DOCUMENT RESUME

ED 435 627 TM 030 225

AUTHOR Alao, Solomon; Coffey, Grace; Ellington, Roni; Wright, Henrietta

TITLE Predicting Placement Test Scores with Cognitive and Socio-Economic Variables.

SPONS AGENCY Department of Housing and Urban Development, Washington, DC.
PUB DATE 1999-09-22
NOTE 30p.
CONTRACT HUD-B-98-SP-MD-074
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Cognitive Ability; *College Freshmen; Construct Validity; Correlation; Grade Point Average; High School Students; High Schools; Higher Education; *Prediction; *Screening Tests; Socioeconomic Status; *Student Placement; *Test Results
IDENTIFIERS Scholastic Assessment Tests

ABSTRACT

The relationship among Scholastic Assessment Test (SAT) results, high school grade point average (GPA), socioeconomic variables, and placement test scores was examined. Participants were 162 freshmen studies students from an urban university. Results of zero-order correlations indicated that the construct validity of the placement skills test used at the university is evident at a moderate level. Participants' English and mathematics placement skills test scores were moderately correlated with those of their SAT scores (verbal and mathematics) in the hypothesized manner. Participants' cognitive profiles were better predictors of their placement test scores than their socioeconomic profiles. The findings are discussed in terms of their implications for identifying and supporting freshmen studies students at the university. (Contains 6 tables and 15 references.) (Author/SLD)

Running Head: Predictors of Placement Test Scores

Predicting Placement Test Scores with Cognitive and Socio-economic Variables

Alao Solomon, Coffey Grace, Ellington Roni, and Wright Henrietta

Morgan State University

The work reported herein is supported by the Special Projects Grant (U. S. Department of Housing and Urban Development [HUD - B 98 SP MD 074]). Correspondence concerining this article should be addressed to Solomon Alao, 310 Jenkins Building. Department of Teacher Education and administration. Morgan State University, 1700 E. Coldspring Lane, Baltimore, MD 21251.

Abstract

The relationship between SAT, high-school GPA, socio-economic variables, and placement test scores were examined. One-hundred and sixty-two freshmen studies students from an urban university were participants. Results of zero-order correlations indicated that the construct validity of the placement skills test utilized at the university is evident at a moderate level. Participants' English and mathematics placement skills test scores were moderately correlated with those of their SAT (verbal and mathematics) in the hypothesized manner. Participants' cognitive profiles were better predictors of their placement test scores than their socio-economic profiles. The findings are discussed in terms of their implications for identifying and supporting freshmen studies students at the university.

The low correlation between placement test scores and grade point average (GPA) should not surprise researchers, college administrators, parents, and students. GPA is a *global* measure of student achievement. On the other hand, institutions of higher learning use the placement skills tests to assess *specific* academic skills (e.g., reading, writing, and mathematics) of incoming freshmen (NCES, 1995). As a matter of fact, the positive but low correlation between GPA and placement test scores is in-line with previous findings in the social-psychological literature demonstrating a positive but low correlation between global and specific achievement measures (see Wambach & Brothen, 1990, for a brief review).

For the aforementioned reasons, concerns about the validity and fairness of placement skills test should not be based on the correlation between placement test scores and (GPA). In general, placement skills test are used to: (a) identify beginning students with basic skill deficiencies; and (b) assign students with skill deficiencies into appropriate courses, or developmental programs. The ultimate goal is to support and equip students who have skill deficiencies with basic skills needed for academic success at the college level (Colby & Opp, 1987).

Any concerns or criticisms about a placement skills test should be directed to its diagnostic ability (Hopkins, 1988; McMillan, 1997). It is important to ensure that a placement skills test measures the constructs or concepts it is designed to measure (Landa, 1998; Willingham, 1974, 1985). Improper diagnosis of students skill levels; placement of students with appropriate skills into developmental programs (or unnecessary delay of student education); and the inability to match developmental programs to the needs of incoming freshmen are plausible consequences that can result from use of a placement skills test that fails to measure the basic

academic skills it is designed to measure (Davis, Kaiser, & McGuire, 1990; Elifson, Pounds, & Stone, 1995; Noble & Sawyer, 1989; Shermis, Wolting, & Lombard, 1996; Slark, 1991; Wambash & Brothen, 1990).

