ASSESSING THE VALIDITY OF GRADUATE RECORD EXAMINATIONS

Most of the graduate schools in the United States require applicants to submit their scores on the Graduate Record Examination (GRE) as a prerequisite for admission, along with undergraduate grades (UGPA), writing samples, letters of reference from faculty members who know the student, the number of honors earned, and grades in the students' majors. However, the GRE is one of the most heavily weighted of these university admission variables.[1] The GRE and UGPA are commonly used as screening devices to eliminate all but the highest-scoring individuals.[2]

Accordingly, there have been numerous studies of the validity of the GRE in predicting success in graduate school.

Predictive Validity of Graduate Record Examination

Many studies have examined the predictive validity of the GRE for specific graduate course grades,[3] comprehensive examination scores,[4] time to degree completion,[5] faculty ratings of students,[6] and students' scholarship and professionalism.[7]

Thus far, four reviews have been made of published research articles concerning the predictive validity of the GRE. Ingram[8] and Thacker and Williams[9] reviewed GRE validity studies published in the 1960s and 1970s. They raised serious doubts about the validity and usefulness of the GRE in identifying potentially successful graduate students. Goldberg and Alliger[10] used a meta-analytic method to examine 27 articles dealing with students in psychology and counseling.[11] Another

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meta-analytic review by Morrison and Morrison[12] examined 22 studies of the relationship of the GRE scores to graduate GPA (GGPA).[13]

After reviewing the published studies, several findings are apparent. Graduate GPA has been the most frequently used of all criterion variables, since the Educational Testing Service developed the GRE to predict first-year graduate school grades. However, GRE scores do not consistently predict GGPA. Studies show that the correlation coefficients between GRE scores and GGPA range mainly from .20 to .40 and rarely exceed .50. A coefficient of .50 is considered statistically inadequate in most validity studies.[14] This means that GRE scores account for so little variance that they can not be considered useful in terms of predictive value.[15] The GRE

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does seem to more reliably predict faculty ratings and specific class grades of students. However, it is a very poor predictor of time to degree completion. Even the GRE Advanced Tests do not offer greater predictive validity.[16]

With all these negative research findings about GRE validity, one might well ask why this test remains one of the most important factors for selection, placement, and guidance in graduate schools. A number of reasons could be cited:

• Longevity—the test has been given for a number of years.

• Familiarity—most graduate faculties took the GRE when they entered graduate school, so they have confidence in this standardized aptitude test.

• Perceived objectivity—the GRE is viewed as offering a more objective criterion than UGPA, samples of students' writings, or recommendation letters from faculty and others who know the student. Thus, faculties can convince themselves that their admission decision is based on an objective evaluation. Furthermore, the Miller Analogies Test, which has sometimes been used as an alternative to the GRE, has proved to be even less valid than the GRE in predicting success in graduate school.[17]

• Bandwagon-itis—less-selective colleges and universities may be merely following the lead of highly selective universities.

Cultural Bias

The GRE seems grossly biased against culturally disadvantaged groups. According to Dollinger,[18] its predictive validity dropped substantially when majority and minority students were considered separately. Data

compiled by Milner, McNeil, and King[19] revealed a rather dramatic rise in minority enrollment after the GRE was eliminated from admissions requirements. If the GRE is biased against culturally disadvantaged groups, schools should discount it in the admissions process. However, no empirical cross-cultural research has yet been performed to investigate the effect of ethnicity on GRE validity.

It may still be premature to eliminate the GRE from the admission requirements for graduate school, since a few studies have yielded somewhat conflicting results. However, these discrepant findings may be accounted for by different samples, as well as the use of dissimilar strategies to analyze the data. Thus, the predictive validity of the GRE warrants further study. There is no doubt, however, that the GRE should be used with the utmost caution in predicting the future performance of students in graduate schools.

GRE in Education

A number of studies have examined the validity of the GRE in predicting graduate GPA using education students.[20] These studies show that the correlation coefficients between GRE scores and GGPA of education students have rarely exceeded .40, and usually ranged from .20 to .35. Kirchner[21] used UGPA and gender as predictors in her study of 103 education students. GRE scores and UGPA explained 23 percent of variance of GGPA; gender explained

only three percent.

