

# THE RELATIONSHIP BETWEEN STUDENT ORIENTATIONS TO COLLEGE, SAT SCORES, AND ROTTER I-E SCORES

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Over 2000 undergraduates for whom SAT scores were available completed the Student Orientations Survey (SOS) and the Rotter I-E Control Scale. F tests showed that high SAT-Verbal scores were associated with an Exploratory orientation to college, and low SAT-Verbal scores with a Preparatory outlook. Low SAT-Math scores were associated with three of the Preparatory scales, but also with three of the Exploratory scales of the SOS. In terms of SOS results, individuals with high-Verbal/low-Math scores tended to have an Exploratory orientation and individuals with low-Verbal/high-Math scores were more Preparatory in their outlook toward college. SAT pattern was not associated with Rotter I-E scores. The relationship between I-E scores and SOS scale scores indicated that "inner control," as measured by the Rotter scale, does not appear to be synonymous with autonomy and a liking for self-direction. Suggestions for further research into the congruence of students' educational attitudes with institutional philosophies, departmental objectives, and the orientations of instructors were discussed.

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## INTRODUCTION

Many institutions of higher learning are currently introducing new programs and courses which stress independent study, interdisciplinary cooperation, and course and program planning shared by students and faculty. Often it is a problem knowing which students should be invited to participate in such programs. If some measure which is routinely obtained by the Admissions Office, such as Scholastic Aptitude Test (SAT) scores, were related to an exploratory orientation toward education, then students high on this measure could be

notified of experimental programs, and invited to register for them. This would be particularly useful at the freshman level, when students are not yet fully aware of all the alternatives open to them. If such a relationship exists, knowledge of it would also be useful to academic advisers.

The question of selection and "fit" of undergraduates in academic programs also has implications for student development. For example, different patterns of change in attitudes and orientations of students in experimental and regular curricula have been reported by Suzcek and Alfert (1970) and Morstain (1973b).

A previous study by Pemberton (1951) using male business executives as subjects showed that a discrepancy between linguistic and quantitative ability was associated with several interest and personality variables. People with linguistic scores markedly higher than quantitative had theoretical, literary and aesthetic interests, and claimed to be reflective and socially introverted. Those with quantitative scores higher than linguistic rated themselves as more agreeable, lively and impulsive, with pressure for overt activity, and a liking for persuasive occupations and economic values.

Himmelweit (1945), Munroe (1946), and Ferguson and Maccoby (1966), using mental hospital patients, college students, and elementary school students as subjects, respectively, found personality differences between high-verbal/low-mathematical and high-mathematical/low-verbal groups. In each study the higher-verbal group appeared to be more inwardly directed, the higher-mathematical group more socially outgoing and practical. Similarly, Holmes (1949) found a relationship between numerical/verbal pattern and nine out of ten educational and vocational interest variables. Cattell (1945) found certain personality traits to be correlated with mathematical ability, others with verbal ability, without considering the discrepancy between the two.

The purpose of the present study was to see whether SAT scores, and/or the disparity between SAT-Verbal and SAT-Mathematical scores, were related to students' orientation to college. It was hypothesized that students with an exploratory outlook toward education would be those with strong feelings of inner control, and for this reason a scale designed to measure internal-external control was also administered.

## **SUBJECTS**

The subjects were 2224 undergraduate students enrolled at the University of Delaware during the spring semester, 1972, who participated in a survey of student opinion and attitudes. Only seniors and sophomores were asked to participate. Our population comprised 41% seniors and 59% sophomores; 57% men and 43% women.

