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Selected Critical Skills in Rowan's Business Administration Curriculum



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Abstract

This study examined relationships between business core courses and quantitative and communicative variables. The first part centered on Pearson correlations between SAT verbal and math scores in relation to core course grades obtained in the School of Business Administration at Rowan. In the second part, multiple regression was employed to examine the effect of both math and verbal SAT scores on core course grades. Finally, prerequisites and student specializations were added to the model.

The first two parts of this study determined a significant correlation between SAT math scores and core courses deemed critical in quantitative skills. Correlations between SAT verbal scores and core courses deemed critical in communicative skills were also found significant. In the final section, generally, communicative and quantitative prerequisites were found significant for all core courses.

This paper explores ways of using quantitative and communicative independent variables to predict student success in core courses in the Rowan College School of Business Administration (SOBA). (The ten core courses represent a common body of business knowledge. See Table 1 on p. 64 for a list of the courses.) The study focuses on the correlations and relationships between the core courses and the predictor variables, using simple-regression, multiple-regression, and correlation analysis. Special attention is given to identifying skills needed

for success in the business curriculum, but especially in courses that teach critical skills. Both the courses and skills are identified by the Instructional Development Work Group (IDWG) of SOBA.

Limitations of the Study

Our first limitation involves obtaining data. SAT scores are not available on the SIS—the database of student records at Rowan College—for most transfer students. Many transfer students have not even taken the SATs. Our analysis may be limited to traditional students who enter Rowan College as freshmen and complete the majority of their courses at Rowan.

Second, we can analyze only two skills (communicative and quantitative) identified by the IDWG. Other identified skills include teamwork, information technology, critical thinking, research, crossfunctionality, and personal development; but we would have measurement problems with these other skills because they cannot be assessed as precisely as the variables we have selected.

Obviously, many variables not included will have interactive and direct effects on the variables we are measuring, but we have no way of accurately accounting for those effects. For instance, we cannot account for the teacher effect. Every professor has his or her own style and may stress different skills for the course that may not be representative of skills identified by the IDWG.

Significance of the Study

We hoped to empirically identify skills that are important to the success of our students in core courses at Rowan College. The SOBA is in the process of evaluating the core courses in the program and is very concerned about skills needed by our students, prerequisites, and how these skills and prerequisites affect core courses. We hope that by identifying essential skills in terms of correlations with various core courses, the study will help measure the performance outcomes of current students to comply with AACSB accreditation requirements.

Identified Skills

Two examples of skills identified by the IDWG include written communication and quantitative skills. In the table below, importance of the skill to the course is ranked NA (not applicable), slight, moderate, or critical, while Actual Use/Coverage is ranked NA, slight, moderate, or intense.

	<i>Importance</i>	<i>Actual Use Coverage</i>
<i>Written Communication</i>		
Organizational Behavior	Critical	Intense
Operations Management	Moderate	—
Business Policy	Critical	Moderate
Legal Environment	Critical	Intense
Prin. of Management	Moderate	Slight
Prin. of Marketing	Moderate	Moderate
<i>Quantitative</i>		
Business Policy	Moderate	Moderate
Operations Management	Critical	Intense
Principles of Finance	Critical	Intense
Prin. of Accounting I	Critical	Moderate
Prin. of Accounting II	Critical	Moderate

Written Communication

Based on the above summaries, we hypothesized that verbal SAT scores would have a higher correlation with students' final grades in courses in which written communication has critical importance, when compared to courses in which written communication has only moderate or slight importance.

Our hypothesis for courses with critical importance coverage in written communications is as follows:

$$H_1: \text{Grades}_{\text{High Verbal SATs}} > \text{Grades}_{\text{Low Verbal SATs}}$$

Quantitative Skills

We also hypothesized that math SAT scores would have a higher correlation with students' final grades in courses in which quantitative skills are ranked critical rather than moderate.

