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ABSTRACT

The usefulness of the Iowa Algebra Aptitude Test (IAAT) as a predictor of student achievement in secondary mathematics courses was studied. Subjects were 977 students from 7 Iowa schools in grades 6 through 9. Data collected included their IAAT scores and Iowa Tests of Basic Skills (ITBS) mathematics skills test scores, as well as data about mathematics classes taken and grades received. Using multiple regression analysis, these factors were studied as predictors of achievement. It was found that the IAAT can be an important measure to use in predicting mathematics grades. Among predictors, current mathematics grade was most highly correlated with previous mathematics grades, as expected. The ITBS was correlated only slightly higher than the IAAT with mathematics grades for all subgroups and the total, but the IAAT was preferred in a stepwise regression when both test scores and previous mathematics grades were considered. Schools with both previous grades and the IAAT available gained only a small portion of useful information from IAAT scores for placement decisions. Discriminant analysis revealed that using a combination of previous mathematics grades and IAAT scores results in the most accurate and efficient classification. (Contains 10 tables and 9 references.) (SLD)

Predicting Achievement in Secondary Mathematics Courses

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INTRODUCTION

A difficult but important task in education is to separate students according to ability in order to provide differential instruction. One such distinction is typically made prior to entering the secondary mathematics curriculum. If this selection process is not given careful thought, students, and eventually society, will suffer. Inaccurate placement may result in frustration and even failure for some students. Others endure boredom and an unchallenging environment. Either error in placement often results in students dropping out of the mathematics curriculum before they have a fair chance to evaluate their interest and aptitude in this area. In today's technological society, it is crucial that as many students as possible pursue mathematical knowledge in upper level secondary mathematics courses. For this reason, the importance of proper placement of students into secondary mathematics courses cannot be underestimated.

Algebra is generally considered to be the first of these upper level secondary mathematics courses. A firm grasp of the fundamentals of algebra is necessary to the pursuit of higher mathematics courses. The NCTM refers to algebra as "...the language through which most of mathematics is

communicated" (NCTM, 1989). Algebra is not just for college-intending students, however. Recently, a reform movement has been advocating, and in some cases mandating, the enrollment of all students into algebra. Also, algebra has enormous applications to real-life and on-the-job problem-solving (Eisner, 1994; House, 1994; House and Coxford, 1995). Appropriate placement into algebra is essential for students to be able to succeed in the secondary mathematics curriculum.

Several pieces of information are relevant to the secondary mathematics placement decision. These include teacher recommendations (which are usually based heavily on previous mathematics grades), standardized achievement test scores, and an aptitude measure. Previous grades and teacher recommendations are usually given the greatest weight in the mathematics placement decision, but standardized achievement and aptitude measures can provide additional useful reliable and objective information. In fact, in some cases these measures are essential to the decision-making process. Such situations arise when a student enrolls in a new school district, or when several primary schools filter into a secondary school. Evidence beyond the grades and teacher recommendations is typically required, because it is unlikely that all teachers, schools, or even districts share common standards for judging students' abilities. While most school systems have a standardized testing program in place at many grade levels, most do not include a measure of mathematics

aptitude. Because the mathematics tests in most standardized achievement batteries are not constructed for placement purposes, it is important to know whether mathematics aptitude makes a significant unique contribution to the accuracy of placement into a first secondary mathematics course, above and beyond that provided by the more readily available achievement test scores, grades, and teacher recommendations.