The construct validity of the placement skills test used at Morgan State University (MSU) is the focus of this study. In other words, is the placement skills test utilized at MSU measuring the constructs it is designed to measure? Similar to other institutions of higher learning the English and mathematic placement skills tests utilized at MSU are designed to assess the basic academic skill levels (e.g., sentence structure, written conventions, arithmetic, and elementary algebra) of incoming freshmen. And, since construct validity is based on the way a measure is related to other measures or tests measuring the same constructs or concepts, we expected the placement skills test utilized at MSU to be significantly correlated with other measures of basic academic skills such as the Scholastic Achievement Test (SAT) and the American College Test (ACT).

On the basis of the above reasons, one purpose of this study is to examine the relationship between placement test scores (English and mathematics), high school GPA, and SAT scores. With the exception of high school GPA, SAT scores (mathematics and verbal) are reliable indicators of basic academic skill levels (ETS, 1999; Noble & Sawyer, 1989). Construct validity of the placement skills test utilized at MSU is evident if : (1) its mathematics placement skills test scores are moderately correlated with those of the mathematics SAT scores; (2) its English placement skills scores are moderately correlated with those of the verbal SAT scores; and (3) its English and mathematics placement skills scores are significantly correlated with high school GPA.

Construct validity of the placement skills test utilized at MSU is not evident if: (1) its mathematics placement skills scores are weakly correlated with those of the SAT scores, and moderately correlated with those of the verbal SAT scores; (2) its English placement skills scores are weakly correlated with those of the verbal SAT scores, and highly correlated with those of the math SAT scores; and (3) its English and math placement skills scores are uncorrelated with high school GPA. A construct-validated instrument should be either high, or moderately correlated with other measures, or methods used to measure the same constructs (*convergent*) validity and low correlations with measures of different constructs (*or discriminant*) validity (Hopkins, 1998; Landa, 1998; McMillan, 1997).

The second purpose of this study is to examine the relative contribution of high school GPA, SAT, and socio-economic status (SES) to placement test scores. In addition to the mentioned cognitive variables, SES is another dimension of a student's background associated with academic success. Furthermore, cognitive and SES variables are critical to student retention and academic success (Grosset & Hawk, 1986; Noble & Sawyer, 1989). The goal is to identify the best predictor(s) of the placement skills test utilized at MSU.

Another important, yet little understood, area of research is the relative contribution of each of the key study variables to placement test scores beyond and above the relative contributions of the other sets of factors. For instance, will high school GPA, SAT, and SES predict a significant amount of the variance in placement test scores after the contributions of the other sets of factors are controlled? Answers to these issues have implications as to how MSU can better identify incoming freshmen with skill deficiencies, assign them into appropriate courses, and equip them with basic skills needed for academic success at MSU. In addition, answers to

these issues have implications for supporting or designing instructional contexts to support incoming students at MSU. For these reasons, the final purpose of this study is to examine the relative contribution of each factor to placement test scores beyond and above the relative contributions of the other sets of factors.

In summary, the purpose of this study is to: (1) examine the construct validity of the placement skills test utilized at MSU; (2) explore the relative contribution of high school GPA, SAT, and socio-economic status (SES) to placement test scores; and (3) examine the relative contributions of each factor to placement test scores beyond and above the relative contributions of the other sets of factors. The three research questions are:

1. What is the relationship between placement test scores, high school GPA, and SAT scores?
2. How much of the variance in placement test scores can be explained by high-school GPA, SAT, and SES?
3. Will high-school GPA, SAT, and SES account for a significant amount of the variance in placement test scores after the contributions of the other factors are controlled?

Method

Participants

One-hundred and sixty-two freshmen studies students at Morgan State University (MSU) participated in this study. Sixty-one percent of the participants were women; 39% were men. These percentages roughly correspond to the percentages of women (59%) and men (41%) at the university in general. The racial composition of this sample 97% African American, 2% Foreign,

1% Indian is similar to the percentages of racial composition (95% African American, 1% Asian, 2% Foreign, 1% Hispanic, 1% Indian, and 2% White) of the students in the university in general. The residency status of this sample 73% (In-State) and 27% (Out-of-State) are also similar to those of the university in general 63% (Maryland [MD]) and 37% (non-MD).

Data Sources

Prior to the data retrieval process, consent to analyze personal records were obtained from the participants. The English and mathematics placement test scores were obtained from the Academic Development Center at MSU. High-school GPA, SAT, residential zip-code, and socio-economic information were obtained from the information or data service center at the university. And, similar to Grosset and Hawk (1986), socio-economic status (SES) operationalized as contextual variables were obtained from the 1990 census data (U.S. Bureau of the Census, 1990).

