COLLEGE ACHIEVEMENT OF HIGH SCHOOL HONOR STUDENTS IN RELATION TO CONTROL STUDENTS WITH APTITUDE AS A CONSTANT

by

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D.E.F.

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ABSTRACT

This study was conducted to discover whether high school honor scholarship recipients obtain significantly higher grade point averages at Montana State College than does the non-honor scholarship holder. For this study, ability was kept constant between the two groups. This was determined by their respective scores on the Minnesota Scholastic Aptitude Test. The resulting data was used to:

1. Compare the Honor student with the Control student in academic achievement.

2. Account for any differences among the different sizes of high schools in Montana.

The results of the study revealed that the honor student at Montana State College, on the average, does better in terms of academic achievement than the control student. It also showed that there was no significant differences in college grade point average among the students from the different sizes of high schools.

It was recommended that a follow-up study be made to determine if this holds true for all honor students that attend Montana State College. A more detailed analysis of the individual student is needed in order to make a more accurate prediction on academic success of students attending Montana State College.

CHAPTER I

INTRODUCTION

Education faces a great challenge in the ensuing period ahead. Not only do high schools face this challenge but also the colleges. Just 25 years ago there was a self-selected 4 or 5 per cent that attended college. In the near future this figure will jump to 50 per cent.[1] In the period from 1951 to 1964 the total college enrollment doubled. It is predicted that in the next 15 years that the enrollment will double again.[2] It is quite apparent that there is a great concern among people today toward higher education. Technological advancement in the past 10 years has provided this impetus.

There is a substantial unemployment problem among the unskilled workers -- but shortages of scientists, engineers, teachers, technicians and other service occupations.[3] In the past 20 years professional, technical, clerical and managerial employment has risen 100 per cent. This the only solution for the person entering the labor force is to have a specialized skill or a college degree.[4]

Education through the twelfth grade is primarily a free commodity. Beyond this the individual must pay most of the

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[1]Crossland, F. E., "College Admissions," Phi Delta Kappan, Vol. 41, pp. 299-300, March, 1965.

[2]Ibid.

[3]Joint Economic Committee Congress of the United States, New Views on Automation, Washington Press, 1960.

[4]Ibid.

bill. As each year passes the cost of higher education greatly increases.[5] Costs of private colleges have risen 102 per cent in the last 13 years. The cost in public institutions has risen about 80 per cent in this same period.[6] This cost is not only increasing for the individual but also for the state, local, and national governments.

Since it seems necessary that today's youth will need more education it will also follow that these youth will need funds to obtain this education. John F. Morse[7] points out that between 60,000 and 100,000 young people miss out every year on a college education because they cannot afford it. If a student does attend college and then works part time to defray the costs of college, his grades may suffer accordingly.[8] The failure to obtain good grades in college might seriously affect entrance to graduate schools and also obtaining a job.[9]

If the financial aspect plays such an important role in higher education today it might be well to inspect some of the practices of giving scholarships to students. At the present

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[5]Strain, William H., "What About College Costs," National Educational Association Journal, Vol. 51, pp. 42-43, January, 1962.

[6]Ibid.

[7]Morse, John F., "Scholars and Dollars," Senior Scholastic, Vol. 79, pp. 5-6, April 26, 1961.

[8]Arnold, W. J., "Top Grads Swamped by Good Job Offers," Business Week, Vol. 38, p. 76, April 14, 1962.

[9]Ibid.

time the practice in Montana of giving honor scholarships is to award them according to class rank. It might be well therefore to investigate this practice and see if there is justification for awarding scholarships according to class rank. If the money used for these honor scholarships does not provide students who achieve a satisfactory grade point average in college then possibly this money could be given to other students who would achieve satisfactory grade point averages.[10]

There will also be a heavy financial burden placed upon the institutions in the form of increased outlays for the physical plants and for an increase in staff members.[11] Since the taxpayers bear a large amount of these expenses they have the right to determine whether the scholarship recipients are obtaining successful academic records in college. If the honor scholarship is not achieving the desired goal -- that of assisting students in obtaining superior academic records in college -- then perhaps this money could be spent in some other manner.

In order to obtain insight into this problem, this study will concern itself with comparing the honor scholarship

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[10]Shaw, Merville C., and Brown, Donald J., "Scholastic Underachievement of Bright College Students," American Personnel and Guidance Journal, Vol. 36, pp. 195-199, November, 1957.

