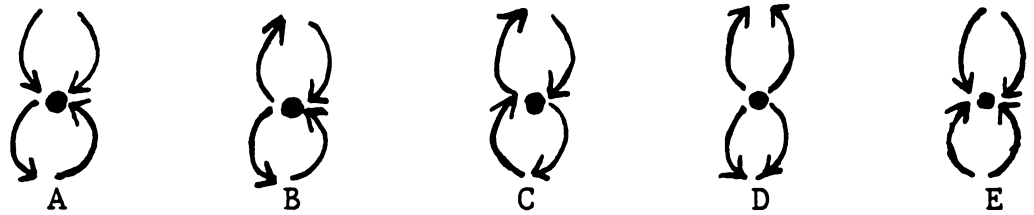
Set VI (Q's 30→34)




Which one of the above (A→E) represents the . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 30 - aorta? | _ | _ | _ | _ | _ |
| 31 - large vein? | _ | _ | _ | _ | _ |
| 32 - palmonary artery? | _ | _ | _ | _ | _ |
| 33 - palmonary vein? | _ | _ | _ | _ | _ |

34 - According to the picture above, which one of the following represents the correct blood circulation movement in your body?

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Set VII (Q's 35→38)

A: 3 B: 5 C: 7 D: 8 E: 12

Which of the numbers above is the right number of bones in the . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 35 - neck vertebrae? | — | — | — | — | — |
| 36 - chest vertebrae? | — | — | — | — | — |
| 37 - lumbar vertebrae? | — | — | — | — | — |
| 38 - sacrum and coccy vertebrae? | — | — | — | — | — |

---

Set VIII (Q's 39→42)

A: Pelvis B: Ankle bones C: Femur D: Tibia E: Knee Cap

All the bones above are parts of the lower extremity. If we assumed that we could match bones from the upper extremity with the lower ones, which one of the above would be matched with . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 39 - ulna? | — | — | — | — | — |
| 40 - shoulder? | — | — | — | — | — |
| 41 - wrist? | — | — | — | — | — |
| 42 - humerus? | — | — | — | — | — |

---

The permanent teeth and milk teeth differ in their number either as a type or in total. However, one, or more, of the teeth types remain(s) the same in both permanent and milk teeth.

43 Which type(s) of teeth are similar, in numbers, in both permanent and milk teeth?

A - incisor teeth
B - canine teeth
C - molar teeth
D - incisor and canine teeth
E - canine and molar teeth

44 Between which one of the following pairs of organs is the "Esophegus" located?

A - gullet and stomach
B - stomach and duodenum
C - liver and pancreas
D - pancreas and small intestine
E - small and large intestine

45 Which one of the following is the function of the bile?

A - regulating the level of sugar in the blood
B - breaking up fats and oils into tiny drops
C - breaking up all kinds of food
D - changing food into energy
E - protecting the body from diseases

46* Which kind(s) of food do(es) your body need to stay alive?

A - carbohydrates
B - proteins
C - vitamins
D - minerals
E - all the above

* item 46 has been deleted from the test, statistically.

---

Let us assume, dear student, that we could compare the human body to many different things in our daily lives (i.e. manufacturing); which one of the following could relate?

47 Brain with (in army):

A - weapon
B - weapons manufacturer
C - soldier
D - officers
E - major general

48 Heart with (car):

A - exhaust
B - gas
C - engine oil
D - engine
E - steering wheel

49 Kidney with (stations):

A - gas station
B - water plant station
C - train station
D - electric plant station

E - airport

50 Spinal Cord with (government offices):

A - clinical center
B - sheriff department
C - post office
D - army office
E - hospital

51 When you eat, which one of the following prevents food or water from entering the wind pipe?

A - saliva
B - tongue
C - esophagus
D - epiglittis
E - wind pipe

52 Which one of the following parts of your body is considered as a "gland"?

A - heart
B - stomach
C - liver
D - kidney
E - brain

53 Which food requires "bile" for digestion in the body?

A - proteins
B - carbohydrates
C - fats
D - vitamins
E - minerals

54 The lung walls are constructed from millions of . . .

A - bronchials
B - bronchial tubes
C - tiny blood vessels
D - tiny glands
E - alveolie

55 From which part of the heart is blood pumped (through the aorta) to regions of the body?

A - right ventricle
B - left ventricle
C - right atrium
D - left atrium
E - all the above

56 Which one of the following destroys the bacteria and other foreign materials in our bodies?

A - tiny blood vessels
B - plasma
C - alveolie
D - red cells
E - white cells

57 Which one of the following does the craniu rest on?

A - upper jaw bone
B - lower jaw bone
C - neck vertebrae
D - chest vertebrae
E - lumbar vertebrae

58 Which kind of the following vertebrae is the largest and heaviest in your spinal column?

A - neck vertebrae
B - chest vertebrae
C - lumber vertebrae
D - sacrum vertebrae
E - coccys vertebrae

59 Between which one of the following pairs is the "ankle joint" joined to?

A - tarsals and leg
B - leg and femur
C - femur and pelvis
D - humeras and shoulder
E - clavicle and shoulder

60 Which one of the following functions does the "sensory nerve fibers" perform?

A - receiving a stimulus from the receptor ending and sending them to the brain
B - receiving a stimulus from the brain and sending them to the body
C - doing both functions in A and B above
D - receiving a stimulus from the skin and sending them to the heart
E - receiving a stimulus from the heart and sending them to the body

---

Set IX (Q's 61→68)

A: Typhoid B: Bilharzia C: Tuberculosis D: Dysentery
E: Cholera

(Q's 61→63)

Which one of the above diseases causes each of the following symptoms?

