DOCUMENT RESUME

ED 389 349 JC 950 566

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TITLE	Funds for Instructional Improvement: Pre/Co/Advisory Requisite Study.
INSTITUTION	California Community Colleges, Sacramento. Office of the Chancellor.
SPONS AGENCY	California Community Coll. Fund for Instructional Improvement.
PUB DATE	[95]
NOTE	31p.
PUB TYPE	Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Academic Achievement; Community Colleges; Course Evaluation; *Curriculum Evaluation; *Instructional Effectiveness; *Outcomes of Education; *Prerequisites; *Required Courses; Student Attitudes; Success; Teacher Attitudes; Two Year Colleges
IDENTIFIERS	*California Community Colleges

ABSTRACT

In 1994, the Chancellor's Office of the California Community Colleges funded a study to determine the effect of pre-, co-, and advisory requisites on target course outcomes at nine community colleges. Quantitative data were gathered on student success in target courses and retention, while qualitative data were collected through spring 1994 surveys of student perceptions of requisites and faculty perceptions of student preparedness in target courses. The study also considered the degree of curriculum alignment between required course exit and target course entrance requirements, as well as the degree of instructional alignment between target course outcomes and actual curriculum and strategies used in the classroom. Outcomes were gathered for 7,512 students grouped by those who completed requisite courses and those who did not. Students who completed prerequisite or advisory courses in computational and communication skills were found to be more successful in target courses than students who did not. In addition, results from faculty and student surveys were very similar to those of the quantitative data. Instructional alignment of target courses ranged from moderately to highly aligned, with requisites having a positive effect on student outcomes. Age was the only additional measure beyond requisite preparation that had any effect on student outcome, with older students more likely to succeed than younger students. The student survey instrument is included. (TGI)

Funds for Instructional Improvement

Pre/Co/Advisory Requisite Study

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Executive Summary

The purpose of this evaluative study was to determine if Pre-/Co/Advisory requisites have an effect on target course outcomes. The study used both quantitative and qualitative data to assess the requisites' effects on student outcomes. Quantitative dependent variables included success or non-success in target course, and retention. Qualitative dependent variables were student perceptions of requisites and faculty perceptions of student pre-paredness in target courses. Also considered was the degree of curriculum alignment between the exit competencies for the requisite course and the entrance competencies for the target course as well as the degree of instructional alignment between target course outcomes and the actual curriculum and strategies used in the classroom.

Two cohort groups (those with the pre-/co/advisory requisites and those without) were drawn from the target courses at each site. The data from each of these cohort groups were examined to ascertain whether there was a difference between student performance and student perception.

Quantitative Outcomes:

- Students with the appropriate pre- or advisory requisites met with success more often than their counterparts without the pre- or advisory requisites.

- Students with the appropriate pre- or advisory requisites were more likely to complete the target course than those students without the appropriate pre- or advisory requisites.

Qualitative Outcomes:

- Instructor and student ratings were consistent with quantitative data.

- Requsite course exit competencies were aligned with entrance competencies in target courses. and

- Course syllabi were evaluated for the degree of instructional aliignment and were found to be moderately to highly aligned with stated course outcomes. .

FII 94-95
PRE/CO/ADVISORY REQUISITE STUDY

In the Fall of 1994, the Chancellor's Office, under the auspices of Funds for Instructional Improvement, funded an evaluative study entitled Validation of Pre/Co and Advisory Requisites Cross Disciplines: A Consortium Study to:

Examine a sample of the critical courses that are likely to require communication and computational requisites and advisories on recommended preparation;

Determine specific student demographic and performance variables to be collected;

Gather and analyze data to determine the relationship between student prerequisite skills and potential for success in target courses;

Formalize recommendations from the research findings and channel them to the appropriate bodies for inclusion in district matriculation and curriculum plans.

