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To differentiate certain characteristics of unsuccessful, marginally successful, or successful students in a junior college remedial program, the author made a random selection of 219 males and 120 females (from the 790 enrolled in a 15 probation program) according to the independent variables of high school rank (HSR), SCAT-Total score, class load, age, attendance, and sex. The hypotheses--that there are no differences between dismissed, retained, or good standing probationary students on these six variables--were rejected at the .05 level or less: (1) HSR--for total group, but not for males or females; (2) SCAT-T--for males, females, and total grouping; (3) class load--for females only, not for males or total; (4) age--for all three groupings; (5) attendance--for all groupings; and (6) sex--for males and females, but not for total. The successful (good standing) probationary student is about a year older than his or her classmates, attends class regularly, and has an HSR in at least the 22nd percentile. Females will have a SCAT-T score of 54 and limit their class load to nine hours. Males will have a SCAT-T score of 57 and will take only enough classes to exempt them from the draft. The remedial program is relatively ineffective for the younger students., especially males, just our of high school, with an HSR in the lowest 20%. Also, males with a SCAT-T raw score at or below 52 and females with a score at or below 46 have little chance of success. (HH)

Correlates of Educational Outcome for Junior College Remedial Students

Neal E. Hartman

The community junior college, having instituted the open door policy, appears to be implementing the proposal of the Educational Policies Commission (1964) which states that the Nation's goal of universal opportunity must be extended to include at least two further years of education, open to any high school graduate. In practice, many junior colleges do not even require that students be high school graduates--only 18 years of age (Schenz, 1964). The result is that included in the great diversity of students admitted to the junior college are those with relatively very low academic achievement and ability. Many educators doubt that the community college can provide meaningful course work for individuals in the lowest 20% of the population, as measured by intellectual ability and academic achievement (Blocker, Plummer, & Richardson, 1965), and some educators state, "It is a monstrous untruth--that college is for everybody (Cox, 1966, p. 3)."

Thus, while admitting all comers, there is some belief among junior college educators that certain individuals should not be admitted if they are "below a certain intellectual level," and for those who are "marginal" there should be remedial, or developmental, curricula provided. A large majority of colleges offer some type of remedial program (Medsker, 1960), but there needs to be more research into who can or cannot profit from remedial programs. Should there be more than one type or level of remedial program? How can the "marginal" students be determined and differentiated from those who possibly cannot profit from remedial courses? As stated by Roueche (1967), "The typical junior college recognizes the need for remedial and developmental studies, yet few of them have engaged in systematic evaluations of these

programs (p. 22)." The present study attempted to differentiate certain characteristics of students who were unsuccessful, marginally successful, or successful in a junior college remedial program.[1] The results of the study should provide insight into the questions of which students, if any, could not benefit from a remedial program, and how those students might be identified; conversely, the study should demonstrate how the remedial program might be modified to serve those students presently not benefiting from it. Finally, the study should determine some pertinent characteristics of low ability students and the relationships of those characteristics to current academic programs.

METHOD

The subjects were first time college students (less than 15 accumulated semester hours) who were enrolled on 1.5 probation in the remedial program at Florissant Valley Community College (FVCC), St. Louis, Missouri, in the fall, 1966, semester. They consisted of 219 males and 120 females randomly selected from an approximate total of 790 such students. A 1.5 probationary (remedial) student was from the lower half of his high school class and ranked in the lowest third on the School and College Ability Test **Total** score (SCAT-T), national norms. There were three possible outcomes for the probationary student. He could (a) be admitted to good standing--GPA $\geq$ 2.0 on a 4.0 scale, (b) be retained on probation--1.5 $\leq$ GPA $<$ 2.0, or (c) be dismissed--GPA $<$ 1.5.

