Journal of Contemporary Issues in Business and Government Vol. 27, No. 2,2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.123

Assessment of Jordanian High School Students Performances in Computer Subject: Inclusion for Measurements and Evaluation of Learning

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Abstract

Nowadays, every student is able to use technology in school or at home. Computers have become a necessary part in schools for the sake of well teaching style. The low levels of students' achievement and their computer subject skills weaknesses at the public examinations in Jordan have continued to draw major stakeholders' attention in education. This study examined Jordanian high school students' academic achievement in computer subject, also gender difference in students' achievement was examined. An ex-post-facto design of descriptive research was adopted for the study. A preform was used to collect data from a sample of (200) students who have been selected using a stratified random sampling procedure from the secondary schools in Jordan/Irbid. The data, which was collected, is the students' performances in computer subject achievement tests. The data were analyzed using descriptive statistics and an independent-sample t-test. Results showed that the test internal consistency reliability is low; the students performed below average (M=47.02, SD=16.493 (47%).

Keywords: Academic performances, Computer subject, Measurement and evaluation, Jordanian high school students

Introduction

Jordan prides and glorifies due to the sophisticated and the prosperous education system (ES) (Hanemann, 2012). Jordanians are well educated since the education was possessed into account, on a core worth in the Jordanian culture. Jordan has the best magnitude relation of researchers in the research and development part among all fifty-seven nations in the

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.123

Organization of Islamic Cooperation (OIC). In Jordan, there are 8060 researchers per million individuals, whereas the European Union (EU) is with an average of 6494. At a high level, with the global average of 2532 per million, Jordan provided a more robust proportion to its public population, which considered the importance of the education system more profoundly than other countries in the world (SESRIC, 2010).

The field of both educational and psychological assessment and evaluation has received increasing rate in research attention from psychologists and educators. This field's primary objective was to reveal individual differences of all kinds, whether inter-individual differences between groups or intra-individual differences (Astin, 2012). Educators have been interested in teaching the computer subject because of the goals that contribute to the education of adolescents and provide them with the knowledge side that forms part of their general culture (Black et al., 2013; Hsu, Chang, & Hung, 2018; Sternberg, Kaplan, & Borck, 2007). The skills that qualify them to coexist in a technological environment (Van Horn, 1991) and develop their mental skills and learn through computers as an educational tool. Additionally, given the importance of computers in developing societies and meeting the needs of contemporary life, they found out that the goals of teaching computer subject in Jordanian schools are in correspond with the educational process requirement researchers. Computer teachers noticed that students are afraid of essay questions more than the multiple-choice questions. They prefer the multiple-choice questions much more than the essay/structural questions (Brady, 2005; Raykov & Marcoulides, 2011). They have also noticed the lack of studies that have addressed the computer curriculum according to the Ex-post-facto research design, which is ideal for conducting research when it is impossible to manipulate human participants' characteristics (Simon & Goes, 2013).

Many reasons are considered as the focal point for Jordanian high school students' low level of achievement in the computer subject, summarized as follows: incompatibility between the current curriculum and the time period (academic year). Besides, the number of pupils in the classroom exceeded its absorptive capacity, the majority of teachers did not receive revitalization and qualification courses about the established curricula, schools' lack of modern and equipped laboratories and lack of maintenance of laboratories the inadequacy of computer curricula for the age of students in several classes, pupils' inability to use English terminology in computer subjects. Along with this, limited previous studies investigated the influence of computer usage on students' achievement (Edwards, 2005; Mambwe, 2016). Other studies investigated computer technology utilization by teachers and in the classroom and teaching effectiveness for the computer topics (Forgasz, 2004; Harris, 2000).

Consequently, the central point of this study to entail an Assessment, based on evaluation measurements which is taken to assess students' performance in the qualified computer subject examination. Trends in the past showed a downward decline in students' performance in this discipline; thus, the need to curb these trends becomes necessary for educational measurement and classroom learning evaluation.

