MATHEMATICS PLACEMENT AND ITS RELATIONSHIP TO RETNETION

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CHAPTER 1 INTRODUCTION

The initial goal of this study was to determine if a link exists between retention and the mathematical experiences of Truman students. Recently there has been a large amount of discussion on campus about the Essential Skills and Mode of Inquiry requirements in the area of mathematics. An integral part of successful completion of these requirements is the placement of students into their first mathematics course at Truman. Currently students are placed using a system based on a combination of four pieces of information: ACT math score, placement test score, high school transcript, and self-placement recommendation. This analysis attempted to investigate the relationship between their first mathematics class and their likelihood of staying at Truman.

While no significant relationship was found between placement and retention, due to a large number of confounding factors, several other interesting relationships were discovered. A strong linear relationship exists between ACT and retention, with higher ACT scores coinciding with greater retention. Poor grades in the first math class typically indicate a substantial drop in retention, and this trend is accentuated with rising ACT scores. While these relationships are probably not unexpected, this report gives quantifiable evidence to back common beliefs.

CHAPTER 2 PRE-ENROLLMENT

This section of the report will involve looking at retention based on information that can be obtained about the student before they begin instruction on the Truman campus. This includes ACT scores, math placement test scores, and personal information on the student.

The data set used in this study consists of students enrolling at Truman State University from Fall 1995 through Fall 2002. The information on these approximately 11,000 students was obtained from the Truman ITC department.

Retention in this report will be defined slightly different than the traditional freshman-sophomore retention rate. As this study includes both cohorts that have graduated and others that are currently enrolled, a new measure representing whether a student left the university is required. This measure will indicate that a student has either graduated or enrolled for the next semester (GORE). A student who has not graduated and is not enrolled for the Fall2003 semester, will be considered to have left the university.

2.1 ACT Scores

The analysis begins by comparing retention to the cumulative ACT score. The ACT scores are probably the most reliable data used in this study, as it is a nationally standardized test administered in a controlled environment.

The plot of retention rate versus cumulative ACT (figure 1) indicates a strong relationship between an incoming freshman's ACT and their likelihood of staying at the university. There is almost a linear relationship from a low of 60% for an ACT of 21 to the high of 100% for an ACT of 36. The trend in the graph is not surprising as one might intuitively believe that students with a higher ACT are going to be more successful in their classes and would be more likely to remain in school.

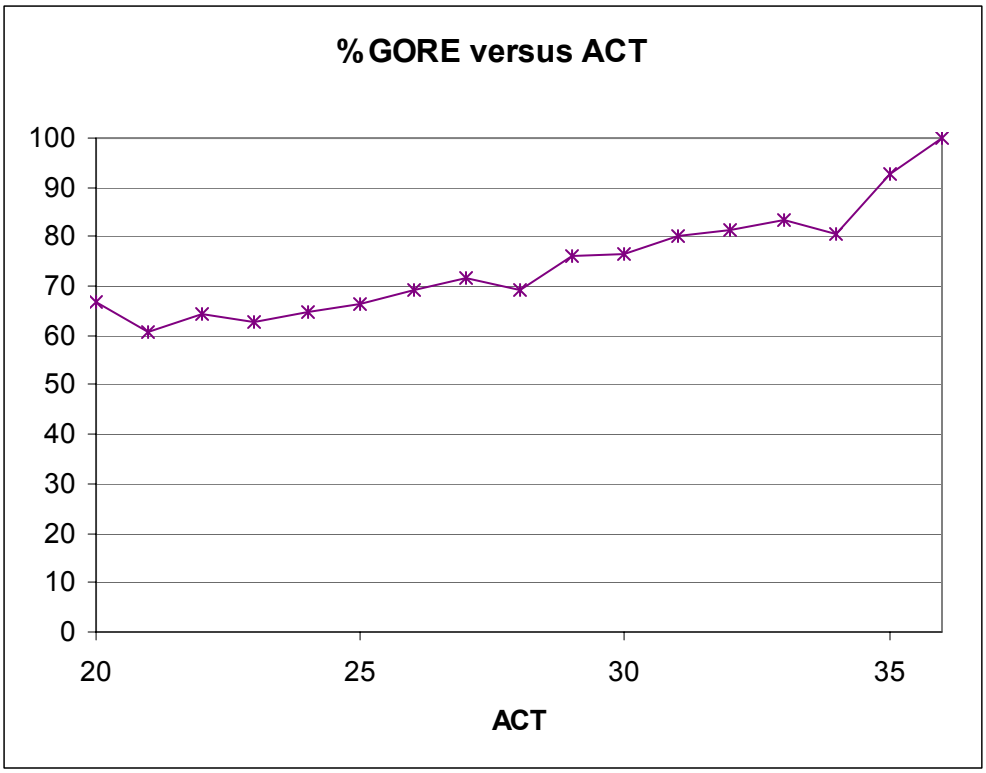


Figure 1 – Retention rate versus cumulative ACT for the 1995-2002 cohorts.

2.2 ACT sub-scores

An alterative measure of a student's ability is the ACT sub-scores which indicate strengths in particular fields: Math, English, Reading, and Science. Of these areas, Math (ACTM) is the most interesting for this study.

From Figure 2, we can see that there is once again a very strong linear relationship between the students math score and their likelihood of remaining at the university. It is interesting to note two substantial drops in retention at ACTM's of 33 and 36. The drop at 36 is most likely due to the relatively small sample size but the drop at 33 may require more investigation as there is a relatively large sample size (n=179). The math ACT appears to be as good at predicting retention as cumulative ACT and possibly may be even better at differentiating student retention as the slope of the relationship appears slightly steeper than that of cumulative ACT.

