

## **The Effect of Iranian University Entrance Examinations and High School Grade Point Average on Iranian Agriculture Students' Achievement**

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### **ABSTRACT**

The present study investigated the effect of Iranian university entrance examinations and the high school grade point average (HSGPA) on agriculture students' achievement. The population included 598 admitted students at the Faculties of Agriculture and Natural Resources, University of Tehran. The specific variables of the study included college grade point average (CGPA) and average of major field specialized courses (FSGPA) as dependent variables. Also, scores in mathematics, physics, biology, and chemistry at the university entrance examinations record (UEX), along with high school grade point average (HSGPA) were the independent variables of the study. The results indicated that high school grade point average (HSGPA) was a significant predictor of agriculture students' academic achievement. With the exception of Food Sciences, there was no significant relationship between the scores in mathematics and students' academic achievement in fields related to agriculture.

**Keywords:** High school grade point average (HSGPA), Average of major field specialized courses (FSGPA), Achievement, University entrance examinations (UEX), College grade point average (CGPA).

### **INTRODUCTION**

High level training of the workforce to meet the economic, political, and social needs of the society is one of the tasks undertaken by universities and higher education centers. Given the high costs invested in providing advanced education at a standard level, admission to higher education centers and the benefits from the training offered in such centers are subjects of great importance in all countries throughout the world. In recent decades, there has been an increasing trend in submitting applications for higher education admission. The number of high school graduates expecting to enter higher education institutions has far exceeded the existing admission capacity. This has necessitated adopting a screening mechanism like the

university entrance examinations to reduce the number of applicants (Hedjazi, 2002; Duncan-Hewitt, 1996). The objective of university entrance examinations is to predict students' potential for achievement as a candidate who wishes to enter higher education centers.

One of the most commonly used predictors of academic success (university grade point average) are standardized college admissions tests. However, they are incomplete predictors of how well a student will do in college coursework; they are necessary but not sufficient markers of progress and prognosis (Ransdell, 2001). Current research indicates that standardized college admissions tests such as the Scholastic Aptitude Test (SAT) and the American College Test (ACT) account for no more than about 20% of the variances in first-year GPA (Linn, 1989). Pharr, et.al (1993)

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examined the relationships between ACT/SAT scores, sophomore GPA, and GPA in lower level business courses and performance in upper level business and university courses, and found that these predictor variables had a significant effect on performance, with ACT/SAT being a much weaker predictor. Shen and Comrey (1997) studied academic performance of medical students and found that Medical College Aptitude Test (MCAT) scores were significant predictors of student performance but scores of premedical GPAs were not predictors of academic performance. Tekian (2001) reviewed 11 years of research regarding the admissions process in medical educations and suggested that GPA and MCAT could not predict a large proportion of student performance. Houglum, et.al (2005) studied predictors of academic success and failure in a pharmacy professional program. Academic performance measures in this study were cumulative GPA, science GPA, American College Test (ACT) and average organic chemistry grade. Findings of the study demonstrated a significant correlation between higher science grades, prior degree and higher organic chemistry grades and higher scores on the ACT with students who transfer to a four-year college and students who succeed. Platt, et.al (2001) conducted a study with the objective of investigating preadmission criteria, Scholastic Aptitude Test (SAT) scores, and high school grade point average (HSGPA) and to determine the ability of those criteria to predict the college grade point average (CGPA) of graduates from programs in athletic training and five other allied health disciplines. Both SAT score and HSGPA were found to predict 14% of the variance in student success (CGPA) in all allied health programs; however, only HSGPA was predictive of student success in athletic training.

Several studies suggest that high school grade point average (HSGPA) is a somewhat better predictor of college GPA. Downey (2002) found that GPA of incoming college students and total SAT score were significant predictors of dental hygiene students at graduation. The authors also found that incoming students' GPA was a significant

predictor of the National Board Dental Hygiene Examinations scores. Ting and Robinson (1998) concluded that high school grade point average GPA was the most significant predictor of first-year GPA. Hedjazi (2002) showed that high school grade point average is a moderate predictor of graduating GPA.

Lynch (2006) studied the relationship between the Leaving Certificate Examinations as selection examinations for entry into university education in Ireland and student performance in the university. Whilst there was a significant relationship between performance in the Leaving Certificate Examinations and the First Dental Examinations, there was no relationship between performance in the Leaving Certificate and the Final Dental Examinations. There was a significant correlation between performance in the Leaving Certificate Examinations and performance in seven of the 55 program modules, all of which were pre-clinical modules, and of which five were related to basic sciences.