There were six independent variables: high school rank (HSR); SCAT-T; class load; age; attendance; and sex. HSR's were converted to stanine

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[1] Successful is defined here as earning a 2.0 grade point average (GPA) or better in order to be released from probation and advanced to good standing. Marginally successful is a GPA ranging from 1.5 up to, but not including 2.0; unsuccessful is less than a 1.5 GPA.

scores for ease of statistical treatment (Flanagan, 1948; Walker & Lev, 1958). Only SCAT total scores were used as it was previously discovered that while SCAT verbal (V) and quantitative (Q) scores were not significantly related to probationary outcome at FVCC, the SCAT-T score was (Hartman, 1964). Also, Hirsch (1967) found that the relationship of dropouts to test scores was considerably stronger for SCAT-T than for V or Q. Class load was the number of credit hours after the four week drop period, and age was recorded as of the end of the fall semester studied. Attendance was categorized as to (a) those reported excessively absent, and (b) those not so reported. The independent variables were tested as they related to the dependent variables of probationary (or remedial) outcome of three groups of students: the dismissed (D) group, the retained (R) group, and the good standing (GS) group. The three groups, D, R, and GS, were mutually exclusive and exhaustive of the 1.5 probationary students at FVCC.

The principle method used to analyze the continuous independent variables was the one way fixed effects analysis of variance. The "effects" or "treatment" groups were the D, R, and GS probationary outcome groups. The chi-square statistic was used to test the discrete data variables--attendance and sex. And finally the $\underline{t}$ test was used to determine significant differences between the male and the female means on HSR, SCAT-T, load, age, and first semester GPA. The strength of relationship between dependent and independent variables was estimated using the omega squared ($\underline{\omega^2}$) statistic for the analysis of variance and $\underline{t}$ tests, and the phi-coefficient ($\underline{\varphi'}$) and lambda sub-beta ($\underline{\lambda_\beta}$)[2] for $\underline{\chi^2}$. The $\underline{\varphi'}$ statistic is primarily an index of

[2]Because $\underline{\lambda_\beta}$ is not yet widely used, a short explanation is provided: Given a joint-probability distribution of (A_j, B_k), as in $\underline{\chi^2}$, where A_j is independent and B_k is dependent, the A category literally tells one about how to bet on B, since the probability or error is reduced when the particular A category is known. Thus,

$$\lambda_\beta = \frac{p(\text{error}|\, A_j \text{ unknown}) - p(\text{error}|\, A_j \text{ known})}{p(\text{error}|\, A_j \text{ unknown})}$$

(Hays, 1963, p. 606)

relationship which has only a relative interpretation; ω^2 and λ_e can be interpreted as a rough indication of the variance in the dependent variable accounted for by the independent variable.

Three analyses were conducted for three combinations of the sample by sex: (a) for the combined M-F group, (b) for males alone, and (c) for females alone.

RESULTS

The analysis of sex differences is reported first in order to provide some rationale in presenting the remaining data.

Analysis of Sex Differences

The differences between the males and females on the continuous variables are presented in Table 1. The hypothesis tested, of course, is that there are no significant differences between the means for males and females on the variables HSR, SCAT-T, load, age, and GPA.

Insert Table 1 about here

It can be observed that the average probationary females ranked significantly higher than males in academic achievement (HSR) with stanine ranks reconverted to percentiles of the 24th (female) versus the 17th (male) ($p < .002$; $t = 4.003$; $df = 337$).

The opposite was true for academic ability as measured by SCAT. The males were significantly higher than the females ($p < .002$; $t = 3.640$; $df = 337$), and the percentile equivalents of the mean raw scores were the 34th for males and the 24th for females, local norms.

Table 1 indicates that the females took a lighter class load than the males--10.3 semester hours for females versus 11.8 for males. That was an average difference of 1.5 hours ($p < .002$; $t = 3.102$; $df = 337$), or about one-half a normal three hour course less for females than males.

The average male age was 20.3 versus an average of 19.3 for females. The age factor was statistically significant ($p < .01$; $t = 2.976$; $df = 337$).

The male GPA (1.52) was slightly lower than that for female (1.65), but the difference was not significant ($p > .05$; $t = 1.238$; $df = 337$).

Thus, Table 1 shows that all continuous data variables, except GPA, were differentiated according to sex; however, the proportion of variance accounted for in each variable by sex difference was relatively slight as indicated by ω^2 (HSR=.044; SCAT=.035; Load=.026; Age=.023, and GPA=.002). Sex difference, then, did not account for as much as 5% of the variance in any of those variables.

