**Differential validity of the GAT Admission test in Saudi Arabia**

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**Abstract**:

Several admission criteria have been used to predict university GPA in Saudi Arabian Universities. The General Aptitude Test (GAT) was introduced eleven years ago by the National Center for Assessment in Higher Education. The test has two parts, verbal and quantitative. All items are in the multiple choice format.

High school students may register for the test in either the 11th grade or the 12th grade. Many studies of its validity have been conducted, especially its predictive validity. All these studies have concluded that the test has predictive validity comparable to other internationally known tests such as the SAT. Other validity evidences are continually gathered. This study is intended to investigate GAT’s construct validity and assess its differential validity. It aimed to answer the following question: When partialling out the effect of the high school GPA, does the GAT score differentiate high scorers from low scorers in university GPA? The findings indicate that regardless of the HSGPA magnitude the GAT score changes gauge the changes in FYGPA.

**Introduction:**

Typically admission criterion was used to predict grade point average of the first year in universities (FYGPA). Some studies emphasize the importance of high school GPA while other studies put more emphases on admission tests such as SAT or ACT. For example, Morgan (1989) studied the predictive validity of the SAT and HSPGA over a period of ten years. The findings indicated that SAT predictive validity decreased slightly from .51 to .47. However, Krick and others (1997), and Geiser and Studley (2003) stress the importance of HSGPA and SAT in predicting FYGPA. In the other hand, some researchers stress the importance of HSGPA for predicting FYGPA over the SAT. For example, Geiser and Santelices (2001) found high correlation between HSGPA and FYGPA. They argue that standardized tests should be deemphasized in college admissions. Similarly, Course and Trusheim (1988) argued that the increment in R, or for that matter R 2 , by adding SAT scores to the regression model is so small as to make the SAT useless. Cimetta and others (2010) indicated that HSPGA and SAT were more important than state standard-based examination.

Kobrin (2002) studied the effect of SAT and HSGPA when they are in contradiction. The findings showed that when SAT score is high, FYGPA is high, regardless of the HSGPA. Kobrin concluded that SAT is more precise predictor of FYGPA than HSGPA. In a study by Ramist, and McCamley-Jenkins (1994) predictive validity of SAT on 45 colleges and universities were examined. Students were grouped according to: ability level (high, medium, low), gender, English as best language, and racial/ ethnic group. They found that For ability levels, based on SAT scores and high school grade point average (HSGPA), the SAT was more predictive for the high ability students ( r= 0.59 ) than for the low-ability group ( r= 0.43 ).

Validity of the GAT has been studied BY the National Center for Assessment in Higher Education (NCA). Figure1 summarize the finding of such studies. It can be seen that GAT correlation with other measures ranges from 0.51 to 0.72. The correlations with similar tests are moderately high such as the correlation with post- graduate General Aptitude Test (POSTGAT), SAT-M, and Standardized Achievement Admission Test (SAAT). However, correlations with HSPGA, FYGPA, and SAAT are moderate. Correlation with SAT critical reading is reasonable( NCA report, 2011)

Figure1: Correlation of the GAT with other measures.

However, the importance of GAT admission test over HSGPA or vs. versa has not been studied in Saudi Arabia. Thus, the purpose of the current study is to assess the importance of GAT in predicting FYGPA. The study aimed to answer the following question: when selecting a high performance students based on HSGPA, does high and low scorers on GAT associated with high and low performance on FYGPA?

**Methods**

Data set:

The present study has used a data set from the data base of the National Center for Assessment in Higher Education (NCA). These data were gathered regularly form universities after one year from admission to study students' performance at each one. Science and art major students who have been admitted to seven major universities were included in the study. Thus, a total of 48476 student's records enrolling in seven major universities were included in the study.

GAT Admission Test:

The General Aptitude Test (GAT) was developed to satisfy the need for a standardized measurement of scholastic aptitude for use by institutions of higher learning. The original GAT Arabic Version has been in use for several years as one of the major tools in selecting those who will be admitted to universities and colleges throughout the Kingdom as well as in some other Arab countries. The test is offered in Arabic and English**.**

However, the GAT uses language and mathematics to measure the following abilities:

1. Reading comprehension

2. Logical relations

3. Problem-solving behavior

4. Inferential abilities

5. Inductional abilities

All questions are multiple choices, with four possible answers marked as A, B, C, and D. The test-takers select the best answer and mark their choice on the answer sheet. The answer sheets are then machine scored.

Some of the questions in the GAT are non-scorable items and are not counted toward the score of the test-taker. Rather, they are included as trial items which are used in future tests.

The test-takers’ scores are calculated only on the 120 questions of the actual GAT test; 68 of these questions are verbal and 52 are quantitative. To enhance security there are 5 forms of each test. The overall duration of the test is 3 hours.