## PROCEDURE

All students took the Student Orientations Survey (SOS) devised by Gray and Morstain (1970). The reliability, validity, method of scoring, and individual items comprising this questionnaire, as well as the rationale on which it is based, are discussed by Morstain (1973a). The SOS consists of ten eight-item scales, five of which have been shown by factor analysis to cluster around the Preparatory outlook toward education, and five around the Exploratory. The five scales concerned with the Preparatory orientation are:

*Achievement:* dealing with a practical, goal-oriented outlook which gauges various aspects of the college experience in terms of their future usefulness

*Assignment Learning:* specific, clear-cut, formal requirements are valued by people scoring high on this scale

*Assessment:* evaluations by people in authority, in the form of grades and examinations, are important to students with high scores on this scale

*Affiliation:* this scale deals with the importance of maintaining strong institutional loyalty and support, and belonging to organized extracurricular groups.

*Affirmation:* students scoring high on this scale are satisfied with the status quo and believe that public officials are doing their best to solve civic problems.

The scales dealing with the Exploratory orientation are:

*Inquiry:* items on this scale stress the value of insight, the perception of relationships between many fields — in essence, “learning is its own reward”

*Independent Study:* students who make high scores on this scale prefer informal, unstructured courses in which they set their own goals and standards, and pursue their own interests

*Interaction:* the desirability of faculty and students sharing the planning of courses and academic programs is stressed in this scale

*Informal Association:* a liking for informal relationships with peers, and a dislike for formal, well-planned social events characterize people high on this scale

*Involvement:* a high score on this scale represents a strong interest in social problems and political affairs; the desirability of students taking a stand on public issues is stressed.

In addition all students filled out the Internal-External Control (I-E) Scale devised by Rotter (1966). This is a forced-choice scale in which the subject reads a pair of statements and then indicates with which he more strongly agrees. The scores range from 0 to 23. A high score indicates a strong belief in external control; rewards are seen as depending on fate, luck, or chance rather than on the individual's own behavior.

SAT-Verbal and SAT-Mathematical scores were obtained from admissions

data. Students were classified into three SAT-V and SAT-M groups: 1) 500 and below; 2) between 501 and 600; and 3) 600 and above. For the combined SAT scores students were categorized as follows: 1) 1000 and below; 2) 1001–1200; and 3) 1201 and above. One-way analyses of variance for all the SOS scales were calculated for each of these three breakdowns (V, M, and T). Table I shows the mean standard scores<sup>1</sup> and standard deviations for each SOS scale, for each of the three SAT breakdowns, together with F values and levels of significance of the differences between group means. Results from the SAT-Verbal breakdown are shown graphically in Fig. 1.

Students were also divided into three categories on the basis of discrepancy between SAT-Verbal and Mathematical scores. Since the average SAT-M score for our sample was 553 (S. D. 96.7) and the average SAT-V score was 523 (S. D. 95.2), the means were first equated by subtracting 30 points from each SAT-M score. Using these adjusted scores all students whose SAT-V scores were 100 points (approximately one S.D.) or more higher than their SAT-M scores were classified as (1)  $V > M$  (N=228); those whose Verbal scores and Math scores did not differ by more than 100 points were designated (2)  $V=M$  (N=1603); and those whose Verbal scores were 100 points or more below their Math scores were called (3)  $V < M$  (N=393). The mean SOS scale scores and standard deviations for the three groups of students with different Verbal/Mathematical patterns are shown in Table II, together with the F and p value obtained from the analyses of variance.

Since more men had SAT-V scores lower than SAT-M, and more women had SAT-V higher than SAT-M, the results for males and females were examined separately, to assure that differences in orientation to college between these groups were not due merely to sex differences. The sex breakdowns are also shown in Table II. The SOS profiles for the three different types of Verbal/Mathematical patterns, using the total group, appear in Fig. 2.

The mean External Control scores of the Rotter I-E Scale for the three different SAT Verbal/Mathematical patterns are shown in Table III, as well as F and p values. Students were also allocated to three different groups, on the basis of their External Control scores: 1) students with scores of 8 or below; 2) students with scores of 9 through 13 inclusive (half a standard deviation above and below the mean); and 3) students with scores of 14 and above. The mean SOS scores, and F and p values for students in these three different External Control categories are shown in Table IV, and graphically in Fig. 3.