The literature review provides some helpful insights for future education studies. Only a few studies have investigated the predictive validity of GRE scores in conjunction with academic background variables in specific career areas such as psychology (clinical, counseling, school, and general/experimental).[22] Similar empirical validations should be undertaken in other disciplines.

Most of the studies of education students have been conducted using correlation and ANOVA analyses in combination with analysis of chi-square and t-test.[23] There is a need for further regression and meta-analytic research in this area.

To resolve these issues, the author recently investigated which variables among GRE scores, education academic background (curriculum, administration, and psychology), ethnicity (Caucasian, African-American, Hispanic, and Asian), and nationality (American students and foreign students) in combination with gender, UGPA, and the degree sought (master's and education specialist/doctoral degrees) had the greatest impact in predicting the GPA of graduate-level education students.

Method

The sample of 170 subjects for this investigation included all students who had been accepted into the graduate degree programs at a university in southern California from 1993 to 1996, and

for whom the GRE Verbal Section subscore (GRE-V), the GRE Quantitative Section subscore (GRE-Q), the GRE Analytic Section subscore (GRE-A), and other related data were available. These students had either completed their first-year classwork or graduated at the time of the investigation. Only their first-year GPA was used for the study.

Table 1 shows the results of correlation analyses using the graduate GGPA, undergraduate UGPA, age, and GRE scores. No significant correlations were found between GGPA, age, and UGPA. Although the correlation coefficients were low, a significant relation existed between GGPA and GRE-Q scores; GRE-V scores; GRE-A scores; the composite scores of GRE-Q and GRE-V; and the composites of the three GRE subscores.

To select the first best variable, a set of regression analysis was performed between GGPA as the dependent variable and the independent variables listed above. GRE-Q scores, GRE-V scores, and age accounted for significant shares of GGPA, with GRE-Q scores clearly the best predictor of GGPA. GRE-Q scores alone explained 16 percent of the variance of GGPA.

Then GRE-Q scores, age, and GRE-V scores were added to the equation. Addition of gender, academic background, degrees sought, nationality, and ethnicity as variables resulted in less than a three-percent increment in R square.[24]

When the composite scores of GRE-Q and GRE-V were used for analyses, age alone explained eight percent of the variance of GGPA. The same was true when the composite scores of GRE-Q, GRE-V, and GRE-A were used.

Discussion

The results of this study revealed that the GRE scores had a weak relationship to the graduate GPA of education students, and thus support the previous findings of Kirchner, and Matthews and Martin. Age appears to interact with other variables, as Matthews and Martin have pointed out. In contrast to the studies dealing with psychology students,[25] the relation of GRE scores to GGPA did not vary across the

Table 1
Pearson's Correlation for Age, GGPA, UGPA, and GRE Scores

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Age	1.00	-.13	.19	-.04	.00	-.16*	-.01	-.07
(2) GGPA		1.00	.19	.34*	.22*	.31*	.32	.34*
(3) UGPA			1.00	.39*	.29*	.22	.38*	.35*
(4) GRE-Q				1.00	.56*	.61*	.88*	.84*
(5) GRE-V					1.00	.59*	.89*	.84*
(6) GRE-A						1.00	.68*	.87*
(7) GRE-Q, V							1.00	.95*
(8) GRE-Q, V, A								1.00

N=170, *p< .05.

graduate programs in education. Ethnicity, nationality, degree, gender, and UGPA did not prove to be important variables in predicting success in graduate work.

On the other hand, the GRE-Q and GRE-V scores accounted, respectively, for only about 16 percent and six percent of the variance. The composite scores of GRE-Q, GRE-V, and GRE-A had a weaker relationship with GGPA than GRE-Q and GRE-V. scores.

In summary, the GRE offers little evidence about an applicant's success in graduate school, and is particularly bad at predicting graduate GPA. Caution should be used in using the GRE and composite scores on GRE-Q, GRE-V, and GRE-A exams as a criteria for graduate admissions. ✑

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9. A. J. Thacker and R. E. Williams, "The Relationship of the Graduate Record Examination to Grade Point Average and Success in Graduate School," *Educational and Psychological Measurement* 34:4 (Winter 1974), pp. 939-944.