Tsai (2006) examined the effect of the multiple enrollment admission channel system on the academic achievement of physical education students in Taiwan's normal universities and universities of education. The result of comparing means indicated that the effects of admission channels, years in college and gender were statistically significant. By applying regression analysis, findings showed that there was a 13.2% variance in the first-year GPA in physical education obtained through the "General Subject Ability Test" including high school GPA, the highest level of sport experience, gender, participation in a sport club before college, and the highest level of education.

Truell and Woosely (2008) studied admission criteria as predictors of business student graduation. The criteria were math, business statistics, computer, and English scores. Results of this study showed that business statistics was positively associated with high probabilities of graduation and the GPA.

Dlamini (1995) showed that although mathematics grade was not found to be the best predictor of academic performance, it had a high correlation with the school related variable. The study implied that, the overall grade, science and even mathematics should be considered in admitting a student to a further training in agriculture.

The university entrance examinations record (UEX) has served as a determinant for students' entry into higher education in Iran since 1969 (Saae, 1998). Every July, these examinations are taken by four groups of candidates including the students of mathematics and physics, natural sciences, humanities, and arts. The examinations include two sections:

1) General Test, covering the subjects of literature, Arabic, English as a second language, and theology.

2) Specialized Test, comprising of the subjects of mathematics, physics, biology and chemistry.

Only for a few years, high school grade point average (HSGPA) has also been used as an admission criteria. Comparing with other admission criteria, the high school grade point average (HSGPA) has had less weight in the student admission.

The procedure of students' admission in universities is such that every student takes part in the entrance examinations, and then those having earned the highest scores will be accepted in their preferred academic field given the university admission capacity. The students apply for admission to particular majors. In other words, some majors are more demanding than others and consequently these majors are more difficult to get into than others. Regarding the present procedure, the question for admission of agricultural students is:

1. Can the materials included in the university entrance examinations (UEX) on subjects such as biology, mathematics, physics, and Chemistry assess the abilities and competencies of students who intend to study in agricultural majors?

2. Can high school grade point average (HSGPA) predict student academic achievements in agriculture?

3. Which subject (i.e. mathematics, physics, chemistry or biology) can predict the students' academic achievements in agriculture?

### Purpose and Objectives

The purpose of this study was to investigate the effect of university entrance examinations (UEX) and high school grade point average (HSGPA) on predicting students' achievement in agriculture at the University of Tehran. Pursuing the research objectives, the following hypotheses are assumed:

1. There are significant relationships between university entrance examinations (mathematics, biology, chemistry and physics) and high school grade point average (HSGPA) and college grade point average (CGPA) in different majors in the Faculties of Agriculture and Natural Resources, University of Tehran.

2. There is a significant relationship between university entrance examinations (mathematics, biology, chemistry and physics) and high school grade point average (HSGPA), with average of major field specialized courses (FSGPA) of the study major in the Faculties of Agriculture and Natural Resources, University of Tehran.

## MATERIALS AND METHODS

### Population and measurement

The target population consisted of all 598 undergraduate students (57.8% male and 42.2% female) who entered, University of Tehran. All 10 departments of the Faculty of Agriculture namely, Agricultural Education and Extension (n=62), Agricultural Economics (n=54), Horticulture (n=64), Animal Sciences (n=63), Soil Sciences (n=57), Crop Production (n=52), Plant Protection (n=58), Food Sciences (n=61), Agricultural Machinery



(n=65) and Irrigation (n=62) were involved in the study.

Data were obtained from official records consisting of two parts. Part one included scores of physics, chemistry, mathematics, and biology at the university entrance examinations (UEX) and high school grade point average (HSGPA), and Part two included scores of college grade point averages (CGPA) and average of major field specialized courses (FSGPA). Achievement indicators were considered as college grade point average and averages of major field specialized courses in each major.

### Variables

Dependent variables were college grade point average (140 course data) and average of major field specialized courses (36 course data). Independent variables were high school grade point average (HSGPA) and scores in university entrance examinations (UEX) including mathematics, physics, chemistry and biology.

### Data analysis

Data were analyzed using Pearson product moment correlation and multiple

regression analysis. These two tests were carried out in two stages. In the first stage, the relationships between high school grade point average (HSGPA) and university entrance examinations scores (UEX) and college grade point average (CGPA) were assessed. In the second stage, an assessment was made of the relationships of those two factors (HSGPA and UEX) with the average of major field specialized courses (FSGPA). All data were analyzed using the SPSS for Windows, version 11.5.0.