Our hypothesis for courses with critical importance coverage in quantitative skills is as follows:

$$H_1: \text{Grades}_{\text{High Math SATs}} > \text{Grades}_{\text{Low Math SATs}}$$

One might expect numerous other interrelated student characteristics besides SATs (cognitive style, test-taking ability, faculty member, grading distribution, number of hours worked at an outside job each week, GPA, specialization, gender, race, age, prerequisite course grades, rate of progress in the curriculum, student status—full-time, part-time, etc.) to interact in the prediction of grades in core courses. In this study, we are limiting our predictor variables to data that can be obtained on the SIS system. The data involve various levels of identified skills. Thus, the interactive effect of specialization and prerequisite course grades (see below) will also be considered as part of our equations, as follows:

$$\text{CGRAD}_n = B_0 + B_1 \text{SATV} + B_2 \text{SATM} + B_3 \text{SPEC} + B_4 \text{STAT} + B_5 \text{COM1} + B_6 \text{COM2} + B_7 \text{CALC} + B_8 \text{PCAL} + B_9 \text{MICE} + B_{10} \text{MACE} + \text{Error}$$

where:

CGRAD = Grade in core course

SATV = Verbal score on SATs

SATM = Math score on SATs

SPEC = Specialization (Accounting/Finance, Management, or Marketing)

STAT = Grade in Principles of Statistics I

COM1 = Grade in Communications I

COM2 = Grade in Communications II

CALC = Grade in Calculus for Techniques and Applications

PCAL = Grade in Precalculus

MICE = Microeconomics

MACE = Macroeconomics

We hypothesize that the grades in courses which are highly quantitative (i.e., Statistics I, Calculus for Techniques and Applications, Macroeconomics, and Microeconomics) will have a stronger correlation with courses in which the quantitative importance is critical (Operations Management, Principles of Finance, and Accounting I and II) than with courses in which the quantitative importance is moderate. We also hypothesize that the grades in Communications I and II are more highly correlated to courses in which written communication is critical (Legal Environment and Organizational Behavior) than in courses in which written communication is moderate. We include the specialization in the model because we speculate that students who are more quantitative usually major in Accounting/Finance, while students who are better in communication usually major in Marketing, with Management students somewhere in the middle. Thus we hypothesize that Accounting/Finance majors will do better than Marketing majors in courses in which the quantitative skills are critical, and Marketing majors will do better than Accounting/Finance majors in courses in which the written communication skills are deemed critical.

Discussion

Data on the SIS system since 1988 was included for the dependent variables. Data used for the independent variables went as far back as 1981. During the school year 1988, the College adopted the plus/minus system, which we have in place at the present time. The plus/minus system allows the dependent variable to have a greater distribution of choices than the old system, in which there were only five: A = 4, B = 3, C = 2, D = 1, and F = 0.

Pearson Correlation Coefficients

The Pearson correlation coefficient (r) measures the strength of the linear relationship between two variables. The (r) statistic ranges in value from -1 to +1, indicating a positive or negative relationship.

Table 1 (p. 64) is a summary of the verbal and math SAT scores and the Pearson correlation coefficient between the two SAT scores and the grades earned in the core courses. The table includes all students who took the listed courses from 1988 to the present.

Of the four courses in which quantitative skills are deemed critical (Operations Management, Principles of Finance, Principles of Accounting I, and Principles of Accounting II), only Operations Management does not have a significant Pearson correlation coefficient between the math SAT scores and the grade in the course, when considering all majors. However, Operations Management has a negative Pearson correlation coefficient when comparing the verbal SAT scores and grades in the course. Neither Principles of Accounting I or II nor Principles of Finance was significant at the .05 level, using the Verbal SATs.

The second skill (written communication) was deemed critical by the IDWG in three courses: Organizational Behavior, Business Policy, and Legal Environment. All three of the courses have significant correlations between verbal SATs and the course grade. Of the three courses deemed to have moderate importance for written communication skills, Principles of Management and Principles of Marketing both have significant correlations between the verbal SATs and grades, while Operations Management has a negative correlation. Only one of these six courses, Principles of Management, was significant at the .05 level for the SAT math score.

Thus the Pearson correlation coefficients indicate that both hypotheses are appropriate; that is, verbal SAT scores appear to have a higher correlation with the students' final grade in courses in which written communication has critical importance, and the math SAT scores appear to have a higher correlation with the students' final grade in courses in which quantitative skills are ranked critical.

Regression Equations Using SAT Scores

Table 2 (p. 64) presents regression parameters for SOBA

core courses using grades in the course as the dependent variable, including both SAT verbal and SAT math scores as the independent variables for all students taking courses from 1988 to the present. A forward stepwise procedure is used to allow the independent variables to enter into the regression models if they obtain a 0.1500 significance level. (In a forward stepwise regression procedure, the first variable considered for entry into the model is the one with the largest correlation with the dependent variable. To determine whether succeeding variables can be entered into the model, an F value at the 0.1500 significance level has to be obtained.) None of the ten models representing all the core courses had both SAT scores enter into the equation. Three models reached a significant F score with SAT math parameters entering into the model, and five models reached a significant F score with SAT verbal parameters entering into the model.