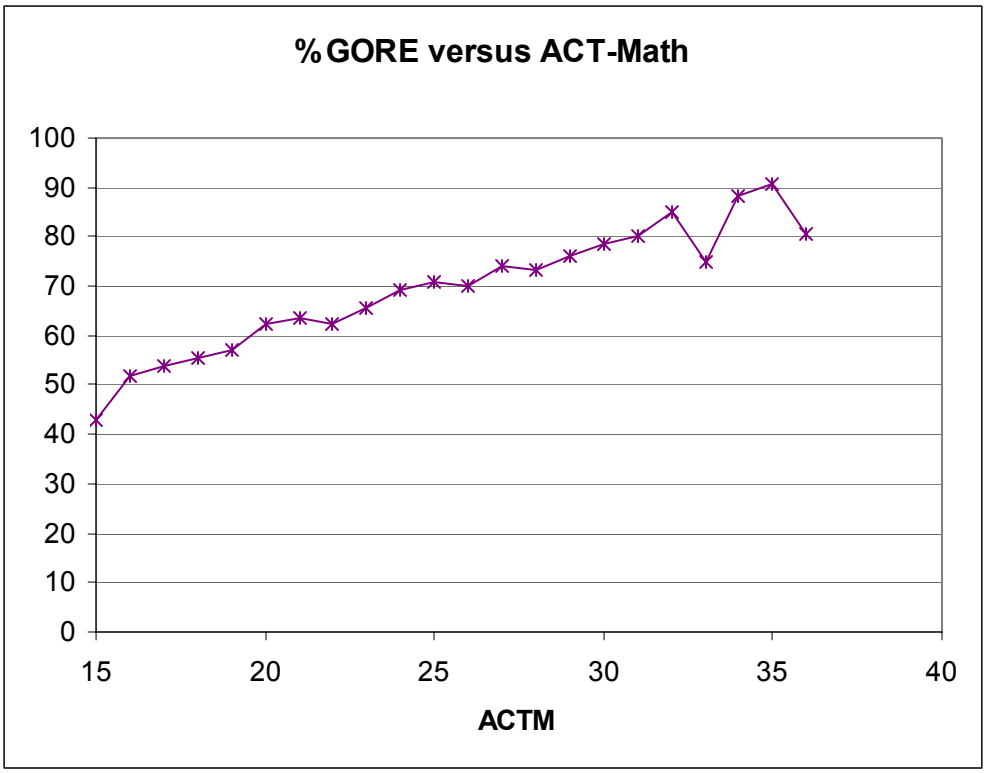


Figure 2 – Retention rate versus math ACT sub-score for the 1995-2002 cohorts.

As the focus of the analysis is on math, I will only briefly discuss the other ACT sub-scores without displaying their graphs. English has a fairly strong relationship to retention, with better students tending to remain at Truman. It does not differentiate as well as ACT or ACTM, as the relationship is slightly less linear with a range of 55-85%. The science and reading sub-scores show similar relationships, but it is interesting to note a relatively flat slope to their lines. Students with poor ACT scores in these areas have only a slightly lower retention rate than students who have strong ACT scores.

Of interest is why Math seems to differentiate students so much better than Reading or Science (and even slightly more than English) for retention. The most likely reason for this phenomenon is due to the nature of the subjects. Mathematics strongly builds on material learned in previous courses. A student who has a poor/weak high school background in mathematics is likely to struggle in an introductory (or upper level) math

course at Truman. In contrast, a student who had a poor quality education in the sciences may be able to catch up in an introductory science course at Truman. While reading comprehension level seems to have almost no relationship to retention, it doesn't mean that a reading ability is unrelated to their success in college. It may only indicate that students with lower scores have abilities above the threshold necessary to succeed in our classes, or possibly they are able to gain the required skills early in our curriculum.

2.3 Placement Test

A second measure of mathematical ability used is the mathematics placement exam. This test is administered to all high school seniors via mail. The students are asked to allocate themselves 2 hours to complete the exam and are requested to not use books or additional assistance.

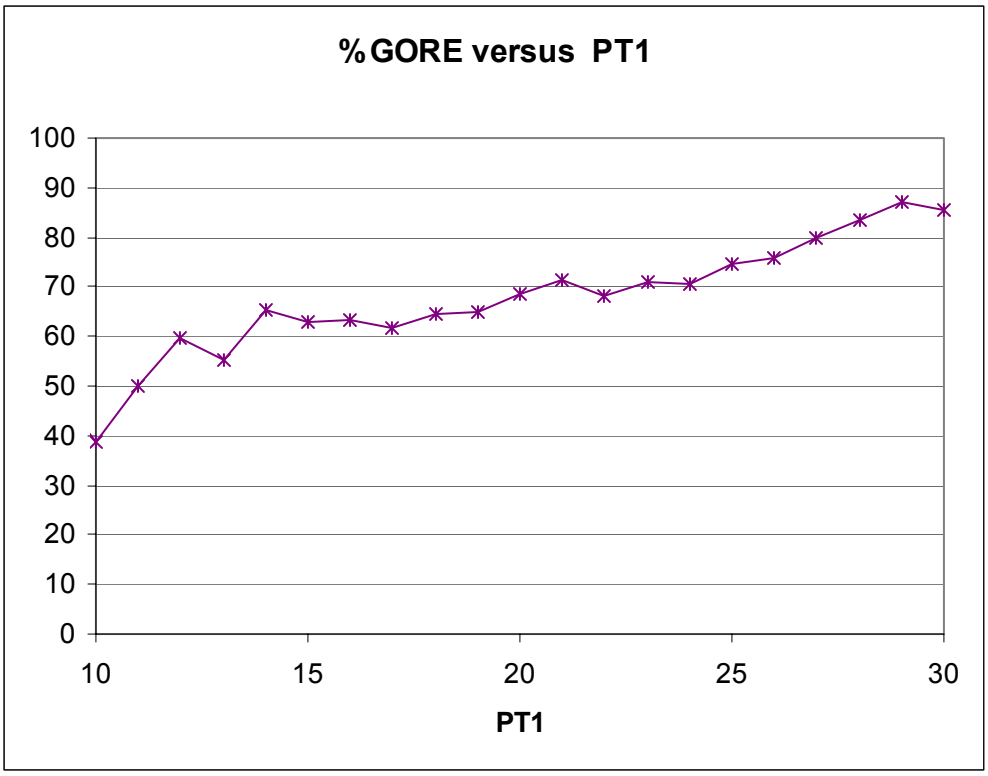


Figure 3 – Retention rate versus math placement test score for the 1995-2002 cohorts.

The test is primarily used to determine if the students have mastered the essential skills requirement and are ready for calculus. As this test is measuring approximately the same abilities as the ACTM, we would expect this test to mimic the ACTM results. A review of the graph indicates that this is true, with the PT results showing a strong linear relationship to retention.

2.4 Supplementary material

Though not in the original scope of this grant, it became evident from speaking with several individuals that additional variables may warrant consideration when evaluating retention. The two factors considered are whether a student is a first generation (FG) college student and whether a student is low income (LI).

The data was taken from the CIRP data set and the number of individuals examined is slightly different (n=7600), as these two pieces of information are not available on all students within the cohorts.

	Left	Retained
First Generation	34%	66%
Non-FG	26%	74%

Table 1 - Retention rate for the 1995-2002 cohorts based on first generation status.

The table indicates a substantial difference in retention between first generation students and those whose students who have at least one parent with an advanced degree. The FG students have a one in three chance of leaving while the non-FG students have only a one in four chance of not being retained.

	Left	Retained
Low Income	37%	63%
Non-LI	26%	74%

Table 2 - Retention rate for the 1995-2002 cohorts based on family income status.

