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Factors affecting transfer of students entering the Arts and Sciences Division of Iowa Central Community College during the years 1963, 1964, and 1965

Dean Wesley Cramer
Iowa State University

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by

Dean Wesley Cramer

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Head of Major Area

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Dean of Graduate College

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INTRODUCTION

The importance of prediction studies in higher education, and particularly the community college, cannot be overstated. O'Connor (52, p. 4) defines this need when he states: "The most important person in the junior college is the student. What happens to the young man or woman while in the college, and even after matriculation, must be of primary concern to all who are involved in the educational process. The success of the institution can best be measured by the success of the student."

This study is an attempt to predict success of college parallel students, based on their decision to transfer, after leaving Iowa Central Community College. Hopefully the results will necessitate continuous study of instruction and curricula in the community colleges of Iowa.

The Problem

The problem of this study was concerned with the college parallel students entering the Fort Dodge Center of Iowa Central Community College for the years 1963, 1964, and 1965.

The need to study this problem is emphasized by Gleazer (24, p. 66) when he states: "One out of three students enrolled in the community college will continue his work in a four-year college. The other two will not . . . no one knows for sure whether the student will be in the one-

third or the two-thirds until after the fact . . . ." This study is concerned with factors influencing transfer to senior colleges and develops data for the prediction of transfer.

While the literature is voluminous in the area of predicting grade point average from junior to senior college, there is scant literature predicting who will transfer and graduate. While prediction studies concerning the "transfer shock" that usually accompanies matriculation from junior to senior college are important, the conclusion of most studies of this nature states that the "shock" is a fact of life. This study concedes a drop in grade point average, but goes beyond that point to discuss the elements of a more important topic: Do selected students have more of a tendency to transfer, and, once they transfer, do they graduate? The need for this study is reinforced by the following questions that remain unanswered by community college administrators and counselors:

1. Is there an academic difference between students who transfer and those who do not?
2. Is it possible to predict transfer and graduation based on academic predictors?
3. Is it possible to predict which student will transfer and which one will not?

4. Is counseling relevant when offered to students on the assumption they will transfer when there is a good chance they will not?
5. How can the curriculum best serve the terminal-transfer student?
6. Are there some factors that might indicate success in senior college?

The answer to these and other questions may help in assessing students and curricula in the community college.

Predictor variables will be age, sex, marital status, high school rank, size of high school class, the five scores reported by the American College Testing Program, community college grade point average, number of semester hours attempted at Iowa Central Community College, semesters enrolled at Iowa Central Community College, and graduation from the community college. If it is possible to determine a difference between (1) students who transfer to a senior college and do not graduate, (2) those who transfer to a senior college and graduate, and (3) those who do not transfer to a senior college, a valuable service will be performed for those counseling students at the elementary, secondary, and college level.

The null hypotheses tested in this study are as follows:

Hypothesis One: There is no significant difference, based on academic predictors, between students enrolled at

Iowa Central Community College who transfer to senior institutions and those who do not transfer.

Hypothesis Two: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who do not transfer.

Hypothesis Three: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who transfer and do not graduate.

Hypothesis Four: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and do not graduate, and those who do not transfer.

Purpose of the Study

The purpose of this study was to determine if there is a relationship between the academic ability of students at Iowa Central Community College and their decision concerning transfer. Many studies are concerned with determining significance by comparing grade point average at the senior institution with the community college. This study uses transfer and graduation from senior college as the criterion variables for study.

In addition to the summary of students based on transfer or nontransfer, other information concerning student char-

acteristics of these two groups will be revealed.

Information about these groups of students is necessary in evaluating and properly preparing a curriculum at Iowa Central Community College for all students.

Definition of Terms

1. Arts and Sciences Student: A student enrolled in a program designed to transfer from the community college to a senior institution. Some students are required to take remedial or general studies courses, but all with the intent of upgrading themselves until they can transfer.

2. Community College: Colleges offering a wide range of post-high school educational offerings. Comprehensive community colleges, like Iowa Central Community College, offer work in college parallel, vocational-technical, and adult education. Additional services in Student Personnel are a large part of the community college.

3. Senior College: A baccalaureate granting institution where students may transfer credit from the community college.

4. Associate Degree: Granted to students who have successfully completed the prescribed two-year program at Iowa Central Community College. The Associate Degree required 60 successfully completed credit hours. Students who complete the Associate Degree normally are considered to have junior standing when they transfer to a senior

college.

5. Transfer Student: A student who matriculated to a senior college from Iowa Central Community College.

6. Transfer Shock: The initial grade point drop of students who transfer from junior to senior colleges.

7. Terminal Student: A student who did not transfer to a senior college.

8. Native Student: A student who matriculated to a senior college directly from high school.

9. Graduated from Iowa Central Community College: Completed 60 semester hours and was granted an Associate Degree.

10. Graduated from a Senior College: Received a baccalaureate degree from a senior college.

Sources of Data

Data for this study were collected from the following sources:

1. The high school transcript of each student was reviewed for rank, size of graduating class, and occasionally the American College Testing test scores.

2. The Iowa Central Community College permanent record of each student was used to ascertain age, sex, marital status, college grade point average, hours, semesters attended, and if the student received his Associate Degree.

3. American College Testing provided test scores when

the high school record did not contain the scores.

4. Senior colleges provided information concerning transfer, withdrawal, and graduation of students in the study.

Delimitations

The scope of this study was limited to an analysis of Arts and Sciences students who had enrolled at Iowa Central Community College, Fort Dodge Center, during the years 1963, 1964, and 1965. The students in Vocational-Technical programs were not included in the study because they do not plan to transfer at the completion of their programs.

While the design might be applicable to a number of analyses, findings were limited to Iowa Central Community College.

Organization of the Study

The material presented in this study was divided into five sections. The first includes a brief introduction pointing out the importance of prediction studies, a statement of the problem and working hypotheses, the purpose of the study, definition of terms, sources of data, delimitations, and organization of the study. The second contains a summary and analysis of related literature and research. Section three discusses methodology and design for the study. The fourth includes a presentation of the

data collected. Section five summarizes the findings, conclusions, and recommendations for further study.

REVIEW OF RELATED LITERATURE

A General Survey of the Community College Student

Students entering the Arts and Sciences Division of community colleges have received a great deal of review and in some areas, much research. Blocker (5) reports that knowledge about students in community colleges is sparse, except in relation to their abilities and achievement before and after transfer to a four-year college. Probably the most comprehensive study of community college students was carried on by Knoell and Medsker (36) at the University of California in conjunction with the American Council of Education. The study involved some 10,000 students at 345 two-year institutions. The study was designed to follow the performance of 7,243 college transfer students and compare them with other transfer students and some native students. Knoell and Medsker found that much of the variability in personal characteristics that had been anticipated, was not found. They found that as the junior college freshmen class is almost indistinguishable from the high school graduating class, so is the junior college transfer group like the native student population found in the four-year colleges. The high school record of the men was not as good as the women, although both groups took a general pre-college curriculum in high school. Of those students who transferred the majority graduated in the upper half of

the graduating class. The study by Knoell and Medsker did not emphasize the large percent of students who did not transfer and is valid primarily in accessing the student that transferred to a senior college.

In another analysis of two-year college students, Medsker (46) reported that students in two-year colleges very closely resemble a typical high school graduating class with respect to academic ability and socio-economic characteristics. He found that fewer junior college students exist at the extremes of the range than in high school. More than half were found to be under 20 years of age.

The studies by Knoell and Medsker were a landmark in evaluating community college students. Although most of the emphasis was placed on students who transferred and ultimately graduated from senior colleges, a great deal of information was gathered about students attending community colleges. Students of higher education, and particularly the community college student, would be wise to start their reading with the writings by Knoell and Medsker.

Collins (7) reported that students entering four-year colleges are markedly better in academic potential than those that enter two-year colleges and two-year students more closely resemble a cross section of high school seniors than four-year college enrollments. Collins also found that students completing lower division work at the junior college

more closely resemble the typical college cross section and are only slightly, if at all, less endowed than the senior college student.

Research by Hoyt (31) revealed the diversity in students attending junior colleges. Utilizing characteristics collected by the American College Testing Program, Hoyt's most important findings are as follows:

1. Academic diversity was striking. The average student at one college earned an American College Testing Composite score that placed him at the 13th percentile on national norms; at another college, the average student was at the 75th percentile of national norms. Similarly, the typical student at one college had a high school average of about a B, while at another the typical high school average was below C. College grading practices also showed immense diversity, with more than a grade point separating the highest and lowest college averages.

2. Student goals differed widely from one college to the next. In one college, two-thirds of the students chose vocational preparation as their most important goal; at another college only one-third selected this emphasis. Similar differences occurred when other motives for attending college were assessed.

3. Some of the largest differences occurred when the importance of low cost and proximity to home were examined.

Thus, in one public college, only 5 percent rated "close to home" as a major consideration; in a contrasting college, 71 percent rated this as a major factor in selecting a college.

4. Entering classes were widely different with respect to the degree parents, teachers, or counselors had influenced college selection. For example, in one college about 1 student in 10 reported that a counselor had been a major influence, while at the other extreme about 3 out of 4 gave that response.

5. The degree to which students typically had gained recognition for out-of-class accomplishments also differentiated colleges. In Dramatic Arts, for example, 80 percent of the students at one junior college claimed at least one accomplishment, but less than 30 percent made such a claim at another college. Hoyt (30) concluded that generalizing about all students from his sample would be misleading because of the wide variance between student characteristics. He also concluded that catalog statements about a community college and student attitudes often suffer a credibility gap.

Cross (8) reported that junior college students have lower educational and occupational aspirations than native students. While 70 or 75 percent plan to get a bachelor's degree, only about one-third even transfer to senior

colleges. Barton (3) reports the same facts when he found two-thirds of junior college students in transfer curricula but only about one-third of them actually transfer to senior colleges. Eells (15) found that only 25 percent of the entering freshmen continue their formal education past the sophomore year.

While it is important to realize there are significant differences between students entering community colleges and senior colleges, a more important question exists, that of determining if many of the low-ability are actually being misled. Gleazer (24) asks the question about those "two out of three that will not transfer" when he states: What are the community colleges doing about the other two? Gleazer concludes that community colleges are assuming most students will transfer, when in reality just the opposite is true.

The problem of unrealistic goals in relation to students in college parallel programs is best illustrated by Super (56) when he relates that many students in high school feel the necessity to illustrate high motivation for professional activities when in reality peer group pressure is the primary mover. He reports a high school student telling a counselor that every boy in his class was either going to be a doctor, lawyer, or engineer. The result of such attitudes creates the "democratic right to fail" concept. This is often obvious from the "revolving-door" found in

most college parallel programs.

Eells (14) argues that general culture is a legitimate objective of students who do not plan to continue in the university and are justified in planning a terminal program that is culturally oriented. Nall (50) suggested in 1962 the development of a "second-track" for students not interested in college parallel studies but still not interested in identified vocational-technical programs. He suggests courses that are not "warmed-over" or "watered-down" versions of typical lower division courses, but re-designed and evaluated in light of the career objectives of the individuals. Mohs (47) found in studying a large group of graduates from Pasadena City College that the words "terminal" and "transfer" do not have relevance anymore. While educators tend to think of "terminal" students as those who have job entry abilities and "transfer" students as prepared for senior college courses, in actuality this evaluation did not work. The study by Mohs concluded that neat compartmentalization by transfer and terminal is not practical when universities are allowed to determine credit on an individual basis and students can choose not to transfer after originally thinking they were going to.

The Community College Student: Prediction and Transfer

Most predictive studies of community college students use grade point average at the senior college as the variable

to be predicted. This variable is normally connected in some way with the comparative grade point average achieved at the two institutions. Recent findings by Lonning (39) suggest that most follow-up information is limited to grade point prediction at senior colleges. Research by Knoell and Medsker (36) point out that many factors affect the success of a transfer student. Their research concluded that the possibility of success is a subtle accommodation between student attributes and the characteristics of the institution he entered or the particular part of the institution in which he concentrated his studies. The result was to negate any positive conclusion about success unless it was in relation with the individual, the senior college and the interaction of the transfer student. Students who failed at one college might have met with success at another college.

An early comparison of grades and transfer at junior and senior colleges was done by Hale(26) in 1932. Hale reported that almost three-fourths (74.36) of the students that had been graduated from junior college stayed in residence and earned their degrees. Hale's study showed though, that just more than one-third of those students achieved a grade point average at least as good or better than the general average in the senior college.

Hale's study is still relevant today although some of

the frequencies are probably a little higher than they would be today. As with many researchers, Hale dealt only with graduates of community colleges, consequently showing the results in a favorable manner.

Eells (16) surveying 6,962 students in California junior colleges in 1929 found that by 1935 only slightly over one-fourth of them had transferred and only one-half of those had graduated. Eells reports that intentions reported by sophomores were much more reliable than those of freshmen. He suggests that college administrators consider carefully their institutions in light of his findings. The junior college, far more than commonly supposed, is a terminal institution for a large part of the student body and should offer occupational opportunities in addition to the transfer curriculum.

Eells' study was forerunner to the large studies of Knoell and Medsker and served as the last word in junior college research for a number of years. His conclusions concerning the terminal-transfer function played by the community colleges is still relevant.

Love (40) concluded in his work published in 1938 that there was a positive correlation between grades achieved in junior college and those achieved at the senior college. His study also evaluated the effect of junior college grade point average and the probability that the student would

transfer. He concluded that generally there is very little correlation between the grades achieved at the junior college and the probability that the student would transfer to a senior college.