The Placement Skills Test

Independent of prior academic achievements (high-school GPA, SAT, and ACT scores), all incoming freshmen at MSU are required to complete the English and mathematics portions of the placement skills test. MSU purchased its placement skills test from the Educational Testing Service (ETS). In 1988, ETS aligned the content of the placement skills test with the Basic Academic Competencies defined by the College Board's Educational Equality Project. The project was a ten year effort sponsored by the College Board to identify the knowledge and skills needed by all college entrants. With the help of distinguished educators (more than 200 college and high-school instructors) and a special literary and mathematics advisory committee, the identified competencies or items were piloted by ETS.

The English and mathematics portions of the placement skills test utilized at MSU are the focus of this study; more specifically, the sentence structure, written conventions, arithmetic, and elementary algebra aspects of the skills test. The *sentence structure skills items* are designed to determine: (a) how much a student knows about how the parts of a sentence fit together; and (b) about ways to make the meaning of a sentence clear. The *conventions of written English skills items* are designed to determine: (1) how much a student knows about using standard form of written English; (2) a student's ability to connect ideas appropriately; and (3) a student's ability to maintain consistency in writing.

The *arithmetic skills items* are designed to measure students' knowledge of: operations with whole numbers, operations with fractions, operations with decimals, ratio, proportion, and percent; and students' ability to apply arithmetic skills in solving problems. The *elementary algebra skills items* are designed to measure students' knowledge of operations with real numbers; operations with algebraic expressions; solutions of equations and inequalities; and students' ability to apply algebraic operations to interpret data.

In contrast to the mentioned portions of the English and mathematics placement skills test, the *SAT verbal questions* are designed to assess students' ability to understand and analyze written materials; recognize relationships between parts of a sentence; see the relationships between pairs of words; and their ability to understand the meaning of words. The *SAT mathematics questions* are designed to assess students' ability to solve problems involving: arithmetic, algebra, and geometry skills and concepts. While the placement skills test and the SAT are reliable indicators of basic English and mathematics competencies, both tests are designed to assess similar, but not the same skills (ETS, 1998; Noble and Sawyer, 1989). For these reasons, we expected the

participants' English and mathematics placement test scores to be moderately correlated with those of their SAT verbal and mathematics scores.

In line with the purpose of the placement skills test (see ETS, 1998, for more information), MSU uses incoming freshmen placement test scores for academic advising. More specifically, the placement test scores are used to determine: (a) what courses (English and mathematics); and (b) the number of course load students should take. The goal is to assign students into appropriate courses that are neither too easy, nor too difficult for them to handle with reasonable effort.

A student with a sub-score of 32 or above on the *written convention* and a sub-score of 24 or above on the *sentence structure* portions of the English placement skills test is eligible to take English 101 three days a week. In contrast, a student with a sub-score lower than 24 on the sentence structure and a sub-score lower than 32 on the written conventions portions of the English placement test is advised to enroll in English 101 five days a week. The latter student failed to meet the *minimum cut-off points* (32 for the written conventions and 24 for the sentence structure) needed for passing the English portion of the placement skills test. The latter student needs to improve his or her written conventions and sentence structure skills; for this reason, the student is classified as an English freshmen studies student.

Students with a sub-score of 28 or above on the *arithmetic* and a sub-score of 28 on the *elementary algebra* portions of the math placement skills test are eligible to enroll in a mathematics course prescribed for their major. A student with a sub-score lower than 28 on both the arithmetic and elementary algebra portions of the mathematics placement skills test is advised to enroll in mathematics 106 or College Algebra. Similar to the above scenario, the latter student

failed to meet the *minimum cut-off points* (28 for arithmetic and elementary algebra) needed for passing the mathematics portion of the placement skills test. The latter student needs to improve his or her arithmetic and elementary algebra skills needed for success in a college mathematics course higher than math 106; for this reason, the student is classified as a freshmen studies mathematics student.

Students who meet or exceed the cut-off score for the English and mathematics portions of the placement skills test are eligible to carry 15 or more credits during their freshmen year. Students who fail to pass either the English or mathematics portion of the placement skills test are required to carry the minimum 12 credits needed to become a full-time student during their freshmen year. In this study, the *criterion variables* are English and mathematics placement test scores of freshmen studies students.