A very similar trend is found by looking at the low-income factor. The LI individual is also more likely to leave before graduation with LI having approximately a one in three chance while non-LI have a one in four chance of leaving.

2.5 Models

2.5.1 ACTM

Using the Math ACT score a simple logistic regression model can be created to predict the GORE probability of a student. The probability they remain (Π) is given by:

$$\Pi = \left(1 + e^{-(-1.2901 + 0.085421 ACTM)}\right)^{-1}.$$

The coefficients on the equation indicate that a higher ACTM results in a higher probability for retention. Using the equation, we would predict a student with a Math ACT score of 35 to have an 85.6% chance of completing their degree at Truman, while a student with a 15 ACTM would have a 51.8% chance of remaining at Truman.

2.5.2 ACTM, FG, & LI

A slightly more complex logistic model can be created using the FG and LI data along with the ACTM.

$$\Pi = \left(1 + e^{-(-1.0631 + 0.08457 ACTM - 0.28495 FG - 0.35433 LI)}\right)^{-1}$$

All of the coefficients in this model are significant and their signs indicate that retention increases with higher ACTM, while retention decreases if a student is first generation or low income. Using the equation (with 0 or 1 indicating if a student is LI/FG), we would predict a first generation student (who is not low-income) with an ACTM of 35 to have an 83.4% chance of completing their degree at Truman, while a first generation low-income student with a 15 ACTM would have a 39.3% chance of remaining at Truman.

CHAPTER 3 POST ENROLLMENT

This section of the report will involve looking at retention based on information obtained after the student has arrived on the Truman campus. In addition to the ACT and placement test scores are the classes and grades received for all math classes taken at Truman.

3.1 Initial mathematics course

One of the intents of this study was to compare the retention rate for the various classes within the math department. Below are the retention statistics for the courses that have initial enrollments of approximately 100 students or greater. Note that the total GORE rate is 69.1%, which does not represent Truman's total retention as this data set excludes math courses with minor enrollments and any student who transfers all math requirements.

course	left%	stayed%	count
57	46.7	53.3	711
156	34.4	65.6	4612
157	27.3	72.7	499
186	30.2	69.8	1778
192	28.4	71.6	95
194	20.1	79.9	463
198	25.3	74.7	1899
263	19.5	80.5	548
264	12.9	87.1	93
Total	30.9	69.1	10698

Table 3 - Retention rate for the 1995-2002 cohorts based on first math enrollment.

In general, the retention rate increases with the higher level of math class first attempted by the student. This would be expected from the ACT data reviewed earlier, as

students with a higher ACT [and a greater retention rate] will tend to be enrolled in higher-level math classes.

3.2 Placement

To investigate the effect of placement upon student retention the data must be broken down so that students of similar abilities can be compared. Assuming that the ACTM is the best measure of mathematical ability, the retention rate for each course has been calculated for each ACTM score in the table below.

	57	156	157	186	192	194	198	263	264
14	100 (1)	--	--	--	--	--	--	--	--
15	25 (4)	100 (2)	--	--	--	0 (1)	--	--	--
16	50(16)	56 (9)	--	--	--	--	--	--	--
17	55 (44)	55 (40)	50 (2)	0 (1)	--	--	--	--	--
18	50 (86)	57 (103)	60 (15)	75 (4)	100 (1)	--	--	--	--
19	51 (98)	58 (199)	71 (21)	67 (15)	--	--	50 (2)	0 (1)	--
20	55 (98)	65 (268)	67 (30)	63 (27)	0 (2)	100 (3)	50 (4)	100 (2)	--
21	56 (108)	64 (385)	66 (35)	61 (36)	100 (2)	100 (4)	81 (16)	100 (2)	--
22	42 (79)	64 (451)	63 (30)	74 (46)	100 (1)	86 (14)	67 (12)	--	--
23	62 (45)	64 (565)	70 (64)	66 (128)	75 (4)	86 (21)	60 (35)	100 (3)	--
24	56 (43)	68 (564)	77 (64)	69 (154)	60 (10)	80 (35)	72 (61)	80 (10)	--
25	66 (32)	69 (575)	73 (51)	72 (231)	73 (11)	76 (33)	75 (100)	79 (14)	100 (1)
26	79 (14)	67 (474)	79 (57)	70 (211)	50 (14)	76 (55)	73 (165)	70 (23)	50 (4)
27	0 (4)	69 (336)	78 (45)	75 (270)	73 (11)	82 (60)	73 (221)	85 (33)	100 (6)
28	50 (6)	70 (238)	69 (36)	69 (209)	73 (11)	72 (65)	73 (229)	84 (44)	100 (2)
29	100 (3)	66 (157)	83 (18)	71 (151)	67 (6)	83 (53)	74 (269)	85 (67)	82 (11)
30	--	66 (65)	88 (17)	69 (120)	100 (5)	83 (46)	78 (252)	80 (70)	100 (10)
31	--	72 (46)	83 (6)	67 (69)	100 (4)	80 (35)	83 (185)	78 (87)	100 (7)
32	--	64 (44)	40 (5)	77 (31)	100 (5)	94 (18)	83 (139)	88 (65)	91 (11)
33	--	100 (6)	100 (2)	67 (6)	100 (3)	63 (8)	70 (60)	62 (47)	89 (9)
34	100 (1)	100 (1)	--	75 (8)	--	67 (6)	85 (40)	93 (27)	92 (12)
35	--	--	--	--	--	100 (2)	88 (8)	87 (15)	90 (10)
36	--	--	--	100 (1)	--	--	77 (13)	82 (17)	67 (6)

Table 4 - GORE% (number in cell)- Retention rate for the 1995-2002 cohorts based on ACTM and first math enrollment.

Ideally, a student should be placed in a class where they have sufficient skills to complete the class, but are still challenged enough to maintain interest. Placing a student

too highly will result in the student being overwhelmed, while low placement often results in boredom and disinterest.

By looking across a row, the retention for various classes can be compared. For example comparing the retention for the most popular classes for a student with an ACTM of 29 we find a GORE of 66% for MATH156, a GORE of 71% for MATH186, and a GORE of 74% for MATH198. Initial interpretation of this data would seem to indicate that placing students at this level of ability in MATH198 results in the best retention. Unfortunately, the analysis is not that simple.