Insert Table 2 about here

Finally, absences as a factor of sex difference was analyzed by χ^2, shown in Table 2. Males had a disproportionate number of absences relative to females ($p < .05$; $\chi^2 = 5.56$; $df = 1$); however, the strength of association index, ϕ, of .128 was not high, and when converted to an estimated coefficient of correlation (Wert, Neidt, & Ahmann, 1954), the r was .20, indicating that only about 4% of the variance in absences was accounted for by sex difference.

Thus, the hypothesis of no difference between the sexes was rejected for HSR, SCAT-T, Load, Age, and Absences at the .05 level or less; so there appeared to be some justification for analyzing those variables separately for sex, even though the strengths of association were weak. The differences between sexes were definite and consistent on the variables tested.

Analysis of Probationary Outcome

The following analyses presents each of the six variables so that they may be observed in their relationship to probationary outcome. Table 3 presents the summary of the analyses of variance between the D, R, and GS groups

for the four quantified variables--HSR, SCAT, age, and load. That procedure is thus reported in Table 3 for the three groupings by sex: combined sexes, males, and females. Table 4 is a companion table which simply lists the means for the 3x3 subgroupings--three sex subgroups by three probationary outcome subgroups.

Insert Tables 3 and 4 about here

HSR. Table 3 indicates that HSR significantly differentiated the three probationary outcome (PO) groups for the combined sex group ($p < .05$; $F=3.41$; $df=2, 336$), but not for males ($p > .05$; $F=1.84$; $df=2, 216$) or females ($p > .05$; $F=2.30$; $df=2, 117$) separately. The ω^2 of .01 for the combined group indicates that the strength of the relationship between HSR and PO was practically negligible, even though statistically significant. The statistical significance was obviously due more to the large N of the combined group than to the relationship (N=339). Table 4 presents the mean stanine rankings for the nine subgroups for HSR. The relationships for the combined group and the females were monotone-increasing (possibly linear[3]), but that was not so for the males. The equivalent percentile ranks for the three PO combined sex groups were approximately the 17th, 20th, and 22nd. The equivalents for the male and female outcome groups are not provided since they were not statistically significant.

SCAT-T. Tables 3 and 4 indicate that SCAT-T scores differentiated the three outcomes significantly for all three sex groupings of the probationary students: (a) combined group ($p < .01$; $F=7.60$; $df=2, 336$); (b) males ($p < .05$; $F=3.68$; $df=2, 216$); females ($p < .01$; $F=6.79$; $df=2, 117$). Also, the relationship between SCAT-T and PO is monotone-increasing for the three sex groups with the equivalent local norm percentiles for D, R, and GS students as

[3]Linearity of relationships was not determined in this study.

follows: (a) combined sex group--24th, 31st, and 38th; (b) males--27th, 34th, and 38th; (c) females--18th, 21st, and 34th. The proportion of variance in PO groups accounted for by SCAT-T was relatively high for females, .09, as compared to only .04 and .02 for the combined and male groups, as shown by ω^2 in Table 3.

Load. Table 3 shows that the size of credit hour load was significantly related to PO only for females ($p < .05$; $F=3.92$; $df=2, 117$). Table 4 shows that females who went to good standing took an average of only 9.3 hours, the lowest class load of any of the subgroups. However, it is interesting that even for the females, the relationship between load and outcome ($\omega^2=.05$) was curvilinear rather than monotonic. In all three sex groupings, the GS class load was lighter than that of either the D or R loads. The three PO groups for males were so homogeneous that there was no discernible relationship between load and outcome.

Age. Age was probably the best predictor of PO of any of the four quantitative variables tested. Table 3 indicates that age, like SCAT-T, was a statistically significant factor for all three sex groupings: (a) combined ($p < .01$; $F=9.14$; $df=2, 336$); (b) male ($p < .01$; $F=7.18$; $df=2, 216$); (c) female ($p < .01$; $F= 6.04$; $df= 2, 117$). Also, Table 4 indicates that the relationship of age to probationary outcome was almost completely monotone-increasing for the three sex groupings, with good standing males being 1.8 years older than dismissed males, on the average, and good standing females being 1.9 years older than the dismissed or retained females. The age-PO relationship as shown by ω^2 is .05 for males, .08 for females, and .05 for the combined sexes.