## RESULTS AND DISCUSSION

Extracting data from the database, adjusting grade point variable, running the regressions, and doing various comparisons in this study, the results are as follows:

### Hypothesis one

The results of Pearson correlation between university entrance examinations (UEX) and high school grade point average (HSGPA) and college grade point average (CGPA) are presented in Table 1. There was a significant correlation between college grade point average and high school grade point average in all agricultural fields with the exception of

**Table 1.** The results of Pearson correlation: relations between universities entrance examinations (UEX) and high school grade point average (HSGPA) and college grade point average (CGPA).

Field of study	University Examinations				
	HSGPA	Math	Physics	Chemistry	Biology
Agriculture economics	0.415**	0.423**	0.447**	0.068	0.071
Irrigation	0.297*	0.091	0.395**	0.130	0.118
Agriculture machinery	0.402**	0.040	0.204	0.293	0.093
Animal sciences	0.521**	0.141	0.294*	0.370**	0.466**
Horticulture	0.563**	0.220	0.327*	0.425**	0.341*
Food sciences	0.611**	0.544**	0.655**	0.508**	0.611**
Crop production	0.186	0.081	0.131	0.064	0.318*
Soil Sciences	0.749**	0.174	0.124	0.382**	0.211
Plant Protection	0.605**	0.186	0.038	0.317*	0.368*
Agriculture extension and education	0.337*	0.286*	0.275*	0.184	0.049

\* P< 0.05

\*\* P<0.01

crop production. The relationship between college grade point average and subjects in the university entrance examinations in different majors of agriculture were as follows:

- Physics score was significantly related to scores from irrigation, food sciences, agricultural economics, animal sciences, horticulture and agricultural extension and education.

- Mathematics score was significantly correlated with scores from food sciences, agricultural economics and agricultural extension and education.

- Biology score was significantly correlated with scores from animal sciences, horticulture, food sciences, crop production and plant protection.

- Chemistry score was significantly correlated with scores from soil sciences, animal sciences, horticulture, food sciences and plant protection.

On the basis of the students' type of Diploma degree (mathematics and physics or natural sciences degree), the 10 majors were categorized into the two corresponding groups. Group one included animal sciences, horticulture, food sciences, crop production, soil sciences, plants protection and agricultural extension, and education (natural sciences Diploma degree) whereas group two included majors of irrigation, agricultural economics, and agricultural machinery (mathematics and physics Diploma degree).

The relationship between high school grade point average (HSGPA) and record in university entrance examinations (UEX) and college grade point average (CGPA) for

majors of animal sciences, horticulture, food sciences, crop production, soil sciences, plants protection and agriculture extension and education was studied through step-wise multiple regression procedure. As it can be observed in Table 2, high school grade point average, mathematics score, physics score, chemistry score, and biology score explained a statistically significant portion of the variance ( $R^2 = 0.72$ ) associated with college grade point average. Biology score explained the greatest amount of variance for college grade point average (47.2 %). Table 2 results also indicated that high school grade point average was the most effective variable on the changing variance of the dependent variable (Beta value of 0.048).

To predict variables including the college grade point averages in irrigation, agriculture economics, and agriculture machinery, stepwise multiple regressions were used. Results revealed that high school grade point average, mathematics, physics, and chemistry scores explained a statistically significant portion of the variance ( $R^2 = 0.552$ ) associated with college grade point average (Table 3). High school grade point average explained the greatest amount of variance for college grade point average (47.1%). Results presented in Table 3 also showed that high school grade point average was the most effective variable on the changing variance of the dependent variable (Beta value of 0.050).

### Hypothesis two

The second objective of the research was to describe the relationship between scores

**Table 2.** Stepwise regression of the relationships between university entrance examinations (UEX) and high school grade point average (HSGPA) and college grade point average (CGPA).

Independent Variables	R	R <sup>2</sup>	F	B	Beta	t	Sig
(Constant)				1.470	0.231	6.354	0.000
Biology Score	0.695	0.472	123.4	0.293	0.041	7.086	0.000
Mathematics Score	0.828	0.665	133.8	0.250	0.042	6.005	0.000
HSGPA	0.831	0.690	99.26	0.159	0.048	3.327	0.001
Chemistry Score	0.842	0.707	80.29	0.114	0.036	3.127	0.002
Physics Score	0.848	0.72	67.78	0.102	0.031	2.431	0.016

Dependent variable: college grade point average

**Table 3.** Stepwise regression between university entrance examinations (UEX) and high school grade point average (HSGPA) and college grade point average CGPA (Irrigation, Agricultural Economics and Agricultural Machinery).

