A Cohort Analyses of Fall 2011 New Students at Cosumnes River College: Predicting persistence and units earned

CRC Research Office

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Background

The purpose of this study, which was undertaken in support of the College's update of the Student Equity Plan, was to identify the factors that predicted terms enrolled and units earned for new CRC students who did not complete an award and/or transfer within six fall/spring semesters.

Methodology

The Research Office tracked a cohort of first time students' enrolled at Cosumnes River College (CRC) and the Los Rios Community College District (LRCCD) for a three-year period, from Fall 2011 to Spring 2014. Student demographic background information (i.e, gender, race, and age at the start of their education at CRC), course success outcomes, units enrolled/completed, award completion, and transfer data were gathered. Due to the scope of this study, the following types of students were excluded from the cohort: students who completed a degree/certificate, students who transferred to another 2-year or 4-year institution, students who enrolled at a Los Rios sister college for all six semesters, and students with sporadic enrollment at CRC over the six semester time frame. The remaining students were those who either continuously enrolled at CRC for all six terms or were enrolled in one or more continuous terms at CRC before leaving for the remainder of the three year period. These students were classified as 'leavers' if they left with two or more semesters remaining the three year period, and 'stayers' if they were continuously enrolled or left with only one semester remaining in the three year period. Data were analyzed in exploratory fashion with predictive regression models.

Overview of Findings

The number of consecutively enrolled terms was strongly predicted by Fall 2011 course success rate. In addition, the number of units completed was correlated with the number of consecutively enrolled terms.

In general, younger students enrolled in more consecutive terms than their older peers regardless of success rate or ethnicity. They also earned more units than their older peers – regardless of enrollment status or ethnicity. Students who were Asian/Pacific Islander enrolled in more consecutive terms, regardless of age and success rates. They also earned more units regardless of enrollment status and age. Students who were African American enrolled in fewer consecutive terms and earned fewer units than students from the other major ethnic groups. Contrary to the general trend, older African American students enrolled in more consecutive terms than younger African American students. Interestingly, the difference between White and African American students shrank when accounting for success rates. This suggests that African American students have lower success rates and therefore enroll in fewer terms than their White peers (at least within this sample of students).

Finally, within this sample, enrollment patterns could not be explained by award achievement or transfer to another college

Implications of Findings

The findings of this study supplement the data and conclusions drawn from the College's Student Equity Plan. There is a disproportionate number of African American students who are succeeding at lower rates, earning fewer units, and enrolling in fewer consecutive terms than their fellow peers. These differences in enrollment may be larger for young African American students and may be explained by lower success rates. In addition, the study indicates that outreach to first time new students during their initial semester of enrollment may enhance persistence and program completion.

Limitations

This study was limited to tracking only one new student cohort through six semesters (fall/spring), from Fall 2011 to Spring 2014 and should be replicated using another cohort (i.e., new students from fall 2012). Although this report highlights differences between various demographics, it cannot determine the cause of the differences between groups. Moreover, due to fairly large sample sizes, small effects – particularly for age – were found to be significant and therefore should be interpreted with caution. Finally, the sample of Native American students was too small to make valid statistical conclusions.

Analyses

As previously stated, students who completed a degree/certificate, transferred to another 2-year or 4-year institution, enrolled at a Los Rios sister college for all six semesters, and enrolled sporadically at CRC over the six semester time frame were excluded from the study. Of the original cohort of 2,663 students, a total of 1,021 students were excluded leaving 1,642 for the exploratory regression analyses. After the exclusion of students, Hispanic students were slightly over-represented in this study, while White students were slightly underrepresented. A demographic breakdown of the original cohort and the cohort after exclusion can be found in *Table 1*. *Table 2* identifies the enrollment behavior for the major ethnic groups.

Table 1. *Student Demographic Breakdown*

Student Demographics	Percentage of New Fall 2011 Students	Percentage of New Fall 2011 Students in Study	Difference
Ethnic Group			
African American	11.8%	12.8%	1.0%
Asian/Filipino/Pacific Islander	23.0%	23.7%	0.7%
Hispanic/Latino	25.1%	26.6%	1.5%
Multi-Race/Other Non-White/Unknown	19.0%	18.1%	-0.9%
Native American	0.4%	0.0%	-0.4%
White	20.6%	18.8%	-1.9%
Gender			
Female	49.7%	49.0%	-0.7%
Male	49.3%	50.2%	0.9%
Unknown	1.0%	0.8%	-0.2%
Average Age	21.4	21.9	0.5
Total	**2,663**	**1,642**	

Note. Unfortunately the small sample size of Native American students (*N*=6) would have rendered any statistical conclusions invalid; therefore, they were excluded from the study.