<sup>1</sup>These are nonnormalized standard scores, with mean of 50 and standard deviation of 10, standardized on the University of Delaware students used in this study.

Table I. Mean Scores and Standard Deviations on the SOS Scales for Various SAT Breakdowns

Breakdown	Preparatory Scales						Exploratory Scales					
	Ach.	A.L.	As.	Affl.	Affr.	Inq.	I.S.	Inter.	I.A.	Inv.	N	
<b>SAT-V</b>												
500 & below	M	52.4	51.6	50.3	51.4	52.4	48.2	49.8	48.3	49.2	930	
	SD	9.3	9.3	9.9	9.8	9.7	10.1	9.9	9.4	9.8		
501-600	M	48.7	49.2	49.4	50.1	48.6	50.3	50.7	50.7	50.9	803	
	SD	9.7	9.7	9.8	10.1	9.7	9.8	9.5	10.3	9.9		
601 & above	M	47.1	47.6	49.3	47.6	46.9	52.1	51.0	52.5	50.6	491	
	SD	10.5	10.9	10.2	9.8	9.6	9.9	10.0	9.9	10.2		
F		60.63	28.89	2.63	24.17	61.20	20.33	2.40	30.19	7.03		
p		.01	.01	n.s.	.01	.01	.01	n.s.	.01	.01	.01	
<b>SAT-M</b>												
500 & below	M	51.8	51.0	49.5	50.1	51.8	50.0	51.1	50.0	50.2	691	
	SD	9.7	9.7	9.9	9.9	10.1	10.5	9.7	10.2	9.8		
501-600	M	50.0	49.5	50.0	50.5	49.6	49.8	50.4	49.5	50.9	793	
	SD	9.9	10.1	9.9	9.7	9.7	9.9	10.0	9.7	9.8		
601 & above	M	47.8	49.1	49.7	49.6	48.3	49.7	49.8	50.8	49.3	740	
	SD	10.0	9.9	10.0	10.3	9.9	9.8	9.6	10.1	10.2		
F		28.78	7.52	.56	1.47	23.01	.14	3.82	2.98	5.07		
p		.01	.01	n.s.	n.s.	.01	n.s.	.025	.05	n.s.	.01	
<b>SAT-T</b>												
1000 & below	M	52.3	51.2	49.8	50.6	52.4	49.1	50.6	48.8	49.6	738	
	SD	9.3	9.5	10.0	9.9	9.9	10.3	10.0	9.7	9.8		
1001 - 1200	M	49.7	50.0	49.9	50.6	49.4	49.6	50.4	50.2	50.6	917	
	SD	9.9	9.8	9.9	9.8	9.7	9.9	9.9	9.8	10.0		
1201 & above	M	46.8	47.7	49.5	48.6	47.2	51.1	50.4	51.5	50.0	569	
	SD	10.0	10.4	10.0	10.3	9.6	9.9	9.7	10.1	10.2		
F		50.40	20.02	.34	9.04	47.72	6.91	.52	11.78	2.01		
p		.01	.01	n.s.	.01	.01	.01	n.s.	.01	n.s.	n.s.	

Table II. Mean Scores and Standard Deviations on the SOS Scales for Various SAT Patterns