Lagomarcino (38) and Casey (6) in somewhat similar studies of transfer students, generally concluded that while junior college transfer students do not achieve quite as well as native students, there is a strong relationship between junior college grade point average and success at the senior college. Lagomarcino's study was of 257 students who had graduated from Iowa's junior colleges and then transferred during the fall of 1951-52. Based on this information, Lagomarcino constructed probability tables of graduation from the three state universities of Iowa. For every 100 students graduating with a 2.0 from one of Iowa's junior colleges, 70 would graduate from Iowa State Teachers College (now University of Northern Iowa), 60 would graduate from the University of Iowa, and 53 would graduate from Iowa State College (now Iowa State University). As the grade point average of the transfer student increased, his chances of receiving a degree also increased, until at a 4.0 level the chances out of 100 were 88, 81, and 76 respectively.

A shortcoming of Lagomarcino's study of transfer students is the fact that only students who had received at

least 60 semester hours in college parallel courses were evaluated. Many students transfer before reaching the 60 hour level. While Lagomarcino's study (38) is significant in discussing junior college graduates, it does not provide insight concerning those that transferred prior to completing two years.

Casey (6) found prediction of graduation to follow very closely that of Lagomarcino. A junior college student with a grade point of 2.01 to 2.50 would have the probability of graduating at State College of Iowa (now University of Northern Iowa) of .73; at the State University of Iowa, .55, and at Iowa State University, of .38. At a 3.51 to 4.00 community college grade point average, the probabilities were .90, .88, and .79. Casey concluded that for the purpose of predicting graduation from one of Iowa's three state universities, the best predictor variable was the community college point average. He noted, however, that there was a great variance in individual student achievement depending on the senior college.

Casey (6) found that generally high school grade point average was the least important predictor of college graduation and first year grades at the university was the best predictor of graduation. The community college grade point average fell between the two. Casey reported, though, that intercorrelations for students graduating from State College

of Iowa were as follows: X_1--high school grade point average, .502; X_2--community college grade point average, .895; and X_3--first year State College of Iowa grade point average, .379. The N was 155. Casey (6) also evaluated students at State College of Iowa based on those that completed 30 and 60 semester hours. His intercorrelations for 30 hour students were: X_1--.129; X_2--.061; and X_3--.015. Because of a small N of 10, these predictions were not significant. Intercorrelation for students completing 60 hours was: X_1--.680; X_2--.118; and X_3--.342. An unusual finding by Casey was the fact that the intercorrelation between community college grade point average and graduation of all students was .895 but with the students completing 60 hours it fell to .118. Normally the intercorrelation of all students would be lower than those that completed two years.

Masiko (42) agrees that college follow-up studies are important, but suggests it is just as important to consider what educational opportunities are being offered to students. Statistics usually reveal that only a small percent of students actually transfer and graduate and there is good reason for it. To document this fact, a randomly selected group of 100 full-time day students in the Chicago Junior Colleges was studied. These students were chosen during the fall of 1955; one year later 62 had registered for the

second year, 9 had entered employment, 7 had transferred, 7 were excluded for scholastic reasons, 5 had to quit because of work schedules or marriage, and 1 was not accounted for. Thornton (58) writes that many of the students attending community colleges have the ability to transfer and succeed, but for a multitude of reasons do not. He suggests that transfer alone is not a fair criterion of student success. Morse (48, p. 17) argues the same line when he states, "Success was clearly and rigorously defined . . . The junior college student was a success if he learned the course content well and was accepted as a junior in the university." Related to these facts are data from Hoyt (32) revealing that there is little if any relationship between college success and adult success. In addition, distinguished success outside the classroom, whether in high school or college, bears little relation to grades or test of academic potential. Academic success predicts academic success but not necessarily adult success.

D'Amico and Prahl (9) followed up the graduates of Flint Junior College for the years 1953-1956. Seventy-three percent of the students had transferred to senior colleges. At the time of the study, 59 percent of the first class had already graduated with some of the students still attending a senior college. This study suffers the same limitations as others who treat just community college graduates.

Holmes (29) reported a study of transfer students to the College of Liberal Arts at Syracuse University from 1946 to 1955. Sixty-one percent of the junior college transfer students had completed two or more years of study when they transferred with a mean grade point average of 1.6 (on a three point scale, 3.0 = A). Almost one-fourth of the transfers fell below the 1.0 required to remain in Syracuse and were dropped. While 26 percent of the transfers had a grade point of above 2.0 at the junior college, only 13.5 percent achieved that same grade point after graduating. While the junior college student has a greater difficulty adjusting to the university than other transfer students, 62 percent graduated while other transfer students graduated at a 68 percent rate.

A study by the registrar's of the three regent institutions of Iowa in 1958 (43) surveyed transfer students between June, 1953, and March, 1955. Of the total number of 1,688, 312 were from public community colleges. When the study was written, there were 38 students still enrolled and 129 that had graduated. The total still enrolled or graduated represented more than 50 percent. In general, the community college transfer student compared very favorably with transfer students from other private and public colleges.

The results of a 1959 study of 63 institutions and

17,627 students by Medsker (45) shows that 33 percent of the students who had originally enrolled during the fall of 1952 had transferred to a senior college by January of 1956. Men transferred at a rate of 36 percent while only 30 percent of the women transferred. In comparing all entering students with just graduates, the percentage increased from the previously mentioned 33 percent to 56 percent. While only about 33 percent of the students transferred, almost twice that number indicated they had planned to transfer. Medsker suggests that the disparity might reflect very well on the junior college because it has provided the student an opportunity to become realistic about his goals. Comparison of students who graduated and those that did not, reveal that scores achieved by graduates on the ACE test were nine points higher than for nongraduates, 99.54 versus 90.40. The substantial difference in scores of the two groups would suggest that the less able students tend to drop out of junior college.

Collins (7) reports that the percentage of entering students in junior colleges who transfer is only 30 percent. Normally 9 percent transfer prior to graduation and 21 percent transfer after graduation.

The findings of Knoell and Medsker (36) in the area of transfers are significant. The research reports on 7,243 students who transferred in 1960 to 43 senior colleges

in ten states. Nearly three-fourths of the total transferred to 20 state universities. The major finding concerning transfer students are as follows:

1. There is very little difference in personal characteristics between the native student and transfer students. While the junior college freshman class looks similar to the high school senior class, so does the transferring student look like the native.

2. The economics of college dictated that many students would attend junior colleges. Low cost and living at home were major reasons to initially attend a junior college.

3. Sixty-two percent of the junior college students graduated within three years and another 9 percent were still enrolled. The authors estimate that 75 percent of the group will ultimately receive their degrees.

4. The "transfer shock" did occur almost universally, particularly during the first term. A small drop in overall grades did occur.

5. Junior college grades were more significant in predicting senior college success than were high school grades.

6. While grade point average for dropouts was lower, test scores did not reflect a significant difference between those that dropped out and those that graduated.

7. While it is difficult to judge, statistically there

seems to be no real difference between the academic ability of the native and junior college transfer student. Differences in achievement might be tied to early goal selection and realistic goals on the part of native students.

Davis (10) in a 1965 follow-up of students who had successfully completed their bachelor's degrees after having transferred from St. Petersburg Junior College, concluded that success in senior colleges is most adequately predicted by the community college grade point average. His study included an evaluation of school and college ability test scores, the Cooperative Reading Test, the five test battery scores that make up the Twelfth Grade Senior Placement Test and Personality Traits recorded on the Guilford-Zimmerman Temperament Analysis, and the college grade point average for the first two semesters. While some predictors were more desirable than others, for example, personality traits were found to be of no value, the single best predictor was the junior college grade point average.

Willingham and Findikyan (63) conducted a study of two year transfer students. Their major conclusions are:

1. Students that transfer have almost the same average grade point average as students coming from four-year institutions.

2. Few junior college students who have followed occupational programs transfer to senior colleges. For

those few that attempt to transfer it is very difficult.

3. Junior college grade point average is the main stumbling block to transfer. Almost 100,000 students annually attempt to move from one college to another with less than a 2.0.

4. Poor college grades are often the result of poor college choice, but as the transfer student grade point average slips below the arbitrary 2.0 his chances of transferring drop from 70 percent to 25 percent.

Hills (28) in evaluating the results of over 20 studies of the transfer students, including unpublished masters' and doctoral theses, summarizes:

1. Forty-four out of 46 studies reflect a transfer shock but recovery from the shock occurred in 34 out of 38 studies.

2. Out of 33 sets of data relevant to the question of whether native students obtain better grades than transfers, 22 indicated that the natives performed better, 4 indicated the transfers performed better, and 7 indicated they performed equally well.

3. Out of the six sets of data which compared the performance of junior college transfers with the performance of transfers from other kinds of institutions, five found that transfers from other institutions were more successful than junior college transfers. One found that the junior

college transfers were more successful.

4. Out of 21 sets of data that examined whether the junior college transfers took longer than natives to graduate or that considered whether a smaller proportion of transfers than natives graduated, 19 showed the natives to graduate sooner or in greater proportions, and 2 showed the junior college transfer to graduate sooner or in greater proportions.

It is interesting to note that while most of the research agrees on most points, it is possible in certain circumstances to achieve results that are strikingly opposite.

Berg (4) found in a study of 1,869 students who left Everett Washington Junior College that there was little academic difference between students who first entered the junior college and those reverse transfers who initially entered the senior college. Forty-two percent of the students in the study transferred to senior colleges and 58 percent used the junior college as their terminal education.

Research by Gadzella and Bentall (22) analyzed high school test results in mental ability and academic achievements to point out the significant differences between students who graduated from an institution of higher learning with a degree and those who dropped out. A sample of 365 students was used from nine public high schools. After a period of four years a follow-up was made showing that 178 students had entered college and 43 graduated.

One hundred and forty-three had dropped out but some had re-enrolled after several terms. Sixty of the dropouts were randomly chosen and compared statistically with the degree winners on a basis of the following predictor variables: IQ, high school grade point average, Stanford Reading Achievement and five scores from the Iowa Tests of Educational Development. For all groups, data were tested for significance at the .01 and .05 levels of confidence. The only "t" significantly different was registered in comparison with the mean of high school grade point average. While higher scores were generally achieved by those successfully completing their bachelor's degrees only in grade point average comparison of 3.15 and 2.87 was it statistically significant. Other recent studies by Harrington (27) and Baird and Richards (2) show that any nonacademic criterion is much less likely to predict success than academic criterion. Baird and Richards state that there is little relation between academic and nonacademic achievement. Harrington concludes that admitting students by their nonacademic achievement records would form a poor basis for selecting college academic achievers.

Research by the Educational Research Information Center (ERIC) (57) reports that recent studies tend to corroborate conclusions drawn by Knoell and Medsker (35) and reinforced data reported in research dating to 1928.

The major findings are as follows:

1. Students who enter junior colleges and transfer eventually to senior institutions typically experience a lower grade point average during the first semester following transfer.

2. In most cases, the transfer student's marks recover from the loss which occurs during his first semester.

3. Transfers' grade point averages improve with each successive semester in which they are enrolled at the senior institution.

4. Transfer students' marks are lower than the average grades made by students who entered senior institutions as freshmen (natives), a transfer student is less likely than the native to graduate, and the transfer student who does graduate takes longer to reach the baccalaureate than does the comparable native student.

Methods Used in Analyzing Success of Transfer Students

In the study by Lagomarcino (38) a determination of success of transfer students based on academic average was investigated. Specifically, Lagomarcino was interested in (1) predicting grade point averages of transfer students, (2) analyzing the probability of graduating from the senior college, and (3) determining the probability of graduating in the upper half of the class.

In predicting grade point average of transfer students

the following regression analysis was used:

$$X = ax_1 + bx_2 + c$$

where

X_1 = high school average

and

X_2 = junior college average

The F test determined that no significance was lost when the high school average was dropped; consequently it was possible to predict from the junior college grade point average. A prediction table was constructed for Iowa State College, State University of Iowa and Iowa State Teacher's College. It was shown rather dynamically that Iowa State University was grading low in comparison with the other two institutions.

Lagomarcino (38) used a discriminant analysis in constructing a probability table estimating the chance transfer students have of graduating from the three state institutions. Using the basic normal equations in deviation form, the analysis was as follows:

$$NZd_1 = aex_2 + bex_1x_2$$

$$NZd_2 = aex_1x_2 + bex_2$$

where

N = the number of cases

Z = the height of the ordinate

d_1 = the difference in the means of the high school averages between the attrition and the survival groups

d_2 = the difference in the means of the junior college averages between the attrition and the survival groups

x_1 = the high school average

x_2 = the junior college average

An F test resulted in values of less than one when the high school average was dropped, resulting in a discriminant function using just junior college grades. A probability table was constructed from the discriminant function equations. Utilizing the same analysis, Lagomarcino constructed prediction tables to show probability of graduating in the upper half of the college graduating class.

Casey (6) utilized the coefficient of correlation in predicting first year grade point averages of students transferring to the state institutions. Without exception the junior college grade point average correlated higher than ACE scores or high school grades. Coefficients of correlation were also determined for students transferring with 60 hours and those transferring with 30 hours. Gen-

erally the correlation is higher between students with more hours. Intercorrelations between high school grade point average, community college grade point average, and first term grades when determining first year grade point average were also constructed. Since the predictor variable X_2, first semester or quarter grade point average is in effect a large part of criterion Y, first year grade point average, there is a generally high correlation. For students remaining in the community college for 60 hours though, often the community college grade point average correlates higher than the first term grades.

Casey (6) used high school grade point average, community college grade point average, and first year grades at the senior college to compute intercorrelations using graduation from the senior college as the criterion variable Y. Generally the first year college grade point average proved to be the best predictor of graduation. A regression equation was used to predict graduation from the three state schools. High school grade point average and community college grade point average were the two predictor variables. Casey reports an unusual discovery when he suggests that the community college grade point average could be dropped without significant loss in prediction.

Love (40) did not predict if a student would transfer or not, but did draw some conclusions concerning the

attrition of students who did transfer. Pearson product-moment correlation coefficients were calculated between grades achieved in the junior college and grades in the junior and senior year. Using a regression analysis, probability limits were constructed. Love points out that dropouts generally achieved poorer than those that ultimately graduate, but also concludes that nearly 65 percent of the dropouts withdrew for reasons other than scholastic.