[11]Cohen, W., "Costs of Education," U.S. Office of Education, Vol. 19, pp. 8-9, November, 1962.

recipients with a comparable control group. In order for this comparison to be meaningful, an attempt will be made to equate the two groups first by ability and secondly by the size of high school attended. The main concern for this study is to determine whether the honor scholarship holders do achieve significantly better grade point averages while in college than a comparable control group who do not receive a High School Honor Scholarship.

DEFINITION OF TERMS

In order to develop a clearer picture of this study it is in order to present some definitions. These terms might not be in accord with other similar definitions but for this study they will be used in the manner prescribed below.

1. GPA - is the grade point achieved for the first three quarters at Montana State College. This is based on a system in which an A = 4 points, a B = 3 points, a C = 2 points, a D = 1 point and an F = 0 points.

2. Honor Student - any student who graduated from a high school in Montana and received a scholarship to attend Montana State College. This scholarship is designated as a High School Honor Scholarship.

3. Control Student - any student who graduated from a high school in Montana and did not receive a High School Honor Scholarship for the first three quarters while attending Montana State College.

4. Class 1 School - any school district that has more than 8,000 people shall be designated as a class 1 high school.

5. Class 2 School - any school district that has in excess of 1,000 people but not more than 8,000 shall be designated as a class 2 school.

6. Class 3 School - any school district that has under 1,000 people shall be designated as a class 3 school.

7. Ohio Stannine Score - The Minnesota Scholastic Aptitude Test (MSAT); a short form of the Ohio Psychological Examination. The Stannines have a minimum score of 1 and a maximum score of 9.

8. High School Honor Scholarships - at least one from each high school and one more for every 25 students. They must also rank in the top one fourth of their class and must be the highest in scholarship of those who attend the University system.

STATEMENT OF PROBLEM

With the advent of rapid technological change there is a heavy emphasis upon attending college. This will lead to a fantastic growth in college enrollment. The financial burdens will be felt by both the taxpayer and the students. In order to ascertain whether honor scholarships are achieving their desired function, this study will examine the college achievement of the honor scholarship holder.

The purpose of this study is to relate and compare the academic achievements of the honor and control students at Montana State College. This study will concern itself with only those honor and control students who have graduated from Montana high schools. Ability, according to their score on the Minnesota scholastic Aptitude Test, will be consistent between the two groups. In order to maintain closely matched

groups this study will also take into account the various sizes of high school districts in the state of Montana.

This will be done in order to establish whether there is a real difference between the honor and control groups or whether it is just the size of school that accounts for the difference.

If it can be shown that the control students do not score significantly lower grade point averages in college, then possibly a change in awarding honor scholarships might be in order. If these control students achieve as well academically in college then the state of Montana is not achieving its goal of providing financial assistance to those students who have a propensity to do well in college.

There are of course different ways of viewing this problem. First of all, those students who now receive scholarships might have developed the necessary study habits in high school to greatly assist them in college. Since the honor scholarship is renewable every year, the monetary incentive might be the reason they strive for good grades in college.

If differences do occur between the honor and control groups it might assist the high school and college personnel in providing the student with a better picture of himself as he enters college. The counseling departments in both the

high school and the college could use this information to provide better service to both the student and the state of Montana. This might be accomplished in terms of helping the student to develop better study habits so that his time can be better put to use while attending college.

The object of this study will be to compare the honor group with the control group and see if a difference does in fact occur. If differences do not occur the money spent on honor scholarships should be awarded on some other basis than what is now used.

HYPOTHESIS

The hypothesis for this study will be a null hypothesis. It will assume that the high school honor student does not achieve significantly higher grade point averages than does the control student. The control students being similar to the honor students except that they do not receive an honor scholarship.

PROCEDURE

There were a total of 150 students used in this study. The experimental group consisted of 75 students listed as honor scholarship recipients. The control group consisted of 75 students who did not receive an honor scholarship during the first three quarters at Montana State College.

The students used in this study were those who entered Montana State College in the fall of 1960, 1961, and 1962. The control group was selected according to ability and size of high school attended. The experimental group was selected from 412 high school honor students listed in years above.

The information for the size of high school was provided by the registrar's office at Montana State College. The Montana State College Testing and Counseling service provided the information by which ability was judged. This was determined by the Minnesota Scholastic Aptitude Test. The grade point used for this comparison was the grade point attained at the completion of the first three quarters at Montana State College.