Breakdown	Preparatory Scales					Exploratory Scales					N	
	Ach.	A.L.	As.	Affl.	Affr.	Inq.	I.S.	Inter.	I.A.	Inv.		
All Students = SAT												
V>M	M	47.8	46.9	47.8	46.9	47.1	53.7	52.9	53.4	53.2	52.4	228
	SD	10.6	10.7	9.6	9.9	10.5	10.1	9.9	9.5	10.6	10.4	
V=M	M	50.0	50.0	49.9	50.3	49.9	50.0	50.0	50.5	50.0	50.5	1603
	SD	10.0	10.0	9.9	9.9	9.8	9.9	9.9	9.7	9.9	9.7	
V<M	M	50.5	50.6	50.3	51.1	51.3	47.1	48.8	48.4	48.8	47.5	393
	SD	9.5	9.1	10.0	10.0	10.0	9.7	10.0	9.8	9.5	10.2	
F		5.75	11.55	5.02	13.99	13.27	32.10	12.24	19.65	14.56	20.67	
p		.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
Male Students = SAT												
V>M	M	47.1	46.2	47.6	45.8	46.7	53.6	53.5	52.6	56.0	51.8	69
	SD	9.8	11.2	9.8	10.2	11.3	10.5	10.4	9.9	12.0	10.2	
V=M	M	49.7	50.7	50.8	50.6	49.5	50.0	49.5	48.3	50.1	49.5	773
	SD	10.0	9.9	10.2	9.8	10.0	9.9	10.0	9.6	9.8	10.1	
V<M	M	50.3	50.8	51.3	51.0	51.0	46.8	48.4	47.3	49.3	47.1	300
	SD	9.9	9.4	10.1	10.1	10.3	9.8	10.2	10.1	9.6	10.4	
F		2.83	6.69	3.68	8.17	5.75	17.58	7.32	8.44	12.66	8.49	
p		n.s.	.01	.05	.01	.01	.01	.01	.01	.01	.01	.01
Female Students = SAT												
V>M	M	48.5	47.3	48.1	47.6	47.7	53.5	52.3	53.7	51.8	52.4	151
	SD	10.7	10.5	9.5	9.9	10.0	10.0	9.8	9.4	9.9	10.4	
V=M	M	50.3	49.4	49.0	49.9	50.3	50.0	50.5	52.6	49.9	51.3	819
	SD	9.9	10.0	9.6	9.9	9.6	10.0	9.8	9.3	10.0	9.3	
V<M	M	51.0	49.9	47.3	51.5	52.3	48.3	50.3	52.0	47.3	49.0	89
	SD	8.4	7.9	9.2	9.7	9.0	9.6	9.3	7.8	9.0	9.0	
F		2.45	3.13	1.65	5.04	7.10	10.01	2.21	1.30	5.85	3.49	
p		n.s.	.05	n.s.	.01	.01	.01	n.s.	n.s.	.01	.05	.05

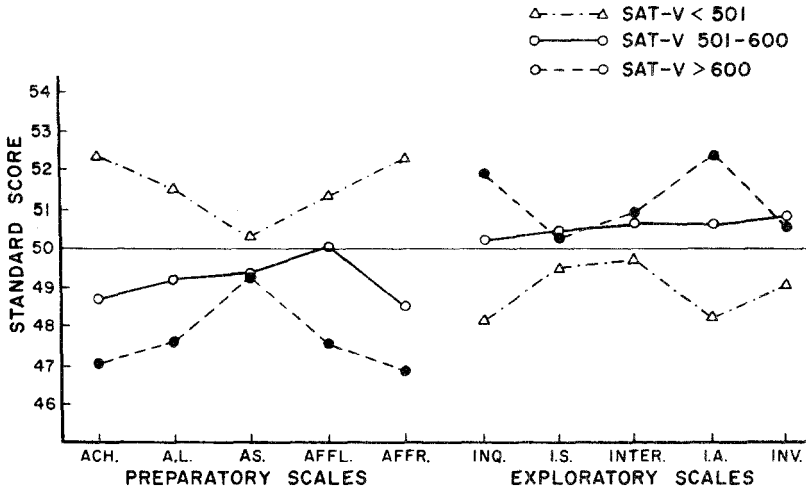


Fig. 1. SOS profiles for students with three different SAT-Verbal levels.