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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Jordanian students and their parents are considered the most significant personnel and the critical period of growth in the secondary stage, which is the initial time for a young individual's growth. The reason is that the students will become more aware of the impact on their psychological, social, and spiritual environments when they reach adolescence, adding on to their enrolment in secondary schools to pursue their studies (Ahlawat & Baydoun, 1984). Moreover, this period is considered the transitioning period for them to continue their education in universities. Hence, after finishing the Tawjihi exam which is the General Secondary Education Certificate Examination (GSECE) in Jordan, where it is considered the last stage. Besides, to sit for the exam, students must finish two years of pre-school education, ten years of basic education, and two years of secondary academic or vocational education (Tawjihi year). Subjects that are included in the exam are Arabic, English, Mathematics, Physics, Biology, Chemistry, Computer Science, Geology, Civil Studies, and Islamic studies unless Christian. Consequently, those who pass the exam with a good mark may apply to a university (Education, 2005). They will become well educated and qualified students synchronously. They can enroll in universities (public or private) or community colleges, following their major, education-wise (Al-Saaideh, 2016; Innabi, 2003).

The objectives of the study

The objective of this study is to investigate student performance in the computer subject in some selected scientific secondary schools to achieve the following objectives:

i. Examine the reliability coefficient (estimation of internal consistency) of the computer subject Examination.
ii. Determine the overall secondary school students' performance in the computer subject.
iii. Find out whether gender difference exists in the students' performance in the computer subject.
iv. Find out whether the school's location influences students' performance in the computer subject in Irbid.

Research Questions

The questions that guided the study are as follows:

1. What is the reliability coefficient (Estimation of Internal Consistency) of the computer subject Examination?

2. What are the levels of secondary school students' performances in the computer subject?

3. Is there any significant gender difference in the students' performance in the computer subject?

4. Does school's location influences students' performance in the computer subject in Irbid?

P-ISSN: 2204-1990; E-ISSN:1323-6903
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The hypotheses of the study

The hypotheses which were formulated and tested for the study are as follows:

Ho1: There is no significant gender difference in secondary school students' performance in the computer subject.

Ho2: There is no significant difference in students' performance regarding school's location.

Research Method

Research design

Ex-post-facto research design was employed to assess students' performance in computer subjects. Ex-post-facto research is ideal for conducting research when it is impossible to manipulate human participation's characteristics. It can be used to test hypotheses about cause-and-effect or correlational relationships, where it is not practical to apply a true or even a quasi-experimental design (Goes & Simon, 2017; Lammers & Badia, 2005). The data to be used will be collected from the "Directorate of Education of Irbid District."

Participants

This study's population comprises all the Jordanian high school students in Jordan /Irbid senior secondary school who are ready to do their final examination. According to the ministry of education (MoE) (Education, 2005) and (Statistics & International, 2018), the population of the students is twenty-six thousand, three hundred and seventy-two (26,372). A sample of 200 Jordanian high school students was selected.

A stratified random sampling technique was used to choose the selected school to take sample for the study. In a stratified random sampling procedure, the population is divided into strata (groups) with similar characteristics, and the samples are drawn from each group (Saunders, Lewis, & Thornhill, 2009; Tongco, 2007). The distribution of the respondents is presented in Table 1.

Table 1. Distribution of participants

Gender	Frequency	Percentage
Male	90	45%
Female	110	55%
Total	200	100%

Instruments

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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The computer subject Achievement Test (CSAT) which was constructed in Irbid district for Jordanian high school students qualifying examination will be used for this study. The CSAT comprises of essay and 40 multiple-choice items with five answer choices/options (A-E). The test items covered the whole senior secondary school computer subject syllabus prepared for Jordanian high school students by the Ministry of Education in Jordan.