Insert Table 5 about here

Absences. Table 5 presents chi-square summaries for the absences-PO relationships and the sex-PO relationship. The absence-PO relationship was very significant for all sex groupings: (a) combined ($p<.001$; $\chi^2=46.81$; df=2); (b) male ($p<.001$; $\chi^2=32.83$; df=2); (c) female ($p<.01$; $\chi^2=8.82$; df=1). The proportion of variance in PO accounted for by absences was relatively great compared with the other variables studied. That is, λ_e indicated that 13%, 14%, and 17% of the variance in probationary outcome (male, female, and combined group) could be accounted for by absences. As expected, then, there were disproportionately more absences reported for dismissed students than could be expected if there was complete independence of absences and outcome.

Sex. As indicated in Table 5, the hypothesis that there was independence between sex differences and PO had to be accepted; however, a λ_e of .04 indicated that there was a sex-outcome relationship, but apparently it was not strong enough to have occurred by other than sampling error alone.

To summarize the results, five of the six variables studied can be compared across the three sex groupings for males, females, and combined groups. The rank order of importance of the variables for males and the total group was identical, with the rank order for females being similar to the male and combined groups. The rankings of the variables as to proportion of variance accounted for were as follows:

	Absences	Age	SCAT-T	HSR	Load
Male/Combined Groups:	1	2	3	4	5
Female Group:	1	3	2	5	4

That the correspondence between the two rank orders was high is indicated by a Spearman rank correlation coefficient of $r_S=.80$.

DISCUSSION

The present study appears to concur with Blocker et al. (1965) that perhaps there is a lower limit of effectiveness of remedial programs for students entering through the "open door" of the community college. The findings presented here indicated that--for the college concerned and for its remedial program--students in the 20th percentile or below on HSR and at or below a raw SCAT-T score of 52 (for males) or 45 (for females) had relatively slim chances to succeed in school, if allowed only a one semester probationary trial period to earn a 1.5 GPA. Some evidence has been presented that the chances of these students--at least females--might be increased by enrolling in fewer hours. From this study, it would seem that the optimal load for those in the lowest fifth of probationary entrants might be about nine hours. Also, there was evidence that increased age is helpful for both males and females; of the quantitative variables, age was related more to PO for males than any other factor, and, for females, the age-PO relationship ranked second to SCAT-T.

However, these results, if followed for males, would cause undue hardship on males with lower academic ability because of the military draft. The draft requires that a student take more than nine hours and many, if not most males would be drafted before age 21, the mean age of the "successful" outcome group.

One of the limitations of this study was that the sample was restricted to lower ability students, thus reducing the chances of detecting high relationships between the variables studied. This was especially apparent for HSR which showed relatively little relationship to probationary outcome. The fact that SCAT-T scores were better predictors of PO than HSR was surprising in view of the survey by Guisti (1964) which concluded that high

school average is unquestionably the best single source of data for predicting college success. The present study indicated that SCAT-T, of the quantified intellective variables, was superior to HSR for both males and females, and that, for males and females together, age and absences were superior to SCAT-T.

Class load as a variable in PO was found to be relatively unimportant. For males, the variance within PO groups was greater than between the different groups. Load as a factor should be studied more extensively at a time when males are more free to vary their loads. Also, class load should probably be studied in conjunction with work load in order to obtain a measure of relationship between total "work week" and probation outcome.

Of all the variables studied, absences, a non-quantitative, non-intellective variable, accounted for much more of the variance than any other single variable studied.

Attendance definitely would seem to be an indication of motivation and interest. Cross (1967), in reporting research done at the University of California, stated that the will to attend and persist in college depends more on motivation than ability.

Although sex per se was not a significant factor in PO, the sex differences observed in this study were important. Males did not achieve as well academically as females in high school, as indicated by a higher mean HSR for females than for males. Yet the males of this study scored significantly higher than the females on the ability test. The implication seems to be that although the females were graded higher, they learned less than the males. Anastasi (1958), in a review of students back to 1927, reported that females have long had a grade point advantage over males, and Caldwell and Hartnett (1967) indicated that females fare better because of instructors'

sex bias toward females. Although the females of this study did not fare significantly better than males, the trend was in that direction. The sex factor, especially as it relates to differences in motivation and attitudes, needs considerably more research.