The size of high school was taken into account under the assumption that academic excellence might vary between the various sizes of schools. Because of the possibility of this variance there will be a number of correlations performed. For all of these correlations the null hypothesis was used. The null hypothesis states that there is no significant difference between the two groups that are being compared. There will be one-tailed tests of significance obtained among the following groups:

1. Between the total honor students and the control students.

2. Between honor students from class 1 and class 2 high schools.

3. Between honor students from class 1 and class 3 high schools.

4. Between honor students from class 2 and class 3 high schools.

5. Between control students from class 1 and class 2 high schools.

6. Between control students from class 1 and class 3 high schools.

7. Between control students from class 2 and class 3 high schools.

The above tests of significance will determine whether there are any differences between honor students among the three classes of schools. It also attempts to show whether differences occur among control students in the three classes of schools.

For testing whether there are any inter-group differences, the following one-tailed tests of significance will be run:

1. Between honor students from class 1 and control students from class 2 high schools.

2. Between honor students from class 1 and control students from class 3 high schools.

3. Between honor students from class 2 and control students from class 1 high schools.

4. Between honor students from class 2 and control students from class 3 high schools.

5. Between honor students from class 3 and control students from class 1 high schools.

6. Between honor students from class 3 and control students from class 2 high schools.

7. Between honor students from class 1 and control students from class 1 high schools.

8. Between honor students from class 2 and control students from class 2 high schools.

9. Between honor students from class 3 and control students from class 3 high schools.

The inter-group correlations will determine whether there are any differences between honor and control students from the three classes of high schools.

There are a number of statistical formulas that were used in obtaining the results. For the total group of 150 students the standard error of the difference between the two means using uncorrelated data was first used. Then a test was used to test the difference between the two means. For the other comparisons in which the total number between the two groups did not exceed 65, a F-test was performed. This is testing a null hypothesis of no differences between the variances. If the null hypothesis was allowed to stand because of a nonsignificant F then the variances could be combined. If the F score is found to be significant then the same formula that was used for the group of 150 was used. For the small groups the formula for finding the standard error of the difference between the two means using a small sample and having uncorrelated data was used.

LIMITATIONS

There were a number of limitations in this study. The most obvious of these was the small number of honor students used in this study. The reason for this small number was that each group had to be matched in ability and class of high school. It was not difficult to match these students in one of the areas but when two specifics were needed the number of students that could be used dropped considerably. Out of the total of 412 honor students there were 96 who qualified in these two areas. Of the 96, 21 did not qualify for various other reasons. Some had dropped out of school before the third quarter and some did not complete at least 45 quarter hours in three quarters of college work.

Another limitation to this study was the failure to take into account the outside activities of these groups. Working part time or being involved in extra-curricular activities could have had an effect on their grade point averages. It was impossible for the researcher to obtain this information as many of the students did not complete college, transferred, or graduated before this study was completed.

Since the number of students used in this study was limited, there is a possibility that the results obtained might not reflect an accurate picture of the honor students at Montana State College.

CHAPTER II

REVIEW OF THE LITERATURE

The review of the literature failed to uncover any previous studies completed in Montana relating to the academic achievement of honor students in college to a control group. Literature was further examined to determine if any recent studies had been completed in this area outside of Montana. Also examined were other areas that compared closely with this study.

The launching point for this study was suggested by Nichols and Holland.[1] They suggested that this area be studied so that counselors might gain insight into the proper guidance of college and high school students. They pointed out that there is likely to be discrepancy in the selection of high school students who will achieve better than average when they attended college.

Donald F. Harder,[2] did one of the most comprehensive and closely related studies in this area. There were a total of 62 freshman from California who were admitted to the University of California at Davis. The comparison group composed

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[1]Nichols, R. C., and Holland, J. F., "The Selection of High Aptitude High School Graduates for Maximum Achievement in College," American Personnel and Guidance Journal, Vol. 18, pp. 39-40, September, 1964.

[2]Harder, Donald F., "A Comparison of the Achievement of Three Academic Groups," California Journal of Educational Research, Vol. 48, pp. 208-213, April, 1958.

of high potential freshman as measured by the American Council on Educational Psychological Examination. It was discovered that the students who were superior in the academic area in high school achieved significantly higher grades while in their freshman year in college than those students who did not do well in high school. The difference was significant at the 1 per cent level.