The *Iowa Algebra Aptitude Test* (*IAAT*, 4th ed., Schoen and Ansley, 1993) was developed to be a measure of aptitude for the study of algebra and was intended for use as a placement tool. Prior to this study, the validity evidence available indicated that the *IAAT* composite score is a significant predictor of success for algebra 1 students. A recent validity study (Schoen & Ansley, 1993) involved eight-hundred twenty-five grade 9 students from algebra 1 classes in three midwestern school districts during the 1989-90 school year. The students took the *IAAT* early in the fall of 1989 (and thus the *IAAT* was not used in making placement decisions). Their grades for both the first and second semesters were recorded, as were their scores on two semester examinations covering the content of first-year algebra. Also available for these students were their grade 8 scores from the *Iowa Tests of Basic Skills* (*ITBS*, Hieronymus and Hoover, 1986) and their scores from the *Iowa Tests of Educational Development* (*ITED*, Feldt, Forsyth, and Alnot, 1989) from the fall of grade 9. It was found that the *IAAT*

composite score was highly related to both algebra 1 grades and semester test scores. In fact, the *IAAT* composite score was a significant predictor, above and beyond the *ITBS* Mathematics Total composite score for these students. In a related study using the same data set, it was found that the *IAAT* scores do not yield gender-biased predictions of success in algebra (Barron, Ansley and Hoover, 1991).

This study is an extension of the two studies cited above. Its purpose is to investigate further the validity of the *IAAT* for selection purposes. The importance of the contribution of *IAAT* scores to predicting mathematics grade is studied. Differential prediction by gender is also examined.

METHOD

Sample. Subjects were 977 students from seven Iowa schools, each located in a different district. Data were collected for all students at these schools who had taken the *IAAT* in the spring of 1994. These students were in grades 6 through 9 during the 1994-95 school year (grade 6, N=18; grade 7, N=221; grade 8, N=540; grade 9, N=198). Data collected for these students included *IAAT* total scores and *ITBS* Mathematics Total scores (*ITBS*-M), gender, mathematics class taken in the 1994-95 school year, grade in that mathematics class, and, for some of the students, mathematics

grades from the previous year. The *IAAT* scores, as mentioned before, were obtained in the spring of 1994. The *ITBS* -M scores were obtained in either the fall or spring of the 1993-94 school year for six out of seven districts; they were obtained in the fall of 1992 for the seventh district. Mathematics class taken and mathematics class grade both pertain to the first grading period of the 1994-95 school year. It should be noted that students were placed into mathematics courses at least partly on the basis of *IAAT* scores.

<u>Predictor and criterion measures</u>. The *IAAT* consists of four parts, each measuring a different type of skill related to the ability to succeed in algebra. Three of the parts contain 15 items; the fourth has 18. Each item is worth one point; a total *IAAT* score is formed by summing the four part scores. The schools in this study used only the total score in making placement decisions.

Several predictor variables were investigated in addition to the *IAAT*. They included *ITBS*-M (in the form of a percentile rank for Iowa), previous grade in math, and gender. The previous grade in mathematics was the letter grade earned in mathematics during the first grading period in the 1993-94 school year. Unfortunately, previous grades were not available for the majority of the sample (i.e., 583 missing values). The criterion measure considered for this study was the letter grade in mathematics for the first grading period of the 1994-95 school year. The letter grades

for both predictor and criterion were converted to a scale from 0 to 4.33. For example, a "B" became a 3.00, while a "B+" became a 3.33, and a "B-" became a 2.67. One final variable, type of mathematics class, served as a classification variable in the discriminant analyses. This variable was formed by logically grouping the mathematics classes of students from all schools into three types as shown in Table 1.

Analyses. To assess the validity of the three variables for predicting success in subsequent mathematics classes, the zero order correlations between the predictors and criterion were obtained within each type of mathematics class and across all mathematics classes. In addition, stepwise regressions were performed in an effort to identify the relative importance and contributions of the predictor variables in explaining the variability in subsequent mathematics course grades.

Using multiple regression analyses, several hypotheses were tested. As a check for consistency with earlier results (Schoen and Ansley, 1993), the uniqueness of the contribution of *IAAT* to a model containing *ITBS*-M score was investigated. Next, the importance of the *IAAT* was put to a stricter test by examining the hypothesis that the *IAAT* makes a unique contribution to a model already containing either previous mathematics grade or both previous mathematics grade and *ITBS*-M score. Multiple regression was also used to examine differential predictive validity by gender. Using a dummy

variable coding for gender, the coincidence and parallelism hypotheses were tested for several regression equations.