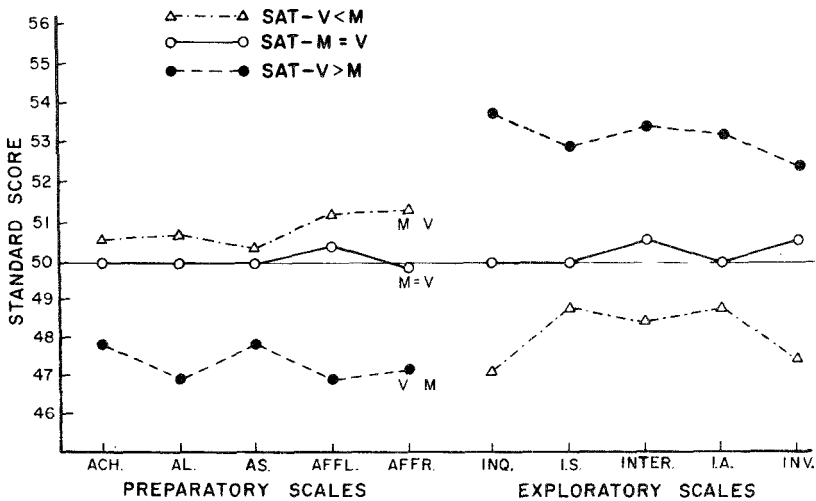


Fig. 2. SOS profiles for students with a) SAT-Math scores one standard deviation above SAT-Verbal, b) SAT-Math and SAT-Verbal not differing by more than one standard deviation, and c) SAT-Verbal scores one standard deviation above SAT-Math.

Table III. Rotter Scale Scores for Various SAT Patterns

Breakdown	N	Rotter Score	S.D.	F	p
All Students					
SAT					
V > M	206	11.25	4.51	1.06	n.s.
V = M	1498	11.23	4.42		
V < M	365	10.86	4.49		
Male Students					
SAT					
V > M	66	10.74	4.59	.00	n.s.
V = M	722	10.76	4.44		
V < M	281	10.74	4.51		
Female Students					
SAT					
V > M	140	11.49	4.47	.44	n.s.
V = M	765	11.69	4.35		
V < M	84	11.26	4.42		

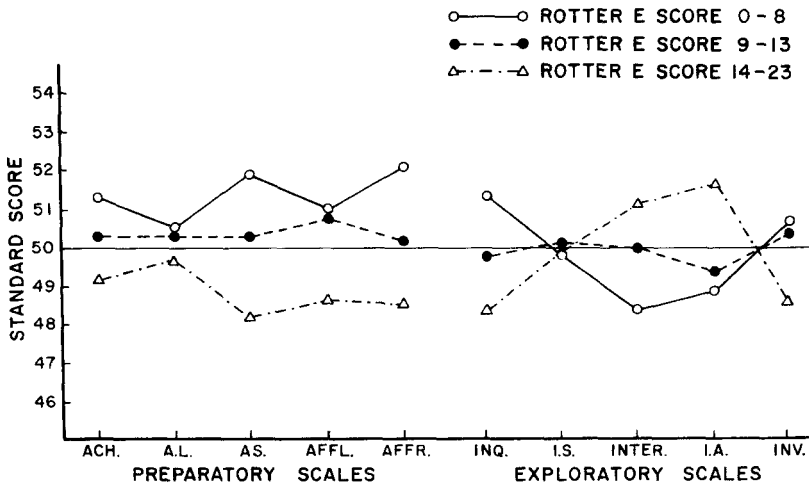


Fig. 3. SOS profiles of students with three different levels of Rotter External Control scores.