With all the differences between the sexes discovered here, it was surprising that sex was not a significant factor in probationary outcome. But, as noted, some of the differences are counteracting in outcome and GPA, e.g., if females learn less (lower SCAT-T) but are graded higher for what they do learn (higher HSR), possibly because of a "better" attitude and higher motivation (fewer absences), and because females are free to enroll in fewer hours since they are not subject to the draft, they are likely to have a probationary outcome as good as, or better than, their male counterparts. That, of course, is precisely what happened. Furthermore, it was found that, contrary to the popular belief that females are more unpredictable than males--in this study, at least--the indices of predictive relationship were generally higher for females than for males, indicating, then, that the females were more predictable than the males.

SUMMARY AND GENERALIZATIONS

The general informal hypotheses of this study--that there are no differences between dismissed, retained, and good standing probationary students on the variables of HSR, SCAT-T, Class Load, Age, Absences, and Sex--were rejected for these variables at the .05 level or less:

(1) HSR--for total group; not for males or females.
(2) SCAT-T--for all three sex groupings.
(3) Load--for females only; not for total or males.
(4) Age--for all groups.
(5) Absences--for all groups.
(6) Sex--did not differentiate for total group.

Although sex did not differentiate, all five of the other variables [illegible] were significantly different between sexes, suggesting the possibility

of different criteria for the sexes in placing students in remedial programs. More research is still needed on sex differences to improve both placement and student personnel services.

The successful probationary student--the one going to good standing--is approximately one year older than his contemporaries, i.e., becoming 21, if male, and 20, if female, by the end of the first semester. The successful student is likely to have been in at least the 22nd percentile rank of his high school class and, if male, to have had a SCAT total raw score of about 57, and, if female, a raw score of about 54. Most important, the successful student would attend classes regularly, and, if male, would probably be able to do no other than to take a class load which would permit him to be exempt from the draft; but if the successful student were female, she would limit her class load to approximately nine hours.

As opposed to the "successful" remedial student, this study has provided some evidence that the present remedial program is relatively ineffective for the younger students, especially males, just out of high school, and who ranked in the lowest 20% of their high school classes; in addition, males at or below the 27th percentile on the SCAT (52 raw score), or females at or below the 18th percentile (46 raw score) seemed to have slim chances for success.

The implications this study has for programs for lower ability students are clear, and in the words of Johnson (1965) "It is difficult to defend the admission of all comers unless the colleges provide offerings and counseling adapted to their clientele, and . . . if they do not, the open door becomes the revolving door (p. 9)."

References

Anastasi, Anne. Differential psychology. New York: MacMillan, 1958.

Blocker, C. E., Plummer, R. H., & Richardson, R. C., Jr. The two year college: A social synthesis. Englewood Cliffs, N. J.: Prentice-Hall, 1965.

Caldwell, E., & Hartnett, R. Sex bias in college grading? Journal of Educational Measurement, 1967, 4(3), 129-133.

Cox, Marian. The college is for everyone cult. Junior College Journal, 1966, 37(1), 37-39.

Cross, Patricia K. Beyond ability. The Research Reporter: The Center for Research and Development in Higher Education, 1967, 2, No. 1. (A report of the work of L. L. Medsker & J. W. Trent.) Berkley: University of California Press.

Educational Policies Commission. Universal opportunity for education beyond high school. Washington, D. C.: National Education Association, 1964.

Flanagan, J. C. (Ed.) The aviation psychology program in the Army Air Forces, Report No. 1. Washington, D. C.: U. S. Government Printing Office, 1948.

Guisti, J. P. High school average as a predictor of college success: A survey of the literature. College and University, 1964, 39, 200-209.

Hartman, N. E. A study of factors related to the disposition of probationary students at Florissant Valley Community College, Fall, 1964. Listed in the Junior College Review, 2(5), JC 660-099.

Hays, W. L. Statistics for psychologists. New York: Holt, Rinehart, & Winston, 1963.

Hirsch, P. M. Students who do not return: A profile analysis. Unpublished institutional research report, Florissant Valley Community College, St. Louis, Missouri, August 7, 1967.