The project was funded as a consortium project with 9 colleges participating. The colleges represented a snapshot picture of state enrollments with three colleges from Northern California, three from Central California, and three from Southern California. Two colleges were rural; six were suburban; and one was an urban inner city college.

During the summer of 1994, a steering committee for the grant was organized with a director of institutional research from a large suburban Southern California community college district, an assessment director from a midsize rural Northern California community college district and the grant director from a large, suburban Northern California community college district. Together the committee developed a triangulated research strategy that used three different methods to determine the validity of cross-discipline requisites. Data to be collected included both quantitative and qualitative independent variables. Protocols and timelines were developed for the Fall semester implementation and a teleconference format was used to disseminate the information to the researchers and faculty involved. A second teleconference was held in early December to assess progress, discuss problems, and disseminate protocols for Spring semester.

During the early part of the Spring semester, survey of student self-certification, student perception of requisite, and faculty perception of student preparedness were administered to all faculty and students participating in the project at each of the respective schools.

The researchers from each school involved in the project met at the Chancellor's office at the end of March to review the data and discuss possible

outcomes. At that meeting, the reporting mechanisms and data elements were established for the quantitative data due to the grant director by mid June. All quantitative data were received by the grant director by mid July. These data were analyzed and the results are attached.

Since the grant was charged with "building a model" for addressing this issue, only two target classes were used--CAN Chem 2 and its computational prerequisite and CAN History 8 and its communications advisory requisite which in most cases is English and Reading one level below CAN English 2.

Two research questions were posed:

1. Does academic preparation in the form of prerequisites and advisories have an effect on

    (a). course grade?

    (b) course retention?

2. Do multiple measures including age, gender, and recency have an effect on student outcomes when correlated with requisite preparation?

Triangulation Strategy

To address the research questions posed, a triangulation strategy was devised, as single measures do not by themselves tell researchers all they need to know about a subject under study. Triangulation strategies foster convergence using both qualitative and quantitative methodologies which verify evidence in multiple ways (Popham, p 160-161). Additionally, the District Model Policy suggests four possible ways to validate cross-discipline requisites, and these methods were incorporated into the triangulation strategy used.

Therefore, for the purposes of this study, the multiple measures used to understand the construct of requisite preparation and its effect on student outcomes were as follows:

1. a content review of the target courses focusing on the entrance competencies necessary for students to succeed;

2. a content review of the prerequisite course focusing on the exit competencies of that particular course;

3. a review of the degree of alignment between target course competencies and course assignments and exams; and

4. And, a review of the effects prerequisite acquisition had on student outcomes as defined by grade point average, retention in the target classes, student perceptions of the necessity for the requisite, and faculty perceptions of student preparedness for the target course.

The following research was undertaken:

1. A content review was done for each of the two target courses to establish entry level competencies: CAN History 8 and CAN Chem 2.

2. Content reviews were done for each of the requisite courses in the study. For CAN History 8, the grant looked at a writing and/or reading course one level below CAN English 2. For CAN Chem 2, Beginning and Intermediate Algebra skill requisites were examined. As a result of these content reviews, exit competencies were established for these courses.

3. Course outlines were gathered for CAN Chem 2 and CAN History 8 from each of the consortium schools. Course outlines were analyzed by a panel of faculty experts to determine the extent to which entrance competencies for target courses (CAN History 8 and CAN Chem 2) align with the exit competencies for their prerequisites or advisories.

4. Retention data, grade point average, and demographic data were collected for each section involved in the study. Two cohort groups in each section were compared , those with requisites and those without.

PROTOCOL FOR RESEARCHERS

The protocol for researchers involved in this study was as follows:

1. At each school, a team of specialists in each area performed content reviews of intermediate algebra and English 1A to ascertain exit competencies for each specific course.

2. Course outlines were collected from 2 - 4 instructors at each site in the consortium for each of the targeted classes. Care was taken so that neither individual instructors nor schools were identified.

3. At each site, teams from each of the target content areas did a content review of CAN Chem 2 and CAN History 8 to ascertain entrance level competencies.