The Center follows established scientific methods in preparing its tests and follows standards that insure quality and accuracy. The formation process of the test can be summarized as follows:

1. Scientific Preparation:The Center uses only qualified professionals in Verbal, Math, and IQ item writing as well as professionals in Psychometric Testing. It holds several regularly scheduled four-day workshops in test objectives and item writing, depending on need.

2. Item Writing:The Center asks the workshop participants to write questions for the various test components according to the assigned requirements and objectives of the test.

3. Registration:When items are sent to the Center, each item is assigned a special code number that remains with it in the item bank, whether or not the item is actually used. Likewise, each item writer is also given a code number in order to insure anonymity and avoid any kind of personal bias.

4. Reviewing:With anonymity of the item writer assured, each item is reviewed by a committee which consists of three members: (1) a field specialist, (2) a specialist in measurement and (3) a neutral person who may be an advocate for the test-taker or the society at large. The Reviewing Committee scrutinizes each item for: content, domain, and bias towards sex or region, difficulty, creativity, suitability of each stem and/or choices. When the item is selected for use in a test, it is reviewed for a second time to insure accuracy and adherence to the test requirements.

5. Trial Items:Several items are incorporated within a test as try-out items. Test-takers are not aware of which items are in this category. Only the real items in the test are scored for the test-takers.

6. Analysis:All try-out items are statistically analyzed and reviewed. Items that show good statistical parameters are then stored in the item bank for future tests. The bad try-outs are revised and tested again or discarded if not correctable.

1. Test Formation: In order to insure security, the actual test in its final shape, including the trial items, is used to generate alternate forms. All items that form the test are arranged randomly. Care is taken that each section has different ideas and difficulty levels. The objective is to obtain equally balanced forms with ascending difficulty in each section, thus insuring that the score obtained reflects the real level of the test-takers. Finally, tests are printed in booklets that contain general instructions as well as specific instructions for each section. Example questions and how to answer them are on the back cover page of the test booklet.
2. Every time the test is given, the reliability of the test is calculated. It has been found that the reliability coefficient has never been less than 0.91. Parallel form correlation between any two different versions of the test is not less than 0.88 if the test is given within three months.
3. The GAT mean is set as 65 and a standard deviation as10.

As for the validity of the test, the Center makes sure that test items are not biased to a particular region. Also, test predictive validity is checked every year for all students who take the test. At the universities the optimal weight for both the test and the high school grades is studied with regression analysis; concurrent validity between the test and HSGPA is also calculated. The value of the correlation is 0.56. Also, the correlation between the standardized achievement test (SAAT) developed by the Center and the GAT is 0.68. Thus, all indicators suggest that GAT is a valid measure and its predictive validity when combined with high school grades is reasonable. However, the test is more predictive of university performance than HSGPA.

**Definition of terms:**

HSGPA: IT is an accumulative score of 11th and 12th grades summative report presented as a percentage.

FYGPA: It is a scale ranging from 1 as an indication of failure to 5 as an indication of excellence.

Data Analysis:

Initial data poll contains 48467 student records. Because our target poll is the records of students who got 95 or more out of a hundred in high school, the number of records satisfying this condition was 40087.

T-test was used to investigate differences between mean FYGPA of high and low scorers in GAT. Graphical representations of the relation between scores in the studied variables are used.

Results

Descriptive statistics of the data are showing in table 1 for the seven universities. As can be seen, the admitted student has a GAT mean (72.54) which is better than the national average of 65. However, GAT average score is highest for KFUPM followed by TU and KAU. KFUPM does not admit student who has a GAT less than 70. This may explain the high average of KFUPM.

The HSGPA average for the selected students is 89.42 which are not far from the national average of 85.30. However, the highest average is, again, obtained by KFUPM (96.73) followed by TU and KSU. Taibah University got the highest FYGPA (4.25). The high average may be due to small selected group coupled with stringent selection criteria.

However, range-restriction is evident in KFUPM to a great degree and to a lesser degree in KAU and IU.