Freshmen studies students' high-school GPA, SAT, total family income, and the following SES indicators: percentage of college graduates; percentage of high-school graduates; mean per-capita income; percentage of persons below poverty; median household income; percentage of un-employment associated with the zip-code of each participant are the *predictor variables.* Placement test scores, high-school GPA, and SAT scores were conceptualized as cognitive variables. Total family income and the aforementioned SES indicators were conceptualized as socio-economic variables. And, as mentioned earlier, one purpose of this study is to predict placement test scores with cognitive and socio-economic variables. Those variables are critical to student retention and academic success at MSU. For these reasons, it is important to explore the relationship between the key study variables.

Results

Descriptive Statistics

Table 1 lists means, and standard deviations for the cognitive variables. Participants average elementary algebra, arithmetic, and placement math total scores are (M = 21.04; M = 26.23; and M = 47.48), respectively. These averages are lower than the sub-score of 28, 28, and 56 which are needed to pass the mathematics portions of the placement skills test. On the other hand, participants' arithmetic scores are higher than their elementary algebra scores.

Participants' average written conventions, sentence structure, and placement English total scores are (M = 27.31; M = 22.37; and 49.63), respectively. These averages are lower than the sub-score of 32, 24, and 56 which students need to pass the English portions of the placement skills test. On the basis of their placement mean test scores, these results are in-line with the fact, that all of the participants are classified as freshmen studies students.

The average high-school GPA of the participants (M = 2.85) correspond to the average (M = 2.9) of the students at the university in general. The average combined SAT score of the participants (M = 916) is lower than the combined SAT score (M = 950) of students at the university in general. Participants performed better on the verbal portion of the SAT than they performed on the mathematics portion (Table 1). These results suggest that freshmen studies students': (a) high-school GPA correspond to those of non-freshmen studies students at the university; and (b) total SAT scores are lower than those of students at the university in general.

Insert Table 1 about here

Zip-code information indicated that 99% of the participants reside in an urban environment; one participant (1%) reside in a rural environment. Those percentages are in-line with the urban mission of MSU "Morgan State University is an historically black institution with the unique designation as Maryland's public urban university. As an urban university, Morgan serves an ethically and culturally diverse student body, among which are some of Maryland's best and brightest students as well as representative numbers of high school graduates from urban communities who would not otherwise pursue the baccalaureate degree." The *median family income* of the participants is $31,036, which is lower than the median family income for the state of Maryland which is $45,035.

Table 2 contains information on the socio-economic variables associated with the social contexts that the participants reside in. To emphasize the importance of the social-indicators, participants' residential indicators are compared with those of the state of Maryland. Participants' mean *per-capita income* and *household income* median are 15.42 and 36.25, respectively. In general, the average per-capita mean and income household median associated with the urban contexts that the participants reside in are lower than those associated with the social contexts that students in the state reside in (Table 2).

As for *educational attainment*, the percentage of high-school and college graduates that reside in the urban contexts that the participants reside in are (74.11% and 21.38%), respectively. Those percentages are lower than those of high-school and college graduates that reside in the social contexts that other students in the state reside in (78.40% and 26.50%), respectively. The percentages of *persons below the poverty level* and *unemployment level* in the urban contexts that participants reside in are (10.78% and 6.13%), respectively; those percentages are higher than those in social contexts that other students reside in (8.30% and 4.30%), respectively. In contrast

to other students in the state, Table 2 indicates that the participants reside in socio-economically and educationally disadvantaged social contexts.

Insert Table 2 about here

Research Question 1

What is the relationship between placement test scores, high-school GPA, and SAT scores? As mentioned earlier, construct validity of the placement skills test utilized at MSU is the focus of this study. And, since construct validity is based on the way that a measure is related to other measures or tests measuring the same constructs or concepts, it is important to examine the relationship between freshmen studies students' placement test scores (English and mathematics) and their SAT scores. Table 3 shows the intercorrelations between the cognitive and socio-economic variables. With the exception of total family income (TINC), the rest of the SES variables were not correlated with the cognitive variables.

Participants' placement mathematics total scores (PMTOT) are significantly correlated with those of their elementary algebra scores (EALG); arithmetic scores (ARITH); SAT mathematics scores (SAT-M); and SAT total scores (SAT-T). Participants placement English total scores (PETOT) are also significantly correlated with those of their written conventions scores (WCONV); and sentence structure scores (SENT-S); SAT verbal scores (SAT-V); and SAT total scores (SAT-T). The moderate correlations between placement mathematics total scores and SAT mathematics scores ($r = .47$, $p<.01$) and SAT total scores ($r = .42$, $p<.01$); and the moderate correlations between placement English total scores and SAT verbal scores ($r = .35$,

$p<.01$) indicate that the construct validity of the placement skills test (English and mathematics) utilized at MSU is evident at a moderate level.

