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Research Article  
Computer Science**STATISTICAL ANALYSIS FOR EFFECT FACTOR TO PUPILS' LEVEL IN  
MATHEMATICAL COURSE FOR PREPARATORY EDUCATION****预科数学课程中影响学生水平的因素统计分析**Hadeel Ismail Mustafa<sup>a</sup>, Mohamed Abdulrahman Abdulhamed<sup>b</sup>, Zainab Ibrahim Othman<sup>a</sup><sup>a</sup> Computer Information System Department, University of BasrahAl-Ashar-Corniche St., Basrah, Iraq, [hadeelismailm@gmail.com](mailto:hadeelismailm@gmail.com), [zai\\_nab\\_alfahad@yahoo.com](mailto:zai_nab_alfahad@yahoo.com)<sup>b</sup> Computer Science Department, University of BasrahAl-Ashar-Corniche St., Basrah, Iraq, [mohammedalhmdany@gmail.com](mailto:mohammedalhmdany@gmail.com)*Received: June 01, 2019* ▪ *Review: September 02, 2019* ▪ *Accepted: February 10, 2020*

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**Abstract**

In an educational foundation whose objective is to contribute to the enhancement of the finest education, the improvement of quality in an educational institution is verified by providing the best services which are better meeting each student's need. General, in preparatory school in Iraq—especially in Basra—the students' ability in mathematical courses is low levels based General, in preparatory school in Iraq—especially in Basra—the students' ability in mathematical courses is low levels based. In this study, we discussed the effect of diverse factors on student failure and success using real data collected in many of the schools in Basra. These data were analyzed using SPSS version 0.23. At the end of the study, we identified the factors that could have affected the students' capabilities (e.g., teachers' ability, student effect factors, and institutional ability).

**Keywords:** Student Performance, Education Institution, Dependent Variable, Independent Variable

**摘要** 在一个旨在促进最优质教育发展的教育基金会中，通过提供最好的服务来更好地满足每个学生的需求，从而验证了教育机构质量的提高。一般，在伊拉克的预科学校，尤其是在巴士拉，学生的数学能力是基于低水平的一般，在伊拉克的预科学校，尤其是在巴士拉，学生的数学能力是基于低水平的。在这项研究中，我们使用巴士拉许多学校收集的真实数据讨论了各种因素对学生失败和成功的影响。使用 SPSS 0.23 版分析了这些数据。在研究结束时，我们确定了可能影响学生能力的因素（例如，老师的能力，学生影响因素和机构能力）。

**关键词:** 学生成绩，教育机构，因变量，自变量**I. INTRODUCTION**

The students' learning is based on various factors, such as individual and community

qualities, gender, capabilities of the teachers and students, and other environmental variables [1], [18], [19]. The significant data and material are

assembled on a consistent basis, and they are measured by the suitable authorities using criteria intended to keep the education process excellent [2]. The contributors in the learning process, by satisfying their requirements through suitable actions, build an enormous quantity of data that must be collected, combined, and used. By translating this data into facts, the benefits to all contributors are realized: pupils, professors, management, assistant supervision, and society. All contributors in the educational procedure could help by applying the findings [3], [20]. This study is aimed to ascertain the causes for low-level pupils' capability in mathematical material, to attempt to study the causes, and to recommend results.

## II. IMPORTANCE OF EDUCATION

In Iraq, as in any other country, education is considered a basic necessity, and it is playing a vital role in communities' development [4]. Education is one of the most influential and verified vehicles for sustainable development [5]. Sixty percent of Iraq's people today are under the age of 25 [6], and towns are under pressure to offer educational opportunities for this ever-growing number of young persons, who are looking to construct their lives in spite of continuing problems following the ages of wars [7]. An interest in education has been detected across the country, and resulting improvements have been realized in recent years [8] with the fundamental school registrations growing at about 4.1% per year. As of 2013, 13.5% (1.2 million) Iraqi school pupils had not entered elementary education, and for those in school, great retention and attrition rates were a sad truth [8]. The increasing number of pupils combined with the modern financial calamity in Iraq are likely to lead to a further worsening of schooling in Iraq if solutions are not found in due course [9]. In Iraq, there are two types of schools: public and private schools [10].