Nichols and Holland[3] have stated that the best method of predicting college success is on the basis of high school rank. Austin[4] states that many of the students who are dropped from colleges due to academic reasons are students who did not do well in the academic area in high school. Cox,[5] after studying the results of the Nebraska Instructional Research Program, showed that the grade point average of students in high school is a very good predictor of how the student will achieve academically in college. A study by Pike,[6] which was also done at the University of Nebraska, was even more significant. The State of Nebraska decided in 1940 to give scholarships to students who showed academic

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[3]Nichols and Holland, op. cit., pp. 39-40.

[4]Austin, A., "Keeping Abreast in Education," Phi Delta Kappan, Vol., 65, p. 247, January, 1965.

[5]Cox, Henry M., "Instructional Research at the University of Nebraska," Examination Services of the University of Nebraska, Lincoln, Nebraska, 1956.

[6]Pike, Ruth E., A Group of Scholarship Students, University of Nebraska Publication, Lincoln, Nebraska, 1938.

superiority in high school. At the present time there are about 300 scholarships awarded each year. Out of these 300 approximately 20 per cent of them enter the University of Nebraska. Pike did a lengthy follow-up study on these students to see if they perform better academically in college. The scholarship students showed a superiority of approximately three tenths of a grade point based on a three point grading system.

Since the honor students are those with the higher grade averages in Montana high schools, it might be well to review some of the various studies on the relation of high school rank to academic achievement in college.

In a study by Garrett[7] high school scholarship was definately related to college academic performance. A correlation of .56 was shown when college grade point average was compared with high school grade point average. Pierson and Nettels[8] found a correlation of .52 between high school scholarship and college academic performance. Also discovered in this same study was a correlation of .42

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[7]Garrett, Harley F., "A Review and Interpretation of Investigations of Factors Related to Scholastic Success in Colleges of Arts and Sciences and Teachers Colleges," Journal of Experimental Education, Vol. 18, pp. 91-138, December, 1949.

[8]Pierson, C. D., and Nettels, C. H., "A Study of High School Seniors to Determine Who Shall be Recommended to College," School and Society, Vol. 28, pp. 215-216, September, 1928.

between college scholarship and I. Q. scores. McCormick and Asher[9] did a similar study concerned with high school scholarship in relation to college scholarship. They stated that as a single measure, one of the best predictors of college grade point average is high school grade point.

In recent years there has been a number of organizations that have set up various different types of scholarship programs. One of the organizations which has helped in awarding scholarships is the National Merit Scholarship Corporation. By 1960 they had awarded 4,882 scholarships with an average stipend of 740 dollars. In addition to this they gave more than 25 million dollars to the institutions that the Merit scholars attend.[10] The purpose of giving these scholarships is to render financial assistance to students that they feel will produce superior academic performances in college. A brief survey of the recipients for 1960 shows that out of 555 students, over 60 per cent were in the top 10 per cent of their class in college and about 80 per cent graduated with some academic honor while in college.[11] Since the

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[9]McCormick, J. H., and Asher W., "Aspects of High School Record Related to the First Semester College Grade Point Average," Personnel and Guidance Journal, Vol. 42, pp. 701-703, March, 1964.

[10]Stalnaker, John M., "The Nations Greatest Talent Hunt," Saturday Review, Vol. 45, p. 45, December 16, 1961.

[11]Ibid.

National Merit Scholarship Corporation is highly successful in finding students who do well in college their methods of selection should be examined.

The results of their 1961 annual report shows that the high school academic record tends to be associated with college academic performance.[12] They further state that the most promising group from which large numbers of academic talented students might be recruited is made up of those who rank below the top 5 per cent in ability and that scholarships may be the best way of recruiting them.

Since this study will take into accounts for possible differences between the various sizes of schools, this area should be examined. In a well publicized study by Altman,[13] an investigation was made to determine whether or not there are any differences between the students in the large and small high schools. The hypothesis tested was that students coming from larger high schools, regardless of their rank in class, achieve better grades in college than do students from smaller high schools who are in the upper 30 per cent of their class. A small school was one with at least 200

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[12]National Merit Scholarship Corporation, Talent: Our Prime National Resource, National Merit Scholarship Annual Report, Evanston, Illinois, 1961.

[13]Altman, Esther R., "The Effect of Rank in Class and Size of High School on the Academic Achievement of Central Michigan College Seniors Class of 1957," Journal of Educational Research, Vol. 52, pp. 307-309, April, 1959.

students but no more than 250. A large school was one with at least 1,000 students but no more than 1,050. The results showed that grade point average in college was not significantly higher than graduates of the smaller high school.