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 61 - backache and joint disorder | – | – | – | – | – |
| 62 - pain associated with many bowel movements daily | – | – | – | – | – |
| 63 - violent diarrhea and vomiting | – | – | – | – | – |

(Q's 64→68)

Which one of the above diseases (A→E) applies to each of the following statement?

| | | | | | |
|---|---|---|---|---|---|
| 64 - the flies are not considered as a means of its transmission | – | – | – | – | – |
| 65 - its germs settle in the urinary bladder | – | – | – | – | – |
| 66 - its germs don't enter through the mouth | – | – | – | – | – |
| 67 - its germs settle in the chest | – | – | – | – | – |
| 68 - its symptoms start by constipation and then followed by diarrhea | – | – | – | – | – |

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Set X (Q's 69→71)

Ali visited Ibraham in his house and they spent the time in Ibraham's small room; following this, Ibraham came down with a disease the next day. Ali listed all the things which he had done with Ibraham the day before which could be the cause of transmitting the germs to him (Ali).
(A): he shook his hand twice (B): he sat on his bed (C): he used his water cup (D): he used the same kleenex tissue which Ibraham used to put on his mouth when coughing (E): he had been bitten several times by a mosquito in Ibraham's room.

Which one of the five reasons above is the most probable reason that would be the major cause of transmitting the germs to Ali if Ibraham had been sick with . . .

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 69 - typhoid? | – | – | – | – | – |
| 70 - malaria? | – | – | – | – | – |
| 71 - tuberculosis? | – | – | – | – | – |

---

72 Which one of the following order is the right sequence to the three cut-stages (or periods) of malaria symptoms?

A - chills - thirst - fever
B - fever - thirst - chills
C - chills - fever - thirst
D - thirst - chills - fever
E - fever - chills - thirst

73 Which one of the following pairs does not cause bloody feces or bloody urine?

A - typhoid/belharzia
B - cholera/maleria
C - malaria/dysentery
D - dysentery/typhoid
E - belharzia/malaria

74 Which one of the following pairs of germs do not transmit to our bodies through the mouth?

A - bilharzia/malaria
B - bilharzia/tuberculosis
C - malaria/cholera
D - typhoid/cholera
E - typhoid/dysentery

# APPENDIX B

## ALANI SCIENCE ACHIEVEMENT TEST

## "ASAT"

## The Final Arabic Edition

عزيزي الطالب ، عزيزتي الطالبة

الذى بين يديك اختبار تحصيلي لمعرفة مقدار فهم واستيعاب التلميذ لمادة الوحدات الثلاث الاولى من كتاب العلوم والتربية الصحية للصف السادس الابتدائي .

ان اسئلة الاختبار تتكون من نمطين من الاسئلة ولكنهما متشابهان في طريقة الاجابة عنهما :

١ـ النمط الاول وهو على شكل مجموعات تضم كل مجموعة عدة اسئلة تشترك جميعها في خمس استجابات مختلفة . والذى عليك هو اختيار الاستجابة الصحيحة من هذه الاستجابات الخمس ولكل سؤال من اسئلة تلك المجموعة وتؤشر عليها بعلامة × على ورقة الاجوبة الخاصة وامام رقم كل سؤال من تلك الاسئلة .

(( في مجموعة رقم (١) لديك مثال لكيفية الاجابة عن هذا النمط من الاسئلة ))

٢ـ النمط الثاني وهو يتكون من اسئلة منفردة . ولكل سؤال خمس استجابات لتسلسل من أ الى هـ ) فيها استجابة واحدة صحيحة فقط والاربع الجوابات هي غير صحيحة .. وعليك اختيار تلك الاستجابة الصحيحة والتأشير عليها بعلامة × كذلك وعلى ورقة الاجوبة الخاصة وامام رقم كل سؤال .

## كيفية الاجابة

١ـ اولا : لا تكتب اى شيء ولا تؤشر باى شيء على اوراق الاختبار

٢ـ اقرأ السؤال جيدا ، ثم فكر في الاستجابة الصحيحة او اصح او انسب استجابة من الاستجابات الخمس المخصصة لذلك السؤال .