### A. Public Schools

The current state of the public school part of Iraq's educational system is dissatisfying. Classrooms are overloaded, school structures are ancient and unsafe, and there is an absence of services. Up to one third of schools are required to run on several schemes, with some even including triple or quadruple periods of education [11]. Under the current scheme, a negative outcome in pupils' learning is the result. The situation looks unlikely to change in the foreseeable future. In 2015-2016, 6.8 trillion IQD was consumed by the Ministry of Education,

which establishes a mere 5.7% of Iraq's whole government budget. Compulsory enhancement and fundamental expansions within the education sector are, therefore, worrisome [12].

### B. Private Schools

As a result of the challenges encountered by the public schools, parents are increasingly in search of replacements for their children's schooling, and their quest is supported by an ever-growing number of private schools. Tables 1 and 2 denote the proportion of success in preparatory education between 2014-2017 in both free and private education, with the number of private schools rising at a much faster rate than the number of free schools. As a result, the number of Iraqi pupils joining private schools is always increasing because the private schools are commonly witnessed to have better capabilities than their public equivalents; they offer more instructional time per day for their pupils and might propose extra courses (e.g., ballet or music) [13].

Table 1.  
Number of preparatory schools (public, private)

|           | Preparatory schools |         |
|-----------|---------------------|---------|
|           | Public              | Private |
| 2013-2014 | 700                 | 80      |
| 2014-2015 | 650                 | 90      |
| 2015-2016 | 750                 | 110     |

Table 2.  
The success rate per cent in Basra (public, private)

|           | Preparatory schools |         |
|-----------|---------------------|---------|
|           | Public              | Private |
| 2014-2015 | 73.1                | 96.9    |
| 2015-2016 | 74.6                | 44.1    |
| 2016-2017 | 54.5                | 45.5    |

## III. BASRA GOVERNORATE

Basra is the most southerly governorate in Iraq. It creates land boundaries with Iran, Kuwait, and Saudi Arabia [14]. Basra Governorate has eight administrative districts, and Basra City is divided into nine administrative districts. The governorate administration is prepared according to Qadha (district) and Nahiya (subdistrict) Boards and Governorate Board, which have an organization in central Basra City [15].

## IV. RESEARCH METHODOLOGY

The questionnaires are the basic tools used to collect the real data. We will select the samples from the preparatory sixth grade in Basra government and its scientific branch that fulfill the aim of this study. The data concentrated on gender (i.e., male and female), different

environments (i.e., cities and localities), and special and governmental factors. The total number of respondents was 100, and after we checked them and removed all the respondents who did not provide complete information, we had only 54 questionnaires. Using SPSS version 0.23, we find the following statistical analysis.

### A. Demographic Information for Sample Research

Demographic information can be illustrated as follows:

#### 1) Gender

Table 3 shows the total number of males (53.7) and females (46.3).

Table 3.

Total number of males and females

| Rates | Number | Gender |
|-------|--------|--------|
| 53.7% | 29     | Male   |
| 46.3% | 25     | Female |
| 100%  | 54     | Total  |

#### 2) Location Address

The samples were selected from different locations and differ in lifestyle, as represented in Table 4.

Table 4.

The samples locations

| Rate | Location      |
|------|---------------|
| 80%  | City center   |
| 20%  | City locality |

#### 3) Education Type

In the Basra Governorate the education type is divided into public and private; public schools are more highly represented than private, as seen in Table 5.

Table 5.

Education types

| Rate | Education type |
|------|----------------|
| 70%  | Public         |
| 30%  | Private        |

### B. Descriptive Information of the Research Variable

There are three important research factors that will be studied, as shown in Table 6.

Table 6.

Research factors

| Symbol | Factor name           | No. of variables |
|--------|-----------------------|------------------|
| T      | Teacher ability       | 3                |
| P      | Student ability       | 3                |
| S      | Institutions facility | 3                |

The study variables are explained in Table 7, which indicates the respondent's level, which was determined by using a fifth Likert-scale, dividing the individual mean into intervals.

Table 7.

The study variables

| Interpretation         | Mean score  | Likert – scale |
|------------------------|-------------|----------------|
| Strongly disagree (SD) | 1.00 – 1.79 | 1              |
| Disagree (D)           | 1.80 – 2.59 | 2              |
| Moderate agree (MA)    | 2.60 – 3.39 | 3              |
| Agree (A)              | 3.40 – 4.19 | 4              |
| Strongly agree (SA)    | 4.20 – 5.00 | 5              |

#### 1) Teacher Ability

This factor includes three variables, as presented in Table 8.