Of the four courses deemed to have critical quantitative skills by the IDWG, three (Principles of Accounting I, Principles of Accounting II, and Principles of Finance) had significant SAT math parameter estimates. The fourth (Operations Management) had a negative SAT verbal parameter.

Organizational Behavior, Principles of Management, Business Policy, Principles of Marketing, and Legal Environment had regression models in which a level of significance of .05 was reached, and the SAT verbal score entered into the model as the parameter estimate. None of these courses was considered by the IDWG as having critical importance in terms of quantitative skills.

Three were identified as having critical written communication importance. Written communication was identified as having moderate importance for Principles of Management and Principles of Marketing; however, neither of these two courses was listed in the quantitative category. Based on the regression analysis on the two SAT scores, we find the conclusions are basically the same as before; that is, verbal SAT scores are highly correlated with courses in which written communication has critical importance, and math SAT scores are highly

correlated with courses in which quantitative skills are ranked critical.

Regression Equations Using Prerequisite Courses, SAT Scores, and Specialization

The third part of this study regressed grades students earned in their prerequisite courses during their first two years as part of the general education model on grades earned by students in the ten core courses. Most of the prerequisites can be easily categorized into quantitative or communication courses. We also included the two SAT scores and the specialization of the students in the model.

The predictor variables and the number of times they were significant are as follows:

Quantitative:

- Macroeconomics (7)
- Microeconomics (2)
- Statistics I (9)
- Calculus T & A (3)
- Precalculus (1)
- SAT math (0)

Communication:

- Communications I (1)
- Communications II (3)
- SAT verbal (3)

Not Categorized:

- Specialization (6)

Four indicator variables were used to determine the specialization, one each for the three specializations and one to extract the data from the SIS system for the students who had not declared a specialization at the time they took the course.

We again used the stepwise regression technique to identify the most important predictors of the dependent variable. Since it is impractical to fit all possible regression models involving subsets of the independent variables, we included only the final model.

One interesting aspect of the data in Table 3 (pp. 65-67) is the low R^2 values obtained in the regression equations for the ten core courses. The highest R^2 s were found for Operations Management (.25) and Principles of Accounting II (.24), and the lowest were found for Policy (.12) and Principles of

Marketing (.12). It is obvious that there are many other characteristics or variables that determine a student's grade.

The first three models displayed in Table 3 are Principles of Accounting I and II and Principles of Finance. For all three models, the grades in Macroeconomics and Calculus T & A, and the Accounting/Finance Specialization represented as an indicator variable entered into the equation. The grade in Microeconomics entered into the equation for Principles of Accounting I. The grade in Statistics I entered into the equation for both of the two Accounting courses. In all three cases, the Accounting/Finance students fared better than students in other specializations, and only quantitative prerequisites were found to be significant.

For the three courses deemed critical in importance for written communication, each had a communication variable entering into the equation. Legal Environment had Composition I, Policy had Composition II (however, significant at .14), and Organizational Behavior had SAT verbal. However, all three also had quantitative courses entering into the equation—Statistics I is significant for all three models, Microeconomics is significant for Legal Environment, Calculus T & A is significant for Business Policy, and Macroeconomics is significant for Organizational Behavior.

One of the most interesting findings in the study is that Statistics I entered into the forward regression model nine times, which indicates that Statistics I is one of the most important prerequisites and is an indicator of success in the core courses.

The indicator variables representing the students' specialization was found significant in the following courses: Principles of Accounting I, Principles of Accounting II, Principles of Finance, Organizational Behavior, Operations Management, and Management Information Systems. In the three core courses—Principles of Accounting I, Principles of Accounting II, and Principles of Finance—students specializing in Accounting/Finance statistically did better than students specializing in Marketing, Management, or undeclared spe-

cializations. The level of significance ranged from .0001 for Principles of Finance to .0656 for Principles of Accounting I.

A student taking the core course Organizational Behavior statistically did better when a specialization was declared. Thus, students without a specialization at the time of taking the course did not earn as high a grade as others. A student specializing in Management did not statistically do as well (significance .01) in the core course Operations Management when compared to students specializing in other areas. And finally, a student specializing in Marketing did better than students in other specializations when taking the course MIS.