٣ـ وعند وصولك الى قرار باختيار الاستجابة الصحيحة ارجع الى ورقة الاجوبة الخاصة واشر على الاستجابة التي تعتقد انها هي الصحيحة بعلامة × تحت الحرف الذى اخترته وعلى الخط الموضوع تحته تماما بحيث تفد و الاشارة على الشكل التالي : *

مثال

| رقم السؤال | الاستجابات أ | ب | حـ | د | هـ | |
|---|---|---|---|---|---|---|
| ١٣ | ـ | × | ـ | ـ | ـ | (اذا كانت ب هي الاستجابة المختارة) |
| ١٤ | ـ | ـ | ـ | ـ | × | ( ـ ـ ـ هـ ) |
| ١٥ | ـ | × | ـ | ـ | ـ | ( ـ ـ حـ ـ ) |

## مجموعة رقم (١)

((اسئلة ١ـ٦))

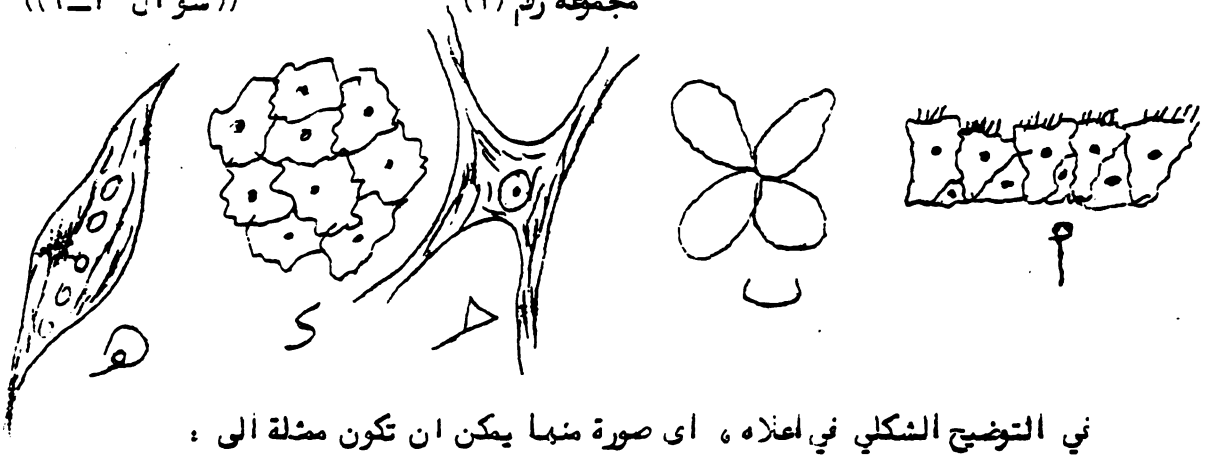
(أ) الجهاز الغضلي والعظمي (ب) الجهاز الهضمي (حـ) الجهاز العصبي
(د) جهاز الدوران (هـ) الجهاز التنفسي

في الاسئلة التالية اعضاء ، او اجزاء أو اعمال ، كل واحد منها يخص او يعتبر جزءا في واحد (فقط) من الاجهزة الجسمية الخمسة في اعلاه . أشر بعلامة ضرب (×) على الخط الذي يقع امام الجهاز الذي تعتبره انه الاجابة الصحيحة للسؤال .

| | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|
| مثال ـ السعود الفقري | × | ـ | ـ | ـ | ـ |
| ١ـ كيس الصفراء | ـ | ـ | ـ | ـ | ـ |
| ٢ـ النخاع الشوكي | ـ | ـ | ـ | ـ | ـ |
| ٣ـ العرقوب | ـ | ـ | ـ | ـ | ـ |
| ٤ـ النبض | ـ | ـ | ـ | ـ | ـ |
| ٥ـ الكاحل | ـ | ـ | ـ | ـ | ـ |
| ٦ـ البلازما | ـ | ـ | ـ | ـ | ـ |

-٢-

مجموعة رقم (٢) ((سؤال ٧-٩))




في التوضيح الشكلي في اعلاه ، اى صورة منها يمكن ان تكون ممثلة الى :

| | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|
| ٧- خلية جلدية | - | - | - | - | - |
| ٨- " عصبية | - | - | - | - | - |
| ٩- " عضلية | - | - | - | - | - |

مجموعة رقم (٣) ((سؤال ١٠-١٢))

(أ) الدم (ب) المعدة (حـ) الانسولين (د) الكبد (هـ) القلب

كل واحد من الاسئلة التالية عي (وظيفة) لواحد من الاشياء الخمسة في اعلاه، اى منها يمكن ان تكون وظيفته ...

| | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|
| ١٠- حمل التجهيزات التي تحتاجها جميع اجزاء الجسم لكي تبقى حية ؟ | - | - | - | - | - |
| ١١- صنع عصارة المرارة | - | - | - | - | - |
| ١٢- تنظيم كمية السكر في الدم | - | - | - | - | - |

-٣-

مجموعة رقم (٤) ((سؤال ١٢-١٨))

(أ) الكربوهيدرات (ب) البروتينات (حـ) الشحوم والدهون
(د) الفيتامينات (هـ) الاملاح

لاى من انواع الاغذية في اعلاه يمكن تصنيف كل واحد مما يلي على اساس احتوائه الى النسبة الكبرى منه ...

| | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|
| ١٣- البيض | - | - | - | - | - |
| ١٤- الذرة | - | - | - | - | - |
| ١٥- القيمر | - | - | - | - | - |

اى من انواع الاغذية في اعلاه (أ ، ب ، حـ ، د ، هـ) يمكن ان يعتبر ...

| | | | | | |
|---|---|---|---|---|---|
| ١٦- المادة الاولية في نمو العظام والاسنان؟ | - | - | - | - | - |
| ١٧- الاكثر مساعدة على بناء الخلايا الجديدة للجسم ؟ | - | - | - | - | - |
| ١٨- الاكثر مساعدة على قيام الجسم بافعاله ونشاطاته الحيوية ؟ | - | - | - | - | - |