It is immediately evident that students of similar abilities are placed in a wide variety of courses. For an ACTM of 29 we see students placed from MATH57 up to MATH264 (basically all levels of math courses for non-majors). This occurs because more information than ACTM is used in placing a student in their first math course. Placement is also based on the placement test score, high school courses taken and grades achieved, and self-placement recommendations. A student placed in MATH156 was most likely placed there as they had exhibited inferior mathematical skills through coursework/test scores or by a direct request to be under-placed. A similar student placed in MATH198 most likely excelled in their high school math classes, either through ability or good study skills. Unfortunately, due to this circumstance, we are unable to determine if retention is increased because students are placed higher or if the students who were most likely to remain at the university (good study skills/attitudes) were placed in higher courses.

The information presented in Table 4 does contain withdraws and section changes which may bias the analysis. Table 5 below summarizes the same information as Table 4, except all audits and withdraws resulting from course changes have been removed. There are some slight changes resulting from these revisions but the general trends in the table remain the same.

	57	156	157	186	192	194	198	263	264
14	--	100 (1)	--	--	--	--	--	--	--
15	0 (1)	60 (5)	--	--	--	0 (1)	--	--	--
16	100 (2)	48 (21)	0 (1)	100 (1)	--	--	--	--	--
17	20 (5)	57 (72)	80 (5)	33 (3)	--	--	--	--	--
18	7 (15)	58 (158)	64 (25)	40 (5)	0 (1)	100 (1)	0 (1)	--	--
19	9 (11)	57 (265)	73 (37)	56 (18)	--	0 (1)	0 (1)	0 (1)	--
20	0 (12)	65 (333)	69 (45)	61 (28)	0 (3)	100 (3)	50 (4)	100 (1)	--
21	11 (9)	65 (459)	62 (47)	52 (46)	100 (4)	100 (7)	80 (10)	100 (2)	--
22	0 (12)	63 (500)	61 (41)	71 (49)	100 (2)	83 (12)	69 (13)	100 (1)	--
23	0 (1)	64 (589)	70 (77)	66 (137)	100 (6)	85 (20)	53 (32)	100 (2)	--
24	0 (4)	67 (565)	78 (93)	70 (164)	64 (14)	82 (33)	76 (55)	73 (11)	--
25	0 (2)	68 (589)	73 (67)	72 (247)	82 (11)	78 (36)	77 (78)	81 (16)	100 (2)
26	--	66 (462)	80 (64)	73 (228)	67 (24)	76 (54)	71 (156)	65 (20)	50 (4)
27	--	68 (335)	78 (46)	74 (293)	76 (17)	83 (59)	74 (206)	86 (29)	67 (6)
28	0 (2)	69 (225)	70 (43)	71 (217)	68 (22)	71 (69)	73 (216)	87 (38)	100 (2)
29	--	65 (158)	94 (18)	73 (158)	67 (9)	83 (46)	73 (263)	81 (63)	88 (17)
30	--	65 (62)	82 (17)	71 (138)	100 (6)	80 (45)	78 (231)	82 (67)	100 (9)
31	--	73 (45)	86 (7)	68 (76)	100 (10)	77 (35)	81 (168)	81 (84)	89 (9)
32	--	67 (12)	50 (4)	82 (28)	100 (11)	89 (18)	83 (135)	83 (62)	91 (11)
33	--	100 (7)	100 (1)	60 (5)	67 (3)	67 (9)	74 (61)	60 (42)	78 (9)
34	--	100 (1)	100 (1)	67 (6)	--	60 (5)	86 (37)	90 (31)	92 (12)
35	--	--	--	--	--	100 (1)	89 (9)	83 (12)	89 (9)
36	--	--	--	100 (1)	100 (1)	--	75 (12)	81 (16)	60 (5)

Table 5 - GORE% (number in cell)- Retention rate for the 1995-2002 cohorts based on ACTM and first math grade. Audits and redundant withdraws have been removed.

3.3 Academic success

Another factor closely tied to placement is success in the first mathematics class. Ideally, a correctly placed student should do well in the class and have a favorable view of the university thus increasing retention. In Table 6 below are the GORE levels for the grades that students received in their first mathematics course.

As would be expected, the retention rate drops as the grades decrease. The A and B grades have retentions of approximately 80%, with a dramatic decrease through the C and D range, to a low of 40% retention for students failing or withdrawing from their first class (Note “W” here represent students who withdraw and never enroll in another math class at Truman).

Grade	Left	GORE
A	19	81
B	23	77
C	30	70
D	44	56
F	62	38
W	61	39
Total	31	69

Table 6 – Percentage of students retained by grade achieved in first math class. Note "W" represents students who have no other math grades.

One possible reason that lower grades result in decreased retention is that many of our students have likely not experienced grades below A and B's in high school. Many have never considered themselves to be "average" and anything below a B would be considered a sub-standard grade. This attitude is closely linked to the problem of grade inflation in today's colleges and universities. Receiving a grade below their expectations most likely results in dissatisfaction with their college experience and an increased likelihood of leaving.

The second, and possibly more important factor to the student could be financially related. Many of Truman's students have some type of academic financial aid and continuation of this support is often tied to their academic success (GPA). Students receiving grades of a C or below are likely to be in danger of losing continuing scholarships, which may make them more likely to leave the university.

To investigate this possibility further another variable was added to the study. The student population was separated into two groups: those with a GPA above a 3.25 and those with a GPA below a 3.25. These groups can be viewed as students getting "good" grades and receiving mostly A's and those receiving few A's or "bad" grades. The 3.25 mark was not arbitrary chosen, but was chosen for its significance to the Truman campus. Students on renewable scholarships are required to maintain a 3.25 to be eligible to

receive their scholarship funds. GPA's lower than this will result in temporary loss of funds until the GPA is raised. There is not an exact ACT cutoff for scholarship qualifications, but most students above an ACT of 26 should be receiving some kind of aid.

Reconstructing Figure 1 with separate lines for the two grade groups yields Figure 4 below. By first examining the students who are maintaining a grade point above a 3.25, we see the upward trend in retention that was present when looking strictly at ACT scores. There is almost a linear relationship between ACT and retention, from an ACT of 20 with retention of 68% to an ACT of 36 with retention of 100%. Of more interest, is the retention of students who are unable to maintain a 3.25 GPA. The rate is approximately unchanging at 60% until about an ACT of 30, when it starts decreasing (note the ACT of 35 has a small sample size of 4). It seems that ACT and retention are not strongly related when the student is not performing well.