Gadzella and Bentall (22) utilized the t test in comparing differences between students who dropped out of college and those that graduated. With a sample of 43 graduates and 60 dropouts, individual t tests were made on IQ, high school grade point average, Standard Reading Achievement Test scores, and five scores from the Iowa Tests of Educational Development. The only t score to prove significant was high school rank. The authors conclude that the other measures of ability do not reflect a difference between college dropouts and graduates.

Lonning (39) in analyzing 187 college transfer students, utilized the discriminate analysis test of significance. Thirteen variables were used to test the hypothesis that there are no significant differences among college transfer students who complete the program, drop from the program but maintain a satisfactory grade point average, and those who fail to do satisfactory work.

Lonning (39) found the value of V with 26 degrees of freedom to be 92.02 which was highly significant; consequently, rejecting the null hypothesis. Further analysis revealed that significant F values were recorded between all 13 variables.

Addition F tests were computed, dropping variables to achieve the maximum predictive value with the minimum number of variables. Grade point average, intelligence quotient, and the American College Test Composite were ascertained to be the three most powerful predictors.

Summary

In summarizing this review, the investigator can generalize about community college students in the college parallel program as follows:

1. The profile of entering freshmen is similar to a high school graduating class.

2. After transfer the profile more closely compares with the college profile instead of the high school.

3. The community college serves as a terminal institution for many students.

4. More students do not transfer than do.

5. Cost and convenience are the two most important reasons for choosing to attend a community college.

6. There is a transfer shock but most students overcome it by the time they leave the senior college.

7. Most studies either compare grade point average of students at two institutions or compare transfer students with native students.

In light of these generalizations, the investigator chose to evaluate transfer and graduation from the senior college, as the important areas of study. While grades are important, it was felt that the decision to transfer and ultimate graduation are the most important elements in evaluating Arts and Sciences students.

METHOD OF PROCEDURE

Sample

The sample for this investigation was drawn from students entering the Arts and Sciences Division, Fort Dodge Center, Iowa Central Community College, during 1963, 1964, and 1965. During the three years, 1,224 students enrolled as freshmen. A follow-up study was undertaken to determine which students transferred and which ones ultimately received their bachelor's degrees. The initial mailing resulted in just over 350 responses, a follow-up post-card brought the total to 421. A telephone campaign resulted in an additional 181 responses bringing the total to 602. Of the total, 361 had transferred and 241 had not. Of the group that transferred, 246 completed bachelor degree requirements.

The sample of one of every three, or 200, was drawn from the 602. A sample of 100 was drawn from the 246 who transferred and graduated; a sample of 50 was drawn from the 115 who transferred and withdrew; and a sample of 50 was drawn from the 241 who did not transfer. The sample resulted in three basic groups: Group 1, those who received bachelor's degrees; Group 2, those who transferred and dropped out; and Group 3, those terminating at Iowa Central Community College.

Data Collection

Data were collected for each student in the sample from records retained in the Office of Student Personnel Services at Iowa Central Community College. Permanent records and folders were utilized to obtain the necessary information on each student.

The following information was collected for each student in each of the three groups:

1. Age upon enrolling
2. Sex
3. Marital status upon enrolling
4. High School Rank
5. Size of High School Class
6. American College Test (ACT), Test number 1, English
7. ACT, Test number 2, Mathematics
8. ACT, Test number 3, Social Science
9. ACT, Test number 4, Natural Science
10. ACT, Composite Score
11. Community College Grade Point Average
12. Total Hours Attempted at Iowa Central Community College
13. Semesters attended at Iowa Central Community College
14. Graduation from Iowa Central Community College
15. Decision upon leaving Iowa Central Community College

Number 15 was divided into three parts to reflect accurately the three groups being compared:

1. Transferred and graduated
2. Transferred and did not graduate
3. Did not transfer

Analysis of the Data

Pearson product-moment coefficients of correlation (1) for the following ten variables were calculated: high school rank, high school class size, all five ACT scores, Iowa Central Community College grade point average, hours attempted, and semesters attended. The correlations were presented in matrix form. The following formula can be used to solve Pearson product-moment coefficient of correlation:

$$r_{xy} = \frac{\Sigma xy}{N s_x s_y}$$

where

r_{xy} = coefficient of correlation,

xy = sum of the products of the paired scores expressed in deviation form,

N = number of cases,

s_x = standard deviation in one distribution,

s_y = standard deviation in another distribution.

A multiple classification analysis of variance (64) using the ten variables was calculated to determine if significance between groups and sex existed, and to determine

if there was significant interaction. An unweighted-mean analysis was necessary because of unequal cell sizes. The number of observations in each cell may be indicated as follows:

		B (group)		
		b_1	b_2	b_3
A (sex)	a_1	n_{11}	n_{12}	n_{13}
	a_2	n_{21}	n_{22}	n_{23}

The harmonic mean of the number of observations per cell is

$$\bar{n} = \frac{pq}{\frac{1}{n_{11}} + \frac{1}{n_{12}} + \frac{1}{n_{21}} + \ldots + \frac{1}{n_{pq}}}$$

where

p = columns,

q = rows,

x_{ijk} = the score for the k^{th} person in the i^{th} sex of the j^{th} group

$i = 1, 2 \quad j = 1, 2, 3 \quad k = 1, 2, 3 \ldots n_{ij}$

$$\text{Error Sum of Squares} = \sum_{i=1}^{p} \sum_{j=1}^{q} \sum_{k=1}^{n_{ij}} (X_{ijk} - \bar{X}_{ij.})^2$$

For the main effect and interaction sums of squares, first compute cell means:

		Group		
		1	2	3
Sex	M	$\bar{X}_{11.}$	$\bar{X}_{12.}$	$\bar{X}_{13.}$
	F	$\bar{X}_{21.}$	$\bar{X}_{22.}$	$\bar{X}_{23.}$

where

$$\bar{S}_i = \frac{\sum_{j=1}^{3} \bar{X}_{ij.}}{3}$$

$$\bar{G}_{j.} = \frac{\sum_{i=1}^{2} \bar{X}_{ij.}}{2}$$

$$\bar{\bar{X}} = \frac{\sum_{i=1}^{2} \sum_{j=1}^{3} \bar{X}_{ij.}}{6}$$

Then considering these means as observations, the following computations were made:

$$\text{Sum of Squares for Sex} = 3 \sum_{i=1}^{2} (\bar{S}_i - \bar{\bar{X}})^2$$

$$\text{Sum of Squares for Group} = 2 \sum_{j=1}^{3} (\bar{G}_j - \bar{\bar{X}}$$

$$\text{Sum of Squares Sex x Group} = \sum_{i=1}^{2} \sum_{j=1}^{3} (\bar{X}_{ij.} - \bar{S}_i$$

$$- \bar{G}_j + \bar{\bar{X}})^2$$

To place the sums of squares on the same basis as the error sum of squares, each was multiplied by $\bar{n}$.

The discriminate analysis statistic (1) was chosen because of its ability to differentiate between specific

groups. The ability to classify into dichotomous groupings is the strength of the discriminate analysis statistic. Predicting a dichotomy from a number of variables allows the researcher to classify students into specific groups and to determine if differences exist between groups. The discriminate analysis statistic was used to test the four hypotheses and to create prediction equations.

The following statistical design was used (57):

where

X_{ijk} = i^{th} score on the j^{th} variable in the k^{th} group

Means:

$$\bar{x}_{jk} = \frac{\sum_{i=1}^{n_k} x_{ijk}}{n_k}$$

where

k = 1, 2, 3, g are groups,

n_k = sample size in the k^{th} group,

j = 1, 2, ..., m are variables.

Within-group sums of squares and cross-products of deviations from means:

$$S_k = s_{jl}^k = \Sigma (x_{ijk} - \bar{x}_{jk}) (x_{ilk} - \bar{x}_{lk})$$

where

j = 1, 2, ..., m,

l = 1, 2, ..., m.

The pooled dispersion matrix was calculated as follows:

$$D = \frac{\sum_{k=1}^{g} S_k}{\sum_{k=1}^{g} n_k - g}$$

where

g = number of groups.

This subroutine performs a discriminate analysis by calculating a set of linear functions that serve as indices for classifying an individual into one of K groups. For all groups combined, the following are obtained:

Common means:

$$\bar{X}_j = \frac{\sum_{k=1}^{g} n_k \bar{x}_{jk}}{\sum_{k=1}^{g} n_k}$$

where

g = number of groups,

j = 1, 2, ..., m are variables,

n_k = sample size in the k^{th} variable in k^{th} group.

$\bar{x}_{jk}$ = mean of j^{th} variable in k^{th} group.

Generalized Mahalanobis D^2 statistics, V:

$$V = \sum_{i=1}^{m} \sum_{j=1}^{m} d_{ij} \sum_{k=1}^{g} n_k(\bar{x}_{ik} - \bar{X}_i)(\bar{x}_{jk} - \bar{X}_j)$$

where

d_{ij} = the inverse element of the pooled dispersion matrix D.

V was used as chi-square (under assumption of normality) with m(g-1) degrees of freedom to test the hypothesis that the mean values are the same in all the g groups for these m variables. For each discriminate function k* = 1, 2, ..., g, the following statistics were calculated.

Coefficients:

$$C_{ik*} = \sum_{j=1}^{m} d_{ij} \bar{x}_{jk}$$

where

$i = 1, 2, \ldots, m$

$k = k*$

Constant:

$$C_{ok*} = -1/2 \sum_{j=1}^{m} \sum_{l=1}^{m} d_{jl} \bar{x}_{jk} \bar{x}_{lk} .$$

For each i^{th} case in each k^{th} group, the following calculations were performed which represents the discriminate functions:

$$f_{k*} = \sum_{j=1}^{m} C_{jk} x_{ijk} + C_{ok*}$$

where

$k* = 1, 2, \ldots, g.$

It is possible to test for significant loss when variables are dropped by using the following calculation:

$$df = D_{diff} = t(g-1)$$

when

t = number of variables lost, i.e., $D_{larger}-D_{smaller} = D_{difference}$,

g = number of groups.

FINDINGS

The findings of this study are discussed and reported utilizing a number of methods. Frequency distributions, means, standard deviations, and correlations are used to describe the three groups of students being studied. In addition, "t" tests, multiple analysis of variance, and discriminate analysis were used to test hypotheses and statistically evaluate the findings.

An examination of Table 1 reveals the similarity between Group 1, students who received their bachelor's degrees, and Group 2, students who transferred and ultimately withdrew before receiving their degrees, when comparing the college or university to which they transferred. In both cases the three Iowa universities accounted for approximately two-thirds of the transfers. The University of Northern Iowa accounted for the largest percent, 25 percent for Group 1 and 28 percent for Group 2. Iowa State University accounted for 22 percent of Group 1 and 20 percent of Group 2, while the University of Iowa accounted for 19 percent and 22 percent, respectively. In both cases Buena Vista College of Storm Lake ranked fourth in frequency, accounting for 7 percent of Group 1 and 8 percent of Group 2. No other college or university accounted for more than 4 percent of the total, although 26 additional senior colleges were chosen by the remaining students. The

Table 1. Colleges and universities to which students transferred from Iowa Central Community College

College or university	Group 1 Transferred and graduated N=100 %	Group 2 Transferred and did not graduate N=50 %
Buena Vista College	7	8
California State College	0	2
Central College	1	0
Colorado State	0	2
Concordia College	2	0
Dakota Wesleyan College	1	0
Drake University	2	0
Iowa State University	22	20
Mankato State College	4	0
Missouri Valley College	1	0
Morningside College	0	2
Northeast Missouri State College	1	0
Northwest Missouri State College	1	0
North Texas State University	1	0
San Fernando Valley State College	0	2
St. Mary's College, Omaha	1	0
Stout State, Wisconsin	0	2
Texas School of Arts and Industry, Kingsville	1	0
University of Arizona	1	0
University of Denver	0	2
University of Iowa	19	22
University of Northern Colorado	1	0
University of Northern Iowa	25	28
University of South Dakota	2	2
Upper Iowa University	0	4
Wartburg College	1	0
Wayne State College	4	0
Westmar College	0	2
Winona State College, Minnesota	2	0
Yankton College	0	2

colleges generally were within the Midwest, although two students transferred to colleges in California and Texas, and others chose colleges located in Arizona, Colorado, Minnesota, Missouri, Nebraska, South Dakota and Wisconsin.

Similarity in the choice of colleges by the two groups studied reflects the findings of most researchers in the community college field, that is, students generally attend a community college for two reasons: proximity to home and cost. By the same token, this thinking applies when selecting a senior college. All three universities in Iowa are relatively inexpensive when contrasted with private institutions. The one private institution within commuting distance of Fort Dodge is Buena Vista, and in both groups, Buena Vista ranked fourth after the state universities.

Table 2 compares the two groups of students who terminated their higher education before receiving a bachelor's degree. Students making up Group 2 withdrew after transferring to a senior college, while students in Group 3 used the community college as a terminal institution. Without exception the students fell into four basic groups: they either went to work, married and did not work, joined the armed forces, or continued their education in a nonbachelor's degree institution. The differences between the two groups is not great except in the number of students who went directly into the armed forces. Only

Table 2. Initial occupation or endeavor of students who withdrew from college

Occupation or endeavor	Group 2 Transferred and did not graduate N=50	Group 3 Did not transfer N=50
Employment	28	23
Marriage--not working	13	12
Armed Forces	5	13
Career education (nondegree)	4	2

five from the senior college group went directly into the service, while 13 of those terminating at the community college went into the service.

The willingness of six of the students to realize that a bachelor's degree was not for them, is particularly interesting. Six decided to try a different kind of higher education, that is, career education. These "crossovers" represent the realization that they need to be able to sell something in the job market. Interestingly enough, half of the total continued their education at Iowa Central Community College in the vocational-technical programs.