مجموعة رقم (٥) ((سؤال ١٦ ـ ٣٠))

(أ) فيتامين A (ب) فيتامين B (حـ) فيتامين C (د) فيتامين D
(هـ) فيتامين E

عوز الجسم لاى فيتامين يمكن ان يسبب مرض ....

| | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|
| ١٦ـ ضعف الاعصاب ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٠ـ الكساح ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢١ـ الاسقربوط ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٢ـ عمى الليل ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٣ـ تورم اللثة ونزفها ؟ | ـ | ـ | ـ | ـ | ـ |

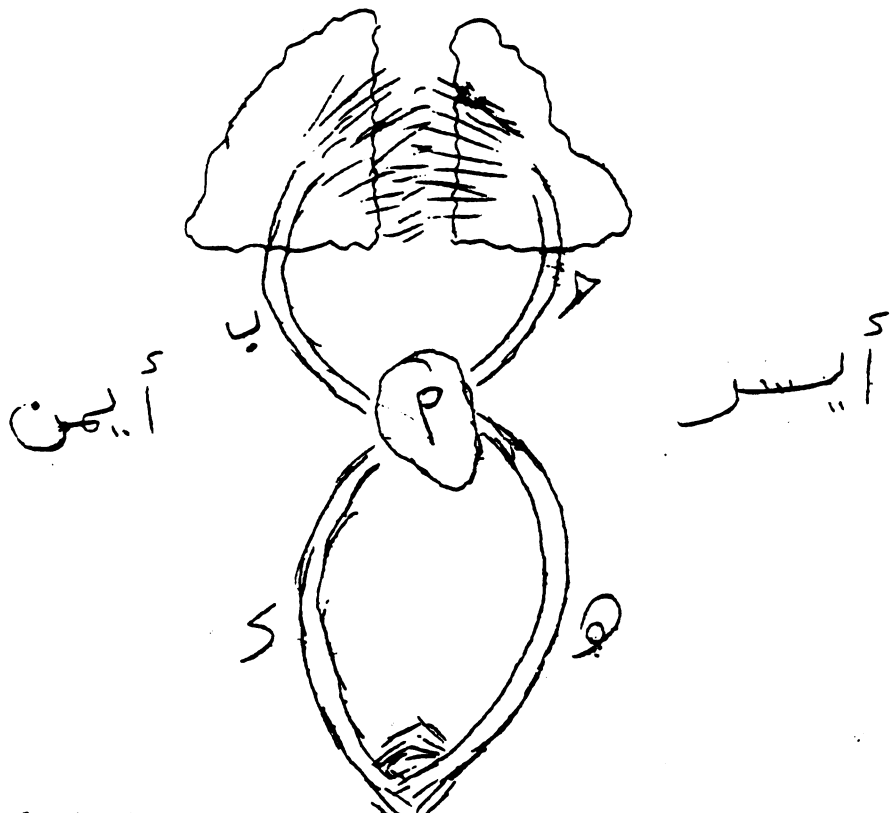
اى من الفيتامينات الخمسة يمكن ان يوجد بصورة رئيسية في ...

| | | | | | |
|---|---|---|---|---|---|
| ٢٤ـ الحضبات ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٥ـ سوء الشمس؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٦ـ الجزر والكبد ؟ | ـ | ـ | ـ | ـ | ـ |

اى من الفيتامينات الخمسة يحتاجها جسم الانسان :

| | | | | | |
|---|---|---|---|---|---|
| ٢٧ـ لحماية سلامة اعيننا وحفظ الجلد والنسيج المخاطي ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٨ـ لايجاد شهية جيدة ، وحفظ الاعصاب بصورة سليمة والنمو ؟ | ـ | ـ | ـ | ـ | ـ |
| ٢٩ـ لنمو وصحة الاسنان والعظام ؟ | ـ | ـ | ـ | ـ | ـ |

مجموعة رقم (٦) ((اسئلة ٣٠ــ٣٤))

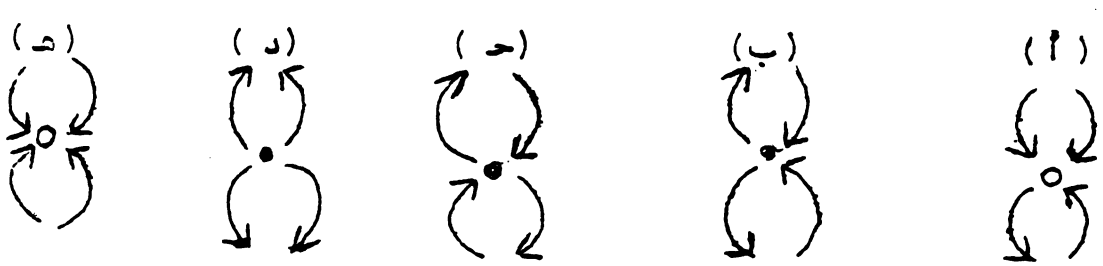



أى جزء من الاجزاء الخمسة في اعلاه ( أ ، ب ، حـ ، د ، هـ ) يمكن ان يكون ممثلا الى ...

| | | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|---|
| ٣٠ــ | الشريان الابهر ؟ | ــ | ــ | ــ | ــ | ــ |
| ٣١ــ | الوريد الاجوف ؟ | ــ | ــ | ــ | ــ | ــ |
| ٣٢ــ | الشريان الرئوى ؟ | ــ | ــ | ــ | ــ | ــ |
| ٣٣ــ | الوريد الرئوى ؟ | ــ | ــ | ــ | ــ | ــ |

بناء على الشكل في اعلاه .....