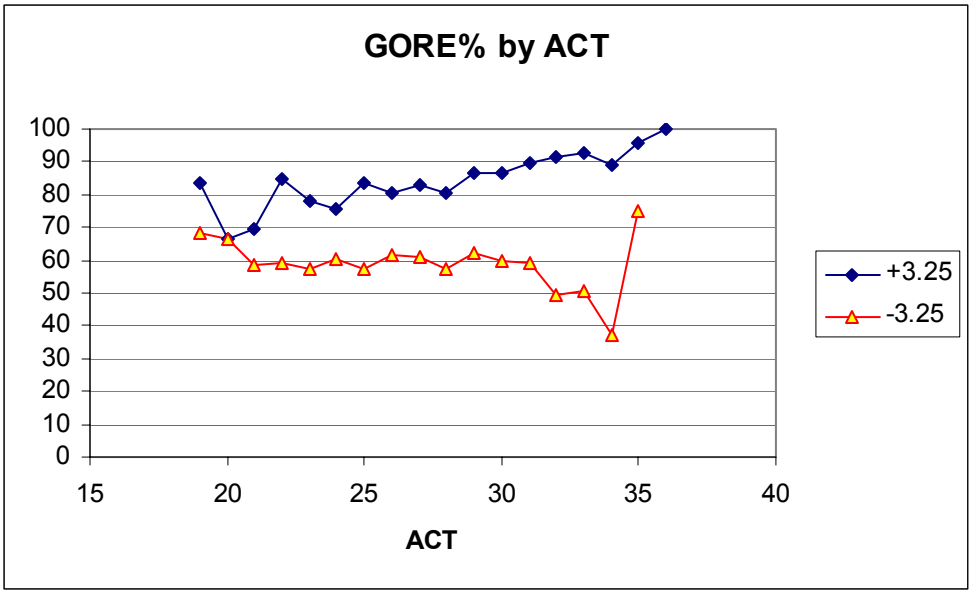


Figure 4 - Cumulative ACT score versus retention rate for the 1995-2002 cohorts separated by students who qualify for scholarship renewal.

By plotting the percent of students leaving the university (rather than retained), Figure 5, the trend is even more apparent. For students with good grades, there is a steady decrease in the percentage of students leaving. This might be due to more students qualifying for scholarships at the higher ACT levels. This trend is not apparent for those with a GPA below 3.25 and in fact students with an ACT of 30 or above show a stronger inclination to leave. Most likely these students would have lost their renewable scholarship.

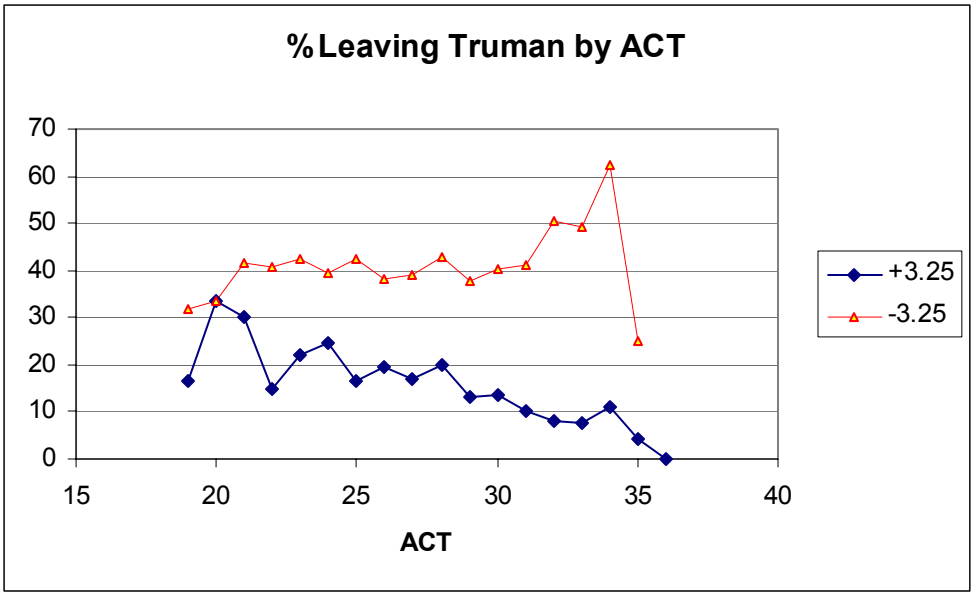


Figure 5 - Cumulative ACT score versus percent of students not returning to Truman for the 1995-2002 cohorts separated by students who qualify for scholarship renewal.

This effect is emphasized on the following graph, which compares the ratio of the students leaving for the "bad" grades, to those leaving with "good" grades. For low ACT scores, the probability of a student leaving the university is relatively the same regardless of whether the student has a GPA above a 3.25 or not. With increasing ACT, the ratio begins to increase with students receiving lower grades being two to three times more likely to leave than the students receiving high grades. This effect is magnified for the

very elite students (ACT of 30 or above) where the students performing poorly are up to six times more likely to leave. While the number of students in this area is relatively small compared to those with an ACT below 30, the loss of these students should be of concern to the university.

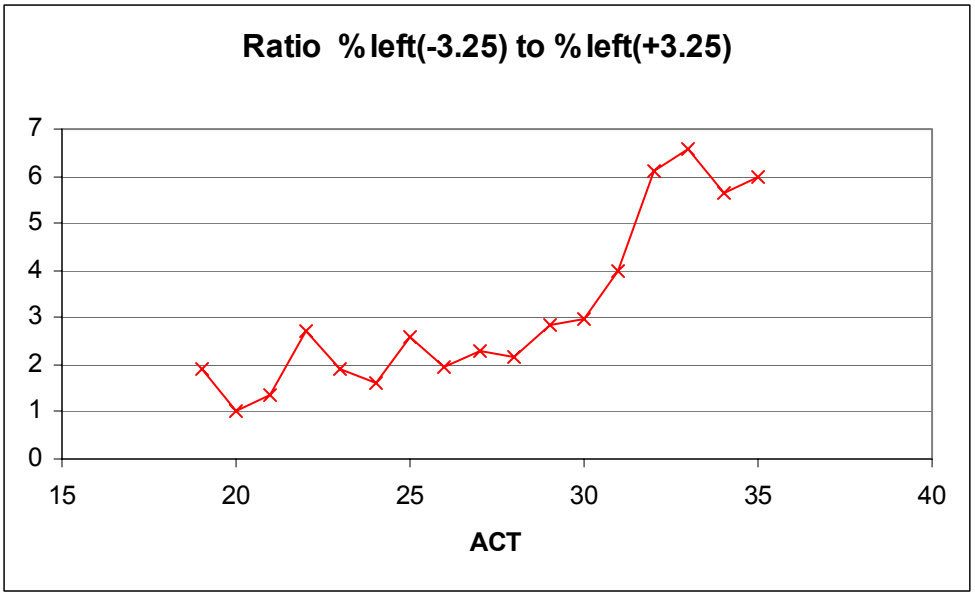


Figure 6 – Ratio of the percent of students leaving who have a GPA below a 3.25 to the percent of students leaving who have a GPA above a 3.25 for each ACT score.

