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ABSTRACT

The purpose of this study was to test a methodology that will help Santa Barbara City College (SBCC), California, to validate the course prerequisites that fall under the category of highest level of scrutiny--data collection and analysis--as defined by the Chancellor's Office. This study gathered data for the validation of prerequisites for three courses: (1) CHEM 101, which requires completion of MATH 4 and ENG 70; (2) ECON 101, which requires completion of MATH 100; and (3) FILMST 101, which requires completion of ENG 80 and ENG 70. These three course were chosen in order to ensure there was a large enough number of students participating in the pilot for each of the selected courses. The study aimed to determine which of the two methods of instructors' rating of students is most appropriate for use in the validation of prerequisites, and whether this process can be served by just one of the two suggested approaches: instructors assessment of student readiness or mid-term grades. For CHEM 101, correlation between the assessment and readiness and mid-term grades was only 0.44, whereas for ECON 101 and FILMST 101, the correlations were 0.727 and 0.854, respectively. The authors conclude that it would be sufficient to use just the mid-term grades for assessment, rather than requiring both measures. Student survey appended. (NB)

Results of Fall 2001 Pilot: Methodology for Validation of Course Prerequisites

Institutional Assessment, Research and Planning
http://www.sbcc.net/home/admin/ia/index.cfm

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Executive Summary

The purpose of this study was to test a methodology that will help SBCC validate the course pre-requisites that fall under the category of highest level of scrutiny – data collection and analysis – as defined by the Chancellor's Office. This analysis is required for out-of-sequence communication and computation skills and non-course prerequisites. In Fall 2001, three courses were selected to participate in this pilot: CHEM 101, ECON 101 and FILMST 101. They had large enough enrollments to ensure a sample sufficient in size for conducting the test.

The following information was collected from the participating sections:

- Student self reported completion of the required prerequisites prior to enrolling in the selected course either at SBCC or at other higher education institution.
- Instructor's assessment of student readiness for the course. Instructors should have completed this assessment during the fourth or fifth week of the course.
- Instructor's mid-term grades. Instructors should have assigned these grades during the eighth or ninth week of the semester.

The Fall 2001 pilot helped identify some of the problems that the college will encounter in a systematic effort to validate the prerequisites that fall under the highest level of scrutiny as well as provided some indications regarding the adjustments that could be made when shifting from a pilot to a larger scale validation.

The findings and recommendations from this study are as follows:

1. Although obvious, it is clear that without a reasonable number of students without the prerequisites for each course in this category, it will not be possible to draw strong conclusions. The primary problem encountered in this pilot was the low number of students who reported not completing the prerequisites. This has undermined to a large degree the ability to draw conclusions. It is recommended that either collect data for multiple semesters or collect data from all sections offered in a given semester for each course to be analyzed emphasizing the need that all students present fill in the prerequisite surveys.
2. It is possible that for courses with below college level prerequisites even if data from multiple semesters or all sections offered in one semester are collected, the number of students without prerequisites will still be too low. It is recommended that the college strongly consider the need for entering the information regarding courses completed at other institutions for all students who enroll. Having the actual courses completed rather than self reported data would not only help in the prerequisite validation process but in many other college business processes such as counseling, preparation of student educational plans and degree audit. In the interim, the self reported information is the only avenue available. Before proceeding with the large scale data collection and analysis, it would be helpful to conduct one more pilot with two or three courses that have higher level prerequisites.
3. Colleges are allowed to combine various analysis approaches. It seems that the four-cell analysis of mid-term grades is better than the analysis of final grades. Thus, it is recommended that this approach be utilized, if the college will proceed with the validation process for all courses in this category.
4. Although for one of the three courses the correlation between the instructor's assessment of student readiness and mid-term grades was lower than desired, it is safe to assume that it would be sufficient to use just the mid-term grades rather than requiring both measures.

Introduction

The purpose of this study was to test a methodology that will help SBCC validate the course pre-requisites that fall under the category of highest level of scrutiny – data collection and analysis – as defined by the Chancellor's Office. This analysis is required for out-of-sequence communication and computation skills and non-course prerequisites. "The basic premise is that the college must demonstrate, using sound research practices, that students are highly unlikely to succeed without these skills" (The Academic Senate for California Community Colleges, 1997, p.4).