٣٤ــ اى من الاشكال التالية في ادناه يمكن ان يمثل حركة دوران الدم داخل الجسم بصورة صحيحة ؟



-٦-

مجموعة رقم (٧) ((أسئلة ٣٥-٣٨))

(أ) ٣ فقرات (ب) ٥ فقرات (حـ) ٧ فقرات (د) ٩ فقرات (هـ) ١٢ فقرة

أى من الاعداد المذكورة في اعلاه يمكن ان يكون الرمز الذى تتكون منه ...

| | | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|---|
| ٣٥- | الفقرات العنقية ؟ | - | - | - | - | - |
| ٣٦- | = الصدرية ؟ | - | - | - | - | - |
| ٣٧- | = القطنية ؟ | - | - | - | - | - |
| ٣٨- | = العجزية والعصعصية ؟ | - | - | - | - | - |

مجموعة رقم (٨) ((أسئلة ٣٩-٤٢))

(أ) الحوض (ب) المرقوب (حـ) الفخذ (د) القصبة (هـ) الركبة

كل العظام الخمسة في اعلاه هي اجزاء تخص عظام الاطراف السفلى في جسم الانسان . ولو افترضنا اننا نستطيع ان نماثل او نقارن بين اجزاء الاطراف السفلى واجزاء الاطراف العليا مناظرة ، فاى من الاجزاء في اعلاه يمكن ان يناظر او يماثل كلا من الاجزاء التالية في اجزاء الاطراف السفلى ؟

| | | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|---|
| ٣٩- | الكعبرة | - | - | - | - | - |
| ٤٠- | الكتف | - | - | - | - | - |
| ٤١- | الرسغ | - | - | - | - | - |
| ٤٢- | العضد | - | - | - | - | - |

ـ٧ـ

٤٣ـ تختلف الاسنان اللبنية عن الدائمية من حيث العدد الكلي . ولكن واحدا او بعضا من انواع الاسنان لا يتغير في العدد (يبقى العدد كما هو سواء في اللبنية او الدائمية .

أى نوع (انواع) من الاسنان يتساوى في العدد في كل من الاسنان اللبنية والدائمية ؟

أ ـ القواطع فقط

ب ـ الانياب فقط

حـ ـ الاضراس فقط

د ـ القواطع و الانياب

هـ ـ الانياب والاضراس

٤٤ـ ماعين اى من الازواج التالية تقع فتحة " الفؤاد " ؟

أ ـ المرئ والمعدة

ب ـ المعدة والاثنى عشرى

حـ ـ الكبد والبنكرياس

د ـ البنكرياس والامعاء الدقيقة

هـ ـ الامعاء الدقيقة والامعاء الغليظة

٤٥ـ اى من الوظائف التالية تعتبر وظيفة " عصارة المرارة " ؟

أ ـ تنظيم كمية السكر في الدم

ب ـ هضم الشحوم في الغذاء

حـ ـ هضم جميع انواع الطعام

د ـ تحويل الطعام الى طاقة

هـ ـ حماية الجسم من الامراض

ـ٨ـ

٤٦ـ * اى نوع (انواع) من الطعام في ادناه تحتاجها خلايا جسمك لبقائها حيـــة ؟

أ ـ الكاربوهيـــــدرات

ب ـ البروتينـــــات

حـ ـ الفيتامينـــــات

د ـ الامـــــــلاح

هـ ـ جميع انواع الطعـــام

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دعنا نتخيل ـ عزيزي الطالب ـ انه يمكن المقارنة ما بين جسم الانســـان وبين اشياء او مصانع او محلات نعرفها من خلال حياتنا اليومية .

اى من الاشياء يمكن ان تقارن بكل من الاجزاء الجسمية التالية ؟

٤٧ـ الدمـاغ (مع الجيـش)

أ ـ الســـــلاح

ب ـ مصانع الســـلاح

حـ ـ رئيس العرفـــاء

د ـ الضابـــــط

هـ ـ القائد العـــام

٤٨ـ القلـب (مع السيارة)

أ ـ خانقة الصوت (الصالصة)

ب ـ البنزيـــــن

حـ ـ دهن الماكنـــة

د ـ الماكنـــــة

هـ ـ عجلة القيادة (السكان)

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* يحذف السؤال رقم ٤٦ لعدم جودته إحصائياً

٤٩- الكلية (محطات)

أ - محطة تعبئة البنزين

ب- محطة تصفية المياه

حـ - محطة توليد الكهرباء

د - المحطة العالمية (السكك)

هـ - مطار بغداد الدولي

٥٠- النخاع الشوكي (دوائر الحكومة)