Frequency Distributions by Group

Student characteristics comparisons are given in Table 3. The characteristics of age, sex, marital status, and high school class size, reflect very little difference in the three groups. Age in all three groups is what is generally considered "college age" for community college students. In Groups 2 and 3, 96 percent of the students were under 21 when they entered Iowa Central Community College, and in Group 1 97 percent were in that age range. Only six students were between the ages of 21 and 24 and only one student was over 25. None of the students were over 30 when they entered college.

Sex distribution of the sample resulted in a male representation of 58.5 percent and a female representation of 41.5. This sample very closely paralleled the population which had a male-female ratio of 60-40. The range was from 63 percent men and 37 percent women in the degree group, to 50 percent men and 50 percent women in the transfer-dropout group. Group 3 was the closest to the overall average with 58 percent men and 42 percent women. This rather top-heavy male advantage is normally attributed to the community college as an institution. Community colleges normally do not have residence halls, and if they do, they usually house only a small percent of the total enrollment. The proportion of men and women who can commute to enroll is

Table 3. Student characteristics: frequency distribution

Characteristic	Group 1 Transferred and graduated N=100 %	Group 2 Transferred and did not graduate N=50 %	Group 3 Did not transfer N=50 %
Age			
Under 21	97	96	96
21-24	2	4	4
25-29	1	0	0
Over 30	0	0	0
Sex			
Male	63	50	58
Female	37	50	42
Marital status			
Single	100	100	96
Married	0	0	4
High school class size			
Less than 100	46	36	38
100-199	7	10	14
200-299	1	2	6
300-399	24	28	24
400-499	22	24	18

almost equal, but because of housing difficulties, more men come from outside commuting distance than do women. Parents have no serious qualms about sending a son away to live in off-campus housing but many parents feel just the opposite about off-campus housing for their daughters. The net result of this attitude is an increased male population on community college campuses.

Just as age classification had a narrow range, the marital situation revealed almost no deviation. Groups 1 and 2 had no married people in the sample and Group 3 had only 4 percent. Most of the students were in the 17-19 year age group and at the time of enrolling had not married.

The distribution of high school class size in Table 3 reveals a pattern related to the feeder schools of Iowa Central Community College. Because Iowa Central Community College, like most community colleges, is a commuter college, the enrollment is made up primarily of schools within driving distance. Two or three facts about the area high schools are revealed by examining the distribution of high school class size. All three groups have the largest percent of students from high schools with a graduating class of less than 100. While the proportion varies from 46 percent in Group 1 to 36 percent in Group 3, it is clearly the dominate size. This is easily attributed to the number of small high schools in the area surrounding Fort Dodge. While re-organization has increased the size of many schools, few of the reorganizations graduate more than 100 students, meaning their high school enrollment normally is not as large as 400-450. The rather small ratio of students in the 100-199 and 200-299 ranges can be attributed to the lack of schools that size within commuting distance. The last two classifications, 300-399 and 400-499, are a

function of Fort Dodge Senior High School. Because the sample covered the years 1963, 1964, and 1965 the size of the Fort Dodge graduating class is of particular importance. The 1963 graduating class at Fort Dodge High School was 327, while the graduating classes for 1964 and 1965 were 350 and 449, respectively. No students in the sample came from schools with a graduating class of 500 or more. This is not surprising because only a small percent of Iowa high schools have graduating classes of that size.

The discussion of Table 4 will examine those facts that are particularly noticeable when viewed as a frequency distribution, and leave until later those areas that can more readily be discussed as means and standard deviations.

A comparison of high school rank of the three groups reveals the academic superiority of students who received bachelor's degrees. While only 16 percent of the non-transfers graduated in the top quarter of their high school graduating class, 26 percent of those that transferred, and 40 percent of degree winners graduated in the top quarter. This same trend is shown when comparisons are made of the number of students graduating in the bottom quarter. While only 7 percent of the degree winners graduated in the bottom quarter of their high school class, 22 percent of the nontransfer students ranked in the bottom fourth. This trend reveals that Group 1 students cluster at the top

Table 4. Achievement characteristics: frequency distribution

Characteristic	Group 1 Transferred and graduated N=100 %	Group 2 Transferred and did not graduate N=50 %	Group 3 Did not transfer N=50 %
High school rank			
Top 1/4	40	26	16
Second 1/4	31	42	22
Third 1/4	22	18	40
Bottom 1/4	7	14	22
ACT test number 1--English			
Less 11	2	4	6
11-15	7	6	22
16-20	40	46	38
21-25	40	40	32
26-30	11	4	2
Over 30	0	0	0
ACT test number 2--Mathematics			
Less 11	5	8	8
11-15	9	13	18
16-20	25	24	30
21-25	26	24	34
26-30	26	12	6
Over 30	9	6	4
ACT test number 3--Social Science			
Less 11	0	2	10
11-15	9	20	16
16-20	27	40	36
21-25	43	34	26
26-30	17	4	12
Over 30	4	0	0
ACT test number 4--Natural Science			
Less 11	3	6	6
11-15	7	12	12
16-20	27	34	28
21-25	29	38	22
26-30	30	10	22
Over 30	4	0	0

Table 4. (Continued)

Characteristic	Group 1 Transferred and graduated N=100 %	Group 2 Transferred and did not graduate N=50 %	Group 3 Did not transfer N=50 %
ACT test number 5--Composite			
Less 11	0	0	4
11-15	7	28	14
16-20	29	32	38
21-25	43	34	38
26-30	19	6	6
Over 30	2	0	0
ICCC GPA			
Less than 1.00	0	2	4
1.01 - 1.50	0	6	32
1.51 - 2.00	10	18	20
2.01 - 2.50	38	46	32
2.51 - 3.00	24	26	10
3.01 - 3.50	20	2	0
Over 3.50	8	0	2
ICCC hours completed			
0 - 14	2	0	8
15 - 29	3	8	14
30 - 44	13	22	24
45 - 59	20	18	26
Over 59	62	52	28
ICCC semesters attended			
1	2	0	6
2	15	22	22
3	5	8	16
4	71	62	40
5	6	4	12
6	1	4	4
ICCC graduation			
Yes	55	46	22
No	45	54	78

of their class, while Group 3 students follow just the opposite pattern. Group 2 is usually between the two extremes, although it is interesting to note in this case that Group 2 had a greater number in the second quarter than either of the others, and had a total of 68 percent in the upper half. This 68 percent compares very favorably with the 71 percent achieved by Group 1. Group 3 by comparison, had only 38 percent of its students in the upper half.

The American College Testing standard scores rank academic ability on a scale ranging from 0 to 36. Normally average scores fall in the 20 to 25 range. The test battery also provides percentile scores that are allowed state, regional, national, university, college and community college comparisons. While the percentile distributions are not utilized in this study, they make comparisons by region or institution more meaningful. The standard scores used here can be equated to percentiles with tables provided by American College Testing.

The first test in the American College Test battery is in English. The three groups of students did not differ to a large degree, with the exception of the 22 percent of Group 3 who achieved standard scores from 11 through 15. Group 3 totaled 22 percent in this category while Group 1 and Group 2 had only 7 and 6 percent, respectively. In all three groups the larger totals were found in the range

"16 through 25". In the "16 through 20" range, all three groups achieved markedly similar results. Group 1 had 40 percent of its students score in this range, while Groups 2 and 3 had 46 percent and 38 percent, respectively. The frequencies in the range "21 through 25" also were very similar, with Groups 1 and 2 placing 40 percent, while Group 3 placed 32 percent. The extremities of the range showed the greatest differences. In the "under 11" range the frequencies of 2 percent, 4 percent and 6 percent, respectively, compared with the "26 - 30" range frequencies of 4 percent, 4 percent, and 2 percent. These frequencies seem to indicate that while there are a large number of students in the middle ground of all three groups, there appears to be a tendency for degree winners to polarize toward better and higher scores, while students that did not transfer from the community college have a tendency to polarize toward lower scores. Just as in the high school rank comparisons, the students of Group 2 who transferred and subsequently withdrew, fell somewhere between the extremes.

American College Test number 2 is a test of mathematical ability. This test, more than any of the other American College Testing tests shows the widest range of scores. While the English test revealed no one scoring over 30, the mathematics test resulted in high scores by

all three groups of students. While these unusually good scores were being achieved, the scores in the lower ranges were greater than they had been in the English test. Unlike the English test, when over two-thirds of the scores were in the range of "16-25", the mathematics scores for the same classification totaled only 51 percent, 48 percent and 64 percent for Groups 1, 2 and 3, respectively. The top two ranges of "26-30" and "over 30" resulted in much larger frequencies. While it is difficult to suggest a reason, or reasons, for the wider variability between English and mathematics, it would seem that the specific knowledge required of mathematics seemingly is either known or not known by a greater degree than is English. If this concept is correct, it would seem reasonable to think that the science test results would look somewhat like mathematics, and social studies would appear more like the English test results.

Frequency counts in the American College Testing results for Social Sciences in Table 4 show a pattern that clearly differentiates between the degree winner and the nontransfers. The scores of the students in Group 2 reveals a third pattern. The degree winners of Group 1 have a total percent in the range "16-30" of 87 percent, compared with 78 percent for Group 2, and 74 percent for Group 3. More students in Group 1 scored in the "21-25"

range than in any of the other subject matter examinations of the American College Testing battery. Group 3 continued to reflect a greater variability than the other two groups, and Group 2 looked much like Group 1, except their scores seem to run one classification lower. In fact, the total of the three ranges, "11-15", "16-20" and "21-25", amount to 94 percent of the total for Group 2, while Groups 1 and 3 amount to only 79 percent and 78 percent, respectively.

The frequency distribution for Test Four, Natural Sciences, shows a continuation of the patterns previously observed. Generally, the majority of scores in Group 1 fall in the standard score range of "16-30". In this case a total of 86 percent fall in that range. When comparing these totals with Groups 2 and 3, the previously noted pattern becomes readily observable. Group 2, those that transferred and did not graduate, show a cluster of scores in the classification of standard scores "11-25". The total for these three classifications represents 84 percent of the total, with 38 percent falling in the "21-25" range, and 34 percent and 12 percent falling in the "16-20" and "11-15" range, respectively. Group 3, for the first time on any of the subject matter examinations of the American College Testing, did not have as many as 30 percent in any one of the six classifications. While there were no students in the "over 30" range, the other five were rela-

tively even, with amounts being 10 percent, 16 percent, 36 percent, 26 percent and 12 percent. This tendency reflects the pattern observed again and again on the American College Testing scores. While there is much similarity in ability of the three groups of students, the group that received bachelor's degrees scored better than either of the other groups.

The Composite Standard Score provided by the American College Testing Program is a summation of the subject matter examinations. The American College Testing Composite score is often thought of as the one score that sums up the ability of an individual student with a two digit number. A conclusion of this nature is dangerous, but for a short-cut look at an individual's overall ability, the American College Testing Composite does provide a certain insight that is relatively accurate, although acknowledged as being a short-cut method. The frequency distributions presented in Table 4 for American College Testing Composite scores, shows that a majority of students in all three groups had scores in the "21-25" range. Group 1 also had 29 percent in the "16-20" range and 19 percent in the "26-30" range, and only 7 percent in the "11-15" range and 2 percent in the "over 30" range. Group 2 had no one in the extreme ranges and only 6 percent in the "26-30" range. Ninety-four percent of the students fell in the

three ranges "11 through 25". When compared with the degree winners, the nondegree winners were just a little less able. Students in Group 3 were also very comparable with those in Group 2, except they had 4 percent in the lowest range. With that exception they had more in the "16-25" range and fewer in the "11-15" range when compared with Group 2.

The striking fact about the American College Testing frequency tables is the pattern of similarity. Group 1 scores were generally in the middle to higher ranges, Group 2 scores had a middle to downward tendency, and Group 3 scores showed a downward tendency coupled with a certain degree of proportionality.

Up to this point all the discussion has centered upon achievement measured primarily before the student entered college. The next measurement, and the three after, are the results of efforts at Iowa Central Community College. Grade point average is one of the most important measurements of post-high school ability. A review of Table 4 reveals some clear tendencies on the part of the three groups of students being studied.

As Willingham and Findikyan (63) pointed out in their study of transfer students, the community college grade point average is of primary importance in the decision to transfer or to terminate. Depending on the length of stay

at the community college, it is difficult to determine exactly what minimum grade point average is necessary to allow transfer to a senior college. Group 1, the degree winners, had 38 percent in the "2.01-2.50" range, 24 percent in the "2.51-3.00" range, and 20 percent in the "3.01-3.50" range. The lowest level achieved by this group were the ten students who achieved in the range "1.51-2.00". The grades achieved by all three groups were similar in the sense that the "2.01-2.50" range provided the greatest number of frequencies for all three groups, 38 percent, 46 percent, and 28 percent, respectively.

Group 2, students who transferred and withdrew, achieved reasonably good grades at Iowa Central Community College. Only 2 percent had less than a 1.00 and only 6 percent were in the "1.01-1.50" grade point range. Ninety-two percent of these students achieved a grade point average above 1.50. The number of students above 2.50 was 28 percent while it was 52 percent for the degree winners. When comparing Group 1 and Group 2, although both groups transferred, there appears to be a tendency for Group 1 grades to cluster in the top levels and Group 2 grades to cluster around the middle. Grades achieved by students in Group 3 make it clear that grade point average must be a very important factor in the decision to transfer. While Group 1 averages clustered around the top, and Group 2 averages

clustered around the middle, it seems there is a definite tendency in the case of Group 3 for grades to cluster around the bottom end of the scale. While none of the students in Group 1 fell in the "1.01-1.50" classification, and only 6 percent of the students in Group 2 fell in that classification, almost one-third, or 32 percent of the non-transfer students, achieved at that level. In fact, the grade range between 1.01 and 2.00 accounted for 52 percent of the students in Group 3, while 10 percent and 24 percent, respectively, of the students in Groups 1 and 2 fell in the same classifications.