**Table IV. Mean Scores and Standard Deviations on the SOS Scales for Three Rotter External-Control Levels**

Break-down E-I Score	Preparatory Scales						Exploratory Scales						N
	Ach.	A.L.	As.	Affl.	Affr.	Inq.	I.S.	Inter.	I.A.	Inv.			
0-8	M	51.3	50.5	51.9	51.0	52.1	51.4	49.8	48.4	48.9	50.7	657	
	SD	9.7	10.0	10.2	9.8	9.9	9.3	10.1	10.7	9.8	10.1		
9-13	M	50.3	50.3	50.3	50.8	50.2	49.8	50.1	50.0	49.4	50.4	926	
	SD	9.8	10.7	9.7	9.7	9.6	9.9	10.1	9.6	10.0	10.0		
14-23	M	49.2	49.7	48.2	48.7	48.6	48.4	49.9	51.2	51.7	48.6	700	
	SD	10.2	9.9	9.8	10.3	10.0	10.5	9.7	9.8	9.9	9.8		
F		7.36	1.49	23.85	11.91	21.03	15.58	.24	12.98	15.78	9.58		
p		.01	n.s.	.01	.01	.01	.01	n.s.	.01	.01	.01		

## RESULTS

From Table I and Fig. 1 it can be seen that the group with SAT-V scores below 500 had the highest mean score on each of the five Preparatory scales, the 501-600 group had intermediate scores on each scale, and the 601 and above group had the lowest score on each Preparatory scale. The largest F's were obtained for Affirmation and Achievement, and the only F which did not reach statistical significance was that for the Assessment scale.

The relationships between SAT-V scores and the Exploratory scales, on the other hand, were all positive. The F tests were largest for the Inquiry and Informal Association scales and also significant for the Involvement Scale.

For the Achievement, Assignment Learning, and Affirmation scales the F tests for the SAT-M score breakdowns are significant, low Math scores being associated with high scores on these scales. For the Exploratory scales, Independent Study, Interaction and Involvement yield significant F tests with the SAT-M breakdown. However, unlike the relationship for the SAT-V breakdown, low Math scores are associated with higher Exploratory scores on these three scales.

For the SAT-Total scores the results were similar to those found for the SAT-V scores, but not as clear-cut. High SAT-Total scores were associated with low scores on the Preparatory scales: Achievement, Assignment Learning, Affiliation and Affirmation, and with high scores on the Exploratory scales identified as Inquiry and Informal Association.

From these results it appears that there is a relationship between level of SAT scores and orientation to college. Low SAT scores tend to be associated with the Preparatory orientation, and higher scores, particularly on the Verbal section, to be associated with the Exploratory function.

As can be seen from Table II, when students are divided into three groups in terms of the discrepancy between Verbal and Mathematical scores, all the F tests were significant at the .01 level or better. Higher-Verbal/low-Mathematical scores were associated with low scores on the Preparatory scales, and with high scores on the Exploratory scales. The  $V > M$  pattern seemed to differentiate students from the  $V = M$  pattern more clearly than the  $V < M$  pattern, particularly on the Preparatory scales, as can be seen in Fig. 2.

For men nine out of ten of the F's were still statistically significant, and for the women six of the ten were significant, as can be seen in Table II. Apparently differences in orientation to college for the three groups with different SAT patterns are not due merely to sex differences.

Since previous studies have shown that people with the  $SAT-V > M$  pattern appeared to be introverted, and those with  $M > V$  to be more outgoing, it was thought that there might be some relationship between SAT pattern and scores on the Rotter I-E scale. From results shown in Table III, it can be seen

that there were no significant differences between the three SAT patterns for scores on this scale.

Results found in Table IV indicate that for all five Preparatory scales the people with low External Control scores had the highest scores, and the people with high External Control scores had the lowest scale scores. The F tests for four of the five Preparatory scales were significant at the .01 level or better; only Assignment Learning was not significant. For the Exploratory scales the low Externals also had the highest scores for the Inquiry and Involvement scales, and the high Externals had the lowest scores. The F tests for both these scales were also significant at the .01 level. The F for Independent Study was not significant. For the Interaction and Informal Association scales the high Externals had the highest scores, and the low Externals the lowest.