Discriminant analyses were employed to determine the relative contributions of the predictor variables to the accuracy of the placement decision as defined by which of the three types of mathematics classes students were assigned to in the 1994-1995 school year.

RESULTS

Means and standard deviations for the predictor and criterion measures used in this study are presented in Tables 2-4. These statistics are given for subgroups defined by gender and mathematics course. It should be noted that sample sizes in these tables vary because of missing data. Based on the average *ITBS*-M Iowa percentile ranks, these were relatively able students. Had these been national percentile ranks, they would have been even more impressive. Even the general mathematics group had an average Iowa percentile rank of 52.

Another piece of information should be gleaned from these statistics. Note the gender differences in mathematics grades. As is almost universally reported, girls generally had higher mean GPAs than boys. However, while tests are often assailed for showing an opposite trend, such was not generally the case here. On both the *ITBS*-M and the *IAAT*, girls generally performed better. It is true however that

the effect sizes were larger for GPA than for either test as regards gender comparisons.

Also worthy of note is the very small number of students in the pre-algebra group. This small number reflects the fact that for most schools involved in this study, the mathematics placement decision was essentially dichotomous. A number of unusual results are associated with this group. Interpretation of any results involving this group must be tempered by consideration of its small size.

Partial evidence for the validity of the predictors is given by their correlations with each other and with the outcome variable, mathematics grade. Table 5 lists these correlations. In the total group and algebra group, the highest correlation was between previous mathematics grade and mathematics grade (.82 for the total group and .73 in the algebra group). The same correlation was nearly the highest one observed in the other two groups as well (.55 for pre-algebra and .57 for general math). The two test scores correlated moderately with mathematics grade as well, and in all four groupings, the *ITBS*-M Total score correlated slightly higher with mathematics grade than did the *IAAT*.

Stepwise regressions were performed to determine the best subset and ordering of variables for predicting mathematics grade. The criterion for entering at any step was $p < .15$. Regressions were done by type of mathematics class and across mathematics classes. The results of these analyses are shown in Table 6. When the predictor variables

specified consisted only of *ITBS*-M and *IAAT*, both variables entered the model for the total group as well as for the general mathematics and algebra subgroups. Only the *ITBS*-M entered the model for pre-algebra students. Note that for the entire group, *ITBS*-M alone explained 36% of the variability in mathematics grades. The subsequent entry of *IAAT* scores added 3% to this squared correlation value. This represented a small, but highly statistically significant addition. The significant contribution of *IAAT* to a model containing *ITBS*-M is consistent with previous findings (Schoen and Ansley, 1993).

When previous mathematics grade was added to the variable list, it entered first for all class types and for the total group and resulted in larger values of the final R^2 for all groups (as compared to the regressions using only test score predictors). For the total group and the general mathematics and algebra subgroups, the *IAAT* entered the equation second; for the pre-algebra group, only previous mathematics grade entered the model. *ITBS*-M did not enter the model for any group. Note that for the entire group, previous grade accounted for 68% of the variability in current grade, and that *IAAT* added a small, but statistically significant, 1% to this value. However, for the general mathematics group, the addition of *IAAT* to the previous grade increased the R^2 by a sizable 12%. Apparently much was gained by considering IAAT scores for these students.

Examination of Table 5 reveals a fair degree of collinearity among predictor variables. Since for most school systems previous grades and mathematics achievement test scores are more readily available and easily understood than aptitude measures, it makes sense to investigate whether the *IAAT* makes a significant contribution to a model already containing both of these variables. This is a fairly strict test of the validity of the *IAAT*, given its collinearity with those other predictors. Thus, the *IAAT* was added to a model containing both previous mathematics grade and *ITBS*-M. The result was significant at the .10 level for the total group, but not for any subgroup. The increment in R^2 was approximately 1%. It seems that if both previous grades and *ITBS*-M scores are used in mathematics placement decisions, the contribution of *IAAT* scores is marginal. However, if a school wants to determine the more potent predictor variable to consider along with previous grade, *IAAT* seems to be preferable.