Procedure for data collection

The computer subject Achievement Test was administered to the students by teachers with the Monitoring and Evaluation Unit of the ministry of education in Irbid in October 2020. The used data is the test scores established by teachers following the designed marking scheme. A preform form, designed and validated by the researchers, was used to collect the available records of the students' performance from the official students' records of the Monitoring and Evaluation Unit of the ministry of education in Irbid.

Data analysis procedure

The collected data was analyzed using SPSS 26 v. The Mean, Standard Deviation, and Independent Sample t-test statistics will be used. The level of significance was set at 0.05 for all statistical tests.

Results and Discussion

As explained in the preceding section of the data analysis procedure, this study's results are presented in the descriptive and inferential analysis. Similarly, the results are presented under each research question and hypothesis and discuss other studies' findings, expert opinions' and other validated assertions.

Research question 1: What is the reliability coefficient (estimation of the computer subject examination's internal consistency)?

To answer the above research question, the examinees' responses from computer subject test items were scored and used to conduct an item analysis to determine the test items' internal consistent reliability. The result of the analysis is presented in Table 2 below.

Table 2. internal consistent reliability of computer subject test

N	Indicator	Value
1	Number of Item	70
2	Kuder Richardson (KR-20)	0.620

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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3	Cronbach's Alpha based on standardized items	0.617
4	Mean Item Difficulty	0.56
5	Mean Item Difficulty	0.41

In an achieved test, all of the selected area items have to measure this type of construct, now no longer an exceptional one. Similarly, items are dichotomously scored '1' correct '0' wrong. Moreover, in item analysis, Cronbach's Alpha and Kuder-Richardson (KR-20 and 21) have an equal procedure; however, KR-20 is marked for dichotomous variables as it's like in the computer subject test items. The test's standard internal consistency reliability as measured with the assist of using the KR-20 is 0.620, which is low in correspond with the (Nunnally, 1978; Raykov & Marcoulides, 2011) that recommends a suitable value of 0.70. KR20 is usually considered a higher reliability estimation than (Lenke, 1977; Traub & Fisher, 1977).

Finding the reliability coefficient (Estimation of Internal Consistency) of the computer subject examination items discovered that the items have low and unacceptable internal consistency reliability; this can result from the reliability coefficient is less than the recommends an acceptable value of 0.70 (Nunnally, 1978; Raykov & Marcoulides, 2011). Also, as it is in literature review , KR20 is considered a much better reliability estimate than KR21 (Lenke, 1977; Traub & Fisher, 1977). This suggests that the computer subject examination cannot be considered a good and reliable tool to assess students' computer subject ability, therefore failing to satisfy its purpose. Similarly, test items with poor reliability values don't measure an equivalent skill or ability or are confusing or dishonorable to examine (Compton, Hankerson-Dyson, & Broussard, 2011).

The differences between alpha and standardized alpha are (usually) small. Regular alpha is based on covariances. Standardized alpha is based on correlations (which can be thought of as based on standardized covariance or standardized variables). The latter alpha is based on the assumption that all of the items have equal variances, which is often not practical (Osburn, 2000; Peterson & Kim, 2013). The Findings of Cronbach's Alpha which were Based on Standardized Items, were 0.617.

Research question 2: What are the levels of Jordanian high school students' performances in the computer subject?

To answer this question, the mean and standard deviation with the percentage of the students' performances were computed and presented in Table 3 below.

Table 3. The performance of students in the computer subject

N	Indicator	Value
1	Maximum Total Score	100
2	Number of Students	200
3	Mean Score	47.02

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.123

4	Standard Deviation (SD)	16.493
5	The Performance %	47.02%

Table 3 above reveals the mean students' academic achievement measured by their performance in the computer subject. The results illustrated that the computer subject's mean performance to be M=47.02, standard deviation SD=16.493 (47%). This result shows that the students' achievement in the computer subject is below average (50%).