Table 2. *Student Enrollment Behavior by Ethnic Group*

Enrollment Behavior by Ethnic Groups	Number of Students	Percent
African American	**315**	
Completer	7	2.2%
Leavers	159	50.5%
Not CRC	9	2.9%
Sporadic	37	11.7%
Stayer	51	16.2%
Transfer	52	16.5%
Asian/Filipino/Pacific Islander	**612**	
Completer	25	4.1%
Leavers	182	29.7%
Not CRC	26	4.2%
Sporadic	86	14.1%
Stayer	207	33.8%
Transfer	86	14.1%
Hispanic/Latino	**669**	
Completer	27	4.4%
Leavers	258	38.6%
Not CRC	14	2.1%
Sporadic	110	16.4%
Stayer	179	26.8%
Transfer	81	12.1%
Multi-Race/Unknown/Other	**507**	
Completer	14	2.8%
Leavers	182	35.9%
Not CRC	17	3.4%
Sporadic	89	17.6%
Stayer	116	22.9%
Transfer	89	17.6%
Native American	**11**	
Completer	0	0.0%
Leavers	3	27.3%
Not CRC	1	9.1%
Sporadic	3	27.3%
Stayer	3	27.3%
Transfer	1	9.1%
White	**549**	
Completer	31	5.6%
Leavers	191	34.8%
Not CRC	23	4.2%
Sporadic	75	13.7%

Enrollment Behavior by Ethnic Groups	Number of Students	Percent
Stayer	117	21.3%
Transfer	112	20.4%
Total	**2,663**	
Completer	104	3.9%
Leavers	975	36.6%
Not CRC	90	3.4%
Sporadic	400	15.0%
Stayer	673	25.3%
Transfer	421	15.8%

Terms Enrolled from Fall 2011 to Spring 2014 for New Students

Summary. A *term* variable was created to quantify the number of consecutive terms a student was enrolled in prior to leaving for the remainder of the three year period (1 = *one semester* to 6 = *six semesters*). A linear regression was then used to predict this *term* variable with Fall 2011 course success rates, ethnicity (excluding Native Americans due to small raw count of students), gender, and Fall 2011 term age as the predicting variables. The number of consecutively enrolled terms was strongly predicted by Fall 2011 course success rate. Moreover, younger students enrolled in more consecutive terms than their older peers regardless of success rate or ethnicity. Students who were API also enrolled in more consecutive terms, regardless of age and success rate. Interestingly, the projected difference between White and African American students shrank when accounting for success rates. This suggests that African American students have lower success rates and therefore enroll in fewer terms than their White peers (at least within this sample of students).

Technical Specifications and Description. An ordinary least squares regression was implemented to predict the number of consecutive terms a student attended prior to leaving. Four variables were used in this regression: ethnicity, age, gender, and student success rate in the Fall 2011 term. Success rate for a particular student was defined as the number of courses where a C, B, A, or P was earned divided by the total number of courses taken. The average course success rate for all students was subtracted from the success rate for each student. This yielded a mean centered success rate. The same calculation was also performed on student age to yield a mean centered age score for each student. Finally, the White student group was again used as the baseline group for regression comparisons.

The ordinary least squares regression proceeded in several steps. First, ethnicity was entered and significantly predicted the number of terms, $\Delta R^2 = .035$, $F(4, 1637) = 15.10$, $p < .001$. African American students attended significantly fewer consecutive terms than their White peers, whereas API students attended more. Next, gender and age were entered as predictors of term. As in the previous analysis, gender did not add to the prediction of term attendance, but age did, $\Delta R^2 = .041$, $F(1, 1636) = 70.80$, $p < .001$. Older students attended for fewer consecutive terms than younger students. Finally, success in the Fall 2011 terms was entered as a predictor and was significant, $\Delta R^2 = .140$, $F(1, 1635) = 293.74$, $p < .001$. Higher success rates were associated with longer consecutive attendance. Interestingly, when success rates were entered into the equation, the projected difference between White students and African American students disappeared, $t(1636) = -0.604$, *ns*. This suggests that success rates potentially explain the difference between White and African American students. Specifically, African American students may achieve lower success rates, and as a result, may attend fewer terms. Finally, the interaction between age

and ethnicity was significant, $\Delta R^2 = .007$, $F(4, 1631) = 4.05$, $p < .01$. The difference between African American students and White students was smaller for older African American students. The aforementioned effects remained significant even when outliers were excluded from the model (students that earned units greater than 2 standard deviations from the overall mean).