It is certainly clear after evaluating the grade point average frequency distributions that students who do not achieve at a reasonable level in the community colleges do not have a very good chance of transferring, and even if transfer is achieved, winning the degree in many cases might be estimated by the grades achieved at the community college.

Hours completed at Iowa Central Community College is not really a function of achievement in the sense that grade point average is, but it does reflect the number of students that leave early. Iowa Central Community College offers the first two years of the baccalaureate program. Normally this is considered to be 60-64 semester hours. The Associate in Arts was awarded to students who achieve a 2.0 grade point average for at least 60 hours. As

demonstrated in Table 4, students who were degree winners had a tendency to transfer with more hours than those who transferred and dropped out. While 82 percent of the students in Group 1 completed more than 45 semester hours, only 70 percent in Group 2, and 54 percent in Group 3, completed that many hours. The tendency to complete more hours is much greater in Groups 1 and 2, than in Group 3. While the first two groups show a range of 2 percent to 62 percent, and 0 percent to 52 percent, the difference in frequency for Group 3 extends only from 8 percent in the 0-14 classification to 28 percent in the over 59 classification. A pattern for hours completed seems to exist. Generally, students who earn bachelor's degrees complete more hours than the other two groups, and students who do not transfer are more likely to leave before 60 hours than after 60 hours.

The mode for number of semesters attended of all groups was four. This feature is expected because the community college is generally thought of as a two-year school. The percent of students who stayed four semesters was 71 percent for Group 1, 62 percent for Group 2, and only 40 percent for Group 3. This is consistent with the observations previously cited concerning hours completed. In all three cases the percentage of students who completed four or more semesters rose to 78 percent, 80 percent, and 56 per-

cent, respectively. A study of Table 4 does reveal that Group 3 had a more consistent number of students at each interval, while students in Groups 1 and 2 were primarily in the two or four semester category.

The last achievement variable to be analyzed is graduation from Iowa Central Community College. Graduation requirements were basically twofold: 60 semester hours and 2.0 grade point average. In addition, there was a $10 graduation fee and a few specific course requirements. In all three groups there seems to be a very consistent relationship between those completing 60 hours and those graduating. Sixty-two percent of the students in Group 1 completed 60 semester hours and 55 percent of them graduated. This is a difference of 7 percent. In the case of Group 2, 52 percent completed 60 hours, 46 percent graduated, a difference of 6 percent. Twenty-eight percent of the students in Group 3 completed at least 60 hours and 22 percent of them graduated, a difference of 6 percent. Because graduation has grade point average and semester hour requirements, the results closely paralleled those two variables to a large degree.

Means and Standard Deviations

Student characteristics and achievement can also be analyzed using means and standard deviations. Differences are sometimes more clear than frequency distributions and

allow clear numerical comparisons. The following discussion will first compare overall means and standard deviations with group means and standard deviations, and then will compare group means and standard deviations within group by sex. Means and standard deviations for ten variables have been calculated.

Examination of Table 5 illustrates some distinct differences in the mean high school rank of the three groups being studied. Means range from 64.04 for degree winners to 43.64 for students who did not transfer. The mean rank of students in Group 2 was between the extremes with a rank of 57.01. This indicates that as an average, students who transferred from Iowa Central Community College and received their bachelor's degrees were clearly in the upper half of their high school graduating class, and come very close to being in the upper third. Conversely, students who did not transfer ranked in the bottom half of their graduating class. The composite mean rank was 57.18 which was very close to that achieved by Group 2. Standard deviation scores for the three groups ranged from 21.74 for Group 2 to 24.49 for Group 3. The standard deviation for Group 1 was 24.25.

An interesting pattern is evident when mean scores for the American College Testing Program are studied. Group 1 scores without exception are higher than Groups 2 or 3.

Table 5. Achievement characteristics: means and standard deviations

Characteristic	Group 1 Transferred and graduated N=100		Group 2 Transferred and did not graduate N=50		Group 3 Did not transfer N=50		Composite	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
High school rank	64.04	24.25	57.01	21.74	43.64	24.49	57.18	25.13
High school class size	210.67	171.80	243.00	164.52	209.65	158.95	218.65	167.47
ACT 1, English	20.51	4.20	19.71	3.73	18.29	4.50	19.76	4.26
ACT 2, Mathematics	22.18	6.53	19.12	6.32	19.00	5.67	20.62	6.46
ACT 3, Social Science	22.09	4.73	18.84	4.72	18.95	5.57	20.50	5.20
ACT 4, Natural Science	22.26	5.47	19.57	5.26	20.23	5.94	21.09	5.67
ACT 5, Composite	21.89	4.34	19.43	4.38	19.25	4.57	20.62	4.59
ICCC GPA	2.63	.54	2.20	.48	1.75	.65	2.30	.66
ICCC Hours	54.73	12.85	52.51	13.79	44.35	16.79	51.58	14.79
ICCC Semesters	3.67	.90	3.60	1.00	3.46	1.28	3.60	1.03

Group 2 scores are higher than Group 3 scores in three of five areas. The standard deviation for Group 2 scores are smallest in three of the five cases, with Group 1 having the smallest standard deviation in one case and Group 3 having the smallest in one case.

Scores on test number one, English, ranged from a high of 20.51 for Group 1 to a low of 18.29 for Group 3. Group 2 had a mean score of 19.71. The standard deviation for Group 1 was 4.20, while it was 4.50 for Group 3, but only 3.73 for Group 2. The score for all 200 students on the English examination was 19.76, with a standard deviation of 4.26.

The second American College test, Mathematics, showed results somewhat similar to the English test. Group 1 again had the highest mean score with 22.18, but the standard deviation was also clearly the largest for all three groups, at 6.53. Group 2 had a mean score of 19.12 with a standard deviation of 6.32, and Group 3 had a mean of 19.00 with a standard deviation of 5.67. The overall mean and standard deviation for the mathematics test was 20.62 and 6.46, respectively.

Test 3, Social Science, shows a wide variation between the three groups. While Group 1 had a score of 22.09 with a relatively low standard deviation, Groups 2 and 3 both had scores below 19. Group 2 had a mean of 18.84 with a

standard deviation of 4.72, while Group 3 had a mean score of 18.95 with a standard deviation of 5.57.

Natural Science scores reported in Table 5 shows a wide variance, although not as wide as Social Science scores. Group 3 once again scored better than Group 2 with a mean of 20.23. The Group 2 mean was 19.57. As in the case on all American College Testing scores, Group 1 had the highest mean with a 22.26. The mean score for all 200 students was 21.09. Standard deviations ranged from 5.26 for Group 2 to 5.94 for Group 3, and 5.47 for Group 1. The standard deviation for all 200 students was 5.67.

The Composite score is a score composed of all four subject matter examinations. Once again, the high mean score was achieved by Group 1 with a score of 21.89 and a standard deviation of 4.34. Group 3 had the lowest Composite score at 19.25 with a standard deviation of 4.57, while Group 2 fell between the extremes with a mean score of 19.43 and a standard deviation of 4.38. The mean and standard deviation for all 200 students was 20.62 with a standard deviation of 4.59.

The final three measurements of academic achievement are measures of the students after they attended Iowa Central Community College. The three measures are: Iowa Central Community College grade point average, hours attempted, and semesters attended. The pattern that can

be observed is this: The means for each variable are higher for Group 1, and lower for Group 3. Group 2 means in all three cases falls between the other two. It appears that students in Group 1 have a tendency to complete more hours, stay in school longer, and achieve better grades, than the other two groups. Students in Group 3 are just the opposite, they stay in school for a shorter period, complete less hours, and achieve poorer grades.

The grade point average achieved by students attending Iowa Central Community College is a very important variable. Failure to achieve a good grade point in the community college is often cited as the prime reason for inability to transfer. As portrayed in Table 5, students who are degree winners achieved a grade point average of 2.63 while students who did not transfer achieved only a 1.75. While there is no magic point at which transfer is impossible, many colleges consider a grade point average below 2.0 as too low. The grade point average of students in Group 2 was 2.20. Standard deviations for the three groups demonstrated the greater variability of nontransfer students. While the standard deviation for Group 1 and Group 2 was .54 and .48 respectively, the standard deviation for students in Group 3 was .65. This difference in standard deviation would indicate that as a group there is more homogeniety in the ability and achievement of students

that transfer than those that do not.

The mean and standard deviation for all 200 students was 2.30 and .66, respectively. The .66 standard deviation compares very favorably with the .65 achieved by non-transfers. This fact would seem to indicate that the variability in all 200 students is just a little greater than the variability of the 50 students in Group 3.

Length of stay at Iowa Central Community College is reflected in two ways: by the number of semesters completed and the number of hours attempted. On both measurements, the means were highest for Group 1 and lowest for Group 3, with the mean for Group 2 closely resembling the overall average. The average length of stay for students who transferred and graduated was 3.67 semesters, with 54.73 semester hours attempted. This indicates, that on the average, students who were classified into Group 1 stayed more than three semesters, actually closer to four semesters, and carried an average load for that time of 14.9 semester hours. This would indicate that most of the students in this group made every effort to complete most of their general education requirements while attending the community college. The students in Group 2 compared very favorably with the students in Group 1. The mean number of semesters for the students in Group 2 was 3.60. They attempted 52.51 semester hours for an average load of 14.5 hours per semester, which is

only .4 different than Group 1. There is an observable difference between students who transferred and those that terminated, when comparing semesters attended and hours attempted. The students in Group 3 were enrolled about the same length, 3.46 semesters, but during that period of time attempted only 44.35 hours. The average load was 12.8, which is more than two semester hours less than the degree winners attempted. This reduction in load with the correspondingly low grade point average, indicates that the terminal student takes a lighter load and still does not achieve better grades. Conversely, academically successful students carry a heavier load, stay longer, and receive higher grade point averages. The number of semesters attended for all 200 students was the same as Group 2, 3.60. The total group attempted 51.58 hours, for an average load of 14.3, which was lower than either Groups 1 or 2 but higher than Group 3.

Standard deviations reflect the greater variability of the terminal students. While degree winners had a standard deviation of only .90 for semesters attended, the comparable figure for terminal students was 1.28. Once again, students in Group 2, those that transferred and then dropped out, have a score midway between the other two at 1.00. The standard deviation of all 200 students was 1.02. The standard deviation for hours attempted reflected

the same pattern, with degree winners achieving a standard deviation of 12.85, terminal students a 16.79 and the transfer drop-outs a 13.79. The standard deviation for all 200 students was 14.79.

While not reported in Table 5, means and standard deviations for age were also computed. Just as the discussion of age reported in the frequency distribution showed very few differences, the means substantiate that fact. The average age of the three groups was 17.90 years of age, with the degree winners having a mean of 17.81 for the youngest, and the oldest being 18.00 for students who did not transfer. Students who transferred and withdrew had a mean of 17.98. Standard deviations ranged from 1.22 for degree winners to .78 for the transfer-dropout group. Students who did not transfer had a standard deviation of 1.20.

The difference in high school graduation class size ranged from 209.65 for Group 3 to 243.07 for Group 2. Group 1 had a mean class size of 210.67. The standard deviation for class size indicated a great degree of variability.

Means and Standard Deviations by Sex

To further analyze the data, means and standard deviations for each group by sex were calculated for ten continuous variables. High school rank for men in the three

groups was poorer than for the women in all three cases. In the case of students who received bachelor's degrees, the high school rank of the men was 54.90, which is just above the midpoint, while for the women the rank was 79.62, or just .38 from being in the upper 20 percent. The mean for men in Group 2 was very similar to the mean of the men in Group 1, with an average rank of 54.28. The women in Group 2 ranked better than the men in the same group, but did not achieve nearly as well as the women in Group 1. The women in Group 2 ranked 59.75, compared with 54.28 for men. The students who chose not to transfer from Iowa Central Community College did not rank as well as either of the two groups that transferred. The men in Group 3 ranked 34.75 which is almost in the bottom one-third.

Standard deviation differences were most apparent between men who were degree winners and women who did not transfer. In the former, the standard deviation was 23.44 while in the latter the standard deviation was 24.02.

Means and standard deviations for American College Testing standard scores are presented in Table 6. Test number 1, English, reveals mean scores ranging from 22.13 for women degree winners to 17.44 for men in the nontransfer group. The only scores averaging above 20 were the previously mentioned 22.13, and 20.20 scored by females in the transfer-dropout group. Men in all three groups

Table 6. Achievement characteristics by sex: means and standard deviations

Characteristic	Group 1 Transferred and graduated N=63 M		N=37 F	
	Mean	S.D.	Mean	S.D.
High school rank	54.90	23.44	79.62	16.39
High school class size	203.00	174.55	223.75	166.19
ACT 1, English	19.57	3.82	22.13	4.33
ACT 2, Mathematics	22.90	6.28	20.97	6.76
ACT 3, Social Science	21.73	5.22	22.72	3.65
ACT 4, Natural Science	22.66	5.54	21.59	5.29
ACT 5, Composite	21.85	4.49	21.94	4.07
ICCC GPA	2.50	.54	2.85	.47
ICCC hours	54.50	13.36	55.10	11.93
ICCC semesters	3.73	.97	3.56	.75

Group 2 Transferred and did not graduate				Group 3 Did not transfer			
N=25 M		N=25 F		N=29 M		N=21 F	
Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
54.28	21.65	59.75	21.50	34.75	20.70	55.90	24.02
227.91	158.08	259.31	169.27	180.82	149.85	249.47	162.51
19.23	4.32	20.20	2.95	17.44	4.70	19.47	3.92
20.35	7.10	17.87	5.14	19.86	5.17	17.80	6.09
18.95	5.14	18.71	4.24	19.17	5.73	18.66	5.33
20.56	5.36	18.59	4.96	20.86	6.32	19.38	5.24
19.95	4.95	18.92	3.65	19.41	4.71	19.04	4.35
2.11	.46	2.30	.49	1.51	.51	2.08	.67
52.43	15.09	52.59	12.34	43.72	16.24	45.23	17.48
3.64	1.01	3.56	.98	3.51	1.30	3.38	1.25

achieved at a level below the women. The range of standard deviations was from 4.70 for men in the nontransfer group to 2.95 for men in the transfer-dropout group.