Next, a test for differential prediction by gender was carried out. These results are reported for the entire group only. Tests of coincidence and parallelism were conducted for one model containing previous mathematics grades, *ITBS*-M, *IAAT*, gender, and the two-way interaction terms involving gender and for another model containing all of the variables in the first model except previous grades. Tables 7 and 8 contain the relevant regression equations for these analyses. The first equation in each case allows different regression

equations for each gender. The second equation requires that only the hypothesis of parallelism was rejected. The third equation offers a common regression line for males and females. Results of the tests for coincidence and parallelism are presented in Table 9. For equations including all three predictor variables (previous grade, *ITBS*-M, and *IAAT*), the coincidence hypothesis was retained, indicating that there was no need to consider separate regression lines for males and females. However, when only *ITBS*-M and *IAAT* were considered, the hypotheses of coincidence and parallelism were rejected, indicating a possible need to consider separate regression equations for females and males. It should be noted, however, that the lack of coincidence translated into an underprediction of the criterion of approximately .13 for females scoring near the averages on the predictor variables. Recall this criterion is grades that were on a scale from 0 to 4.33. Even this statistically significant difference was of marginal practical importance. These results are not surprising in light of the means and standard deviations shown and discussed earlier. Although the females were generally superior across all measures, their superiority was most pronounced for grades. The smaller differences between males and females on test scores would naturally generally lead to at least slight underpredictions for females and overpredictions for males. It is unlikely that schools would fail to use previous grades as a selection variable. These

results imply that it might be unwise to ignore previous grades.

Finally, discriminant analyses were conducted with type of mathematics class as the classification variable. Five subsets of the predictor variables were used (1. previous mathematics grade only; 2. previous mathematics grade and ITBS; 3. previous mathematics grade and IAAT; 4. ITBS and IAAT; and 5. previous grade, ITBS, and IAAT). For each subset, the analysis was run on two groups--the total group and the group consisting of algebra and general mathematics students. This second group of analyses was run after determining that in the total group, the error rate for classifying the pre-algebra students was very high. Using previous mathematics grade as the only predictor, 75 percent of students in the total group and 79 percent of students in the algebra-general mathematics group were correctly classified. When *ITBS*-M was used in conjunction with previous mathematics grade, 81 percent of students in the total group and 86 percent of students in the algebra-general mathematics group were correctly classified. *ITBS*-M and *IAAT* together yielded 79 percent correct classification in the total group and 85 percent in the algebra-general mathematics group. The combination of previous mathematics grade and *IAAT* yielded an 83 percent correct classification rate for the total group and an 87 percent correct rate for the algebra-general mathematics group. When both tests and previous mathematics grade were all contributing to the

classification, 83 percent of the total group and 87 percent of the algebra-general mathematics group were correctly classified. There was virtually no difference in the overall accuracy of classification when previous mathematics grade and *IAAT* were used than when both test scores were used in combination with previous mathematics grade. Table 10 shows the breakdown of the hit rates for each subset of predictors for both groups.

The problems with correct classification for the middle group are of some interest. It is of course somewhat logical that this group would pose the greatest problems for classification. However, it was also true that this group was fairly bright. The vast majority of these students were predicted to fall into the algebra group. It seems clear that school personnel were drawing upon information beyond that gathered here to place these students. A likely variable is student discipline. In many schools, all that separates the top two groups of students is attitude or behavior.