Parameter estimates for the final model can be found in *Table 2*. Regression diagnostics revealed that the distribution of residuals had heavy tails, but error was constant for all predicted values of the regression equation. The non-normally distributed errors are not a threat to the validity of the model, but may result in higher prediction error. The intercept for this model represents the average number of terms for a White student at average sample age (21.9 years of age) with an average course success (63.9%). The model explained 22.4% of the variance in consecutive term enrollment.

Table 3. *Final Model Predicting Number of Consecutive Terms*

Coefficients	Estimate	*t*-value	*P*
Intercept	3.27	30.86	<.001
African American	-0.22	-1.27	*ns*.
API	0.62	4.39	<.001
Hispanic	0.28	2.05	<.05*
Multi-Race/Unknown/Other	0.25	1.66	*ns.*
Age	-0.06	-4.32	<.001
Student Success	1.97	17.15	<.001
African American X Age	0.05	2.63	<.01
API X Age	-0.01	-0.72	*ns.*
Hispanic X Age	-0.02	-0.79	*ns.*
Multi-Race/Unknown/Other X Age	0.02	0.91	*ns.*

Note. *Hispanic students were not significantly different from White students when outliers were removed.

New Fall 2011 Students' Units Achieved by Spring 2014

Summary. A linear regression model was used to predict units earned within the previously described sample. The predictor variables were enrollment status, gender, age, and ethnicity (excluding Native Americans due to small raw count of students). Enrollment status was determined by the number of consecutively enrolled terms. If a student left with two or more semesters remaining in the three year period, they were classified as 'leavers'. If they did not leave, or left with only one semester remaining in the three year period, they were classified as 'stayers'. Not surprisingly, the model predicted that students who were 'stayers' earned more units than their peers who were 'leavers.' Younger students earned more units than their older peers – regardless of enrollment status or ethnicity. Holding enrollment status and term age constant API students earned more units compared to their White peers. Unfortunately, African American students earned fewer units than their White peers. White students who left prior to Spring 2014 earned an average of 9 units, whereas African American students who left earned an average of 5 units. API students earned 12 units on average prior to leaving.

Technical Specifications and Description. Four variables were used to predict the total number of units completed by students prior to Spring 2014: enrollment status, gender, term age, and ethnicity. The term

age variable represented the students' age during the fall 2011 term/semester; the average sample age was subtracted from each student's age to generate a mean centered age variable. Five ethnic groups were represented in the present analysis – White, African American, Asian/Filipino/Pacific Islander, Hispanic, and Multi-Race/Unknown/Other. Native Americans were excluded due to inadequate sample sizes. In this case, the White student group was utilized as the comparison or baseline group for regression analyses.

Next, an ordinary least squares regression was performed in several steps. First, enrollment status was entered as a predictor of total units completed. Enrollment status significantly and strongly improved the prediction of units completed, $\Delta R^2 = .669$, $F(1, 1640) = 3213$, $p < .001$. Students that were classified as stayers earned more units than those that were not classified as stayers. Ethnicity was then entered into the regression equation as a predictor, and also significantly predicted units earned, $\Delta R^2 = .007$, $F(4, 1636) = 9.78$, $p < .001$. African American students earned fewer units than their White peers, whereas API students earned more units than their White peers. Hispanic and Multi-Race students did not significantly differ from White students. In the third and fourth steps, gender and age were entered as predictors. Gender did not significantly improve the prediction of total units earned, but age did, $\Delta R^2 = .002$, $F(1, 1640) = 5.51$, $p < .05$. Older students earned fewer units than their younger peers. The aforementioned effects remained significant even when outliers were excluded from the model (students that earned units greater than 2 standard deviations from the overall mean).

Parameter estimates for the final model are presented in *Table 1*. Diagnostics of this model suggest that errors were normally distributed and varied only slightly across predicted values. Overall this model explained 67.1% of the variance in units earned. It should however be noted that a substantial portion of this variance was explained by enrollment status (66%). The intercept for this model can be interpreted as the average units earned for white students who were exactly of average age (21.9 years old) and were classified as leavers. The projected units earned for African American leavers at average sample age was 5, compared to 9 for Hispanic students, 9 for White students, and 12 for API students.

Table 4. *Final Model Predicting Total Units Earned*

Coefficients	**Estimate**	***t*-value**	***P***
Intercept	9.10	11.16	<.001
Leaver Status	38.04	54.43	<.001
African American	-3.81	-3.12	<.01
API	2.89	2.78	<.01
Hispanic	-1.17	-1.16	*ns.*
Multi-Race/Unknown/Other	0.72	0.65	*ns.*
Age	-0.1	-2.35	<.05