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The Potential of Diagnostic Basic Math Tests

Joel P. Wiesen, Ph.D.
June, 2003

Need

Promotional opportunities closed to some good employees
Organizations sometimes have fewer acceptable candidates than needed

Problems Implementing a Diagnostic Approach

Length of test
Reliability of diagnostic scores

Possible Approaches

Longer test
More choices
Graded difficulty (similar to a Guttman Scale)

Examples of Approaches

Examples of score reports
Reliability and validity of diagnostic scores

Diagnostic Math Test Web Site

http://www.aprtestingservices.com/educational/index.htm

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Reliabilities and Validities of the Diagnostic Test of Pre-Algebra Math (DT-PAM)

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Diagnostic Score	Validity* N=152	Reliability N=972
Number correct (50)	0.59**	0.93
Whole Numbers (3)	0.32**	0.45
Common Fractions (2)	0.29**	0.50
Decimal Fractions (3)	0.34**	0.48
Percentages (3)	0.44**	0.47
Measures (2)	0.29**	0.53
Signed Numbers (2)	0.31**	0.42
Simple Powers (3)	0.36**	0.61
Substitution (2)	0.39**	0.61
Setting up Equations (3)	0.49**	0.43
Solving Equations (2)	0.45**	0.60
Geometry (3)	0.51**	0.58
Comparisons (2)	0.33**	0.46
Graphs (2)	0.32**	0.25
Tables (2)	0.23**	0.38
Estimation (2)	0.47**	0.51
Probability (2)	0.15	0.12
Statistics (2)	0.30**	0.40
Order of Operations (2)	0.34**	0.41
Ratios (2)	0.49**	0.49
Math Vocabulary (3)	0.21**	0.45
Word Problems (3)	0.36**	0.49

* Criterion is total score on Math MCAS M/C questions (max = 29)
** Sig. (2-tailed) = 0.01

Diagnostic Area	Reli-ability	Area-total Correlation		
		Fall 2000 Administration(n=972)	Validity Group 1 (n=184)	Validity Group 2A (n=97)
1. Whole Numbers (3)	0.45	.61*	.61*	.60*
2. Common Fractions (2)	0.50	.55*	.40*	.45*
3. Decimal Fractions (3)	0.48	.59*	.49*	.53*
4. Percentages (3)	0.47	.72*	.64*	.70*
5. Units of Measurement (2)	0.53	.62*	.54*	.58*
6. Signed Numbers (2)	0.42	.39*	0	.54*
7. Simple Powers (3)	0.61	.69*	.61*	.71*
8. Substitution (2)	0.61	.69*	.66*	.70*
9. Setting up Equations (3)	0.43	.65*	.59*	.59*
10. Solving Equations (2)	0.60	.72*	.68*	.72*
11. Geometry (3)	0.58	.62*	.62*	.66*
12. Comparisons (2)	0.46	.47*	.38*	.44*
13. Graphs (2)	0.25	.44*	.32*	.48*
14. Tables (2)	0.38	.54*	.40*	.49*
15. Estimation (2)	0.51	.64*	.54*	.65*
16. Probability (2)	0.12	.41*	.43*	.39*
17. Statistics (2)	0.40	.57*	.50*	.58*
18. Order of Operations (2)	0.41	.57*	.56*	.40*
19. Ratios (2)	0.49	.63*	.50*	.51*
20. Math Vocabulary (3)	0.45	.59*	.50*	.62*
21. Word Problems (3)	0.49	.64*	.54*	.57*

Note: Number in parentheses after the area name indicates the number of questions for that area.
* $p < .001$