10. Edith L. Goldberg and George M. Alliger, "Assessing the Validity of the GRE for Students in Psychology: A Validity Generalization Approach," *Educational and Psychological Measurement* 52:4 (Winter 1992), pp. 1019-1027.

11. Mean validity coefficients ranged from .03 to .37, with an average of .18. Most of the squared population validity coefficients indicate that less than nine percent of the variance in the criterion was accounted for.

12. Todd Morrison and Melanie Morrison, "A Meta-Analytic Assessment of the Predictive Validity of the Quantitative and Verbal Components of the Graduate Record Examination With Graduate Grade Point Average Representing the Criterion of Graduate Success," *Educational and Psychological Measurement* 55:2 (April 1995), pp. 309-316.

13. The correlation coefficients with GGPA were .22 and .28 respectively for GRE-Q and GRE-V scores. Thus, GRE scores accounted for an average of 6.3 percent of the variance.

14. L. R. Gay, *Educational Research: Competencies for Analysis and Application* (New York: Merrill, 1992), p. 161.

15. The highest reported variance was 23 percent (see Grace L. Kirchner, "Gender as a

Moderator Variable in Predicting Success in a Master of Arts in Teaching Program," *Educational and Psychological Measurement* 53:1 [Spring 1993], pp. 155-157).

16. Joseph Camp and Thomas Clawson, "The Relationship Between the Graduate Record Examinations Aptitude Test and Graduate Grade Point Average in a Master of Arts in Counseling Program," *Educational and Psychological Measurement* 39:2 (Summer 1979), pp. 429-431.

17 Furst and Roelfs; Kirnan and Geisinger; Payne, Wells, and Clarke.

18. Dillinger, 1989.

19. Milner, McNeil, and King, 1984.

20. Covert and Chansky (See Robert W. Covert and Norman M. Chansky, "The Moderator Effect of Undergraduate Grade Point Average on the Prediction of Success in Graduate Education," *Educational and Psychological Measurement* 35:4 [Winter 1975], pp. 947-950) conducted correlation research with 355 students by using the GRE scores and UGPA as predictor variables. Herbert and Holmes (see David J. Herbert and Alan F. Holmes, "Graduate Record Examinations Aptitude Test Scores as a Predictor of Graduate Grade Point Average," *Educational and Psychological Measurement* 39:2 [Summer 1979], pp. 415-420) related GRE scores to GGPA as variables in their correlation and ANOVA research using 67 students. House (see J. Daniel House, "Age Bias in Prediction of Graduate Grade Point Average from Graduate Record Examination Scores," *Educational and Psychological Measurement* 49:3 [Autumn 1989], pp. 663-666) used age, UGPA, and GRE scores from 1,138 students in his correlation and ANOVA research. Michael (see Joan J. Michael, "The Prediction of Academic Achievement in Graduate Study in Education," *Educational and Psychological Measurement* 43:4 [Summer 1983], pp. 1133-1139) used GRE scores, the GRE Advanced Education Test scores, the Undergraduate Record Examination scores, and UGPA in her correlation and stepwise regression analyses. The sample was derived from 653 education students.

21. Kirchner, 1993.

22. E.g., House and Johnson (1993), Kirnan and Geisinger (1981), and Sternberg and Williams (see Robert J. Sternberg and Wendy M. Williams, "Does the Graduate Record Examination Predict Meaningful Success in the Graduate Training of Psychologists?" *American Psychologist* 52:6 [June 1997], pp. 630-641). Yet most characteristic is the absence of empirical studies using academic background variables outside of psychology.

23. Rare exceptions are Kirchner (1993) and Matthews and Martin (see Tom A. Matthews and David J. Martin, "Reciprocal Suppression and Interaction Effects of Age With Undergraduate Grades and GRE on Graduate Performance in a College of Education," *Educational and Psychological Measurement* 52:2 [Summer 1992], pp. 453-456), who used regression analyses.

24. In terms of R square and theoretical validity or the model, the three-variable model of GRE-Q scores, age, and GRE-V scores seemed to be the best model in predicting GGPA.

25. Cf. House and Johnson (1992); and Kirnan and Geisinger (1981).