DISCUSSION

Recently increased attention has been given to mathematics achievement comparisons internationally and within the U.S. One goal of this study was to enhance the understanding of the best variables to consider in making

placement decisions, because proper placement is crucial to encouraging success in mathematics. Specifically, it was of interest to determine whether an aptitude measure such as the *IAAT* contributes anything unique to the prediction of mathematics grades over and above the more readily available previous mathematics grades and *ITBS*-M scores. It was found that the *IAAT* can be an important measure to use in predicting mathematics grades. Among predictors, current mathematics grades were most highly correlated with previous mathematics grades, as expected. The *ITBS*-M correlated only slightly higher with mathematics grades than the *IAAT* for all subgroups and the total group, but the *IAAT* was preferred over the *ITBS*-M in a stepwise regression when both test scores and previous mathematics grades were considered. Indeed, *ITBS*-M did not enter the model for any group. When only *ITBS*-M and *IAAT* were considered, *ITBS*-M did enter the model first followed by the *IAAT*. However, schools having both previous grades and *ITBS* scores available gained just a small portion of useful additional information from *IAAT* scores for placement decisions. Discriminant analyses revealed that using the combination of previous mathematics grades and *IAAT* scores resulted in the most accurate and efficient classification possible with these variables for this sample. All of these data indicate that it can be helpful to consider an aptitude measure in mathematics placement situations.

For some years now, there has been concern about the under-representation of women in mathematics and science careers. The root of the problem may be the fact that during the middle school and early high school years, girls tend to drop out of the mathematics curriculum in disproportionate numbers. Perhaps poor placement into secondary mathematics courses is part of the cause of this problem. The results of this study indicate that the often-cited underprediction of grades for females was only a marginal issue if only tests are used as placement criteria. It does seem clear, however, that regardless of how small the effect, caution is warranted when trying to place females who are borderline into higher mathematics classes. For such females, perhaps past achievement should be given more weight in this placement decision. As is true in any study of differential selection (with respect to gender or any other classification variable), if differential selection is present, there are two competing explanations possible, The one typically put forth is that the predictor variables contain bias. However, it also must be acknowledged that if differential grading standards exist, a valid predictor might appear to be biased. Neither explanation can be completely defended based on these results.

It is clear, however, that the most informed decision possible should be made regarding mathematics placement. The results of this study indicate that previous grades and achievement and aptitude test scores can provide useful,

unique information. While not perfect, there does appear to be strength in a multiplicity of predictors. Perhaps other, less traditional measures, could add a unique and substantial piece to this puzzle...but that's a controversy for a different day.

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Table 1

Math Class Groupings

Class Type	Class Names	N
ALGEBRA	Algebra	647
PRE-ALGEBRA	Pre-algebra Integrated Math Applied Math I	63
GENERAL MATH	Math Math 6 Math 7 Math 8 General Math Not algebra[1]	254

[1]One school labeled math class taken for its algebra students only.

Table 2

Means and Standard Deviations by Gender

Variable	Statistic	Gender: Male	Gender: Female
ITBS–M	M	57.26	59.35
	SD	26.63	24.42
	N	414	445
IAAT	M	34.88	35.65
	SD	12.14	11.94
	N	440	471
Previous Math Grade	M	2.77	2.99
	SD	0.90	0.74
	N	175	191
Math Grade	M	2.62	2.88
	SD	1.02	0.86
	N	324	330

Table 3

Means and Standard Deviations by Type of Math Class

Variable	Statistic	Math Class: Algebra	Pre-algebra	GM
ITBS–M	M	73.71	60.06	51.61
	SD	16.65	29.93	25.02
	N	249	63	601
IAAT	M	47.68	36.57	30.16
	SD	8.15	10.46	9.51
	N	254	63	645
Previous Math Grade	M	3.49	2.28	2.63
	SD	0.54	0.51	0.81
	N	113	18	263
Math Grade	M	3.13	2.70	2.50
	SD	0.73	0.82	1.02
	N	241	63	392

Table 4

Means and Standard Deviations by Gender and Type of Math Class

Variable	Statistic	Male			Female		
		A	PA	GM	A	PA	GM
ITBS–M	M	74.74	60.62	50.21	73.69	57.46	53.06
	SD	16.73	29.82	26.02	15.92	31.21	24.38
	N	107	37	267	129	24	287
IAAT	M	46.85	38.62	30.03	48.49	33.08	30.65
	SD	8.74	11.29	9.71	7.59	8.20	9.33
	N	110	37	290	131	24	307
Previous Math Grade	M	3.56	2.33	2.51	3.46	2.07	2.79
	SD	0.49	0.60	0.87	0.56	0.15	0.70
	N	45	12	118	61	5	125
Math Grade	M	3.14	2.60	2.32	3.14	2.86	2.71
	SD	0.73	0.86	1.08	0.70	0.76	0.93
	N	106	37	181	123	24	183