In another similar study some different results were obtained. Street and James[14] did an exhaustive study comparing the academic achievements of students in college with the size of high school attended. The results for this study showed that the students in larger high schools tended to outperform students in smaller high schools. For this study schools larger than 500 were considered large schools and schools of 200 or less were considered small schools. There is apparent disagreement about whether size of high school is important in predicting college academic performance.

There are two areas that this study will investigate. The first will be to determine whether there is a significant difference between the honor and control students in college academic achievement and secondly to determine if size of high schools has an effect upon the academic achievement of these same groups while attending Montana State College.

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[14]Street, Paul and Powell, J. H.; Hambler, J. W., "Achievement of Students and Size of Schools," Journal of Educational Research, Vol. 56, pp. 261-262, 1962.

CHAPTER III

RESULTS

A review of the literature indicated that there have been no studies, such as this one, done in Montana. Until now there has been no apparent attempt to determine whether the practice of giving honor scholarships is achieving its desired purpose.

This study was concerned with the years 1960, 1961, and 1962. The Montana State College permanent records were used to obtain all of the information used in this study. This study dealt with 75 honor scholarship students along with 75 students matched in ability, curriculum, and size of high school.

Comparisons were made between the following groups:

1. Total Honor and Control students.
2. Honor class 1 and honor class 2 high school students.
3. Honor class 1 and honor class 3 high school students.
4. Honor class 2 and honor class 3 high school students.
5. Control class 1 and control class 2 high school students.
6. Control class 1 and control class 3 high school students.
7. Control class 2 and honor class 1 high school students.

8. Honor class 1 and control class 3 high school students.

9. Honor class 2 and control class 3 high school students.

10. Honor class 2 and control class 3 high school students.

11. Honor class 3 and control class 1 high school students.

12. Honor class 3 and control class 2 high school students.

Comparison of Honor Students with Control Students in Class 1, 2, and 3 Schools

The number of students used for this comparison was 150. The null hypothesis for this comparison was that there is no difference between mean grade point average of the honor and the control students, other than would be expected by chance alone. In order to test a null hypothesis an arbitrary level of significance was established. The level set for the total group comparison is 1 per cent. The alternative hypothesis for this study is that there is a significant difference between the mean grade point averages of the honor and control students.

Since the alternative hypothesis indicates the direction of difference, a one-tailed test of significance was used. Therefore a Z score of 1.64 will be considered significant at the 1 per cent level. These are the Z scores needed if the sample size is greater than 30.

The results obtained when honor and control students were compared led the author to reject the null hypothesis and accept the alternative hypothesis. The alternative was that there is a significant difference between the two means. This result is shown on page 21, table 1. Since a Z score of 3.88 is considerably higher than the 2.33 that was needed it is safe to reject the null hypothesis and accept the alternative one. Better explained, the Z score of 3.88 means that the chances are less than 100 out of 10,000 that acceptance of the alternative hypothesis would be improper.

Explanation	Symbol	Honor Students	Control Students
Number	N	75	75
Summation of G. P. A.	Ex	216.22	190.76
Square of summations of the G. P. A.	Ex^2	25.9596	19.2166
Square root of total N	$\sqrt{\ }$	8.6603	8.6603
Standard deviation	S	.5992	.5095
Standard error of each mean	$S_{\bar{x}}$	.0683	.0588
Mean	$\bar{x}$	2.89	2.54
Standard error of the difference between two means for uncorrelated data	$S_{D_{\bar{x}}}$	.09	
Difference between the two means	$D_{\bar{x}}$	.35	
Standard Score	Z	3.88	

Table 1. Comparison of honor and control students and the resulting statistical computations.

It is apparent from the resulting statistics in table 1 that the money Montana schools use in giving scholarships is being used with some success. Perhaps in the future there may be more rigorous selection or a somewhat different manner of selection used so as not to miss those students who are capable of maintaining academic records favorable to the honor students. Out of the 75 control students there were 13 students who obtained 3.00 grade point averages or better.

At the same time however there were three in the honor group who did not maintain at least a 2.00 grade point average, while there were nine in the control group who did not maintain this minimum 2.00 grade point average. As a rough estimate it can be stated that by using our present methods of selection there is one in three chances of picking a control student who will obtain a comparable grade point average to the honor students. See table 2.