Comparing the hypothetical pass mark of 40.00 with the student's mean scores of 47.02, the students performed above the computer subject's pass mark. Furthermore, the overall students' achievement in computer subject is below average. Besides, considering the requirements for admission into higher learning institutions in Jordan at the credit level (50%), the overall Jordanian high school student's achievement in computer subject is unsatisfied and did not meet the mentioned standard.

This finding means that students' achievement in computer subject examination is well all below average as measured by the students' mean scores in their academic performances in computer subject examination. The student's achievements in the computer subject are below average and credit level (50%), which is an indication that performance is unsatisfactory and did not meet the requirement for admission into higher institutions of learning in Jordan.

***Hypothesis 1*:** There is no significant gender difference in students' performance in the computer subject.

To test the first hypothesis, male and female students' mean computer subject performances were used to test differences. The coefficient of the differences was specified using a two-tailed t-test at a 0.05 level of significance, as offered in Table 4 below.

Table 4. Difference between male and female performance in computer subject

Sex	N	Mean	SD	df	t	sig. (2-tailed)	HO1
Male	110	51.08	9.360				
				198	9.45-	0.00	Rejected
Female	90	40.60	12.071				

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The descriptive statistics and the test for differences using the independent sample t-test obtained, as shown in Table 4, indicates that on average percentage, male students performed better (M = 51.08, SD = 9.360) than female students (M = 40.60, SD = 12.071), where t (198) = -9.45, p = 0.00, α = 0.05. The result of the analysis revealed that male students' mean is significantly higher than the mean of the female. This implies that there is a significant gender difference in Jordanian high school students' performance in the computer subject. Meaning that male students performed better than female students in computer subject.

The finding shows that the males have higher mean scores than females in their academic performances in computer subjects. This indicates that the male performed better than the female in the computer subject. This difference in favor of male students is statistically significant.

This finding is consistent with that of (Chee, Pino, & Smith, 2005; Marcenaro–Gutierrez, Lopez–Agudo, & Ropero-García, 2018) who discovered a significant gender difference between the students' academic achievement in different courses at many times. However, the finding is in contrast with that of (Abubakar & Oguguo, 2011; Dania, 2014) who stated that gender difference in academic achievement has been disappeared.

***Hypothesis 2*:** There is no statistically significant difference in students' performance in the computer subject concerning school location (city, suburbs).

To test this hypothesis, the mean computer subject performances of (city and suburbs) students were used to test differences. The differences' coefficient was determined using two-tailed t-tests at a 0.05 level of significance, as presented in Table 5 below.

Table 5. Students' performances with school location (city and suburbs)

Location	N	Mean	S.D	t	df	sig. (2-tailed)	HO1
City	96	39.95	10.40				
				6.16	198	0.00	Rejected
Suburbs	104	48.04	12.30				

The descriptive statistics and a test for differences using the independent sample t-test obtained, as shown in Table 5, indicate that suburbs school students on the average performed better (M = 48.04, SD = 12.30) than cities school students (M = 39. 95, SD = 10.40), Where t (198) = 6.16, p = 0.00, α = 0.05. The analysis revealed that the mean of the suburbs school students is statistically and significantly higher (t = 6.16, df = 198, two-tailed probability <

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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0.05) than the city students' mean. The null hypothesis, which says there is no statistically significant difference in students' performance in the computer subject to school location, is therefore rejected since 0.00 < 0.05. This implies a significant difference in performance between city and suburbs school students in the computer subject. The difference was in favor of suburbs, meaning that they performed better than city school students in the computer subject. This is evident because the mean scores recorded were 48.04 and 39.59 for suburbs and city school students, respectively, which were significantly different. The conclusion is that suburban school students do well in computer subject achievement tests than city school students.