Table 5

Zero Order Correlations Among the Predictors and Criterion For Total Group and Each Math Class Type

Total Group

	1.	2.	3.	4.	5.
1. Gender	1.00 (N = 911)	0.04 (N = 859)	0.03 (N = 911)	0.14 (N = 366)	0.14 (N = 654)
2. ITBS Math Total (IPR)		1.00 (N = 921)	0.66 (N = 919)	0.63 (N = 352)	0.60 (N = 686)
3. IAAT Total Score			1.00 (N = 975)	0.64 (N = 393)	0.54 (N = 696)
4. Previous Math Grade				1.00 (N = 394)	0.82 (N = 132)
5. Math Grade					1.00 (N = 696)

Algebra

	1.	2.	3.	4.	5.
1.	1.00 (N = 241)	–0.03 (N = 236)	0.10 (N = 241)	–0.09 (N = 106)	0.00 (N = 229)
2.		1.00 (N = 249)	0.61 (N = 249)	0.13 (N = 109)	0.47 (N = 236)
3.			1.00 (N = 254)	0.08 (N = 113)	0.41 (N = 241)
4.				1.00 (N = 113)	0.73 (N = 100)
5.					1.00 (N = 241)

Table 5 continued

Pre-Algebra

	1.	2.	3.	4.	5.
1.	1.00 (N = 61)	−0.05 (N = 61)	−0.26 (N = 61)	−0.24 (N = 17)	0.15 (N = 61)
2.		1.00 (N = 63)	0.59 (N = 63)	0.31 (N = 18)	0.53 (N = 63)
3.			1.00 (N = 63)	0.22 (N = 18)	0.36 (N = 63)
4.				1.00 (N = 18)	0.55 (N = 18)
5.					1.00 (N = 63)

General Math

	1.	2.	3.	4.	5.
1.	1.00 (N = 597)	0.06 (N = 554)	0.03 (N = 597)	0.18 (N = 243)	0.19 (N = 364)
2.		1.00 (N = 601)	0.58 (N = 599)	0.58 (N = 225)	0.58 (N = 387)
3.			1.00 (N = 645)	0.59 (N = 262)	0.53 (N = 392)
4.				1.00 (N = 263)	0.57 (N = 14)
5.					1.00 (N = 392)

Table 6

Final Regression Weights and Increments in R^2 for Stepwise Regressions to Predict Math Grade

		Variables in the Model					
		ITBS–M and IAAT			Previous Math Grades ITBS–M and IAAT		
Group	Variable	Step	Weight	Inc. in R^2	Step	Weight	Inc. in R^2
General Math	Prev. Math Grade	N/A	N/A	N/A	1	1.139	0.3274
	ITBS–M	1	0.014	0.3404	—	—	—
	IAAT	2	0.030	0.0417	2	0.101	0.1207
	Constant		0.956			–3.047	
Pre-algebra	Prev. Math Grade	N/A	N/A	N/A	1	0.691	0.3014
	ITBS–M	1	0.015	0.2850	—	—	—
	IAAT	—	—	—	—	—	—
	Constant		1.822			0.425	
Algebra	Prev. Math Grade	N/A	N/A	N/A	1	0.828	0.5289
	ITBS–M	1	0.015	0.2247	—	—	—
	IAAT	2	0.017	0.0227	2	0.013	0.0144
	Constant		1.201			–0.426	
Total Group	Prev. Math Grade	N/A	N/A	N/A	1	0.814	0.6799
	ITBS–M	1	0.015	0.3641	—	—	—
	IAAT	2	0.018	0.0322	2	0.012	0.0111
	Constant		1.201			–0.312	