Table 8.

Teacher ability variables

| T (Factor)   | Status | Mean | N  | Symbol |
|--|--------|------|----|--------|
| The teacher has a high efficiently to understand the student | MA     | 2.94 | 54 | t1     |
| Difficult the items of course                                | MA     | 2.98 | 54 | t2     |
| Teacher interesting by student attending in the lesson       | A      | 3.93 | 54 | t3     |

Table 8 shows that  $Mt3 > Mt2 > Mt1$ , which means (Mt3) interpretation (A Agree), Mt2, and the last Mt2 mean the all teachers in public and private schools are very interested in student attendance. Besides that the factor (t1) is the minimum mean, which shows the teachers are not efficient in understanding the students.

#### 2) Education Institution Facility(s)

Every education organization is governmental or has special standard rules that consider the basics of organization. Table 9 shows these factors and their variables.

Table 9.

Education institution facility(s) factors and their variables

| S (Factor)  | Status | Mean | N  | Symbol |
|---|--------|------|----|--------|
| Duration the class time in the school                       | MA     | 2.98 | 54 | S1     |
| Provident recent tools and devices in the organization      | D      | 2.31 | 54 | S2     |
| Provident study halls such that enough for students' number | D      | 2.26 | 54 | S3     |

We noticed that the mean max is (2.98) for the variable s1 (which represents the duration of the class time in the school), with interpretation of Moderately Agree (MA).

*Notice:* Please note that from this moment the duration time is accepted and available recent devices at last available study halls, compatible with the number of students in the classroom are not suitable for being presented as the best education for students.

### 3) Student Ability (P)

Student ability has special importance; thus, it is essential to find the reason which affects the student's level in mathematics, as shown in Table 10.

Table 10. The student's level in mathematics

| Cronbach's alpha | No. of items |
|------------------|--------------|
| 0.725            | 9            |

Sometime, the student may not have good basics, essential in the previous stage. This is the result of abnormal conditions in the country that led to incomplete syllabus in the previous stage, making the student poor in terms of gaining essential information.

### C. Variables Statistical Views

All factors and variables in the questionnaire are summarized as shown in Table 11.

Table 11.  
All factors and variables

| Variables | Questioner | SD | D    | MA   | A    | SA   | mean | Likert-scale |   |
|-----------|------------|----|------|------|------|------|------|--------------|---|
| T1        | t1         | N  | 5    | 15   | 18   | 10   | 6    | 2.94         | 3 |
|           |            | %  | 9.3  | 27.8 | 33.3 | 18.5 | 11.1 |              |   |
|           |            | N  | 5    | 13   | 19   | 12   | 5    | 2.98         | 3 |
|           |            | %  | 9.3  | 24.1 | 35.2 | 22.2 | 9.3  |              |   |
|           | t2         | N  | 2    | 9    | 8    | 7    | 28   | 3.93         | 4 |
|           |            | %  | 3.7  | 16.7 | 14.8 | 13   | 51.9 |              |   |
| T2        | S1         | N  | 9    | 13   | 13   | 8    | 11   | 2.98         | 3 |
|           |            | %  | 16.7 | 24.1 | 24.1 | 14.8 | 20.4 |              |   |
|           | S2         | N  | 24   | 7    | 12   | 4    | 7    | 2.31         | 2 |
|           |            | %  | 44   | 13.0 | 22.2 | 7.4  | 13.0 |              |   |
|           | S3         | N  | 24   | 9    | 10   | 5    | 6    | 2.26         | 2 |
|           |            | %  | 44.4 | 16.7 | 18.5 | 9.3  | 11.1 |              |   |
| T3        | p1         | N  | 5    | 11   | 19   | 9    | 14   | 2.87         | 3 |
|           |            | %  | 9.3  | 29.6 | 33.3 | 20.4 | 7.4  |              |   |
|           | p2         | N  | 1    | 11   | 19   | 9    | 14   | 3.44         | 4 |
|           |            | %  | 1.9  | 20.4 | 35.2 | 16.7 | 25.9 |              |   |
|           | P3         | N  | 1    | 13   | 24   | 7    | 9    | 3.19         | 3 |
|           |            | %  | 1.9  | 24.1 | 44.4 | 13.0 | 16.7 |              |   |

## V. RELIABILITY ANALYSIS

One of the most used tools to assess reliability is Cronbach's Alpha measurement [16]. Table 12 represents the result of the reliability analysis.