	3.00 G.P.A. or better	2.00 G.P.A. or lower
Honor Students	36	3
Control Students	13	9

Table 2. Showing students in each of the groups that obtain above a 3.00 G.P.A. and those below a 2.00 G.P.A.

The data also shows that each of the three classes of high schools produce about the same percentage of control students who do poorly and do well in college academic achievement. See Appendix A.

There are a number of factors which could have influenced the results. The reader should be aware that even though the attempt was made to match the groups evenly there are always some factors which could have changed the results of this study.

The study habits by both of the groups was not taken into account. Proper study habits can result in less studying and the attainment of higher grades. It is conceivable that honor students have developed better study habits while in high school. This can be shown by the position in which they graduated from their high school class. The honor students are selected according to rank in class. Those that rank first receive the honor scholarship and if they do not use it then the student who has the next best high school grade point average can use the scholarship.

Jobs and extra-curricular activities by the individual student could have also affected the outcome.

Motivation is another aspect that must be considered. These students will continue to receive this honor scholarship if they maintain a certain grade point average while attending college. Perhaps monetary incentive is the main reason for the apparent significant differences between the honor and control students' grade point average.

Inter-Group Comparison of Class 1, 2, and Class 3 High Schools

This comparison was undertaken to determine whether or not there was any significant differences among the different classes of schools. If any significant differences do occur between the different classes of schools then possibly some

re-evaluation of the total data is in order. It would no longer be correct to compare honor with control students of the three classes of high schools if academic excellence did vary significantly.

	Number	Average M.S.A.T. Score	Average G.P.A. Control Group	Honor Group
Class 1 High Schools	32	7.03	2.54	2.88
Class 2 High Schools	29	7.03	2.56	2.86
Class 3 High Schools	14	6.64	2.51	2.79

Table 3. Showing total number of students in each class of high school and their average G.P.A. and M.S.A.T. stannine score.

From the above table it can be shown that the average M.S.A.T. score did not differ greatly among the various classes of high schools. The average for the class 3 schools might be low because of the small sample involved.

Tests of significance were run between the honor class 1 and honor class 2 high schools, honor class 1 and honor class 3 high schools, and between honor class 2 and honor class 3 high schools. None of these were close to being significant at the 5 per cent level which was desired for this comparison. The same tests were run among the control group. From this it is safe to conclude that among honor and

control students there is no significant differences between the mean grade point averages earned while at Montana State College. This dispels the idea of academic excellence between the different sizes of high schools for the students used in this study. See table 4.

		S	S_x	S_{D_x}	Class 1	Class 2	Class 3
Honor Students	Class 1	.5010	.0885	.1349		0.13	
	Class 2	.7211	.1139	.0900			0.77
	Class 3	.5088	.0184	.1624	0.43		
Control Students	Class 1	.5471	.0967	.0984			0.30
	Class 2	.5412	.1004	.1407	0.13		
	Class 3	.3752	.1002	.1009		0.39	

Z scores

Table 4. The statistical data for tests of significance between the honor and control groups in class 1, 2, and 3 schools.

From the above table it is evident that none of the tests showed any significant differences. The null hypothesis for these comparisons was that there is no significant difference between the mean grade point averages. A Z score of at least 1.64 was needed if there was to be any indication of differences between the various classes of schools. The closest Z

score was 0.77 and this was far from the necessary 1.64 that was needed.

Intra-Group Comparisons of Class 1, 2, and Class 3 Schools

In order to discover if the intra-group comparison of the honor and control groups would be significant, a number of other tests of significance were performed. This points out the consistency with which honor students perform better academically than do control students. From table 5 below it can be seen that there are significant differences among the class 1, 2, and 3 honor students when compared to the control students. In order to obtain the statistics listed in table 5 a F test was performed. This F test is computed on all samples under 65 in total number. If the F proves to be non-significant we can let the null hypothesis stand and then pool the variances. This formula is stated in appendix B.

		Control Students		
		Class 1	Class 2	Class 3
Honor Students	Class 1	2.18	2.37	4.19
	Class 2	2.11	1.84	2.09
	Class 3	1.52	1.38	2.05

Table 5. Comparison between honor and control groups in G.P.A. The scores are Z scores.