There is evidence that quantitative prerequisites are more strongly related to the core courses deemed critical in quantitative skills. Of the 17 indicator variables entering in the regression models of the four quantitative core courses, only one variable was positive from the communication area—Communication II. SAT verbal and Management specializations were found significant but had negative parameters.

The evidence is inconclusive that independent variables representing communication skills (the Communications I and II courses and SAT Verbal scores) are more strongly related to the core courses deemed critical in communication skills. All of the core courses with communications identified as being critical had Statistics I (a quantitative course) enter in the regression models, indicating other skills are important.

Conclusions

We shall begin by making some qualifications. We are not trying to predict grades by using SAT scores. A statistically significant relationship between a dependent variable and a predictor (independent) variable does not imply a cause-and-effect relationship.

The results of most studies overwhelmingly indicate that the high school record and the SAT taken together are more effective in predicting grades (usually first-year grades) than either one by itself. There are also numerous papers supporting the idea that the SAT's influence is not very great when

used as a predictor of grades. In our study, the highest R^2 for a regression equation obtained from the models consisting of the core courses and significant SAT scores is 4.4% (Principles of Accounting II). This means we are explaining less than 4.5% of the total variance associated with that particular model.

Second, we are not drawing any conclusions about the teaching effectiveness of the faculty or the value of the courses they teach. That regression models or the Pearson Correlation Coefficients are not significant does not imply any causality between measured variables and teaching effectiveness.

In conclusion, we can state, based on the Pearson Correlation Coefficients between SAT scores and the core course grades and the regression models using both SAT scores as predictor variables, that there is a stronger correlation between SAT math scores and quantitative core courses than SAT math scores and core courses with critical communication skills. Next, based on the same tests, we can also state there is a stronger correlation between SAT verbal scores and core courses with critical communication skills than SAT verbal scores and core courses with critical quantitative skills.

It is more difficult to make any definite conclusions based on the full regression model equation in which ten predictor variables are entered in the equation. However, we can note that there is a strong correlation between quantitative prerequisites and the core courses designated as having critical quantitative skills.

The information provided by this study represents the initial stage of a continuing comprehensive study to identify outcomes measurements in the School of Business Administration at Rowan College as it seeks AACSB accreditation.

—The authors of this study would like to thank Robert Wear for the numerous hours he spent gathering data from the SIS system and performing the statistical analysis in SAS.

Table 1

Summaries of SAT Verbal and Math Scores for SOBA Core Courses and Pearson Correlation Coefficients between SAT Scores and Grades in Core Courses for All Majors of Students Taking Courses from 1988 to the Present

	No.	SAT Verbal	Pearson Corr. Coeff.	Sign.	SAT Math	Corr. Coeff.	Sign.
Accounting I	1135	499	.1194	*.0001	515	.1866	*.0001
Accounting II	701	507	.0671	.0829	523	.2097	*.0001
Prin. of Finance	603	508	.0096	.8189	521	.1012	*.0158
Organ. Behavior	584	502	.1031	*.0147	518	.0677	.1101
Prin. of Mgnt	633	504	.1249	*.0020	520	.0996	*.0137
Operations Mgnt	512	508	-.0766	.0912	524	.0288	.5258
Policy	382	507	.1362	*.0084	520	.0366	.4805
Prin. of Marketing	717	509	.1577	*.0001	522	.0602	.1169
MIS	525	504	.0767	.0852	520	.0580	.1930
Legal Environment	530	499	.1265	*.0042	514	.0848	.0556

* Indicates significant at the .05 level.

Table 2

Regression Parameters for SOBA Core Courses
Using Grade in Course as the Dependent Variable and
SAT Verbal and SAT Math Scores as the Independent Variables
For All Students Taking Courses from 1988 to the Present

	Intercept	Parameters' Estimates ¹			F	Prob>F
		SATV	SATM	R ²		
Accounting I	0.399	—	0.0034	.0348	37.96	*.0001
Accounting II	0.797	—	0.0036	.0440	30.69	*.0001
Prin. of Finance	1.168	—	0.0019	.0102	5.86	*.0158
Organ. Behavior	2.655	0.0012	—	.0106	5.99	*.0147
Prin. of Mgnt	2.240	0.0015	—	.0156	9.66	*.0020
Operations Mgnt	3.147	-0.0012	—	.0059	2.86	.0912
Policy	2.541	0.0012	—	.0185	7.03	*.0084
Prin. of Marketing	1.373	0.0021	—	.0249	17.25	*.0001
MIS	2.443	0.0011	—	.0059	2.98	.0852
Legal Environment	1.842	0.0016	—	.0160	8.26	*.0042

* Indicates significant at the .05 level.