4. A panel of discipline-specific faculty matched entrance level competencies with exit level competencies of the pre/advisory requisite.

5. On each campus, in the targeted courses, CAN Chem 2 sections and CAN History 8, a Student Self-Certification document was distributed. This document asked students to self-certify that they either had the prerequisite or not (See draft form attached). Care was taken so that student identity remained confidential. Student information gathered had no bearing on student enrollment or grades. The information was solely for the benefit of ascertaining the effects of pre/co/advisory requisites on student outcomes for this study.

6. A Faculty Perception of Student Preparedness survey was administered to faculty participating in the project during the spring semester.

7. A Student Perceptions of Requisites survey was administered to all participating students in the spring semester. These surveys were administered by the campus researcher or his/her designee and student confidentiality was maintained.

8. Retention data for each target class were gathered at the end of the semester. This data were reported in ASCII text and dBase IV formats.

9. Class Grades for each target class were required at the end of the semester to determine success/non-success for each cohort group. (pre/advisory requisites, no pre/advisory requisite).

For Researchers:

Courses were divided into five groups based on the degree of alignment between exit level competencies for the requisite and the entrance level competencies for the target course. Actual course syllabi, sample assignments, and tests were the data used to assign each course to a category. The assessments were made by a panel of experts. The five groups follow: (See next page)

ALIGNMENT SCALE OF REQUISITE EXIT COMPETENCIES WITH ENTRANCE COMPETENCIES

RANK	CRITERIA
5 **Perfectly Aligned**	All material is highly and clearly aligned with stated competencies for the course. Entrance competencies are consistently integrated into the course syllabus, assignments and exams and students are required to demonstrate facility with the competencies in the target course assignments.
4 **Highly Aligned**	All material is highly aligned with stated competencies for the course. Entrance competencies are integrated into the course syllabus, assignments, and exams and students are required to demonstrate facility with the competencies in the target course assignments. However, the consistency and clarity of assignment relative to the entrance competencies are not as well defined.
3 **Moderately Aligned**	All material is moderately aligned with stated competencies for the course. Entrance competencies are somewhat reflected in the syllabus, in some assignments, and in some exams and students may be required to demonstrate facility with the competencies. Entrance competencies do not appear to be integrated throughout the course.
2 **Weakly Aligned**	Material presented offers examples of alignment with entrance competencies but there is inconsistency in scope and frequency of required application of the competencies.
1 **Minimally Aligned**	There are few examples of alignment between the entrance competencies and the tasks students are asked to perform.

CONTENT REVIEW FORM

EXIT COMPETENCIES	ENTRANCE COMPETENCIES

Student Preparedness Form

To the Faculty:

The next phase of the validation process entails each instructor rating his/her students' as to their preparedness for the course. The evaluation should be based on observations of students' demonstrated skills during the first six weeks of the term. This would include students' ability to comprehend the material covered in the course which could be manifested in homework assignments, questions asked and in-class exams. Keep in mind the skills students need to possess in order to successfully participate in the course activities. Please don't take into account students' attendance, motivation or whether they submit their assignments; the ratings should be based strictly on students' capabilities to perform. Use a roster generated by your own Admissions and Records office. Return the roster to your campus researcher or designee.
All information will be kept confidential. If you wish, the material may be returned to you at the end of the study.

Rank	Criteria
4	**Student is Highly likely to succeed:** Should be interpreted as a student with very strong skills who can pass easily.
3	**Student is likely to succeed:** Should be interpreted as a student with moderate skills who will pass if s/he applies her/himself.
2	**Student might succeed:** should be interpreted as a student with weak skills who will need to seek outside intervention in the form of individual tutoring or a study group in order to pass.
1	**Student highly unlikely to succeed:** should be interpreted as a student with inadequate skills who will probably not pass the course.