Table1: descriptive statistics for HSGPA, GAT, and FYGPA for seven Saudi universities.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | University GPA | | | GAT | | | High School | | |
| Mean | Count | Standard Deviation | Mean | Count | Standard Deviation | Mean | Count | Standard Deviation |
| King Fahad university for petroleum and minerals ( KFUPM) | 3.63 | 1944 | .99 | 86.01 | 1944 | 4.59 | 96.73 | 1944 | 3.06 |
| King Khalid university ( KKU) | 2.99 | 8945 | .91 | 70.76 | 8945 | 8.23 | 92.23 | 8945 | 5.20 |
| Um Alqura university (UQU) | 3.39 | 15016 | .97 | 68.99 | 15016 | 9.00 | 85.37 | 15016 | 9.11 |
| King Abdulaziz university ( KAU) | 3.48 | 6111 | .59 | 76.15 | 6111 | 6.86 | 91.28 | 6111 | 5.21 |
| King Saud university ( KSU) | 3.54 | 11158 | .87 | 74.59 | 11158 | 8.24 | 92.91 | 11158 | 6.11 |
| Islamic university (IU) | 2.59 | 4096 | 1.15 | 66.79 | 4096 | 7.95 | 80.53 | 4096 | 7.09 |
| Taibah university (TU) | 4.25 | 1206 | .77 | 78.86 | 1206 | 6.13 | 96.56 | 1206 | 3.33 |
| Over All | 2.97 | 48476 | 1.03 | 72.54 | 48476 | 9.19 | 89.42 | 48476 | 8.21 |

**Group differences:**

The cut-off score for high score performance is set to be 1.5 standard deviation. Thus, student who gets lower than 80 is considered a low performance student. However, student who gets 80 or more is considered a high performance student. Table 2 shows t-test results for each university. All universities, except, TU had a significant differences between high and low scorers of GAT in FYGPA means. Thus, getting high score in HSGPA does not mean getting high FYGPA in general, but getting high score in GAT will result in getting high score in FYGPA in general. The differences are more apparent in KAU, UQU, and KSU.

Table2: T-test analysis of the differences between means' level of significant for the low and high scores in GAT.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **University** | **Cut Point** | **Number of students** | **Means** | **T-test value** | **DF** | **Sig** |
| King Fahad university for petroleum and minerals. | Low | 94 | 3.336 | -2.979 | 1, 1316 | .00 |
| High | 1224 | 3.652 |
| King Khalid university. | Low | 7981 | 2.985 | -2.663 | 1, 8820 | .01 |
| High | 841 | 3.073 |
| Um Alqura university. | Low | 8838 | 3.309 | -23.486 | 1, 10180 | .00 |
| High | 1344 | 3.956 |
| King Abdulaziz university. | Low | 4168 | 3.369 | -23.243 | 1, 5971 | .00 |
| High | 1805 | 3.737 |
| King Saud university. | Low | 6748 | 3.401 | -22.074 | 1, 9586 | .00 |
| High | 2840 | 3.824 |
| Islamic university. | Low | 3540 | 2.517 | -14.811 | 1, 3810 | .00 |
| High | 272 | 3.562 |
| Taibah university. | Low | 139 | 4.251 | .132 | 1, 390 | .89 |
| High | 253 | 4.241 |

**Graphical Representation:**

The average HSGPA for the total data set is more than 91 out of a hundred for five out of seven universities. This means that approximately 50% of the students at these universities have a HSGPA greater than 90. This score put them at the excellent level. However, does this excellence label persist at the university education? The answer is no. because the average FYGPA for these universities is far from 4.50 which correspond to the excellent level.

However, KFUPM is highly selective university. This was reflected in the magnitude of scores in HSGPA and GAT, and FYGPA.

Appendix A show graphical representation of GAT, HSGPA, and FYGPA ( tables A through table G ). One can notice that despite the low range of scores for the HSGPA GAT varies considerably. In fact it gets as low as 68 ( see KKU, and IU graphs ), and as high 95 ( see IU graph ).

Figure 1: average score for GAT, HSGPA, and FYGPA for the all Universities

**Discussion**

Studies of the importance of variables in predicting performance in universities and colleges have contradictory results. Some has favored school achievement variables

(Course and Trusheim, 1988; and Geiser and Santelices, 2007), others have favored aptitude variables. The present study resides with studies favoring aptitude variable (Korbin, 2002; Ramist and McCamley-Jenkins, 1994). In fact, General Aptitude Test score change reflects changes in university grade point average. This finding is supported by many studies that place more emphasis on SAT or ACT in college admission. As for the main question of the study, it is apparent that GAT score is more silent in university education than HSGPA which adds up to the accumulated evidence of the validity of the GAT.

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**Appendix: A**

Figure A1: average score for GAT, HSGPA, and FYGPA for all Universities

Figure A2: average score for GAT, HSGPA, and FYGPA for Islamic University

Figure A3: average score for GAT, HSGPA, and FYGPA for KAU University

Figure A4: average score for GAT, HSGPA, and FYGPA for KFUPM University

Figure A5: average score for GAT, HSGPA, and FYGPA for KKU University

Figure A6: average score for GAT, HSGPA, and FYGPA for KSU university

Figure A7: average score for GAT, HSGPA, and FYGPA for TU university

Figure A8: average score for GAT, HSGPA, and FYGPA for UQU university