The Office of Institutional Assessment, Research and Planning conducted an analysis in May 2000 for all SBCC courses that fall in this category using the distribution of final grades over a three-year period (from Fall 1996 to Fall 1999). That analysis did not help in making the case, for most courses, that the prerequisites influence the rate of success of those who met them as opposed to those who did not. One major problem in the data available in the college student information system is that courses completed at other colleges or universities are not recorded, thus the information on actual completion of pre-requisites is just partial, based only on completion of such courses at SBCC or placement tests taken at the college. This pilot attempted to address this deficiency in data available. Another issue was that final grades (excluding Ws) represent only those students who chose to stay and complete the course. After the exclusion of Ws, the percentage of failing grades is, generally, very low, thus limiting the validity of the analysis.

Pilot Methodology

Using the suggestions in the Academic Senate's (1997) document, the following instruments were used to gather data for the validation of prerequisites for three courses (CHEM 101, ECON 101 and FILMST 101) in Fall 2001:

- Student self reported completion of the required prerequisites prior to enrolling in the selected course either at SBCC or at other higher education institution (see Appendix 1 for example of student questionnaire). This questionnaire was administered at the beginning of the semester during a class session.
- Instructor's assessment of student readiness for the course (see Appendix 2 for example of questionnaire). Instructors should have completed this assessment during the fourth or fifth week of the course.
- Instructor's mid-term grades. Instructors should have assigned these grades during the eighth or ninth week of the semester.

The instruments and process were developed in collaboration with the Chair of the Curriculum Committee and presented to the committee for approval.

The main reason for choosing CHEM 101, ECON 101 and FILMST 101 for testing the methodology was the need to ensure that a large enough number of students participated in the pilot for each of the selected courses.

Based on the information included in the 2001-02 College Catalog, the three courses included in the pilot have the following prerequisites:

CHEM 101 requires completion of MATH 4 (or eligibility for MATH 100) and completion of ENG 70 (or eligibility for ENG 103)
ECON 101 requires completion of MATH 100 (or eligibility for MATH 107)
FILMST 101 requires completion of ENG 80 (or eligibility for ENG 100) and completion of ENG 70 (or eligibility for ENG 103).

The data were analyzed using the model suggested by the Chancellor's Office (the Four Cell Process, described in the next section, using the data collected for the three courses selected) augmented by additional tests deemed appropriate (such as comparisons between distribution of mid term grades and actual final grades – excluding Ws – for the courses selected and correlations between instructor's assessment of student readiness and mid-term grades).

Analysis and Results

Student Responses to Prerequisite Questionnaire

The key component in the validation of course prerequisites is having sufficient students in each course who have not completed them such that a comparison can be conducted between the course success of those with and those without prerequisites. Based on the self-reported information by students in the three courses, of the students who responded, most of them indicated having completed the required prerequisites (see Table 1, 2 and 3). Due to this distribution of responses, the essential statistical component of such a study (chi-square between the success of those who succeeded with prerequisite and those without) could not be calculated. This situation can have at least three explanations: 1) it might be that, generally, students actually follow the published requirements regarding courses and enroll having completed the prerequisites; 2) these courses have pre-requisites below the college level for both English and Mathematics, thus it is actually expected that most students should have reached these levels of preparation before enrolling; or 3) given that these surveys were not anonymous, there might be some degree of inflation in the responses.

Table 1. CHEM 101 Student Responses to Prerequisite Survey

	Eligible for MATH 100		Eligible for ENG 103	
Response	N	%	N	%
Yes	77	82%	81	86%
No	4	4%	1	1%
No Response	13	14%	12	13%
Total	94		94	

Table 2. ECON 101 Student Responses to Prerequisite Survey		
	Eligible for MATH 107	
Response	N	%
Yes	97	66%
No	11	8%
No Response	38	26%
Total	146	

Table 3. FILMST 101 Student Responses to Prerequisite Survey				
	Eligible for ENG 100		Eligible for ENG 103	
Response	N	%	N	%
Yes	109	81%	106	79%
No	7	5%	12	9%
No Response	19	14%	17	13%
Total	135		135	

Instructors' Assessment of Student Readiness and Mid-term Grades

One of the purposes of this pilot was to determine which of the two methods of instructor's rating of students is most appropriate for use in the validation of prerequisites and whether this process can be served by using just one of the two suggested approaches: instructor's assessment of student readiness or mid-term grades. The frequencies for the two approaches are listed in Tables 4 through 9. For CHEM 101 the correlation between the assessment of readiness and midterm grades was only 0.44 (significant at <.0005) whereas for ECON 101 and FIMLST 101, the correlations were very high, 0.727 and 0.854, respectively (both significant at <.0005). This indicates that for the latter two courses, using just one of the methods is sufficient. For CHEM 101, the somewhat low correlation prevents drawing a conclusion in this regard. For this course, the assessment of student readiness was, generally, much better than the mid-term grades, whereas for the other two courses the readiness assessment and the mid-term grades were, generally, close.