أ - المستشفى المركزي

ب- مركز الشرطة

حـ - المستوصف السيار

د - دائرة البريد

هـ - دائرة التجنيد

٥١- عندما تأكل ، اى من الاعضاء التالية يكون السبب في منع الطعام او الماء من الدخول الى القصبة الهوائية ؟

أ - اللعاب

ب- اللسان

حـ - المريء

د - المزمار

هـ - القصبة الهوائية

-١٠-

٥٢- اى من الاعضاء التالية من اعضاء جسمك تعتبر " غدة " ؟

أ - القلب

ب- الكبد

حـ- الحدقة

د - الكلية

هـ- الدماغ

٥٣- اى نوع من انواع الطعام التالية يتطلب "عصارة المرارة" لكي يتم هضمه ؟

أ - البروتينات

ب- الكاربوهيدرات

حـ- الفيتامينات

د - الشحوم

هـ- الاملاح

٥٤- تتكون جدران الرئة من ملايين من :

أ - القصيبات

ب- القصبات الهوائية

حـ- الزغابات الصوية

د - الشعيرات الدموية

هـ- الاكياس الهوائية

٥٥- من اى قسم من اقسام القلب يحمل الدم (عن طريق الشريان الابهر) الى جميع اجزاء الجسم ؟

أ - البطين الايمن

ب- البطين الايسر

حـ- الاذين الايمن

د - الاذين الايسر

هـ- جميع ما ذكر في اعلاه

٥٦- اى من الاشياء التالية تعتبر محطمة للبكتريا والاجسام الغريبة في اجسامنا ؟

أ - الشعيرات الدموية

ب - الكريات البيضاء

حـ - الكريات الحمراء

د - مصل الدم (البلازما)

هـ - الاكياس الدوائية

٥٧- على اى من العظام التالية " تستند " عظمة الجمجمة ؟

أ - عظمة الفك الاعلى

ب - عظمة الفك الاسفل

حـ - الفقرات العنقية

د - الفقرات الصدرية

هـ - الفقرات القطنية

٥٨- اى نوع من انواع الفقرات التالية يكون الاكبر والاقوى من فقرات العمود الفقرى ؟

أ - الفقرات العنقية

ب - الفقرات الصدرية

حـ - الفقرات القطنية

د - الفقرات العجزية

هـ - الفقرات العصعصية

٥٩- ما بين اى من الازواج التالية من العظام يربط الكاحل ؟

أ - العرقوب والساق

ب - الساق والفخذ

حـ - الفخذ والحوض

د - العضد والكتف

هـ - الترقوة والكتف

ـ ١٢ ـ

٦٠ـ اى من الوظائف التالية يقوم بها العصب الحسي ؟

أ ـ استلام الايعازات من النهايات الحسية وارسالها الى الدماغ

ب ـ استلام الايعازات من الدماغ وارسالها الى اجزاء الجسم

حـ ـ يقوم بالوظيفتين (في اعلاه) معا

د ـ استلام الايعازات من الجلد وارسالها الى القلب

هـ ـ استلام الايعازات من القلب وارسالها الى اجزاء الجسم

ـ ١٣ ـ

مجموعة رقم (٦) ((اسئلة ٦١ـ٦٨))

(أ) تايفوئيـــد (ب) بلمارزيا (جـ) السل الرئوى (د) الدزنتـــرى
(هـ) الكوليرا

اى من الامراض الخمسة في اعلاه تكون سببا في ظهور كل من الاعراض التالية على المصاب ؟

| | أ | ب | جـ | د | هـ |
|---|---|---|---|---|---|
| ٦١ـ اوجاع في الظهر والمفاصيـــل | ـ | ـ | ـ | ـ | ـ |
| ٦٢ـ تبرزات عديدة يوميا يصاحبها حرقة وألم | ـ | ـ | ـ | ـ | ـ |
| ٦٣ـ نوبة حادة من الاسهال والتقيـؤ | ـ | ـ | ـ | ـ | ـ |

أى من الامراض الخمسة في اعلاه (أ ، ب ، جـ ، د ، هـ) - - - - -

| | | | | | |
|---|---|---|---|---|---|
| ٦٤ـ لا يكون الذباب عاملا لنقل وانتشار المرض ؟ | ـ | ـ | ـ | ـ | ـ |
| ٦٥ـ يستقر جرثومه في المثانة ؟ | ـ | ـ | ـ | ـ | ـ |
| ٦٦ـ لا يتم دخول جرثومه عن طريق الفم ؟ | ـ | ـ | ـ | ـ | ـ |
| ٦٧ـ يتموضع جرثومه في صدر الانسان ؟ | ـ | ـ | ـ | ـ | ـ |
| ٦٨ـ تكون من اعراضه الاولى الاصابة بالاسهال ثم يتحول الى الاسهال بعدها ؟ | ـ | ـ | ـ | ـ | ـ |

ـ ١٤ ـ

مجموعة رقم (١٠) ((اسئلة ٦٦ ـ ٧١))

زار علي ابراهيم في بيته ، وامضيا وقت الزيارة في غرفة ابراهيم الصغيرة . وفي اليوم التالي سمع علي ان ابراهيم مصاب بمرض . سجل علي قائمة بكل الاعمال التي قام بها في غرفة ابراهيم يوم امس والتي يمكن ان تكون عاملا او طريقة من طرق انتقال عدوى المرض اليه

(أ) صافحه لمرتين (ب) جلس على سريره (جـ) شرب من قدح ابراهيم

(د) وجد منديلا فاستخدمه ثم وجد بعد ذلك ان ابراهيم يضعه على فمه كلما سعل (هـ) لقد لمس ببعوض ولعدة مرات في نفس الغرفة .