Student Perceptions of Prerequisites

Form B: Mathematics Skills

Term	College ID		
○ Fall			
○ Winter	0	0	0
○ Spring	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9

Year
○ 1994
○ 1995
○ 1996
○ 1997
○ 1998

Course Name & Number: *Chemistry*

USE NO 2 PENCIL ONLY

Please mark your answers like this. ●
DO NOT check ✓
...or cross. ✗

You are being asked about your perceptions on whether or not prerequisites for this course have any bearing on how you are doing in this course and the grade you think you will get. Please complete this form to the best of your ability.

Your responses will NOT be shared with your instructor nor will they affect the grade you receive.

Thank you for help.

Write the prerequisite descriptions as provided by your instructor in the spaces below. In the righthand column indicate whether or not you have completed the prerequisite.

Prerequisite Description ○ *If none, check this box*	Completed? Yes	No	Unsure
1. *(pre-algebra)*	○	○	○
2. *(beginning algebra)*	○	○	○
3. *(intermediate algebra)*	○	○	○
4. *(other math)*	○	○	○

Student ID								
		+		+				
0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

Course Code				
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

1. Gender?
   - ○ Male
   - ○ Female

2. Age?
   - ○ Less than 20 years old
   - ○ 20 - 24 years old
   - ○ 25 - 29 years old
   - ○ 30 - 49 years old
   - ○ 50 or more years old

3. Do you believe beginning algebra skills are needed to pass this course? ○ Yes ○ No ○ Unsure

4. Do you believe intermediate algebra skills are needed to pass this course? ○ Yes ○ No ○ Unsure

5. Do you expect to pass this course? ○ Definitely ○ Probably ○ Unsure

If this course does not have established prerequisites, you may stop here.

6. How many of the prerequisites for this class have you completed? ○ All ○ ome ○ None

7. If you met at least some of the prerequisites for this class, was it by course completion, assessment testing, or some other method? (mark all that apply) ○ Course ○ Test ○ Other

Thank you for your participation.

Student Perceptions of Prerequisites

Form A: Communication Skills

Course Name & Number: *History*

Term
○ Fall
○ Winter
○ Spring

Year
○ 1994
○ 1995
○ 1996
○ 1997
○ 1998

College ID		
○ 0	○ 0	○ 0
○ 1	○ 1	○ 1
○ 2	○ 2	○ 2
○ 3	○ 3	○ 3
○ 4	○ 4	○ 4
○ 5	○ 5	○ 5
○ 6	○ 6	○ 6
○ 7	○ 7	○ 7
○ 8	○ 8	○ 8
○ 9	○ 9	○ 9

USE NO. 2 PENCIL ONLY

Please mark your answers like this. ●
DO NOT check ✓
...or cross. ✗

You are being asked about your perceptions on whether or not prerequisites for this course have any bearing on how you are doing in this course and the grade you think you will get. Please complete this form to the best of your ability.

Your responses will NOT be shared with your instructor nor will they affect the grade you receive.

Thank you for help.

Write the prerequisite descriptions as provided by your instructor in the spaces below. In the righthand column indicate whether or not you have completed the prerequisite.

Prerequisite Description ○ *If none, check this box*	Completed? Yes	No	Unsure
1. *(pre-college writing)*	○	○	○
2. *(college-level writing)*	○	○	○
3. *(pre-college reading)*	○	○	○
4. *(college-level reading)*	○	○	○

Student ID			-		-			
○ 0	○ 0	○ 0	○ 0	○ 0	○ 0	○ 0	○ 0	○ 0
○ 1	○ 1	○ 1	○ 1	○ 1	○ 1	○ 1	○ 1	○ 1
○ 2	○ 2	○ 2	○ 2	○ 2	○ 2	○ 2	○ 2	○ 2
○ 3	○ 3	○ 3	○ 3	○ 3	○ 3	○ 3	○ 3	○ 3
○ 4	○ 4	○ 4	○ 4	○ 4	○ 4	○ 4	○ 4	○ 4
○ 5	○ 5	○ 5	○ 5	○ 5	○ 5	○ 5	○ 5	○ 5
○ 6	○ 6	○ 6	○ 6	○ 6	○ 6	○ 6	○ 6	○ 6
○ 7	○ 7	○ 7	○ 7	○ 7	○ 7	○ 7	○ 7	○ 7
○ 8	○ 8	○ 8	○ 8	○ 8	○ 8	○ 8	○ 8	○ 8
○ 9	○ 9	○ 9	○ 9	○ 9	○ 9	○ 9	○ 9	○ 9