The standard scores for Test 2, Mathematics, are generally higher than scores for some of the other examinations. The highest mean of all thirty scores presented in Table 6 is the 22.90 achieved by men in the group that won degrees. Of particular interest is the large standard deviation scores achieved on Test 2. This fact seems to substantially reinforce the facts revealed from the frequency distributions. Mathematics seems to be the kind of subject that lends itself to a wide variation of ability. While women generally outscored men in almost every academic area by group, the mathematics scores revealed a clear superiority for men. The women in Groups 2 and 3 had mean scores of 17.87 and 17.80, respectively, while the men in comparison scored 20.35 and 19.86. Standard deviations ranged from a low of 5.14 for the women in Group 2, to 7.10 for men in the same group.

The third test of the American College Testing battery is Social Science. Once again, the scores seem to get smaller as Table 6 is read from left to right. The degree winners had mean scores for the men and women of 21.73 and 22.72, respectively. The transfer-dropouts making up Group 2 had a mean for men of 18.95, while the women scored

18.71. The students in Group 3 had scores for men and women of 19.17 and 18.66, respectively. Standard deviations were much smaller than for the Mathematics scores, and ranged from 5.73 for the men who terminated at Iowa Central Community College, to 3.65 for the women who won their degrees.

The fourth and last American College Testing subject examination is Natural Science. The pattern observed in the Mathematics test is reflected here. The men in all three cases scored means higher than the women. While the standard deviations are not as large as the Mathematics test, they are larger than comparable standard deviations on English and Social Studies. Students in Group 1 achieved a mean score of 22.66 and 21.59 for men and women, while students in Group 2 scored 20.56 and 18.59, respectively. Students in Group 3 had means of 20.86 and 19.38 for the men and women.

The Composite American College Testing score, considered in many studies as a good academic predictor, is a combination of the four subject examinations. The result of the comparisons between men and women and between the three groups seems to indicate a distinct pattern. The mean score for the American College Testing Composite reveals that men scored better in Groups 2 and 3 with women doing better in Group 1. Comparisons by sex show that students

who received bachelor's degrees scored better than the other two groups. In fact, the two best Composite scores were achieved by the men and women in Group 1, with 21.85 and 21.94, respectively. Comparisons by sex between Groups 2 and 3 reveal that the men in Group 2 achieved a better American College Testing Composite than the men in Group 3, but the women in Group 3 did better than the women in Group 2. The standard deviation for the American College Testing Composite ranged from 4.95 for the men in Group 2 to 3.65 for the women of the same group.

Comparisons of Iowa Central Community College grade point average by sex reveal some interesting facts. In each of the three groups the men had lower grade point averages than the women. This would substantiate the high school rank evaluation that followed the same pattern. The other situation that replicates the high school rank evaluation is the fact that grade point average by sex for Group 1 is higher than Group 2, and Group 2 is higher than Group 3. There is though, a difference between high school rank and Iowa Central Community College grade point average. While the women in Group 3 had a high school rank that was better than the men in all three groups, this situation reverses itself in evaluating Iowa Central Community College grade point average. The women in Group 3 scored a higher grade point average than only one other group, and that was

the men of Group 3. The grade point average was highest for degree winners, with women scoring a 2.85 and men a 2.50. The grade point average for the transfer-dropouts was substantially lower, with the women receiving a 2.30 and the men a 2.11. The nontransfer students achieved lowest of all with the women averaging 2.08 and the men 1.51. Standard deviations range from a low of .46 for the men of Group 2 to a high of .67 for the women of Group 3.

Semesters attended and hours attempted showed very little difference by sex. In the case of Group 1 the difference in hours attempted between men and women was almost negligible, 54.50 and 55.10 respectively. The standard deviation for men was 13.36 and for women 11.93. The difference in semesters attempted showed that men have a tendency to stay enrolled a little longer. In the case of Group 1 the difference between the two was slight, with men staying an average of 3.73 semesters and women staying 3.56. The men and women in Group 2 showed the same pattern when comparing semesters attended and hours attempted. While the men were enrolled for just a little longer than the women, they also take just a few less hours. This pattern repeated itself for the students that did not transfer. While the men enrolled for 3.51 semesters only attempted 43.73 hours, the women were enrolled for 3.38 semesters but attempted 45.23 hours. For hours attempted and

semesters attended, standard deviations get consistently larger as Table 6 is read from left to right.

An analysis of the size of high school graduation classes shows that without exception women graduated from larger high schools than men. In Group 1 the average size of the high school graduating class of the women was 222.75 and was only 203.00 for the men. Group 2 revealed the same pattern with women averaging 259.31 and men 227.91. The women in Group 3 came from classes with an average size of 249.47 while the size of graduating class for men was 180.82. While it is difficult to explain the fact, it seems too clear-cut to be just chance. The previous discussion concerning parental attitudes may well explain the difference in this case. Because Fort Dodge High School is the largest school in the immediate area, it may be that the women who matriculated to Iowa Central Community College from Fort Dodge Senior High did so in greater percentages than men. The men from smaller schools surrounding Fort Dodge enrolled in greater proportion than did the women. The factor previously mentioned of off-campus housing would also have a tendency to encourage men from further away to enroll, while discouraging women. Because most high schools in Iowa have relatively small graduating classes, a wider distribution of enrollment would probably reduce the mean size graduating class.

Standard deviations for class size were quite large, with the largest for male degree winners at 174.55 and the smallest was 149.85 for the women in Group 3.

Age differences by sex do not reveal very much variation. Most of the means are close to 18, with the youngest group averaging 17.36 for women degree winners, and the oldest being 18.13 for men who did not transfer. If there is one overall pattern to be observed it is that the men in every group are older than the women. The standard deviations show the same pattern. The ages for men in all three instances have larger standard deviations than those for the women. The standard deviations range from 1.47 for male degree winners to .49 for female degree winners.

Correlations

Correlations by group, and for all 200 students, were constructed to show the relationship between ten continuous variables. These ten variables were: high school rank, class size, five ACT tests, Iowa Central Community College grade point average, Iowa Central Community College hours attempted and Iowa Central Community College semesters attended. Tables 7 through 10 allow comparisons by group. The discussion will be limited to those areas that show unusually high or low correlations, and those variables that are relatively important.

Most studies that utilize American College Testing scores reveal that the American College Testing scores are correlated very highly. Lonning (39), in a recent study, indicated there are very high correlations between the American College Test scores. It is not surprising then, to find that none of the American College Test intercorrelations in Tables 7, 8 and 9 fall below .452, and that generally they are much higher than that. In all three cases the correlations between the composite test score and the four subject matter scores were very high. This can be expected, because the composite is a function of the four subject matter examinations and is not an examination itself. In Table 7 all of the American College Test correlations fall between .452, the correlation for English and Mathematics, and .897 which is the correlation between the Composite score and the Natural Science score. Table 8 has a range between American College Test correlations of .574 and .912. The American College Testing correlations for students who did not transfer are to be found in Table 9. Generally the correlations are very comparable with the correlations for the other two groups. The lowest correlation is .476 for Mathematics/Social Sciences, and the highest correlation is .912 for Natural Science/Composite.

In two of three cases, when the Composite is disregarded, the best correlation is found between Natural Science and

Table 7. Correlation matrix for Group 1: 100 students who transferred and graduated

Variable	H.S. rank	H.S. class size	ACT 1
H.S. rank	1.000		
H.S. class size	.271	1.000	
ACT 1, English	.455	.052	1.000
ACT 2, Mathematics	.441	.104	.452
ACT 3, Social Science	.479	.177	.575
ACT 4, Natural Science	.447	.052	.602
ACT 5, Composite	.556	.118	.746
ICCC GPA	.690	.062	.392
ICCC hours	- .128	.057	.041
ICCC semesters	- .311	.000	- .099

ACT 2	ACT 3	ACT 4	ACT 5 comp.	ICCC GPA	ICCC hours	ICCC semesters
1.000						
.479	1.000					
.722	.631	1.000				
.848	.790	.897	1.000			
.428	.476	.429	.526	1.000		
- .110	.006	- .016	- .047	-.178	1.000	
- .214	- .127	- .131	- .191	-.369	.919	1.000

Table 8. Correlation matrix for Group 2: 50 students who transferred and did not graduate

Variable	H.S. rank	H.S. class size	ACT 1
H.S. rank	1.000		
H.S. class size	.235	1.000	
ACT 1, English	.552	.344	1.000
ACT 2, Mathematics	.386	.316	.607
ACT 3, Social Science	.502	.320	.667
ACT 4, Natural Science	.371	.220	.574
ACT 5, Composite	.512	.341	.787
ICCC GPA	.576	.190	.595
ICCC hours	.015	- .028	.026
ICCC semesters	- .064	- .048	- .121

ACT 2	ACT 3	ACT 4	ACT 5 comp.	ICCC GPA	ICCC hours	ICCC semesters
1.000						
.719	1.000					
.771	.697	1.000				
.912	.873	.888	1.000			
.370	.503	.330	.505	1.000		
.057	- .237	.082	- .002	.055	1.000	
- .093	- .415	- .020	- .165	- .091	.902	1.000

Table 9. Correlation matrix for Group 3: 50 students who did not transfer

Variable	H.S. rank	H.S. class size	ACT 1
H.S. rank	1.000		
H.S. class size	.284	1.000	
ACT 1, English	.561	.180	1.000
ACT 2, Mathematics	.413	- .012	.483
ACT 3, Social Science	.331	- .039	.623
ACT 4, Natural Science	.310	.025	.635
ACT 5, Composite	.466	.028	.795
ICCC GPA	.565	.198	.385
ICCC hours	.141	.177	.206
ICCC semesters	- .145	.094	.069

ACT 2	ACT 3	ACT 4	ACT 5 comp.	ICCC GPA	ICCC hours	ICCC semesters
1.000						
.476	1.000					
.595	.776	1.000				
.761	.864	.912	1.000			
.121	.203	.266	.285	1.000		
.288	.232	.318	.318	.384	1.000	
.112	.144	.211	.163	.151	.861	1.000

Mathematics scores. Table 7, portraying students who received their degrees, and Table 8, portraying students who transferred but did not graduate, correlations between Natural Science and Mathematics, show coefficients of .722 and .771, respectively. Table 9, portraying nontransfer students, shows a correlation of .595 for the same comparison. The fact that in two out of three cases the correlations between Natural Science and Mathematics are very high seems to indicate a high degree of technical knowledge is probably necessary on both examinations. English scores, for example, correlate much lower with Mathematics than do Natural Science.

As expected, and previously alluded to, the Composite American College Test scores all correlate very highly with the subject matter examinations. None of the twelve correlations on Tables 7, 8 and 9, between subject examinations and the Composite are below .746 and a majority of them are above .800.

With the exception of the extremely high correlations between Iowa Central Community College hours and semesters attended, the remaining variables on Tables 7, 8 and 9 are low or negative. The high correlations between hours attempted and semesters enrolled is certainly not unexpected. Tables 7 and 8 show the coefficients to be .919 and .902, respectively, while on Table 9 it is .861. These

two variables failed to correlate very highly with anything but each other. Number of hours attempted and number of semesters attended had negative coefficients. When compared with Iowa Central Community College grade point average for students in Groups 1 and 2, the coefficients show one small negative and one small positive correlation. It is of interest to note that the two variables both are positively correlated for students who did not transfer, and hours completed had a coefficient of .384. It might be suggested that students who receive their degrees have no grade advantage in remaining longer at the community college, but conversely, staying longer at the community college is an advantage for students who do not transfer. We have already noted the distinctly better grades achieved by students who receive degrees, so it may be, that while students who do not transfer are not as academically talented, they will have better grades the longer they stay at the community college.

High school rank is correlated reasonably well with American College Test scores in Tables 7, 8 and 9. A study of the three tables reveals a very interesting fact; the correlation coefficient for high school rank and the American College Testing Composite score is successively higher from nontransfer, to transfer-dropout, to degree winners. This would seem to indicate greater consistency

on the part of degree winners. While the three coefficients are not widely varied, the tendency is observable. The Group 1 coefficient was .466, Group 2 was .512 and Group 3 was .556.

The only other correlation for high school rank showing a strong degree of positive relationship, is the grade point average obtained at Iowa Central Community College. The pattern observed for the American College Test Composite score extended to the relationship between high school rank and Iowa Central Community College grade point average. The correlation for nontransfer students in Table 9 is the smallest of the three groups with a coefficient of .565. The correlation coefficient for Group 2 was .576 but the degree winners making up Group 1 had the highest correlation of the three at .690. This would seem to indicate that high school rank has a stronger positive relationship predicting success at Iowa Central Community College for students who ultimately graduate, than for students who transfer and drop out, or students who do not transfer. While the difference in the three correlation coefficients is not great, a pattern is certainly suggested.

The last group to be examined are the Iowa Central Community College grade point average correlation coefficients. The correlations for grade point average and American College Testing scores are all reasonably good. The correlations for

Group 3 were not as positive as for Group 1 or Group 2. The correlation for the American College Testing Composite and grade point average is .285 for the nontransfer students, .505 for the transfer dropout students, and .526 for the degree winners. This rather wide discrepancy indicates that predicting Iowa Central Community College grade point average from the American College Testing Composite scores might be very risky for students who do not transfer. A brief review of the means reveals that the American College Testing Composite scores for Group 1 through Group 3, respectively, were 21.89, 19.43 and 19.25. The variation is not great but is observable. Overall grade point averages were 2.63, 2.20 and 1.75 for the three groups in the same order. The implication of the low correlation between the two variables in the nontransfer group, and the relatively high correlation between the two variables in the transfer groups, seems to make clear the fact that standardized tests, regardless of their quality, measure only potential, the actual utilization of that potential cannot be so readily measured.