3.4 Conclusions

The pre-enrollment data did not yield any unexpected results. ACT was found to be strongly related to retention with higher scores yielding higher retention. Additionally, both first generation and low income status contributed to a reduction in retention for our students.

The post-enrollment data yielded more interesting results. No firm conclusion could be made about placement due to the confounding factors used in placing students into their first math class. Grades within the students first math class were a strong indicator

of retention with students receiving an A or B being much more likely to remain at the university.

Separating the student population into groups with GPA's above and below 3.25 indicated a substantial difference in the retention of the two groups. For students with the higher GPA retention increased with ACT score. Students in the lower GPA group tended to have a flat retention rate regardless of ACT until 30 when a significant reduction in retention occurred.

CHAPTER 4 SUGGESTIONS

The strong relationship between grades and retention may indicate that we need to do a better job of educating students, and parents, about what are reasonable grades at the college level. Today's students seem to believe that a "C" is unacceptable and receiving such a grade tends to increase dissatisfaction within the students. Unfortunately, this is compounded within our student body as many of them come from the upper percentiles of their high school.

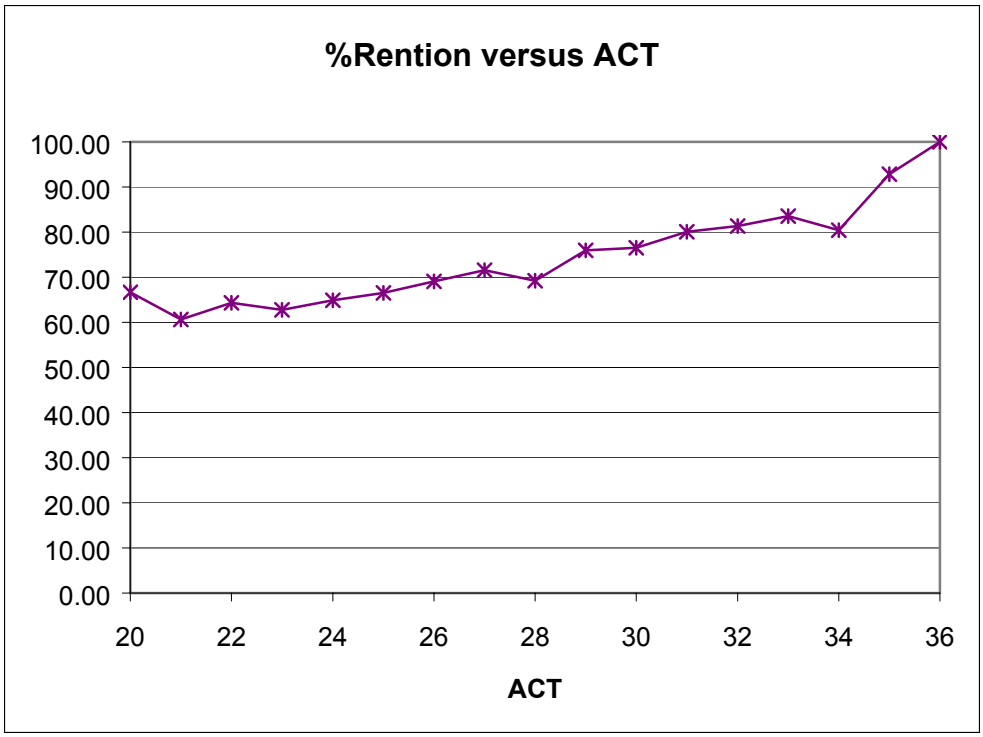
Secondly, a revamping of the scholarship program may be necessary. The evidence seems to suggest that good students who are unable to maintain their 3.25 are much more likely to leave than their peers. Could the GPA requirement be lowered to 3.00? Could a graduated penalty system be put into place?

As an alternative to lowering the standards for the scholarship program another possible option would be to help the students to achieve better grades in their first year of school. Many of our students excelled in high school without much effort and many of them expect college to be the same way. It's usually too late when a student realizes that the level of work required in college is much higher to achieve the same academic success they enjoyed in high school. I know that some programs are already in place during freshman week and such that attempt to prepare students for this transition, but maybe more focused efforts could be done.

Specifically in math, professors could be encouraged to promote the evening tutoring to the students on a regular basis. Students might possibly benefit from the creation of a dedicated math help room that is open during the daytime hours when classes are in session and students are on campus. The assignment of students to small groups within introductory math classes could be strongly recommended to get students working together on homework, a skill they may not have needed in high school.

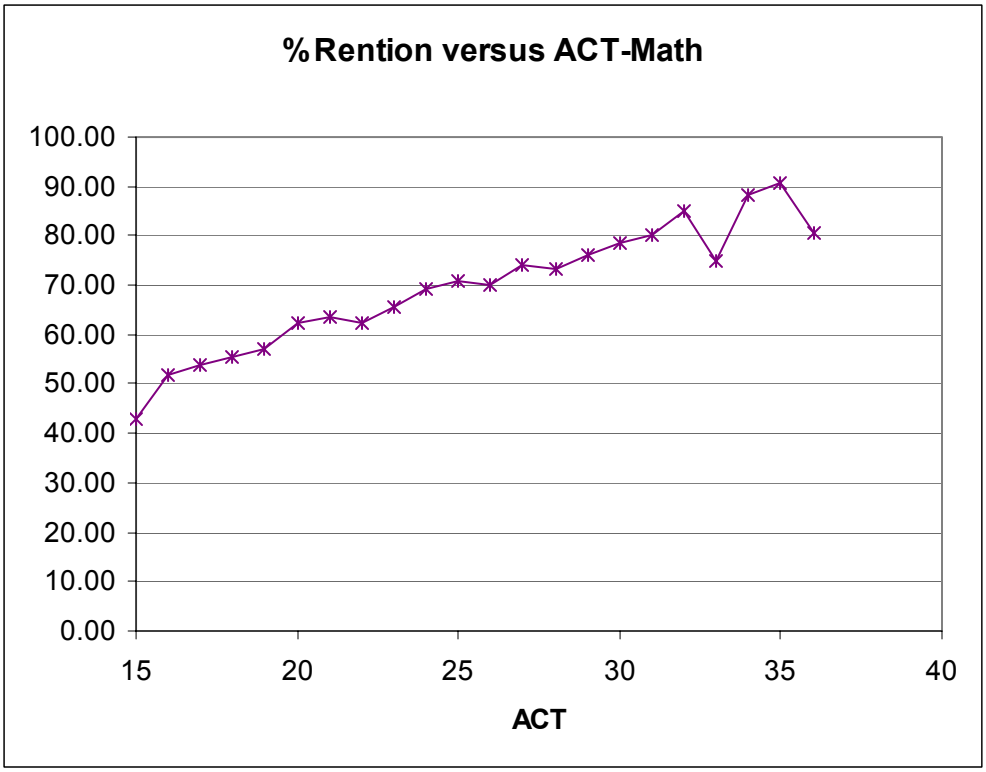
Finally tutoring/counseling could be set-up for students who are on scholarship but below a 3.25 in their first semester of school. I'm sure that we have programs in place to help students who are on academic probation, but are any programs in place to help a student who gets an A, 2 B's, and a C? (but got straight A's in high school). These students may need just as much direction about study skills and time management as students on probation.