اى من الاسباب الخمسة في اعلاه يمكن ان يكون الاكثر احتمالا في نقل المرض من ابراهيم الى علي فيما لو اصيب ابراهيم ...

| | أ | ب | جـ | د | هـ |
|---|---|---|---|---|---|
| ٦٦ـ بمرض التيفوئيد | ـ | ـ | ـ | ـ | ـ |
| ٧٠ـ " الملاريا | ـ | ـ | ـ | ـ | ـ |
| ٧١ـ " السل الرئوي | ـ | ـ | ـ | ـ | ـ |

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٧٢ـ اى مما يأتي يكون التسلسل الصحيح لنوبات الملاريا التي تنتاب المصاب فيها ؟

أ ـ برودة ـ عطش ـ سخونة

ب ـ سخونة ـ عطش ـ برودة

جـ ـ برودة ـ سخونة ـ عطش

د ـ عطش ـ برودة ـ سخونة

هـ ـ سخونة ـ برودة ـ عطش

---

ـ ١٥ ـ

٧٣ـ في اى من الازواج التالية من الامراض لا يصاحبها النزف الدموى سواء في التغوط او التبول ؟

أ ـ التيفوئيد والبلهارزيا

ب ـ الكوليرا والملاريا

حـ ـ الملاريا و الديزنتري

د ـ الديزنتري والتيفوئيد

هـ ـ البلهارزيا و الملاريا

---

٧٤ـ في اى من الازواج التالية لا يتم انتقال جرثوماهما الى المريض عن طريق الفم ؟

أ ـ البلهارزيا والملاريا

ب ـ البلهارزيا والسل الرئوى

حـ ـ الملاريا والكوليرا

د ـ الكوليرا والتيفوئيد

هـ ـ التيفوئيد والديزنتري

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الاســـم　　المدرســـة　　الجنس

(( ورقة الاجابـــات ))

| تسلسل الاسئلة | أ | ب | حـ | د | هـ | تسلسل الاسئلة | أ | ب | حـ | د | هـ | تسلسل الاسئلة | أ | ب | حـ | د | هـ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ١ـ | ـ | ـ | ـ | ـ | ـ | ٢٦ـ | ـ | ـ | ـ | ـ | ـ | ٥١ـ | ـ | ـ | ـ | ـ | ـ |
| ٢ـ | ـ | ـ | ـ | ـ | ـ | ٢٧ـ | ـ | ـ | ـ | ـ | ـ | ٥٢ـ | ـ | ـ | ـ | ـ | ـ |
| ٣ـ | ـ | ـ | ـ | ـ | ـ | ٢٨ـ | ـ | ـ | ـ | ـ | ـ | ٥٣ـ | ـ | ـ | ـ | ـ | ـ |
| ٤ـ | ـ | ـ | ـ | ـ | ـ | ٢٩ـ | ـ | ـ | ـ | ـ | ـ | ٥٤ـ | ـ | ـ | ـ | ـ | ـ |
| ٥ـ | ـ | ـ | ـ | ـ | ـ | ٣٠ـ | ـ | ـ | ـ | ـ | ـ | ٥٥ـ | ـ | ـ | ـ | ـ | ـ |
| ٦ـ | ـ | ـ | ـ | ـ | ـ | ٣١ـ | ـ | ـ | ـ | ـ | ـ | ٥٦ـ | ـ | ـ | ـ | ـ | ـ |
| ٧ـ | ـ | ـ | ـ | ـ | ـ | ٣٢ـ | ـ | ـ | ـ | ـ | ـ | ٥٧ـ | ـ | ـ | ـ | ـ | ـ |
| ٨ـ | ـ | ـ | ـ | ـ | ـ | ٣٣ـ | ـ | ـ | ـ | ـ | ـ | ٥٨ـ | ـ | ـ | ـ | ـ | ـ |
| ٩ـ | ـ | ـ | ـ | ـ | ـ | ٣٤ـ | ـ | ـ | ـ | ـ | ـ | ٥٩ـ | ـ | ـ | ـ | ـ | ـ |
| ١٠ـ | ـ | ـ | ـ | ـ | ـ | ٣٥ـ | ـ | ـ | ـ | ـ | ـ | ٦٠ـ | ـ | ـ | ـ | ـ | ـ |
| ١١ـ | ـ | ـ | ـ | ـ | ـ | ٣٦ـ | ـ | ـ | ـ | ـ | ـ | ٦١ـ | ـ | ـ | ـ | ـ | ـ |
| ١٢ـ | ـ | ـ | ـ | ـ | ـ | ٣٧ـ | ـ | ـ | ـ | ـ | ـ | ٦٢ـ | ـ | ـ | ـ | ـ | ـ |
| ١٣ـ | ـ | ـ | ـ | ـ | ـ | ٣٨ـ | ـ | ـ | ـ | ـ | ـ | ٦٣ـ | ـ | ـ | ـ | ـ | ـ |
| ١٤ـ | ـ | ـ | ـ | ـ | ـ | ٣٩ـ | ـ | ـ | ـ | ـ | ـ | ٦٤ـ | ـ | ـ | ـ | ـ | ـ |
| ١٥ـ | ـ | ـ | ـ | ـ | ـ | ٤٠ـ | ـ | ـ | ـ | ـ | ـ | ٦٥ـ | ـ | ـ | ـ | ـ | ـ |
| ١٦ـ | ـ | ـ | ـ | ـ | ـ | ٤١ـ | ـ | ـ | ـ | ـ | ـ | ٦٦ـ | ـ | ـ | ـ | ـ | ـ |
| ١٧ـ | ـ | ـ | ـ | ـ | ـ | ٤٢ـ | ـ | ـ | ـ | ـ | ـ | ٦٧ـ | ـ | ـ | ـ | ـ | ـ |
| ١٨ـ | ـ | ـ | ـ | ـ | ـ | ٤٣ـ | ـ | ـ | ـ | ـ | ـ | ٦٨ـ | ـ | ـ | ـ | ـ | ـ |
| ١٩ـ | ـ | ـ | ـ | ـ | ـ | ٤٤ـ | ـ | ـ | ـ | ـ | ـ | ٦٩ـ | ـ | ـ | ـ | ـ | ـ |
| ٢٠ـ | ـ | ـ | ـ | ـ | ـ | ٤٥ـ | ـ | ـ | ـ | ـ | ـ | ٧٠ـ | ـ | ـ | ـ | ـ | ـ |
| ٢١ـ | ـ | ـ | ـ | ـ | ـ | ٤٦ـ | ـ | ـ | ـ | ـ | ـ | ٧١ـ | ـ | ـ | ـ | ـ | ـ |
| ٢٢ـ | ـ | ـ | ـ | ـ | ـ | ٤٧ـ | ـ | ـ | ـ | ـ | ـ | ٧٢ـ | ـ | ـ | ـ | ـ | ـ |
| ٢٣ـ | ـ | ـ | ـ | ـ | ـ | ٤٨ـ | ـ | ـ | ـ | ـ | ـ | ٧٣ـ | ـ | ـ | ـ | ـ | ـ |
| ٢٤ـ | ـ | ـ | ـ | ـ | ـ | ٤٩ـ | ـ | ـ | ـ | ـ | ـ | ٧٤ـ | ـ | ـ | ـ | ـ | ـ |
| ٢٥ـ | ـ | ـ | ـ | ـ | ـ | ٥٠ـ | ـ | ـ | ـ | ـ | ـ | ٧٥ـ | ـ | ـ | ـ | ـ | ـ |