Table 10 is a composite correlation matrix for all 200 students in the sample. The highest correlation is found between the American College Testing scores for Natural Science and Composite, which correlate at .901. This fact is not surprising, considering the correlations by group

Table 10. Correlation matrix for all 200 students

Variable	H.S. rank	H.S. class size	ACT 1
High school rank	1.000		
High school class size	.250	1.000	
ACT 1, English	.536	.145	1.000
ACT 2, Mathematics	.452	.116	.510
ACT 3, Social Science	.477	.128	.619
ACT 4, Natural Science	.411	.069	.610
ACT 5, Composite	.551	.132	.771
ICCC GPA	.675	.099	.466
ICCC hours	.083	.070	.145
ICCC semesters	- .160	.016	- .028

ACT 2	ACT 3	ACT 4	ACT 5 comp.	ICCC GPA	ICCC hours	ICCC semesters
1.000						
.565	1.000					
.713	.705	1.000				
.851	.844	.901	1.000			
.389	.461	.385	.499	1.000		
.089	.086	.141	.131	.201	1.000	
- .069	- .073	.020	- .047	- .058	.876	1.000

for the same variable were .897, .888 and .912. In fact, all of the American College Testing scores correlated highly, with the smallest coefficient being .510 for Mathematics and English. Only one other coefficient for American College Testing intercorrelations were below .600, and that was the .565 for Mathematics and Social Science. All other American College Test scores were very positively correlated with each other.

High school rank generally correlated better with the American College Test battery than did Iowa Central Community College grade point average. The highest coefficients between high school rank and American College Test scores was English with a correlation coefficient of .536. None of the subject matter examinations of American College Tests correlated with grade point average above the English correlation of .466. While the strength of individual correlations between American College Test scores and high school rank and Iowa Central Community College grade point average were rather varied, the Composite American College Test score correlated .551 with high school rank and .499 with grade point average.

The correlation between high school rank and grade point average is of particular importance because of the nature of the two measures. Group correlations indicated a high degree of correlation between the two variables, the

correlation for all students is .675. This correlation coefficient is better than any of the American College Test/ grade point average correlations, and must be considered very important in evaluating grade point average at Iowa Central Community College.

The correlation between hours attempted and semesters attended is very high. This pattern is consistent in all three groups correlation matrices. With this exception, the two variables correlate very poorly with other variables and achieve negative numbers in five cases.

Additional Statistical Analysis

This section and the following sections will expand the analysis of the data to allow increased statistical interpretation and prediction. This interpretation will, (1) begin with a discussion of the use of the multiple analysis of variance statistic, and (2) continue by testing the four null hypotheses and creating prediction equations using the discriminate analysis statistic.

The variables used for this analysis were partially dictated by some of the questions raised in the Introduction. All of the null hypotheses were stated in terms of determining if academic differences existed between the three groups of students being studied. In addition, certain questions were posed relevant to the community college in general. Some of these questions were:

1. Is there an academic difference between students who transfer and those that do not?
2. Is it possible to predict transfer and graduation based on academic predictors?
3. Is it possible to predict which student will transfer and which one will not?

If certain academic differences are observable in given groups of students, identifying the differences and arranging them in order of importance is necessary. After arranging the variables in order of importance on statistical analyses, prediction equations using the strongest variables must be constructed.

Multiple Analysis of Variance

In an effort to determine if there were significant differences by group and sex, and also to determine if they interact, the multiple analysis of variance was employed. An examination of Table 14 in Appendix A illustrates the multiple analysis of variance information. An explanation of the statistical method used can be found in Chapter 5.22 of Winer (64).

Group differences were significant for eight of the ten variables. Table 11 portrays the F values for ten continuous variables. Only high school class size and semesters attended did not reveal significant differences between groups.

Table 11. F values by group for ten variables: multiple classification analysis of variance

Variable	Calculated F value
High school rank	14.81**
High school class size	.87
ACT 1, English	5.15**
ACT 2, Mathematics	4.37*
ACT 3, Social Science	5.71**
ACT 4, Natural Science	3.39*
ACT 5, Composite	6.46**
ICCC grade point average	39.75**
ICCC hours attempted	8.42**
ICCC semesters	.60

	Level	"F" value
Book $F_{2,194}$	.01	4.7148
	.05	3.0424

* = significance at the .05 level.
** = significance at the .01 level.

The grade point achieved at Iowa Central Community College and high school rank had F values of 39.75 and 14.81, respectively, which were the largest for the ten variables. All other F values were smaller than ten, with hours attempted and American College Testing Composite following in order of size. The "t" statistic was used to measure where, by group, significant differences existed. Significant "t" values were found between Groups 1 and 2 in six cases, between Groups 1 and 3 in six cases, and between Groups 2 and 3 in three cases. The significant "t"

values between Groups 1 and 2 were: ACT Mathematics, ACT Social Science, ACT Natural Science, ACT Composite, hours attempted and grade point average. The significant "t" values between Groups 1 and 3 were: high school rank, ACT English, ACT Mathematics, ACT Social Science, ACT Composite and grade point average. The significant "t" values between Groups 2 and 3 were: high school rank, hours attempted, and grade point average.

The grade point average achieved at Iowa Central Community College was the only variable that produced significant "t" values between all three groups.

The analysis of variance statistic was calculated to detect differences between the three groups by sex. Table 12 shows that differences by sex existed for five of the ten variables, with high school rank and grade point average revealing the largest F values. Four of the F values indicated significance at the .01 level and one at the .05 level.

The analysis of variance statistic was also calculated to determine if significance existed for interaction between group and sex. A study of Table 13 shows that interaction existed for high school rank, but for no other variable. The F value was significant at the .05 level and indicates that differences in high school rank are a function of sex and group interaction. As a result of the interaction,

Table 12. F values by sex for ten variables: multiple classification analysis of variance

Variable	Calculated F value
High school rank	26.85**
High school class size	3.67
ACT 1, English	8.97**
Act 2, Mathematics	5.17*
ACT 3, Social Science	.04
ACT 4, Natural Science	3.18
ACT 5, Composite	.42
ICCC grade point average	20.21**
ICCC hours attempted	13.88**
ICCC semesters	.63

	Level	"F" value
Book $F_{1,194}$	.01	6.7660
	.05	3.8924

* = significance at the .05 level.
** = significance at the .01 level.

prediction equations utilizing high school rank as one of the prediction variables were adjusted for the differences in group/sex interaction.

Discriminate Analysis

Incorporating the facts gathered by the multiple analysis of variance statistic, a discriminate analysis statistic was used to evaluate the differences among groups, test the null hypotheses, and create prediction equations.

Seven variables that measure academic ability or

Table 13. F values for sex/group interaction for ten variables: multiple analysis of variance

Variable	Calculated F value
High school rank	3.30*
High school class size	.47
ACT 1, English	.70
ACT 2, Mathematics	.29
ACT 3, Social Science	1.97
ACT 4, Natural Science	.09
ACT 5, Composite	.23
ICCC grade point average	2.39
ICCC hours attempted	.003
ICCC semesters	.03

Book $F_{2,194}$	Level	"F" value
	.01	4.7148
	.05	3.0424

* = significance at the .05 level.
** = significance at the .01 level.

achievement were used in the discriminate analysis statistic to determine if significance among groups existed. The seven variables were: high school rank, all five American College Testing scores, and grade point average achieved at Iowa Central Community College. The Generalized Mahalanobis D^2, which is referred to as V in this design, was 102.16. Chi square with 14 degrees of freedom (df = m(g-1) where m = number of variables and g = number of groups) at the .01 level is 29.14. The difference among groups is highly significant when using all seven variables.

To determine if it is possible to drop given variables without losing any signicance, a discriminate analysis statistic was computed with just two variables, high school rank and grade point average. The computed V score was 84.19 which is highly significant with chi square at 4 degrees of freedom. The loss of power due to dropping five variables was 17.97. This loss was not statistically significant (where df = t(g-1) where t = number of variables lost and g = number of groups) at the .05 level where chi square is 18.30 with 10 degrees of freedom.

Based on the facts revealed by the analysis of variance statistic, a discriminate analysis statistic was calculated to determine if statistically significant differences existed between groups by sex. The calculated V score for men using all seven variables was 92.41 which was highly significant with chi square at 14 degrees of freedom. To test for significant loss of power, the five American College Testing scores were eliminated and a discriminate statistic was calculated using just high school rank and grade point average. The calculated V score with chi square at 4 degrees of freedom was 74.19. This value was highly significant at the .01 level of significance. Loss of power due to elimination of the five American College Testing scores was 18.20, which was not significant. The calculated V scores for women with chi square at 14 degrees

of freedom was 51.21. This value was highly significant at the .01 level of significance. The value of V after dropping the five American College Testing scores was 34.94 reflecting a loss of 17.27 which is not a significant loss in power.

Hypothesis Testing

Four null hypotheses had been posed, indicating there was no significant differences, based on academic predictors, between different groups of students who originally entered Iowa Central Community College. The four hypotheses and the results of statistically testing them are as follows:

Hypothesis One: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer to senior institutions and those who do not transfer.

Hypothesis one was rejected. Utilizing the discriminate analysis statistic, Groups 1 and 2 were combined and compared with Group 3. All null hypotheses were tested using three variables, and then one variable was dropped to test the null hypotheses using only two variables.

Using three variables, high school rank, grade point average, and American College Testing Composite, the calculated V score was 59.79. Chi square at the .01 level with 3 degrees of freedom is 11.34 which results in the computed V being highly significant.

The American College Testing Composite score was dropped and a new V score was calculated. The V score was once again highly significant at 57.83. The loss of 2.96 due to dropping the American College Testing Composite score was not significant.

The null hypothesis could also be rejected when divided by sex. The calculated V score, using high school rank and grade point average, for women was 13.55 with chi square at the .01 level with 2 degrees of freedom being 9.21. The calculated V score for men was 55.31 which is highly significant at the .01 level.

Hypothesis Two: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who do not transfer.

Hypothesis two was rejected. Groups 1 and 3 were compared to test hypothesis two. Using the three variables, high school rank, grade point average, and the American College Testing Composite score, a discriminate analysis statistic resulted in a V score of 74.89 which is highly significant. Using just high school rank and grade point average, only .01 was lost and the V score was 74.88. The loss due to dropping the American College Testing Composite score was not significant.

The computed V score for women using two variables was

28.41 which was highly significant. The V score for men was 66.86 with chi square at the .01 level with 2 degrees of freedom being 9.21.

Hypothesis Three: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who transfer and do not graduate.

Hypothesis three was rejected. Comparing Groups 1 and 2, the computed V score using three variables was 27.27 which is highly significant. By eliminating the American College Testing Composite score a calculated V score resulted in a loss of 2.50. This loss of power was not significant and the computed V score of 24.77 using high school rank and grade point average was highly significant at the .01 level.

Using high school rank and grade point average as variables, and dividing by sex, the computed V score was 14.87 for men and 21.43 for women. Both scores are significant at the .01 level.

Hypothesis Four: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and do not graduate, and those who do not transfer.

Hypothesis four was rejected. Groups 2 and 3 were compared to test the hypothesis. The calculated V score was 18.63 using the three variables high school rank, grade

point average, and the American College Testing Composite score. The calculated V of 18.63 is highly significant with chi square with 3 degrees of freedom. Dropping the American College Testing Composite score yielded a computed V score of 15.55 which is significant at the .01 level. Loss of power due to dropping the American College Testing Composite score is not significant.

Among men the null hypothesis could be rejected. The computed V score was 20.54, which is significant at the .01 level. The null hypothesis for women could not be rejected. The calculated V score was 1.46 with chi square with 2 degrees of freedom at the .05 level being 5.99. Failure to reject the null hypothesis that women who transfer and drop out and women who terminate at Iowa Central Community College are not different, seems to reinforce findings of the analysis of variance statistic, that is, there are some differences in predicting success between men and women.

The data were also combined to compare those who graduated from a senior college with the remaining students. The calculated V score for all students when comparing Group 1 with Groups 2 and 3 combined, was 63.95. Grade point average and high school rank were used as the variables. The V score for men was 50.99 and for women was 33.05. All three V scores were significant at the .01 level.

Predicting Transfer and Graduation

A number of prediction equations were generated by the discriminate analysis statistic. More than one set of prediction equations will be presented with the thought of offering high school and college counselors an opportunity to predict with the greatest possible success.

Because on the observed differences between men and women on a number of variables, and particularly because of the interaction of high school rank observed in the analysis of variance statistic, separate equations were created for men and women. The discriminate analysis statistic generates equations that will classify students into dichotomous groups by the size of the calculated equation. For example, if equations for Group 1, Group 2, and Group 3 are available, the equation with the largest numerical value after inserting the appropriate variables is the one into which the student is classified.

When predicting into which of the three groups a student will be classified upon entering the community college, two variables are highly significant and can be used effectively in classifying students. These variables, high school rank and the American College Testing Composite score, yield equations for men and women. The equations for men are as follows:

Group
1: - .01476 (H.S. rank) + 1.0232 (ACT Comp) - 10.77688
2: - .00157 (H.S. rank) + .90168 (ACT Comp) - 8.95609
3: - .05338 (H.S. rank) + 1.01944 (ACT Comp) - 8.9675

Based on the sample, students were classified correctly into Group 1, 43 percent of the time, into Group 2, 36 percent of the time, and into Group 3, 60 percent of the time. Because of the low percentages generated for Groups 1 and 2, counselors would of necessity use Group 3 as relatively accurate but rely less on those predicting into Groups 1 and 2, except to lump them together into the probable transfer group.