As is shown in table 5 there were only two instances that the null hypothesis was accepted. That was between honor class 3 students and control class 1 students, and between honor class 3 students and control class 2 students. This phenonomen might suggest that there is some small amount of difference between the class 1 and 2 schools when compared with the class 3 schools. It was pointed out before that there was a smaller sample used for the class 3 schools and this again could have accounted for this difference. Also it must be remembered that a 5 per cent level of significance was set up and the difference between the above two groups was significant at the 6 per cent and the 8 per cent levels respectively. By completely disregarding this significance a type II[1] error might be committed.

A more concise way of viewing table 5 is to realize that it makes little difference as to what class school the student might attend in high school so long as he or she is an honor student.

An honor student from the class 1 and 2 schools will obtain significantly higher grade point averages than the control students from either class 1, 2, or 3 schools. The data shows that there is reason to question the validity of

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[1]This type of error consists of not rejecting the hypothesis when it should be rejected.

stating that class 3 honor students score significantly higher than control class 1 and 2 schools.

A summary of findings, conclusions and recommendations is presented in chapter IV.

CHAPTER IV

SUMMARY

This study concerned itself with the relationship of the honor and control student at Montana State College and his subsequent academic achievement in the first three quarters of college. The ability level of the students in each of the two groups was kept constant as measured by their test scores on the Minnesota Scholastic Aptitude Test.

A review of the literature was made to determine what studies had been conducted. This review revealed that there is a positive relationship between high school grades and subsequent academic achievement in college. It also showed that there is an incomplete picture as to whether or not size of high school might affect college academic achievement.

The records from the Montana State College Testing and Counseling Service was used to obtain information regarding the ability of the students and also to obtain information on the size of high school the students attended. The Office of the Registrar provided the grade point averages for the honor and control students.

In this investigation it was shown that there is a significant difference between the honor and control students in regard to academic achievement at Montana State College. The honor group had a significantly higher grade point average after three quarters at Montana State College than did the

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APPENDIX

APPENDIX A

RAW DATA

Class of School	Yr.	Ohio Score	Honor Students Grade Average	Non-Honor Students Grade Average
A	61	8	2.29	3.48
A	61	7	2.13	2.71
A	61	5	2.51	1.60
A	61	7	1.88	3.27
A	61	7	2.73	1.60
A	61	5	2.65	2.31
A	61	7	2.67	2.42
A	61	9	3.09	3.02
A	61	6	2.68	2.40
A	61	5	2.62	2.04
A	61	5	3.46	2.09
B	61	8	2.94	3.66
B	61	9	2.92	2.58
B	61	9	3.38	1.89
B	61	7	2.58	2.46
B	61	5	3.72	3.28
B	61	9	2.91	2.89
B	61	5	1.76	3.09
B	61	6	3.26	2.51
B	61	9	3.67	2.51
B	61	9	3.08	2.61
C	61	8	3.06	2.63
C	61	7	2.97	2.18
C	61	8	2.51	2.21
C	61	5	3.22	2.56
A	62	7	3.54	3.10
A	62	8	2.79	2.25
A	62	8	2.48	2.77
A	62	7	3.47	2.22
A	62	7	3.00	1.83
A	62	8	2.53	1.76
A	62	9	2.26	2.06
A	62	6	3.32	2.04
A	62	8	2.31	2.80
A	62	8	3.60	2.30
A	62	4	2.86	2.03
A	62	8	3.73	2.70

APPENDIX A (continued)

Class of School	Yr.	Ohio Score	Honor Students Grade Average	Non-Honor Students Grade Average
B	62	7	3.28	2.00
B	62	7	3.14	2.61
B	62	9	3.15	3.17
B	62	9	3.88	2.46
B	62	7	2.24	2.42
B	62	4	2.06	1.83
B	62	9	3.91	2.00
B	62	7	2.36	2.60
B	62	4	3.02	2.11
B	62	8	3.67	3.47
C	62	7	2.80	2.72
C	62	7	2.52	2.53
C	62	7	3.23	2.60
A	60	8	3.00	3.26
A	60	6	3.06	2.51
A	60	8	3.44	3.45
A	60	9	2.80	3.47
A	60	9	3.44	2.55
A	60	6	2.53	2.75
A	60	9	3.77	2.57
A	60	4	2.33	2.08
A	60	7	3.04	3.48
B	60	6	3.00	2.51
B	60	9	2.61	2.73
B	60	8	3.08	2.06
B	60	4	2.16	1.83
B	60	7	3.57	2.78
B	60	6	2.51	2.67
B	60	5	2.78	3.66
B	60	8	3.07	2.69
B	60	4	2.52	1.69
C	60	6	2.80	2.95
C	60	7	2.06	2.53
C	60	7	3.04	1.59
C	60	7	3.17	2.51
C	60	7	3.54	2.79
C	60	5	2.43	3.12
C	60	5	1.65	2.23