Independent Variables	R	R <sup>2</sup>	F	B	Beta	t	Sig
(Constant)				2.672	0.247	10.823	0.000
HSGPA	0.691	0.471	121.1	0.353	0.050	6.989	0.000
Physics Score	0.722	0.518	72.7	0.189	0.045	4.173	0.000
Mathematic Score	0.736	0.536	41.01	0.139	0.043	2.389	0.018
Chemistry Score	0.749	0.552	35.29	0.126	0.032	2.148	0.034

Dependent variable: college grade point average.

in university entrance examinations (UEX) and high school grade point average (HSGPA) and average of major field specialized courses (FSGPA). The results of Pearson correlation are shown in Table 4. There was a significant correlation between average of major field specialized courses and high school grade point average in animal sciences, horticulture, food sciences, soil sciences and plant protection. The relationships between average of major field specialized courses and subjects in the university entrance examinations in different majors were as follows:

- Physics score was significantly related to scores from irrigation, agricultural machinery and food sciences.
- Mathematics score was significantly related to scores from food sciences.
- Chemistry score was significantly

related to scores from animal sciences, horticulture, food sciences and soil sciences.

- Biology score was significantly related to scores from animal sciences, horticulture, food sciences and plant protection.

A regression procedure was used to examine the variance in average of major field specialized courses by high school grade point average (HSGPA) and university entrance examinations (UEX) for animal sciences, horticulture, food sciences, crop production, soil sciences, plants protection and agriculture extension and education. As shown in Table 5, chemistry score explained the greatest amount of variance for college grade point average in average of major field specialized courses (10.1%). The independent variables entered into the equation, explained a statistically significant portion of the variance ( $R^2 = 0.366$ )

**Table 4.** The results of Pearson correlation: relationships between university entrance examinations (UEX) and high school grade point average (HSGPA) and average of major field specialized courses (FSGPA).

Field of study	University Examinations				
	HSGPA	Math	Physics	Chemistry	Biology
Agricultural economics	0.050	0.088	0.063	0.018	0.063
Irrigation	0.109	0.071	0.414**	0.101	0.162
Agricultural machinery	0.117	0.180	0.330*	0.128	0.134
Animal sciences	0.427**	0.105	0.078	0.325*	0.364*
Horticulture	0.369**	0.012	0.075	0.305*	0.320*
Food sciences	0.504**	0.500**	0.598**	0.472**	0.496**
Crop production	0.041	0.072	0.095	0.039	0.081
Soil Sciences	0.701**	0.189	0.102	0.374**	0.077
Plant Protection	0.521**	0.172	0.127	0.180	0.306*
Agricultural extension and education	0.075	0.091	0.105	0.134	0.125

\* $P < 0.05$       \*\* $P < 0.01$

**Table 5.** Stepwise regression of university entrance examinations (UEX) and high school grade point average (HSGPA) and average of major field specialized courses (FSGPA).

Independent Variables	R	R <sup>2</sup>	F	B	Beta	t	Sig
(Constant)				2.469	0.201	5.848	0.000
Chemistry Score	0.318	0.101	123.4	2.703	0.318	7.105	0.000
HSGPA	0.364	0.132	133.8	0.254	0.042	6.143	0.000
Physics Score	0.521	0.171	99.26	0.243	0.048	3.130	0.002
Biology Score	0.563	0.317	80.29	0.341	0.036	2.218	0.005
Mathematics Score	0.605	0.366	67.78	0.463	0.031	1.541	0.013

Dependent variable: average of major field specialized courses.

associated with average of major field specialized courses. Table 5 results also indicated that chemistry was the most effective variable on the changing variance of the dependent variable (Beta value of 0.318).

Due to variables predicting averages of major field specialized courses for the field of irrigation, agriculture economics and agriculture machinery, stepwise multiple regressions were used. Result revealed that high school grade point average, Mathematics score, physics score, and chemistry score explained a statistically significant portion of the variance ( $R^2=0.206$ ) associated with average of major field specialized courses (Table 6). High school grade point average explained the greatest amount of variance for average of major field specialized courses (8.8%). Table 6 results also showed that physics was

the most effective variable on the changing variance of the dependent variable (Beta value of 0.417).

## CONCLUSION

The results of regression showed that the high school grade point average (HSGPA) was positively associated with student achievement in agriculture. The scores of the subjects biology and chemistry in the university entrance examinations and scores of animal sciences, horticulture, soil sciences, plant protection, agricultural extension & education, crop production and the scores of the subjects of chemistry, physics and mathematics and scores of irrigation, agriculture economics and agriculture machinery were found to be significant predictors of students' achievement in agriculture.

**Table 6.** Stepwise regression of university entrance examinations (UEX) and high school grade point average (HSGPA) and average of major field specialized courses FSGPA (Irrigation, Agricultural Economics and Agricultural Machinery).