For women the equations are as follows:

Group
1: + .04947 (H.S. rank) + 1.15388 (ACT Comp) - 14.63083
2: + .00923 (H.S. rank) + 1.09599 (ACT Comp) - 10.64391
3: - .00672 (H.S. rank) + 1.15189 (ACT Comp) - 10.78249

Based on the two variables, high school rank and the American College Testing Composite score, the sample correctly classified female students into Group 1, 73 percent of the time, into Group 2, 20 percent of the time, and Group 3, 48 percent of the time. The Group 2 classification is not large enough to be reliable but the students classified into Groups 1 and 3 are quite accurate.

The power of prediction is much greater after a grade point average is established at Iowa Central Community College. Using the same format, but eliminating the American College Testing Composite score and substituting

grade point average at Iowa Central Community College, a much better prediction equation results. Using three equations the equation correctly classified 62 percent of the men in Group 1, 48 percent of the men in Group 2, and 76 percent of the men in Group 3. The three equations are as follows:

Group
1: - .02265 (H.S. rank) + 9.517 (ICCC GPA) - 11.30414
2: + .00439 (H.S. rank) + 7.435 (ICCC GPA) - 7.97201
3: - .00943 (H.S. rank) + 5.663 (ICCC GPA) - 4.13924

To more readily facilitate prediction, two groups were collapsed into one group. Groups 2 and 3 were combined and compared with Group 1. The percent of correct classifications did not justify the creation of equations based on this combination. Next, Groups 1 and 2 were collapsed and contrasted with Group 3. The result was a much better set of prediction equations. Using the two equations, those that transfer versus those that do not transfer, the result was 84 percent correct classification when Groups 1 and 2 were combined, and 80 percent correct classification into Group 3. The two equations for men are as follows:

Group
1 & 2: - .00177 (H.S. rank) + 7.977 (ICCC GPA) - 9.50184
3: - .00106 (H.S. rank) + 5.062 (ICCC GPA) - 3.82764

Using the same routine for the women, three equations were developed to classify students into the three groups being studied. With the same two variables, high school rank and grade point average, the following equations

were developed:

Group
1: + .06465 (H.S. rank) + 8.126 (ICCC GPA) - 14.17107
2: + .03643 (H.S. rank) + 6.887 (ICCC GPA) - 9.00935
3: + .03900 (H.S. rank) + 6.122 (ICCC GPA) - 7.48001

By inserting the variables, the foregoing equations will indicate by the larger number into which group the student will probably fall. Using these equations with the sample, it classified correctly 70 percent of the time for Group 1, 40 percent of the time correctly for Group 2, and 47 percent of the time correctly for Group 3.

Because of the 40 percent classification of Group 2, Groups 1 and 2 were collapsed similar to the routine used successfully with the men, to develop two equations. The new formulas would differentiate between those transferring and those not transferring. The new equations did not appreciably increase the prediction of success. But, by collapsing Groups 2 and 3 and contrasting them with Group 1, a much stronger set of equations was created. The equations would differentiate between women who received their bachelor's degrees and those that did not. The equations are as follows:

Group
1: + .06617 (H.S. rank) + 8.014 (ICCC GPA) - 14.07157
2 & 3: + .03863 (H.S. rank) + 6.453 (ICCC GPA) - 8.2291

Using these equations, 72 percent of the sample were correctly classified into Group 1 and 70 percent were correctly classified into Groups 2 and 3 combined.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The problem of this investigation was to determine if differences existed between Arts and Sciences students entering Iowa Central Community College who, (1) transferred and graduated, (2) transferred and withdrew, or (3) terminated at the community college. In addition, a series of prediction equations based on certain variables were developed making it possible to predict into which of these three groups a student would be classified.

The sample consisted of two-hundred observations drawn from freshmen entering Iowa Central Community College during the years 1963, 1964 and 1965. The sample consisted of one-hundred observations drawn from the group that transferred and graduated, fifty drawn from the group that transferred and withdrew, and fifty drawn from the group that terminated at the community college. A variety of methods were used in comparing the three groups. Frequency distributions, means and standard deviations, correlations, "t" tests, multiple analysis of variance and discriminate analysis were all employed. Fourteen variables were used for each observation.

Four null hypotheses were tested using the discriminate analysis statistic, and all four were rejected. In every case, the hypotheses were tested with three variables, high school rank, the ACT Composite score and Iowa Central

Community College grade point average. Every hypothesis was tested using just high school rank and Iowa Central Community College grade point average. In each case, there was no significant loss due to dropping the ACT Composite score.

The four Null Hypotheses were:

Null Hypothesis Number 1: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer to senior institutions and those who do not transfer. The null hypothesis was rejected. Additional analysis revealed that differences existed when the groups were divided by sex.

Null Hypothesis Number 2: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who do not transfer. The null hypothesis was rejected. The comparison by sex could also be rejected.

Null Hypothesis Number 3: There is no significant difference, based on academic predictors, between students enrolled at Iowa Central Community College who transfer and graduate, and those who transfer and do not graduate. The null hypothesis was rejected. The comparison by sex could also be rejected.

Null Hypothesis Number 4: There is no significant difference, based on academic predictors, between students

enrolled at Iowa Central Community College who transfer and do not graduate, and those who do not transfer. The null hypothesis was rejected. Among men, the null hypothesis could be rejected, but for women the null hypothesis could not be rejected.

Additional analysis indicated there were differences between students who received bachelor's degrees and all other students. Significance by sex also existed.

Prediction equations were created using the discriminate analysis statistic. Originally, three equations by sex were created for the three groups being studied. One group of equations was designed to predict if the student would transfer and graduate, transfer and drop out, or terminate at Iowa Central Community College, based on high school rank and the ACT Composite score. A second group of equations utilized high school rank and grade point average achieved at Iowa Central Community College to predict into which group a student would be classified. The first set of equations was designed to be used before the student entered Iowa Central Community College while the second set would be used once the student had established a grade point average at Iowa Central Community College. Predicting which of the three groups a student would be classified into based on high school rank and the ACT Composite score was inconsistent and in most cases not very reliable, con-

sequently, grade point average was inserted to provide a more powerful set of equations.

Using grade point average and high school rank as variables, the equations for men correctly classified 62 percent of the students receiving degrees, 48 percent of the transfer-dropout group, and 76 percent of the students terminating at Iowa Central Community College. To increase the power of prediction, Groups 1 and 2 were collapsed into one. The two equations predicted correctly the men who transferred 84 percent of the time and the men who did not transfer 80 percent of the time. The equations, for men, are as follows:

Men who will transfer:

- .00177 (H.S. rank) + 7.977 (ICCC GPA) - 9.50184

Men who will not transfer:

- .00106 (H.S. rank) + 5.062 (ICCC GPA) + 3.82764

These equations will classify students, according to the largest computed value.

Using high school rank and grade point average as the variables, three prediction equations were developed to classify women into each of the three groups being studied. The equations correctly classified 70 percent of the women receiving degrees, 40 percent of the transfer-dropout group, and 47 percent of the students terminating at Iowa Central Community College.

The best prediction equations for women resulted when the two groups that did not receive bachelor's degrees were collapsed and contrasted with the degree winners. While these equations cannot differentiate between those who will transfer and drop out and those who will not transfer, the two equations predicted correctly women who received bachelor's degrees 70 percent of the time and women who did not receive degrees 73 percent of the time. Following are the equations:

Women, degree winners:

+ .06617 (H.S. rank) + 8.014 (ICCC GPA) - 14.07157

Women, nondegree winners:

+ .03863 (H.S. rank) + 6.453 (ICCC GPA) - 8.2291

These equations will classify into which group a student predicts according to the largest computed value.

Limitations

This study was limited to two-hundred students who entered Iowa Central Community College, Fort Dodge Center, during 1963, 1964, and 1965. Variables were primarily of the type that measure academic ability.

The prediction equations were created to determine which students would transfer and graduate, which would transfer and drop out, and which would terminate at Iowa Central Community College. No attempt was made to predict the college or university individual students might be

advised to transfer to, and which might provide the student the best chance of success.

The sample was randomly drawn from each of three groups being studied. Every effort was made to insure that students grouped into categories two and three were not planning to return to college. If a student indicated he had plans to return, that student was not included in the sample and a new randomly selected student was chosen. If one of the students in Groups 2 or 3 ultimately changes his mind and does return to college, his status concerning this study would be changed.

Conclusions

The conclusions of this study can be stated in answer to some of the questions found in the Introduction.

1. There are academic differences between students who transfer and graduate, transfer and withdraw, or terminate at Iowa Central Community College. Generally, the students who achieve bachelor's degrees have a higher high school class rank, better grades in the community college and better ACT scores, while students who terminate at Iowa Central Community College are poorer students academically. The students who transfer and withdraw are consistently in between these two groups.
2. It is possible to predict which students will graduate, transfer or terminate. Classifying students into three

distinct groups is possible, but a much stronger prediction can be generated by limiting the possibilities to just two alternatives. For example, the sample provided ample evidence of the difference between bachelor's degree holders and students who terminated at the community college. While the differences between Group 1 and Group 3 are distinct, differences between Group 2 and the others are more subtle.

3. Men and women differ in academic ability. In fact, high school rank and grade point average for women were better in every category than they were for men in the same category. The ACT scores for women did not show the clear superiority as high school rank and grade point average. The result of the differences between men and women necessitated the creation of individual prediction equations for men and women.
4. Grade point average at Iowa Central Community College is clearly the strongest predictor, followed by high school rank and the ACT scores.
5. Correlation coefficients among variables were consistent in each group. ACT scores correlate very well with each other. Iowa Central Community College grade point average correlates higher with high school rank than any other variable.

Recommendations

On the basis of this study, and in response to some of the questions posed in the Introduction, the following recommendations are made to Iowa Central Community College in particular, and to any community college offering Arts and Sciences courses:

1. Because many students do not transfer, some terminal-transfer offerings should be available in the curriculum. "Terminal-transfer" is a term that is applied to courses that have life education value and still can be legitimately used as college courses. Currently many community colleges include business education courses in this area.
2. The terminal-transfer courses would offer students the opportunity to experience different areas of possible employment, but still carry transfer credit in case of transfer. These courses might be coordinated with some on-the-job experiences.
3. The curriculum should include a course in vocations for students who do not yet know what area of study in which to concentrate, or do not know if they will transfer.
4. The prediction equations created in this study should be used to assist in counseling students about course selection and their futures.

5. Counseling should alert students who predict into the nontransfer group about the many alternatives open to them.
6. Articulation between divisions in a community college and between community colleges and senior colleges is imperative. Movement between the many parts of higher education, with maximum transferability of credit, is very important if higher education is to serve students.
7. Students who do poorly in the Arts and Sciences Division should be counseled concerning the availability of vocational-technical offerings.
8. Curriculum offerings at a community college should include courses that provide the opportunity for students to up-grade skills that were not developed in high school. Courses in remedial and compensatory education are necessary. These courses will have to be "sold" to the students by active counseling.

Recommendations for Further Study

This experiment could be replicated to cross-validate the procedures. Additional academic variables could be introduced to provide more measures of ability.

A similar study with socio-economic variables would produce a new dimension to the prediction equations. The effect of wealth, family background and attitude are important factors in the pursuit of higher education.

Additional studies might create prediction equations for each senior college. That is, while a student might not predict successfully to one college he might to another. This type of information could help a student determine the degree of difficulty he would encounter at individual colleges and universities.

This type of study is important in assisting counselors who are faced with counseling students who have difficult decisions to make about their futures. Every community college might well develop comparable data.

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APPENDIX A

Table 14. F values by group, sex, and interaction for ten variables: multiple classification analysis of variance

Source	df	SS	MS	F
Variable: high school rank				
Group	2	14,115.32	7,058.16	14.81
Sex	1	12,793.71	12,793.71	26.85
Interaction	2	3,148.29	1,574.14	3.30
Within	194	92,408.29	476.33	
Variable: high school class size				
Group	2	33,740.83	16,870.41	.87
Sex	1	71,252.74	71,252.74	3.67
Interaction	2	18,532.56	9,266.28	.47
Within	194	3,760,901.18	19,386.08	
Variable: ACT 1, English				
Group	2	163.47	86.73	5.15
Sex	1	150.87	150.87	8.96
Interaction	2	23.73	11.86	.70
Within	194	3,264.73	16.82	
Variable: ACT 2, Mathematics				
Group	2	345.70	172.85	4.37
Sex	1	204.39	204.39	5.17
Interaction	2	23.43	11.76	.29
Within	194	7,661.49	39.49	
Variable: ACT 3, Social Science				
Group	2	439.15	265.57	5.71
Sex	1	.19	.19	.04
Interaction	2	18.60	9.30	1.97
Within	194	917.23	4.72	
Variable: ACT 4, Natural Science				
Group	2	211.92	105.96	3.39
Sex	1	99.31	99.31	3.18
Interaction	2	5.81	2.90	.09
Within	194	6,047.48	31.17	

Table 14. (Continued)

Source	df	SS	MS	F
Variable: ACT composite				
Group	2	258.73	129.36	6.46
Sex	1	8.50	8.50	.42
Interaction	2	9.45	4.72	.23
Within	194	3,882.40	20.01	
Variable: Iowa Central Community College grade point average				
Group	2	22.26	11.13	39.75
Sex	1	5.66	5.66	20.21
Interaction	2	1.32	.67	2.39
Within	194	55.91	.28	
Variable: Iowa Central Community College semester hours attempted				
Group	2	3,484.56	1,742.28	8.42
Sex	1	3,445.51	3,445.51	13.88
Interaction	2	13.88	6.94	.003
Within	194	40,107.17	206.73	
Variable: Iowa Central Community College semesters attended				
Group	2	1.23	.66	.60
Sex	1	.70	.70	.63
Interaction	2	.08	.04	.03
Within	194	213.60	1.10	

	Level	"F" value		Level	"F" value
Book $F_{2,194}$	.01	4.7148	Book $F_{1,194}$	.01	6.7660
	.05	3.0424		.05	3.8924