APPENDIX B

FORMULAS USED

Explanation	Formula
1. This is the formula used for finding the means for each of the groups' grade point average and stannine score. X is the mean, E means summation, and N is the number of subjects.	$\bar{x} = \frac{Ex}{N}$
2. This is the formula to find the sum of squares of each of the grade point averages.	$Ex^2 = Ex^2 - \frac{(Ex)^2}{N}$
3. This is the formula used for finding the standard deviation.	$s = \sqrt{\frac{Ex^2}{N-1}}$
4. This is the formula for finding the standard error of the difference between two means for uncorrelated data.	$S_{D_{\bar{x}}} = \sqrt{S_{\bar{x}_1} + S_{\bar{x}_2}}$
5. This is the formula for obtaining a Z score. The top part of the formula is actually the difference between the two means that are being compared.	$Z = \frac{D_{\bar{x}}}{S_{D_{\bar{x}}}}$
6. In doing statistical work with small samples the variances are pooled (next formula). Before this can be done a F test must be run. If the null hypothesis is allowed to stand then the variances can be pooled. If not then formula 4 is used.	$F = \frac{S_1}{S_2}$

APPENDIX B (continued)

Explanation	Formula
6. (continued) S_1 stands for the larger of the two variances and S_2 for the smaller.	
7. Formula for using pooled variances. This is used for finding the standard error of the difference between two means of uncorrelated data when the samples are small (under 35 for this study).	$S_{D_{\bar{x}}} = \sqrt{\frac{Ex_1^2 + Ex_2^2}{N_1 + N_2}\left(\frac{1}{N} + \frac{1}{N}\right)}$

control group. The honor students had a mean grade point average of 2.89 as compared with 2.54 for the control group.

This study lends support for the now prevalent practice of giving high school students honor scholarships. This study also took into account the sizes of high schools and how this might affect academic performance in college. In this study, size of high school did not have any effect upon academic achievement at Montana State College.

CONCLUSIONS

The data for this study was obtained and then organized in such a manner as to allow for statistical inferences to be made. The basis for all the conclusions was made at the 1 and 5 per cent levels of significance. For the total group comparison the 1 per cent level was used. For the intra-group differences the 5 per cent level was used.

This study indicated that there are some differences between the attained grade point average of the honor scholarship holder and the control student. This of course assumes that the ability was equal as measured by the Minnesota Scholastic Aptitude Test. There were a number of control students who did achieve as well or better than the honor student. For this reason there might be room for improving the method of awarding the honor scholarship in Montana.

This study did not include all of the honor students that attended Montana State College in the years 1960, 1961 and 1962. For this reason there is a possibility that there might not be any real significant differences between the honor and control groups.

For the honor students used in this study, size of high school had no significant affect upon the subsequent academic achievement at Montana State College. An honor student would be expected to compare favorably with other honor students no matter what class of Montana high school that was attended. The same held true for the control student.

RECOMMENDATIONS

In order to say with more assurance that the selection method for obtaining honor scholarship recipients is achieving the desired goal, a greater number of students should be included.

This study showed a significant difference between honor and control students and no significant difference between the different sizes of high schools from which honor and control students graduate. The data shows that there are a number of students in the control group who obtain as good or better grade point averages in college as the mean mark of the honor group. Therefore the suggestion might be made to improve methods of selecting so that all high potential students

will be encompassed under the scholarship program to be used in Montana.

Some sort of study should be undertaken to test the motivation factor of the scholarship itself. Scholarships might be given to students during their freshman year to see if they would compare favorably with the honor students' mean grade point average.

In order to obtain a more definite conclusion there should be a study done which would more carefully investigate the background of the individual student used in the study. Since studying habits, amount of extra-curricular activities, part time jobs, and time spent studying are all important aspects to keep in mind, future studies might take into account some of these various factors.

Since there has been a lack of agreement on the effects of high school size, further studies should include a greater number of students for comparison. In this study, the test for academic excellence was not covered to any great extent and it would be well to pursue this area more fully.