For FILMST 101 the distribution of the mid-term grades matches very closely the distribution of the actual final grades given by the instructor who participated in the pilot in Fall 1999 and 2000. However, for the other two courses the pilot mid-term grades are either much lower than the final grades assigned by the instructor in the past or much higher.

Table 4. CHEM 101 Instructor's Assessment of Student Readiness		
Assessment	N	%
Very prepared. The student will definitely be successful.	29	37%
Prepared above average.	25	32%
Prepared. With sufficient study, the student could be successful in this class.	13	16%
Somewhat prepared but below the level needed to succeed in this class.	4	5%
Not at all prepared. The student will have difficulty in this class.	8	10%
Total Students Assessed	79	
Students not assessed because they dropped	15	
Total Students	94	

Table 5. CHEM 101 Comparison of Pilot Midterm Grades to Actual Final Grades for the Last Two Fall Semesters						
	Pilot Mid-Term Grades Fall 2001		Actual Final Grades All CHEM 101 Sections Fall 1999 & 2000		Actual Final Grades for Sections Taught by G. Carroll Fall 1997 & 1998 (Instructor did not teach CHEM 101 in Fall 1999 or 2000)	
Grade	N	%	N	%	N	%
A	11	14%	37	14%	23	19%
B	12	15%	72	28%	33	28%
C	23	29%	96	37%	37	31%
D	22	28%	17	7%	6	5%
F	11	14%	35	14%	19	16%
Total Grades	79		257		118	
No Grades	15					
Total	94					

Table 6. ECON 101 Instructor's Assessment of Student Readiness		
Assessment	N	%
Very prepared. The student will definitely be successful.	5	4%
Prepared above average.	23	19%
Prepared. With sufficient study, the student could be successful in this class.	69	57%
Somewhat prepared but below the level needed to succeed in this class.	23	19%
Not at all prepared. The student will have difficulty in this class.	2	2%
Total Students Assessed	122	
Students not assessed because they dropped	24	
Total Students	146	

Table 7. ECON 101 Comparison of Pilot Midterm Grades to Actual Final Grades for Last Two Fall Semesters						
	Pilot Mid-term Grades Fall 2001		Actual Final Grades All ECON 101 Sections Fall 1999 & 2000		Actual Final Grades for Sections Taught by C. Barr Fall 1999 & 2000	
Grade	N	%	N	%	N	%
A	27	21%	62	16%	20	10%
B	28	21%	104	26%	36	17%
C	35	27%	143	36%	87	42%
D	21	16%	47	12%	37	18%
F	20	15%	43	11%	26	13%
Total Grades	131		399		206	
No Grades	15					
Total	146					

Table 8. FILMST 101 Instructor's Assessment of Student Readiness		
Assessment	N	%
Very prepared. The student will definitely be successful.	22	19%
Prepared above average.	35	30%
Prepared. With sufficient study, the student could be successful in this class.	34	29%
Somewhat prepared but below the level needed to succeed in this class.	18	16%
Not at all prepared. The student will have difficulty in this class.	7	6%
Total Students Assessed	116	
Students not assessed because they dropped	19	
Total Students	135	

Table 9. FILMST 101 Comparison of Midterm Grades to Final Grades for Last Two Fall Semesters						
	Pilot Mid-Term Grades Fall 2001		Actual Final Grades All FILMST 101 Sections Fall 1999 & 2000		Actual Final Grades for Sections Taught by M. Perona Fall 1999 & 2000	
Grade	N	%	N	%	N	%
A	11	9%	46	14%	15	8%
B	28	24%	108	32%	44	24%
C	45	38%	114	34%	71	39%
D	24	21%	45	13%	32	18%
F	9	8%	26	8%	18	10%
Total Grades	117		339		180	
No Grades	18					
Total	135					

Student Performance and Four-Cell Analysis

Although the low number of students without prerequisites met indicated that the analysis would not yield relevant results, in order to test all analytical options suggested in the Academic Senate's document, a four-cell process was attempted for the three courses. The four-cell analysis has the following purposes:

- to test whether the premise that being successful in a course and having completed the required prerequisites are independent of each other is correct (this is done by calculating a Pearson chi-square statistic). In other words, this test serves the purpose to show that having met the prerequisite does make a difference in being successful in the course.
- to determine the right/wrong ratio. A case is "right" if the student was successful and met the prerequisite or if a student without the prerequisite failed. A case is "wrong" if a student with the prerequisite failed or a student without the prerequisite succeeded. The minimum desired level for this ratio is 2.
- to determine the incremental gain in success which represents the percentage gain between the percent of successful students when all students are included versus the rate of successful students when only those with the prerequisites are included. Generally, the incremental gain should be at least 10% to make the case that the prerequisites make a difference in student success.