Independent Variables	R	R <sup>2</sup>	F	B	Beta	t	Sig
(Constant)				2.672	0.754	823.10	0.000
GPA	0.297	0.088	112.3	9.022	0.089	989.7	0.000
Chemistry Score	0.329	0.108	68.9	2.355	0.329	762.4	0.001
Mathematics Score	0.414	0.172	40.21	2.566	0.414	569.2	0.012
Physics Score	0.484	0.206	30.32	2.382	0.417	018.2	0.041

Dependent variable: average of major field specialized courses.



Based on the Pearson correlation analysis on the relationship between university entrance examinations and students achievements, the following conclusions could be drawn:

1. Physics score in university entrance examinations (UEX) had a significant relationship with college grade point average (CGPA) and average of major field specialized courses (FSGPA) for students in the fields of irrigation and food sciences.

2. Biology score in university entrance examinations (UEX) had a significant relationship with college grade point average (CGPA) and average of major field specialized courses (FSGPA) for students in the fields of animal sciences, horticulture, plant production and food sciences.

3. Mathematics score had a significant relationship with college grade point average (CGPA) and average of major field specialized courses (FSGPA) in the case of food sciences students. Mathematics score is not an influential variable in predicting academic achievement for students in the field of agricultural extension and education.

4. Chemistry score in university entrance examinations (UEX) had an influence on predicting college grade point average (CGPA) and average of major field specialized courses (FSGPA) for the students in the fields of animal sciences, horticulture, food sciences and soil sciences. Chemistry score was a weak predictor of the student achievement in the field of plant protection.

5. High school grade point average (HSGPA) was the most influential variable in predicting the college grade point average (CGPA) and average of major field specialized courses (FSGPA) for students in the fields of animal sciences, horticulture, food sciences, soil sciences, and plant protection. Also, high school grade point average (HSGPA) affected college grade point average (CGPA) for students in the agricultural extension, and

education, agricultural machinery, agricultural economics and irrigation.

It was concluded that high school grade point average (HSGPA) is related to student's achievement in all agricultural majors, and thus it is recommended to be taken into account in students' selection and admission. This is in line with findings by Bellico (1972), Dlamini (1995), Burdick and Schwarts (1982), Downey (2002), Hedjazi (2002), Tsai (2006), and Truell and Woosely (2008). The findings of this study were not in line with those of Shen and Comrey (1997), and Tekian (2001).

The results indicated that mathematics score in university entrance examinations did not predict students' academic achievement in agriculture. This finding is similar to findings by Dlamini (1995).

With regard to the above mentioned results, the Ministry of Sciences, Research and Technology (MSRT) should reconsider the university entrance examinations by attaching a special weight to the high school grade point average (HSGPA). In addition, the subjects should be given different weights related to the majors. Physics should have a higher weight for the fields of irrigation and food sciences. Chemistry as well as biology should be given higher weights for fields of animal sciences, horticulture, and food sciences. While agriculture majors are considered as engineering programs, mathematics was only associated with academic achievement for food sciences and agricultural economics students. Educational planning in other agricultural majors may not be focused on mathematics. Therefore, it could be recommended that all agricultural majors have great focus on mathematics in their educational programs. Concerning the importance of students' achievement for increasing higher education quality, students should be required to sit and pass a compulsory course related to the subject they have not obtained the minimum scores for in any subject of admission tests with a high weight for their field of study.



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## نقش آزمون ورودی دانشگاه و معدل دیپلم در پیشرفت تحصیلی دانشجویان کشاورزی ایران

ی. حجازی

### چکیده

هدف این تحقیق بررسی نقش آزمون سراسری و معدل دیپلم دانشجویان رشته‌های مختلف کشاورزی در ایران است. جامعه آماری تحقیق را ۵۹۸ نفر از دانشجویان تشکیل می‌دهند. متغیرهای تحقیق شامل معدل کل و معدل دروس تخصصی دوره کارشناسی به عنوان متغیر وابسته و نمرات تخصصی آزمون سراسری شامل ریاضی، فیزیک، زیست‌شناسی و شیمی و معدل کل دیپلم به عنوان متغیرهای مستقل بودند. نتایج نشان داد معدل دیپلم بالاترین پیش‌بینی پیشرفت تحصیلی (معدل دروس تخصصی و معدل کل) دانشجویان را داراست. ضمناً به استثنای رشته علوم غذایی بین نمرات ریاضیات و پیشرفت تحصیلی دانشجویان رشته کشاورزی رابطه معنی‌داری مشاهده نگردید.