Johnson, B. L. State junior colleges: How can they function effectively? Atlanta, Georgia: Southern Regional Education Board, 1965.

Medsker, L. L. The junior college: Progress and prospect. New York: McGraw-Hill, 1960.

Roueche, J. E. Gaps and overlaps in institutional research. Junior College Journal, 1967, 38(3), 20-24.

Schenz, R. F. What is done for low ability students. Junior College Journal, 1964, 34(8), 22-27.

Walker, Helen M., & Lev, J. Elementary statistical methods. New York: Holt, Rinehart, & Winston, 1958.

Wert, J. E., Neidt, C. O., & Ahmann, J. S. Statistical methods in educational and psychological research. New York: Appleton, Century, Crofts, Inc., 1954.

TABLE 1

Differences Between Means of Male and Female for Selected Variables

Variable	Male[a]		Female[b]		t	ω^2
	M	SD	M	SD		
HSR	3.457	1.13	3.967	1.100	4.003***	.044
SCAT-T	54.55	12.17	49.58	11.75	3.640***	.035
Load	11.8	4.40	10.3	3.96	3.102***	.026
Age	20.3	3.32	19.3	1.94	2.976**	.023
GPA	1.52	.957	1.65	.927	1.238	.002

[a]N=219
[b]N=120
*p <.05
**p <.01
***p <.002

TABLE 2

Chi-square for Sex Differences in Absences

Category	Male		Female		Totals
	Expected	Observed	Expected	Observed	
Absent	.18 39	.22 47	.18 22	.12 14	.18 61
Not Absent	.82 180	.78 172	.82 98	.88 106	.82 278
Totals	1.00 219	1.00 219	1.00 120	1.00 120	1.00 339

Note.--Decimal numbers indicate proportion of column totals.

$\chi^2=5.56$

df=1

$p<.05$

$\phi'=.128$

TABLE 3

Summary: Analyses of Variance

Source	Combined Group[a]			Males[b]			Females[c]		
	MS	F	ω^2	MS	F	ω^2	MS	F	ω^2
HSR									
Between	4.43	3.41*	.01	2.34	1.84	.01	2.72	2.30	.02
Within	1.30			1.28					
SCAT-T									
Between	1095.47	7.60**	.04	531.10	3.68*	.02	854.58	6.79**	.09
Within	144.12			144.45			125.88		
Load									
Between	32.99	1.79	.01	.98	0.05	.00	58.44	3.92*	.05
Within	18.41			19.51			14.92		
Age									
Between	75.50	9.14**	.05	74.86	7.18**	.05	21.00	6.04**	.08
Within	8.26			10.43			3.48		

[a] df=2, 336
[b] df=2. 216
[c] df=2, 117
*p < .05
**p < .01

TABLE 4

Means for Dismissed, Retained, and Good Standing Probationary Students

Group	N	Means for Independent Variables HSR (Stanine)	SCAT-T (R.S.)	Load	Age	
Combined Sexes: Males plus Females						N=339
Dismissed	133	3.4	50.0	11.5	19.7	
Retained	81	3.7	52.6	11.8	20.1	
Good Standing	125	3.8	55.9	10.7	20.7	
Males Separately						N=219
Dismissed	91	3.3	52.1	11.9	19.3	
Retained	53	3.7	55.1	11.8	20.7	
Good Standing	75	3.5	57.1	11.7	21.1	
Females Separately						N=120
Dismissed	42	3.7	45.5	10.6	18.8	
Retained	28	3.9	47.9	11.8	18.8	
Good Standing	50	4.2	53.9	9.3	20.7	

TABLE 5

Absences and Sex Differences as Related to Probationary Outcome

Variable	N	df	Statistic χ^2	ϕ'	λ_p
1. Absences					
(a) Male	219	2	32.83***	.387	.13
(b) Female	120	1	8.82**	.271	.14
(c) M+F	339	2	46.81***	.372	.17
2. Sex	339	2	2.38	.079	.04

Note.--In the female-absent group, the R and GS groups were combined to obtain sufficient expected frequencies, thus only 1 df.

*p < .05
**p < .01
***p < .001