High-school GPA is weakly correlated with placement mathematics total scores ($r = .16$, $p<.05$); placement English total scores ($r = .20$, $p<.05$); but moderately correlated with SAT total scores ($r = .36$, $p<.01$); SAT verbal scores ($r = .33$, $p<.01$); and SAT mathematics scores ($r = .31$, $p<.01$). Participants' high-school GPA is a moderate predictor of their SAT scores; on the other hand, it is a weak predictor of their placement test scores. Total income is weakly correlated with SAT total scores ($r = .17$, $p<.05$); arithmetic scores ($r = .17$, $p<.05$); and SAT mathematics scores ($r = .16$, $p<.05$); but uncorrelated with placement test scores. Participants' total income is a weak predictor of their SAT and placement test scores.

Insert Table 3 about here

Research Question 2

How much of the variance in participants' placement mathematics total scores (PMTOT) can be explained by high-school GPA, SAT, and SES? How much of the variance in participants placement English total scores (PETOT) can be explained by high-school GPA, SAT, and SES? In other words, how well does each of the mentioned variables predict placement skills test scores? To address the first question, five multiple-regression analyses were performed. The dependent variable was PMTOT. The independent variables were elementary algebra scores, arithmetic scores, SAT math scores, SAT total scores, and high-school GPA; each variable was used to predict PMTOT.

As mentioned in the previous section, socio-economic variables were uncorrelated with participants' placement test scores. Results of zero-order correlations and the multiple regression analyses indicate that the cognitive variables are better predictors of participants' placement test scores. Results of the multiple-regression analyses indicate that participants': elementary algebra scores accounted for 79% of the variance in PMTOT; arithmetic scores accounted for 73% of the variance in PMTOT; SAT mathematics scores accounted for 22% of the variance in PMTOT; SAT total scores accounted for 17% of the variance in PMTOT; and high-school GPA accounted for 3% of the variance in PMTOT, as indicated in Table 4.

Results of Table 4 are clear. Participants' knowledge of elementary algebra and arithmetic skills are the best predictors of their placement mathematics total scores. Participants' SAT mathematics total scores and SAT total scores are the next best predictors of their placement mathematics total scores. High-school GPA only accounted for 3% of the total variance in participants' placement mathematics total scores.

Insert Table 4 about here

How much of the variance in participants' placement English total scores (PETOT) can be explained by high-school GPA, SAT, and SES? To address this question, five multiple regression analyses were performed. The SES variables are uncorrelated with the target variable. Participants' written conventions scores accounted for 82% of the variance in PETOT; their sentence structure scores accounted 69% of the variance in PETOT; their SAT verbal scores accounted for 13% of the variance in PETOT; their SAT total scores accounted for 10% of the

variance in PETOT; and their high-school GPA accounted for 4% of the variance in PETOT, as indicated in Table 5.

Results of Table 5 indicate that participants' knowledge of written conventions and sentence structure are the best predictors of their placement English total scores. Participants' SAT verbal and SAT total scores are the next best predictors of their English total scores. High school GPA only accounted for 4% of the variance in participants' placement English total scores. Results of Tables 4 and 5 suggest that students with knowledge of elementary algebra, arithmetic, written conventions, and sentence structure are more likely to pass the placement skills test (English and mathematics) utilized at MSU than their counterparts who lack knowledge of the mentioned English and mathematical concepts, theories, and principles.

Insert Table 5 about here

Research Question 3

Will high-school GPA, SAT, and SES account for a significant amount of the variance in placement test scores after the contributions of the other factors are controlled? As mentioned earlier, knowledge of participants' SES profiles as operationalized in this study tells us nothing about their placement test scores after their cognitive profiles are controlled or taken into consideration. For these reasons, we explored the contributions of high-school GPA and SAT scores to those of the placement test after the contributions of each variable is controlled. In other words, will high-school GPA and SAT account for a significant amount of the variance in placement test scores after the contribution of each variable is controlled?

To address the aforementioned question, four hierarchial multiple-regression analyses were performed. In the first two, analyses, the dependent variable was participants' English total placement test scores (PETOT). In the first analysis, independent variables were entered in the order of high-school GPA and SAT verbal scores (SAT-V). The goal was to understand the contribution of SAT-V to PETOT after high-school GPA is controlled. In the second analysis, independent variables were entered in the order of SAT-V and high-school GPA. The goal was to understand the contributions of high-school GPA to PETOT after SAT-V is controlled. In the last two analyses, the dependent variable was participants' placement mathematics total test scores (PMTOT). In the third analysis, the independent variables were entered in the order of high-school GPA and SAT mathematics total scores (SAT-M). The goal was to understand the contribution of SAT-M to PMTOT after high-school GPA is controlled. In the final analysis, independent variables were entered in the order of SAT-M and high-school GPA to understand the contribution of high-school GPA to PMTOT after SAT-M is controlled, as indicated in Table 6.