# APPENDIX C

## Study's Questionnaire for Student's Socio-Economic Background

## The Final English Edition

APPENDIX C

Study's Questionnaire for Student's
Socio-Economic Background

The Final English Edition

"Do not write your name on this sheet"

* total number of people in your family _____

* family total monthly income (subtract the monthly home rent if it is rented) I.D. F's

Parent's Educational Level
"mark a by the appropriate number"

| Father's Educational Level | Mother's Educational Level |
|---|---|
| 1. Finished M.A., M.S. or Ph.D. | 1. Finished M.A., M.S. or Ph.D. |
| 2. Finished B.A. or B.S. | 2. Finished B.A. or B.S. |
| 3. Finished high technical diploma | 3. Finished high technical diploma |
| 4. Finished high school (12th grade) | 4. Finished high school (12th grade) |
| 5. Finished middle school (9th grade) | 5. Finished middle school (9th grade) |
| 6. Finished elementary school (6th grade) | 6. Finished elementary school (6th grade) |
| 7. Could read and/or write | 7. Could read and/or write |
| 8. Could not read nor write | 8. Could not read nor write |

Student's sex: __Male __Female

# APPENDIX D

## Study's Questionnaire for Student's Socio-Economic Background

## The Final Arabic Edition

(( لا تذكر اسمك على الورقة اطلاقا ))

مجموع عدد افراد اسرتك : _____ فردا

مجموع الدخل الشهري لجميع افراد اسرتك مطروحا منه الايجار الشهري اذا كان البيت مؤجرا .

| | فلس | دينار |
|---|---|---|
| مجموع الدخل الشهري | — | — |

| التحصيل التربوي للأب | التحصيل التربوي للأم |
|---|---|
| ١ـ شهادة جامعية عليا | ١ـ شهادة جامعية عليا |
| ٢ـ شهادة جامعية | ٢ـ شهادة جامعية |
| ٣ـ معهد عالي | ٣ـ معهد عالي |
| ٤ـ ثانوية | ٤ـ ثانوية |
| ٥ـ متوسطة | ٥ـ متوسطة |
| ٦ـ ابتدائية | ٦ـ ابتدائية |
| ٧ـ يقرأ ويكتب | ٧ـ تقرأ وتكتب |
| ٨ـ لا يقرأ ولا يكتب | ٨ـ لا تقرأ ولا تكتب |

اشر بعلامة ✓ على الرقم المناسب

الجنس : ذكر انثى

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