¹ A forward stepwise procedure was used to allow the independent variables entry into the model at the 0.1500 significant level. No model was found to have more than one significant independent variable.

Table 3
*Regression Equations for Grades Earned in the SOBA Core Courses
 Using Prerequisites, SATs, and Specialization as Independent Variables¹*

<i>Principles of Accounting I</i>						
		R^2	F for Model 12.06	$Prob > F$	$.0001$	
Parameter Estimate	Intercept	Macroecon	Microecon	Stat I	Calc T&A	Acct Spec
F Value	.8766	1.494	.2077	.1633	.1160	.2757
Prob>F	10.87	3.53	6.95	7.96	4.86	3.42
	.0011	.0613	.0089	.0052	.0283	.0656
<i>Principles of Accounting II</i>						
		R^2	F for Model 16.31	$Prob > F$	$.0001$	
Parameter Estimate	Intercept	Macroecon	Stat I	Calc T&A	Acct Spec	
F Value	1.3299	.2231	.1285	.1985	.2330	
Prob>F	10.87	3.53	6.38	17.39	3.96	
	.0011	.0613	.0123	.0001	.0480	
<i>Principles of Finance</i>						
		R^2	F for Model 12.69	$Prob > F$	$.0001$	
Parameter Estimate	Intercept	Macroecon	Calc T&A	Acct Spec		
F Value	.9232	.3212	.2269	.2328		
Prob>F	10.43	13.16	13.04	2.64		
	.0015	.0004	.0004	.1066		

¹ Stepwise variable entry and removal method determined the final regression model. The default tolerance level was 0.15.

Table 3 (continued)

		<i>Organizational Behavior</i>			
		R^2	F for Model	8.25	$Prob>F$
Parameter Estimate	Intercept	.1602			.0001
F Value	Macroecon	1.47294	Stat I	SATV	No Spec
Prob>F		6.12	2.077	.0014	-.2938
		.0143	4.39	6.18	6.87
			.0377	.0138	.0096
		<i>Principles of Management</i>			
		R^2	F for Model	15.64	$Prob>F$
Parameter Estimate	Intercept	.1407			.0001
F Value	Macroecon	1.812	Stat I		
Prob>F		8.67	12.94		
		.0036	.0004		
		<i>Operations Management</i>			
		R^2	F for Model	10.09	$Prob>F$
Parameter Estimate	Intercept	.2468			.0001
F Value	Macroecon	2.385	Stat I	Mngt Spec	Comp II
Prob>F		6.95	11.39	-.4135	.2765
		.0092	.0009	6.56	14.84
				.0114	.0002
					.0091
		<i>Business Policy</i>			
		R^2	F for Model	5.66	$Prob>F$
Parameter Estimate	Intercept	.1163			.0011
F Value	Stat I	1.632	Comp II		
Prob>F		9.97	11.14		
		.0018	.0010		

Table 3 (continued)

		<i>Principles of Marketing</i>	
		<i>F for Model 12.59</i>	<i>Prob>F .0001</i>
	R^2	.1165	
Intercept	Stat I		Comp II
Parameter Estimate		.1632	.1964
F Value		9.97	11.14
Prob>F		.0018	.0010
<i>Legal Environment</i>			
	R^2	.1431	<i>F for Model 8.80</i>
			<i>Prob>F .0001</i>
Intercept	Microecon	Stat I	Comp I
Parameter Estimate		.1127	.1625
F Value		3.41	4.03
Prob>F		.0012	.0463
<i>Management Information System</i>			
	R^2	.2091	<i>F for Model 9.94</i>
			<i>Prob>F .0001</i>
Intercept	Macroecon	SATV	Stat I
Parameter Estimate		.0013	.1811
F Value		2.67	10.76
Prob>F		.0184	.0013
			Precalc
			.0918
			3.53
			.0620
			Mking Spec
			.3393
			6.29
			.0131