Results of the first multiple regression analysis showed that SAT-V predicted a significant amount of the variance in PETOT when high-school GPA was controlled. SAT-V accounted for 9% of the total variance in PETOT. R^2 change was significant at $p<.01$, as indicated in Table 6. Results of the second analysis showed that high-school GPA did not account for a significant amount of the variance in PETOT after SAT-V is controlled. R^2 change was not statistically significant. Results of the third analysis showed that SAT-M predicted a significant amount of the variance in PMTOT when high-school GPA was controlled. SAT-M accounted for 19% of the variance in PMTOT. R^2 change was significant at $p<.01$, as indicated in Table 6. Results of the

final analysis showed that high-school GPA did not account for a significant amount of the variance in PMTOT after SAT-M is controlled. R^2 change was not statistically significant. Results suggest that knowledge of participants' high-school GPA tells us nothing about the nature of their placement test scores after SAT scores are controlled. SAT is a better predictor of participants' placement test scores than those of their high school GPA and SES.

Insert Table 6 about here

Discussion

Placement skills tests are used by institutions of higher learning to: (a) identify incoming students with skills deficiencies; and (b) assign students with skill deficiencies into appropriate courses, or developmental programs (NCES, 1995). For these reasons, it is important to ensure a placement skills test is measuring the concepts and constructs it is designed to measure (Willingham, 1974, 1985). The construct validity of the placement skills test utilized at MSU was the focus of this exploratory investigation. In other words, is the placement skills test utilized at MSU measuring the constructs it is designed to measure?

Results of zero-order correlations indicated that the construct validity of the placement skills test utilized at MSU is evident at a moderate level. Participants' English and mathematics placement skills test scores were moderately correlated with those of their SAT (verbal and mathematics) in the hypothesized manner. Results of descriptive statistics further support the diagnostic ability of the placement skills test. Participants' placement English and mathematics test scores are in-line with the criteria for classifying the participants as freshmen studies students.

Moreover, participants combined SAT scores were lower than those of the students at the university in general.

The above results suggest that the placement skills test utilized at MSU is unlikely to misdiagnose incoming students' English and mathematics skill levels. These results are in-line with those of Slark (1991) and others (see Noble & Sawyer, 1989, for a review) that have found that placement skills tests tend to measure the basic skills the tests are designed to measure. Zero-order correlations and descriptive statistics results further suggest that: (a) it may be necessary to administer the placement skills test to incoming students whose combined SAT scores are lower than those of the students at university in general; and (b) the freshmen studies courses and academic support programs be individualized to students' academic needs.

In reference to the latter suggestion, participants performed better on the arithmetic and sentence structure portions of the placement skills test than on the elementary algebra and written conventions portions. In short, it implies that academic support efforts and freshmen studies courses can be designed to enhance students' academic weakness while at the same time building on their academic strengths.

The second purpose of this study was to examine the relative contribution of high-school GPA, SAT, and SES to placement test scores. The goal was to identify the best predictor(s) of the placement skills test utilized at MSU. Results of multiple-regression analyses indicate that participants' knowledge of elementary algebra, arithmetic skills and concepts, SAT-M, SAT total, and high-school GPA are the best predictors of placement math total scores, respectively. Participants' knowledge of written conventions, sentence structure, SAT-V, SAT total, and high-school GPA are the best predictors of placement English total sores, respectively. Socio-

economic variables were uncorrelated with participants' mathematics and English placement test scores.

These set of results suggests that incoming students with knowledge of elementary algebra, arithmetic, written conventions, and sentence structure are more likely to pass the placement skills test utilized at MSU than their counterparts who lack the mentioned English and mathematical concepts, theories, and principles. In contrast to the study conducted by Grosset and Hawk (1986), participants SES variables were not correlated with those of their placement test scores. Discrepancy in findings may be attributed to the purpose of both studies and on how the SES variables were operationalized. For example, Grosset and Hawk (1986) used SES variables to identify high risk college students at the Community College of Philadelphia. This study was designed to understand the contributions of SES and cognitive variables to students' placement test scores. Secondly, the SES variables in the Grosset and Hawk's study were categorized into a lower, middle, and upper-income categories. In this study, the SES variables were not divided into categories before the variables were correlated with students' placement test scores. Furthermore, 99% of the participants in this study were from urban contexts with similar SES profiles. It is, as if, the SES variables were held constant or controlled.