Appendix A1



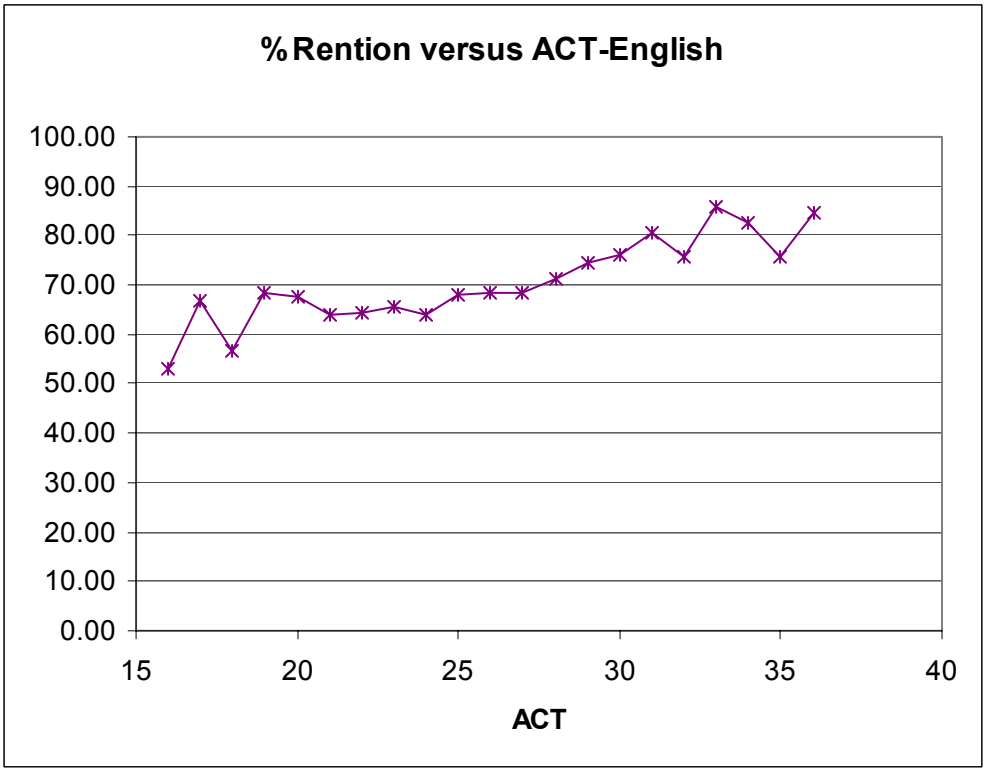
ACT	Leave	Stay	total	%leave	%rentention
17	1	1	2	50.00	50.00
18	0	7	7	0.00	100.00
19	9	22	31	29.03	70.97
20	37	74	111	33.33	66.67
21	117	180	297	39.39	60.61
22	205	370	575	35.65	64.35
23	316	532	848	37.26	62.74
24	399	738	1137	35.09	64.91
25	400	795	1195	33.47	66.53
26	389	868	1257	30.95	69.05
27	357	898	1255	28.45	71.55
28	310	698	1008	30.75	69.25
29	176	555	731	24.08	75.92
30	294	958	1252	23.48	76.52
31	162	650	812	19.95	80.05
32	81	353	434	18.66	81.34
33	56	284	340	16.47	83.53
34	19	78	97	19.59	80.41
35	2	26	28	7.14	92.86
36	0	4	4	0.00	100.00

Appendix A2



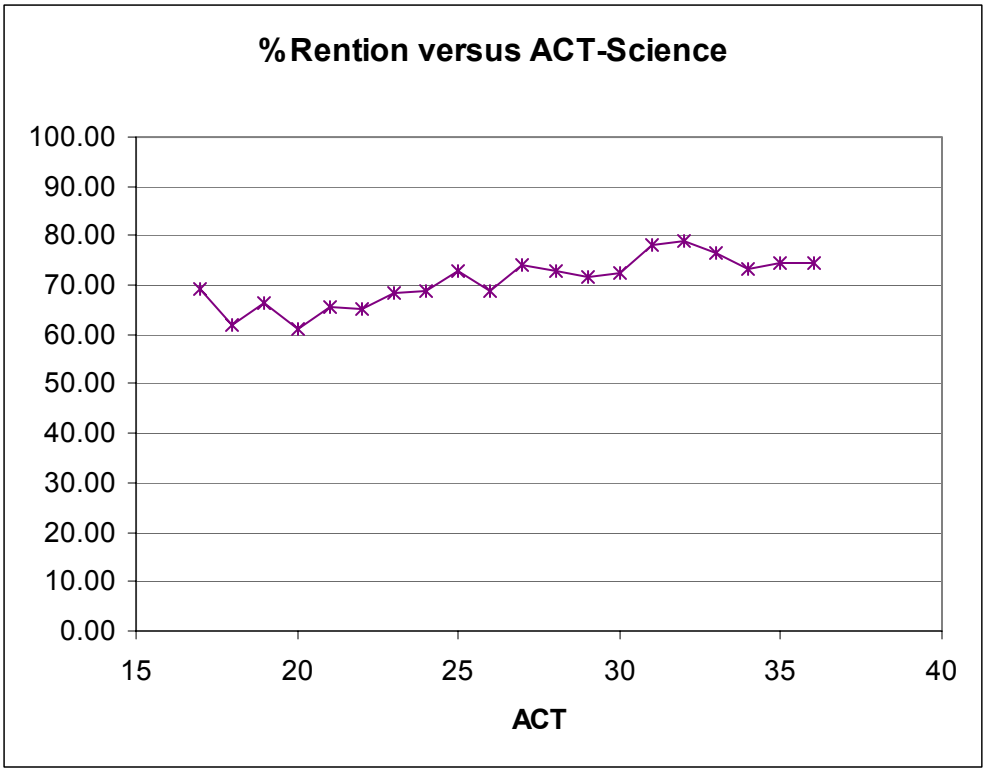
ACTM	Leave	Stay	total	%leave	%rentention
14	0	1	1	0.00	100.00
15	4	3	7	57.14	42.86
16	12	13	25	48.00	52.00
17	40	47	87	45.98	54.02
18	94	117	211	44.55	55.45
19	147	194	341	43.11	56.89
20	167	278	445	37.53	62.47
21	222	386	608	36.51	63.49
22	246	409	655	37.56	62.44
23	309	585	894	34.56	65.44
24	301	682	983	30.62	69.38
25	322	789	1111	28.98	71.02
26	325	766	1091	29.79	70.21
27	284	804	1088	26.10	73.90
28	261	710	971	26.88	73.12
29	210	669	879	23.89	76.11
30	148	548	696	21.26	78.74
31	112	457	569	19.68	80.32
32	54	311	365	14.79	85.21
33	45	134	179	25.14	74.86
34	15	114	129	11.63	88.37
35	4	39	43	9.30	90.70
36	8	33	41	19.51	80.49