As mentioned at the outset, because for all three courses there were too few students without the prerequisite(s), the chi-square statistic could not be calculated.

For CHEM 101, both the right/wrong ratio as well as the incremental gain in success was below the minimum desired levels (see Table 10). Again, this is a direct consequence of not having enough students without the prerequisite. For ECON 101 (see Table 11), the right/wrong ratio was 3.2 (higher than the minimum level of 2) but the incremental gain in success was low. For FILMST 101 the ratios were also well above the level of 2 but the incremental gains were low. Although some of the results of this pilot would be helpful, overall it seems they are not strong enough for any of the three courses to justify their pre-requisites. The primary cause for not being able to draw more forceful conclusions was the low number of students without the prerequisites.

Table 10. CHEM 101 Midterm Grade vs Prerequisite Completion						
	Eligible for Math 100					
Midterm Grade	**Yes**	**No**	**Total**	**Chi-Square**	**Right/Wrong Ratio**	**Incremental Gain in Success**
A, B, or C	43	1	44	Not enough students without prerequisite to calculate	1.53	0.02
D or F	29	3	32		46:30=1.53 (desired level 2.0)	before applying the prerequisite 44/76=0.58
Total	72	4	76			after applying the prerequisite 43/72=0.6
						2% gain
A, B, or C	60%	25%	58%			
D or F	40%	75%	42%			
	Eligible for ENG 103					
Midterm Grade	**Yes**	**No**	**Total**	**Chi-Square**	**Right/Wrong Ratio**	**Incremental Gain in Success**
A, B, or C	45	0	45	Not enough students without prerequisite to calculate	1.48	0.01
D or F	31	1	32		46:31=1.48 (desired level 2.0)	before applying the prerequisite 45/77=0.58
Total	76	1	77			after applying the prerequisite 45/76=0.59
						1% gain
A, B, or C	59%	0%	58%			
D or F	41%	100%	42%			

Table 11. ECON 101 Midterm Grade vs Prerequisite Completion						
	Eligible for Math 107					
Midterm Grade	**Yes**	**No**	**Total**	**Chi-Square**	**Right/Wrong Ratio**	**Incremental Gain in Success**
A, B, or C	76	7	83	Not enough students without prerequisite to calculate	3.20	0.02
D or F	18	4	22		80:25=3.20 (desired level 2.0)	before applying the prerequisite 83/105=0.79
Total	94	11	105			after applying the prerequisite 76/94=0.81
						2% gain
A, B, or C	81%	64%	79%			
D or F	19%	36%	21%			

Table 12. FILMST 101 Midterm Grade vs Prerequisite Completion						
	Eligible for ENG 100					
Midterm Grade	**Yes**	**No**	**Total**	**Chi-Square**	**Right/Wrong Ratio**	**Incremental Gain in Success**
A, B, or C	78	2	80	Not enough students without prerequisite to calculate	3.19	0.03
D or F	24	5	29		83:26=3.19 (desired level 2.0)	before applying the prerequisite 80/109=0.73
Total	102	7	109			after applying the prerequisite 78/102=0.76
						3% gain
A, B, or C	76%	29%	73%			
D or F	24%	71%	27%			
	Eligible for ENG 103					
Midterm Grade	**Yes**	**No**	**Total**	**Chi-Square**	**Right/Wrong Ratio**	**Incremental Gain in Success**
A, B, or C	76	5	81	Not enough students without prerequisite to calculate	2.96	0.04
D or F	23	7	30		83:28=2.96 (desired level 2.0)	before applying the prerequisite 81/111=0.73
Total	99	12	111			after applying the prerequisite 76/99=0.77
						4% gain
A, B, or C	77%	42%	73%			
D or F	23%	58%	27%			

Conclusions and Recommendations

The Fall 2001 pilot helped identify some of the problems that the college will encounter in a systematic effort to validate the prerequisites that fall under the highest level of scrutiny as well as provided some indications regarding the adjustments that could be made when shifting from a pilot to a larger scale validation.