Although the SES variables were uncorrelated with placement test scores, results of descriptive statistics indicate that 99% of the participants are from an urban environment. And, in contrast to other students in the state of Maryland, the participants reside in socio-economically and educationally disadvantaged contexts. In-line with the urban mission of MSU, the aforementioned results suggest that the university may want to develop a partnership with, as many as possible, middle and high schools located in an urban environment in the state to: (a)

inform parents, students, instructors, and school administrators about the results of this study; and (b) inform those stakeholders about the importance of supporting students' knowledge of elementary algebra, arithmetic, written conventions, and sentence structure. As mentioned earlier, students with knowledge of those basic skills are more likely to succeed on the placement skills test utilized at MSU.

This study was also designed to examine the relative contribution of SAT, high-school GPA, and SES to placement test scores beyond and above the relative contributions of the other sets of factors. Results of zero-order correlations, multiple-regression analyses, and hierarchial regression analyses indicated that participants cognitive profiles were better predictors of their placement test scores than their socio-economic profiles. In short, SAT scores were better predictors of participants' placement test scores than those of their high-school GPA and SES. As mentioned in the result section, knowledge of participants' SES and high-school GPA tells us nothing about their placement test scores after their SAT scores are controlled or taken into consideration. Theoretically, MSU should use SAT scores to identify incoming students who need to take the placement skills test; and disregard students' high-school GPA and SES profiles.

Although the results of this study are positive, certain limitations should be kept in mind when interpreting the findings. Our results are limited to the way the cognitive and socio-economic variables were conceptualized and operationalized. A correlational design was used to structure this investigation; strengths and weakness of the design were inherited. For instance, this study did not use an experimental or longitudinal design. For this reason, it is inappropriate to make a clear statement concerning causality. Results are also limited to freshmen studies students at MSU and selected placement test scores. Consequently, it would be useful to replicate this

study with non-freshmen studies students. Despite those caveats, results of this study have contributed to our knowledge of how to identify and support incoming and freshmen studies students at MSU.

REFERENCES

Colby, A., & Opp, R. (1987). *Controversies surrounding developmental education in the community college.* (Eric Documents Reproduction Service No. ED 286557)

Davis, T. M., Kaiser, R. A., Boone, J. N., & McGuire, J. (1990). Caution in testing. *Journal of Developmental Education, 13(3),* 2-4.

Education Testing Service (1999). *Freshmen placement testing.* Princeton, NJ: Author.

Elifson, J. M., Pounds, M. L., & Stone, K. R. (1995). Planning for assessment of developmental programs. *Journal of Developmental Education, 19(1),* 2-11.

Grosset, J. M., & Hawk, T. R. (1986). *Construction and application of a socio-economic status variable.* (ERIC Documents Reproduction Service No. ED 280480)

Hopkins, K. D. (1998). *Educational and Psychological measurement and evaluation.* Boston MA: Allyn & Bacon.

Landa, L. H. (1998). *Educational and Psychological Measurement and evaluation.* Boston MA: Allyn & Bacon.

Mcmillan, J. H. (1997). *Classroom assessment: Principles and practice for effective instruction.* Boston MA: Allyn & Bacon.

National Center for Education Statistics (1995). *Remedial education at higher education institutions.* Washington, D. C: U.S. Department of Education.

Noble, J. P., & Sawyer, R. L. (1989). Predicting grades in college freshmen English and mathematics courses. *Journal of College Student Development, 30,* 345-353.

Shermis, M. D., Wolting, M., & Lombard, D. (1996). Computerized adaptive testing for reading placement and diagnostic assessment. *Journal of Developmental Education, 20(2),* 18-24.

Slark, J. (1991). *RSC validation of mathematics placement tests: Research, planning, resource development report.* (ERIC Document Reproduction Service No. ED 341418)

Wambach, C., & Brothen, T. (1990). An alternative to the prediction-placement model. *Journal of Development Education, 13(3),* 14-26.

Willingham, W. W. (1974). *College placement and exemption.* New York: College Entrance Examination Board.

Willingham, W. W. (1985). *Success in college: Role of personal qualities and academic ability.* New York: College Entrance Examination Board.