Table 7

Previous Grade Included With Test Scores as Predictors

a) Regression Equations Allowing for Non coincidence

Grade = −0.412 + 0.885 (Prev. Math Grade)

− 0.004 (ITBS − M) + 0.014 (IAAT)

+ 0.273 (Gender) + 0.003 (Gen. × ITBS − M)

+0.002 (Gen. × IAAT) − 0.166 (Gen. × Prev. Grade)

$R^2 = .6930$

b) Regression Equations Allowing for Non-parallelism

Grade = −0.329 + 0.806 (Prev. Math Grade)

−0.002 (ITBS − M) + 0.015 (IAAT)

+ 0.041 (Gender)

$R^2 = 0.6903$

c) Common Regression Equations

Grade = −0.323 + 0.806 (Prev. Math Grade)

−0.002 (ITBS − M) + 0.015 (IAAT)

$R^2 = 6898$

Table 8

Test Scores Only as Predictors

a) Regression Equations Allowing for Non coincidence

Grade = 0.924 + 0.015 (ITBS – M) + 0.023 (IAAT)

+ 0.636 (Gender) – 0.001 (Gen. × ITBS – M)

–0.009 (Gen. × IAAT)

$R^2 = 0.4043$

b) Regression Equations Allowing for Non-parallelism

Grade = 1.133 + 0.015 (ITBS – M) + 0.018 (IAAT) + 0.219 (Gender)

$R^2 = 0.3982$

c) Common Regression Line

Grade = 1.232 + 0.015 (ITBS – M) + 0.018 (IAAT)

$R^2 = 0.3849$

Table 9

Tests of the Hypotheses of Differential Prediction

Test for Coincidence

Predictors	df	F	p
P[1], M[2], A[3]	4,113	0.294	>.25
M, A	3,638	6.926	<.001

Test for Parallelism

Predictors	df	F	p
P, M, A	3,113	0.331	>.25
M, A	2,638	3.267	<.05

[1]P = Previous Math Grade

[2]M = ITBS – M

[3]A = IAAT

Table 10

Percent Classified into Each Class Type
Using Different Subsets of Predictors

Predictor: Previous Math Grade

Math Class	Total Group A	Total Group PA	Total Group GM	Pre-algebra Students removed A	Pre-algebra Students removed GM
A	88.59	0.00	11.41	88.59	11.41
PA	100.00	0.00	0.00	—	—
GM	43.36	0.00	56.64	43.36	56.64

Predictors: Previous Math Grade and ITBS–M

Math Class	Total Group A	Total Group PA	Total Group GM	Pre-algebra Students removed A	Pre-algebra Students removed GM
A	86.22	0.00	13.78	86.22	13.78
PA	83.33	5.56	11.11	—	—
GM	14.68	1.83	83.49	14.68	85.32

Predictors: Previous Math Grade and IAAT

Math Class	Total Group A	Total Group PA	Total Group GM	Pre-algebra Students removed A	Pre-algebra Students removed GM
A	88.93	0.38	10.69	89.31	10.69
PA	83.33	5.56	11.11	—	—
GM	17.70	0.88	81.42	17.70	82.30

Table 10 continued

Predictors: ITBS–M and IAAT

Math Class	Total Group A	Total Group PA	Total Group GM	Pre-algebra Students removed A	Pre-algebra Students removed GM
A	88.81	0.00	11.19	88.81	11.19
PA	79.37	0.00	20.63	—	—
GM	22.89	0.00	77.11	22.89	77.11

Predictors: Previous Math Grade, ITBS–M, and IAAT

Math Class	Total Group A	Total Group PA	Total Group GM	Pre-algebra Students removed A	Pre-algebra Students removed GM
A	88.84	0.00	11.16	88.84	11.16
PA	77.78	5.56	16.67	—	—
GM	14.68	2.75	82.57	15.60	84.40

AERA April 8-12, 1996

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