## DISCUSSION

This study attempted to determine whether data such as SAT scores, which are routinely collected by most admissions offices, could be used in differentiating students with different orientations toward a college education. It was found that SAT-Verbal scores could do this more successfully than SAT-Math scores, or SAT-total scores. Verbal scores showed the strongest negative relationship to the vocational orientation to college, and to feelings of satisfaction with society. They were positively associated with a liking for informal social relationships, and the kind of philosophy which believes that "learning is its own reward." SAT-M scores were also negatively related to the vocational orientation to college, assignment learning, and affirmation of the status quo, but Math scores also showed a negative relationship with a liking for independent study, interaction between faculty and students in planning courses and programs, and in involvement with social and political issues.

When dealing with the discrepancy between verbal and mathematical ability, the data suggest that students whose verbal ability is markedly greater than their mathematical ability see college as a vehicle of intellectual exploration and self-determination. They are significantly less interested in college as a means of career preparation than are students whose verbal and mathematical ability are about equal, or those with markedly higher mathematical ability.

Our results indicate that what Rotter calls "inner control" should not be equated with autonomy or inner-directedness. Morstain (1973a) found negative correlations between the Autonomy scale of the Omnibus Personality Inventory and all five Preparatory scales of the SOS, ranging in size from  $-.44$  to  $-.64$ . He also found positive correlations ranging from  $.14$  to  $.50$  between the OPI Autonomy scale and the five Exploratory scales. What relationship there is between inner control, as measured by the Rotter scale, and the SOS Prepara-

tory scales, is in the opposite direction. Apparently people who do not feel controlled by external forces are those who feel capable of dealing with practical matters. However, their orientation toward education appears to be more preparatory than exploratory, and they would probably prefer conventional curricula and teaching methods to experimental programs. High Externals feel that rewards are due to chance, rather than their own efforts, and these are the people who were least interested in having their work graded by people in authority. In fact, the Assessment scale is the scale which yields the highest F. The second highest F is for Affirmation, high Externals feeling critical of their social environment, low Externals feeling more positive toward conditions under which they live. The only two SOS scales on which the high Externals score highest, and the low Externals the lowest, are Interaction and Informal Association. Apparently people who feel manipulated by outside forces would prefer to have more say in planning their own academic programs, and would like their relationship with other students to be informal, rather than planned.

In conclusion, results from this study suggest that knowledge of a student's SAT level, particularly his Verbal score, plus a consideration of his SAT-Verbal/Mathematical discrepancy can be useful for advisement with regard to curriculum choice, as well as for choosing students to participate in experimental programs which stress independent study. A combination of SAT data and scores from the Student Orientations Survey would probably prove to be the best method of selecting students for such special programs. The Rotter I-E Scale did not discriminate in the manner hypothesized, and does not seem to be a suitable instrument for selecting students who favor self-direction and independent study.

The question arises as to the relationship between the Exploratory orientation to education and success in independent learning situations. Morstain (1973a) has reported that educational orientation is associated with the type of program chosen by students. Freshmen who elected to participate in an experimental program scored significantly higher on the Exploratory scales and lower on the Preparatory scales than their peers in the regular curriculum. Furthermore, the type of program chosen interacts with the students in it. Notwithstanding their high initial scores on the Exploratory scales, students in an experimental program increased their scores on these scales to a greater degree than the students in the regular program. During one academic year their scores on the Preparatory scales also decreased more than the scores for the control group (Morstain, 1973b).

In addition to attitude change, however, are high scores on the Exploratory scales related to some measure of success in an experimental program? Is a certain balance between Exploratory and Preparatory scores necessary for this type of achievement? Is success in an independent learning situation related to subsequent creative contributions to society?

These questions, in effect, are part of a broader concern, which is the assessment of “fit” between students and academic programs in relation to educational outcomes. How does the congruence of students’ educational attitudes with institutional philosophies or departmental objectives affect satisfaction and success? Are different patterns of scores on the SOS related to objective measures of academic achievement, such as grades and Graduate Record Examination scores? In terms of the “challenge and response” conceptualization of student development (Sanford, 1967) what is the relationship between student-faculty incongruence and educational outcomes? Inquiry into these areas should be of value to both research workers and practitioners in the field of higher education.

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