The findings and recommendations from this study are as follows:

1. Although obvious, it is clear that without a reasonable number of students without the prerequisites for each course in this category, it will not be possible to draw strong conclusions. One option is to collect data for multiple semesters. Another option is to collect data from all sections offered for a given course in one semester and emphasize the need that all students present during survey administration fill in the information.
2. It is possible that for courses with below college level prerequisites even if data from multiple semesters are collected, the number of students without prerequisites will still be too low to conduct an analysis. It is recommended that the college strongly consider the need for entering the information regarding courses completed at other institutions for all students who enroll. This is customary practice at many institutions. Having the actual courses completed rather than self reported student data would not only help in the prerequisite validation process but in many other college business processes such as counseling, preparation of student educational plans and degree audit. In the interim, the self reported information is the only avenue available. Before proceeding with the large scale data collection and analysis, it would be helpful to conduct one more pilot with two or three courses that have higher level prerequisites.
3. Colleges are allowed to combine various analysis approaches. It seems that the four cell analysis of mid-term grades is better than the analysis of final grades. Thus, it is recommended that this approach be utilized, if the college will proceed with the validation process for all courses in this category.
4. Although for one of the three courses the correlation between the instructor's assessment of student readiness and mid-term grades was lower than desired, it is safe to assume that it would be sufficient to use just the mid-term grades rather than requiring both measures.

References:

The Academic Senate for California Community Colleges. (1997). *Good Practice for the Implementation of Prerequisites. Levels of Scrutiny for Prerequisites.*

Appendix 1. STUDENT SURVEY FALL 2001

FILM STUDIES 101, SECTION

Student Name: «Name»
Survey Code: «Survey_Code»

Please **fill in EACH CIRCLE COMPLETELY** like this ● DO NOT check or circle like this ⊘ ⊗ ◎

Please answer the two questions below:

1. During your studies at **SBCC** or at any other **college** or **university** (**high school courses should not be considered**) have you:

- Completed English 80 Effective Writing Techniques, **OR**
- Completed an English class covering writing competency and fluency, **OR**
- Completed a more advanced English class than those described above (for example, College Fundamentals of Composition; College Composition and Reading), **OR**
- Scored on an English placement exam that you took when you started (SBCC or any other college) at a level **higher than** English 80 or its equivalent (for example, a score that allowed you to enroll directly in ENG 100 – Fundamentals of Composition).

If **ANY** of the above applies to you, then please fill in the circle for **YES** (below). Otherwise, please fill in the circle for **NO**.

○ Yes
○ No

2. During your studies at **SBCC** or at any other **college** or **university** (**high school courses should not be considered**) have you:

- Completed English 70 Effective Reading & Study Skills Techniques, **OR**
- Completed an English class covering reading, study skills, and vocabulary development, **OR**
- Completed a more advanced English class than those described above (for example, College Composition and Reading; College Writing), **OR**
- Scored on an English placement exam that you took when you started (SBCC or any other college) at a level **higher than** English 70 or its equivalent (for example, a score that allowed you to enroll in ENG 103 – Improvement of College Reading).

If **ANY** of the above applies to you, then please fill in the circle for YES (below). Otherwise, please fill in the circle for No.

○ Yes
○ No

Appendix 2. Fall 2001 Student Readiness Questionnaire

Instructor: **Course:** FILMST 101 **Section:**
Date Provided:
Date Returned:

Please **fill in EACH CIRCLE COMPLETELY** like this ● DO NOT check or circle like this
∅ ⊗ ◎

		Assessment of Student Readiness for the Class				
Student Name	**SSN**	Not at all prepared. The student will have difficulty in this class.	Somewhat prepared but below the level needed to succeed in this class.	Prepared. With sufficient study, the student could be successful in this class.	Prepared above average.	Very prepared. The student will definitely be successful.
		○	○	○	○	○
		○	○	○	○	○
		○	○	○	○	○

Appendix 3. Fall 2001 Mid-Term Grades

Instructor: **Course:** FILMST 101 **Section:**
Date Provided:
Date Returned:

Please **fill in EACH CIRCLE COMPLETELY** like this ● DO NOT check or circle like this ∅ ⊗ ◎

		Mid-Term Grade				
Student Name	**SSN**	F	D	C	B	A
		○	○	○	○	○
		○	○	○	○	○

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