Table 12.  
The result of the reliability analysis

| Variables | Cronbach's alpha | No. of items |
|-----------|------------------|--------------|
| T         | 0.374            | 3            |
| S         | 0.427            | 3            |
| P         | 0.630            | 3            |

From the reliability analysis, the P (student abilities), representing the independent factor, has greater Cronbach's Alpha. Overall, the research

reliability for all respondents and for all factors in this study is equal to 0.725, as shown in Table 13. This is a high degree of reliability for a research study, therefore we will continue with the results analysis.

Table 13. The research reliability

| P (Factor)  | Status | Mean | n  | Symbol |
|---|--------|------|----|--------|
| Student have a good essential in the previous stage.                | MA     | 2.87 | 54 | P1     |
| The student perform all the home works                              | A      | 3.44 | 54 | P2     |
| If the duration that respond for preparing the home works is enough | MA     | 3.19 | 54 | P3     |

## VI. HYPOTHESIS TESTING

The reliability analysis found the student's ability to be the max Cronbach's Alpha, which indicates whether gender affects student ability [17]. The research sample distribution between female and male is not equal, as shown in Table 3.

*The first research hypothesis test is:*

H<sub>01</sub>: There are no significant gender-based differences in student ability in a mathematics course.

During statistical data analysis using SPSS, we found the mean and ANOVA, which are represented in Tables 14 and 15, respectively.

Table 14.  
Mean table

| Gender | P1   | P2   | P3   |
|--------|------|------|------|
| Male   | 2.83 | 3.21 | 2.97 |
| Female | 2.92 | 3.72 | 3.44 |

Table 15.  
ANOVA table

|            | F     | Sig   |
|------------|-------|-------|
| P1* gender | 0.096 | 0.758 |
| P2* gender | 2.793 | 0.101 |
| P3* gender | 2.851 | 0.097 |

In Table 15, values for p1, p2, and p3 of more than 0.05 indicate that there are no significant differences based on a student's gender, meaning that males and females did not have significant differences in abilities or skills, nor in their level of mathematics, leading us to accept the first hypothesis test.

*Second hypothesis test:*

H<sub>02</sub>: There is a statistically significant relationship between student ability (P) and teacher ability (T). This hypothesis is tested using a correlation matrix with the spearman correlation factor, which analyzes the relationship (0.357) between the variables p3 and

t1, using a confidence interval of 0.01. This is another relationship between p2 and t1, which is significant in confidence interval 0.05 on value 0.323, and there is a significant relationship between p3 and t3, with a spearman correlation factor of 0.329 in confidence interval 0.05.

*Third hypothesis test:*

H<sub>03</sub>: there is a statistically significant relationship between student ability (P) and institution facility (S). The null Hypothesis H<sub>03</sub> was accepted because there is significant correlation relation between hypothesis variables p3 and s1, with a spearman correlation factor of 0.433, a correlation factor of 0.386 on variable s2, and a correlation factor of 0.352 on variable s3. The p3 and s2 variables had a correlation factor of 0.407 with a confidence level of 0.01.

## VII. FUTURE WORK

All future and proposed work can be summarized below:

1. Perform comparative studies for student ability in more than one course and discuss the correlation.
2. Use machine learning techniques for this data and view the results and comparisons.
3. Use this study for different levels of education, including secondary, primary, and higher education.
4. Use this statistical analysis in other contexts, for example, scientific, community, medical, and so on.
5. Based on the variable multiple analysis method, explain what influences student ability using different factors.

## VIII. CONCLUSION

The following points will be based on results of the study. We found that student ability is the largest factor that influences the pupil's level of mathematics. This variable is based on two conditions: p1 and p2, and had no significant relationship with the pupil's gender. In addition to student ability, teacher ability also had a smaller effect on student performance. This means that educational decisions regarding teaching staff must be made carefully to enhance student learning.

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