Table 1.___Means, & Standard Deviations for the Cognitive Variables (N = 162)

Variable	Mean	Std Dev
Placement (Math-Total)	47.48	9.30
Elementary Algebra	21.04	5.57
Arithmetic	26.23	4.80
SAT-M	452.77	83.24
High-School (GPA)	2.85	.56
Placement (Eng-Total)	49.63	7.23
Written Conventions	27.31	4.76
Sentence Structure	22.37	3.54
SAT-V	463.33	81.26
SAT-Total	916.85	149.41

Table 2.___Economic and Social Indicators 1990 Census of Population and Housing for the Sample (N = 95) and State

Category	Measure	Sample	State
Income	Per-Capita (mean)	15.42	17.73
	Household (median)	36.25	39.39
Poverty	Persons below the level (%)	10.78	8.30
Education	High-school graduates (%)	74.11	78.40
	College graduates (%)	21.38	26.50
Civilian Labor Force	Unemployment level (%)	6.13	4.30

Table 3.___Intercorrelations Among The Cognitive and Socio-Economic Variables (N = 162)

Variable	1	2	3	4	5	6	7	8	9	10	11
1. PMTOT	__	.89**	.85**	.47**	.16*	.32**	.31**	.23*	.28**	.42**	.10
2. EALG		__	.58**	.42**	.08	.28**	.28**	.18*	.25*	.37**	.02
3. ARITH			__	.45**	.20*	.30**	.28**	.24*	.27*	.40**	.17*
4. SAT-M				__	.31**	.22*	.24*	.13	.64**	.91**	.16*
5. HSGPA					__	.20*	.18*	.17*	.33*	.36**	.06
6. PETOT						__	.91**	.83**	.35*	.31**	.04
7. W-CONV							__	.52**	.22*	.31**	.03
8. SENT-S								__	.28**	.22*	.02
9. SAT-V									__	.90**	.12
10. SAT-T										__	.17*
11. TINC											__

Note: *p<.05 **p<.01

Table 4.___Multiple Regression Analyses for Question 2 for the Placement Math Total Scores

Independent Variable	R	R^2	SigChange
Elementary Algebra	.89	.79	.01
Arithmetic	.85	.73	.01
SAT-M	.47	.22	.01
SAT-T	.42	.17	.01
HSGPA	.16	.03	.04

Table 5.___Multiple Regression Analyses for Question 2 for the Placement English Total Scores

Independent Variable	R	R^2	SigChange
Written Conventions	.91	.82	.01
Sentence Structure	.83	.69	.01
SAT-Verbal	.35	.13	.01
SAT-Total	.31	.10	.01
High School GPA	.20	.04	.01

Table 6.___Multiple Regression Analyses for Question 3 for the Placement Test Scores (English and Mathematics)

Independent Variable	R	R^2	R^2 change	SigChange
HSGPA	.20	.04	.04	.01
SAT-V	.36	.13	.09	.01
SAT-V	.35	.12	.12	.01
HSGPA	.36	.13	.01	.32
HSGPA	.16	.03	.03	.04
SAT-M	.47	.22	.19	.01
SAT-M	.47	.22	.22	.01
HSGPA	.47	.22	.00	.89

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

ERIC

TM030225

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Predicting Placement Test Scores with Cognitive and Socio-economic Variables

Author(s): Alao Solomon, Coffey Grace, Ellington Roni, & Wright Henrietta

Corporate Source: Morgan State University

Publication Date: 9-22-99

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1

☒

Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A

☐

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B

☐

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign here, → please

Signature: Solomon Alao

Printed Name/Position/Title: SOLOMON ALAO
Assistant Professor

Organization/Address: 310 Jenkins Building Morgan State University, 1700 E. Coldspring Ln Balt MD 21251

Telephone: 443-885-1985 FAX: 410-319-3781

E-Mail Address: salao@morgan.edu Date: 9-22-99

(over)

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

THE UNIVERSITY OF MARYLAND
ERIC CLEARINGHOUSE ON ASSESSMENT AND EVALUATION
1129 SHRIVER LAB, CAMPUS DRIVE
COLLEGE PARK, MD 20742-5701
Attn: Acquisitions

However, if solicited by the ERIC Facility, or if making an unsolicited contribution to ERIC, return this form (and the document being contributed) to:

ERIC Processing and Reference Facility
1100 West Street, 2nd Floor
Laurel, Maryland 20707-3598

Telephone: 301-497-4080
Toll Free: 800-799-3742
FAX: 301-953-0263
e-mail: ericfac@inet.ed.gov
WWW: http://ericfac.piccard.csc.com