This result is possible since the computer subject is taught at both suburb and city schools and is made for both conventional and sciences specialized schools. In Jordan, the suburbs received equality in education when they were all treated equally and had access to similar learning resources. Equity, on the other hand, is achieved when all students receive the resources they need to be able to graduate prepared for success after high school, and this thing what the Jordanian schools achieved. In today's educational environment, more suburban schools are reexamining how they measure up on equality and equity and are taking steps to ensure that all students are taught by qualified educators who are fully prepared for teaching and supported throughout their careers. Educational resources and the funding that supports them also have crucial roles in both equality and equity. On the other hand, by providing all students access to high-quality college-and career-ready curriculum, certified teachers, and up-to-date instructional materials and tools -- including computers and related technology -- suburbs schools can more adequately provide their students with the resources they need to be prepared in today's ever-changing world, overall all these motivational points helped the Jordanian students in suburbs areas on getting the satisfying result in the current computer subject test.

Implication for measurement and evaluation of learning:

The findings highlighted some important implications for educational measurements and evaluation of learning, especially in the quality of the test items and item bias. Evaluation of students' learning is an important part of teaching and learning process because it is used to make sure the school objectives and curriculum objectives could be assessed. The quality of learning and evaluation systems which were used are conceptually related; where it is vital and a must for science teachers to understand the relationship between standardized tests and curriculum.

The results obtained through testing and test scores have an important use for Jordan's educational system. The score results are used to make an informed decision on the suitability of students for promotion and placement in an appropriate position or classes as the case may be. In this case, the instrument that used computer subject in this study, should be of adequate quality to perform its expected roles. The test has not good psychometric characteristics, that's why school administrators and measurement community face some challenges to make

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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sure that only valid and reliable instruments are used in assessing students' true ability in Jordanian schools.

The computer subject test which was used in this study has been administered to the homogenous samples in terms of gender and schools' location and these different groups of students at the same level of study received instructions from the same curriculum content with almost the same facilities, but the resources affected their performances. In normal circumstances, even with the presence of psychological factors, such a difference should not be a huge matter; however, the significant difference obtained in this study might be due to the presence of bias in the test items. This means that some items favor one group of students over others, which signifies the presence of differential item functioning or item bias in the computer subject test used in this study. In educational; settings, especially classrooms, all decisions are being made using test scores. Jordan has been a heterogeneous country with diverse geographical locations and religions. The test items to be used in assessing students at all levels should be fair to all. Otherwise, if the test items are potentially biased, it might lead to different performances in this study, there is a major concern regarding the validity of scores to warrant a decision-making process.

Conclusion

The study examines the performances of Jordanian high school students in the computer subject; based on its findings, it can be concluded that the computer subject test which was used in (Jordan /Irbid) qualifying examinations to assess students potential ability in the computer subject is not reliable measurement tool based on its internal consistency coefficient and that, the academic achievement of students in the computer subject is below average and unsatisfied despite the hypothetical pass mark is within the normal limit. Secondly, gender differences in students' computer subject achievement exist. This implies distinguishing differences in students' cognitive, affective, and psychomotor achievements concerning gender and school locations. Finally, the computer subjects which are taught at the high school are ready to prepare students to study technology-oriented courses at higher institutions.

Recommendation

Based on the findings of this study with considering the significant and vital role of computer subject globally and in Jordan, it is recommended that;

i. Computer subject items test is used in assessing students' performances in Jordan/Irbid where qualifying examinations should be made to pass through standardization processes. This will help in addressing the silent issue of test bias raised in this paper and properly addressed reliability and validity inadequacy found in the instrument. When these steps are

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properly followed, the instrument would be valid and reliable to make inferences and decisions regarding students' ability and justification of attaining the objective spelled out in the curriculum.

ii. Policymakers should promote programs and provide facilities that could be used in teaching the computer subject to help remove the dreaded difficult parts in the computer subject. Similarly, they should ensure strict adherence to the assessment policies and procedures spelled out in the curriculum.

iii. computer subject teachers should adopt innovative teaching strategies to teach some of the difficult topics in computer subjects and present the difficult concepts in clearer terms, starting from simple to complex.

v. Teachers and other stakeholders should encourage students to develop good study habits to improve their academic achievement in the computer subject.

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