Appendix A3



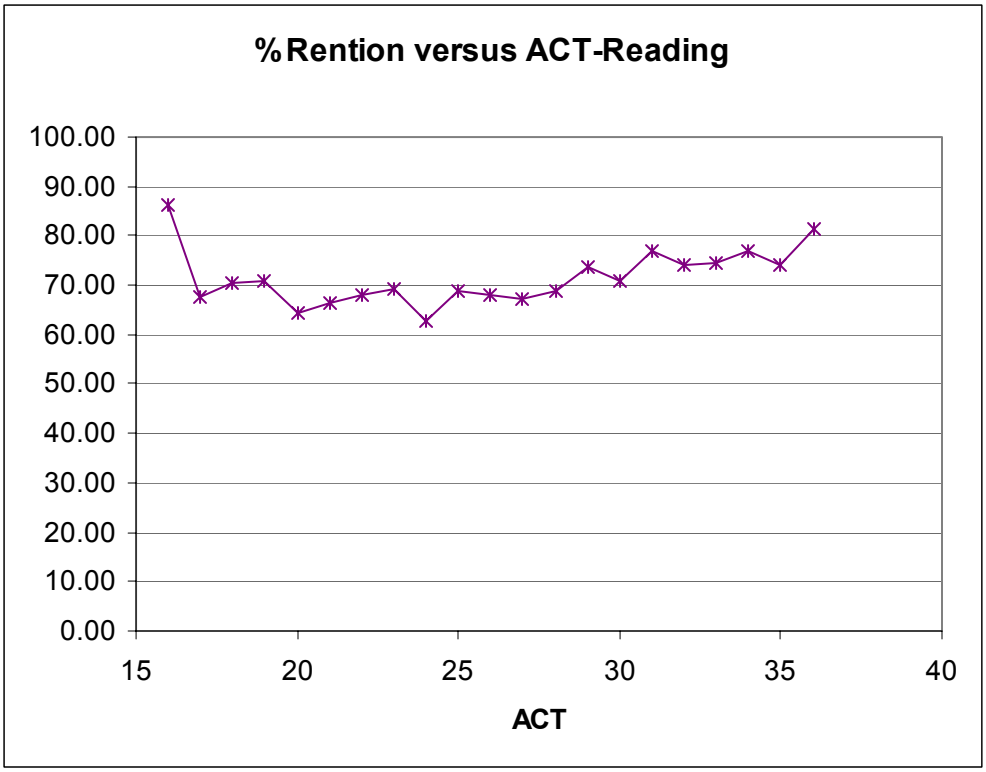
ACTE	Leave	Stay	total	%leave	%rentention
6	1	0	1	100.00	0.00
10	1	0	1	100.00	0.00
13	0	3	3	0.00	100.00
14	0	4	4	0.00	100.00
15	1	2	3	33.33	66.67
16	8	9	17	47.06	52.94
17	13	26	39	33.33	66.67
18	35	46	81	43.21	56.79
19	51	110	161	31.68	68.32
20	100	207	307	32.57	67.43
21	160	283	443	36.12	63.88
22	206	373	579	35.58	64.42
23	266	506	772	34.46	65.54
24	335	593	928	36.10	63.90
25	330	707	1037	31.82	68.18
26	331	719	1050	31.52	68.48
27	359	784	1143	31.41	68.59
28	295	738	1033	28.56	71.44
29	238	702	940	25.32	74.68
30	230	727	957	24.03	75.97
31	121	502	623	19.42	80.58
32	93	289	382	24.35	75.65
33	49	293	342	14.33	85.67
34	60	288	348	17.24	82.76
35	33	103	136	24.26	75.74
36	14	76	90	15.56	84.44

Appendix A4



ACTS	Leave	Stay	total	%leave	%rentention
14	2	3	5	40.00	60.00
15	0	2	2	0.00	100.00
16	2	8	10	20.00	80.00
17	8	18	26	30.77	69.23
18	29	47	76	38.16	61.84
19	58	115	173	33.53	66.47
20	129	202	331	38.97	61.03
21	172	326	498	34.54	65.46
22	281	523	804	34.95	65.05
23	334	722	1056	31.63	68.37
24	325	719	1044	31.13	68.87
25	343	913	1256	27.31	72.69
26	344	753	1097	31.36	68.64
27	258	741	999	25.83	74.17
28	246	657	903	27.24	72.76
29	206	525	731	28.18	71.82
30	177	467	644	27.48	72.52
31	115	409	524	21.95	78.05
32	69	257	326	21.17	78.83
33	63	207	270	23.33	76.67
34	68	186	254	26.77	73.23
35	46	133	179	25.70	74.30
36	54	157	211	25.59	74.41

Appendix A5



ACTR	Leave	Stay	total	%leave	%rentention
12	0	2	2	0.00	100.00
13	0	2	2	0.00	100.00
14	0	2	2	0.00	100.00
15	1	3	4	25.00	75.00
16	3	19	22	13.64	86.36
17	12	25	37	32.43	67.57
18	22	52	74	29.73	70.27
19	49	119	168	29.17	70.83
20	92	166	258	35.66	64.34
21	127	249	376	33.78	66.22
22	174	371	545	31.93	68.07
23	195	442	637	30.61	69.39
24	302	506	808	37.38	62.62
25	225	494	719	31.29	68.71
26	296	630	926	31.97	68.03
27	266	546	812	32.76	67.24
28	293	652	945	31.01	68.99
29	188	528	716	26.26	73.74
30	222	544	766	28.98	71.02
31	148	488	636	23.27	76.73
32	165	467	632	26.11	73.89
33	155	450	605	25.62	74.38
34	155	517	672	23.07	76.93
35	156	450	606	25.74	74.26
36	83	366	449	18.49	81.51