Course Code				
○ 0	○ 0	○ 0	○ 0	○ 0
○ 1	○ 1	○ 1	○ 1	○ 1
○ 2	○ 2	○ 2	○ 2	○ 2
○ 3	○ 3	○ 3	○ 3	○ 3
○ 4	○ 4	○ 4	○ 4	○ 4
○ 5	○ 5	○ 5	○ 5	○ 5
○ 6	○ 6	○ 6	○ 6	○ 6
○ 7	○ 7	○ 7	○ 7	○ 7
○ 8	○ 8	○ 8	○ 8	○ 8
○ 9	○ 9	○ 9	○ 9	○ 9

1. Gender?
   - ○ Male
   - ○ Female

2. Age?
   - ○ Less than 20 years old
   - ○ 20 - 24 years old
   - ○ 25 - 29 years old
   - ○ 30 - 49 years old
   - ○ 50 or more years old

3. Do you believe college-level writing skills are needed to pass this course? ○ Yes ○ No ○ Unsure

4. Do you believe college-level reading skills are needed to pass this course? ○ Yes ○ No ○ Unsure

5. Do you expect to pass this course? ○ Definitely ○ Probably ○ Unsure

If this course does not have established prerequisites, you may stop here.

6. How many of the prerequisites for this class have you completed? ○ All ○ Some ○ None

7. If you met at least some of the prerequisites for this course, was it by course completion, assessment testing, or some other method? (mark all that apply) ○ Course ○ Test ○ Other

Thank you for your participation.

OUTCOMES

DEMOGRAPHICS: (Aggregated Data for both semester for both Chemistry and History)

Age:

There were 7, 512 students who participated in the study during the academic year 1994 - 95. The age categories, frequencies and percentages are as follows:

Age	Number	Percent
Under 20	2,507	36.2
20 - 24	2,883	41.6
25 - 34	1,091	15.7
35 - 49	410	5.9
50+	43	.6

Student Ethnicity:

Ethnicity	Number	Percent
African American	208	3.0
Asian	914	12.2
Filipino	271	4.0
Hispanic	703	10.3
Native American	113	1.5
Other	160	2.3
Pacific Islander	45	.7
White	4,413	64.6

Gender:

Gender	Number	Percent
Male	3,925	52.5
Female	3,568	47.5

For Chemistry, the demographics are:

Age:

There were 1,827 students who participated in the Chemistry study during the academic year 1994 - 95. The age categories, frequencies and percentages are as follows:

Age	Number	Percent
Under 20	489	29.2
20 - 24	722	43.1
25 - 34	366	21.9
35 - 49	91	5.4
50+	6	.4

Student Ethnicity:

Ethnicity	Number	Percent
African American	59	3.6
Asian	407	24.9
Filipino	54	3.3
Hispanic	155	9.5
Native American	23	1.4
Other	45	2.8
Pacific Islander	7	.4
White	883	54.1

Gender:

Gender	Number	Percent
Male	1,028	56.7
Female	785	43.3

For History, the demographics are:

Age:

There were 5,685 students who participated in the history portion of the study during the academic year 1994 - 95. The age categories, frequencies and percentages are as follows:

Age	Number	Percent
Under 20	2,018	35.5
20 - 24	2,161	41.1
25 - 34	725	13.8
35 - 49	319	6.1
50+	37	.7

Student Ethnicity:

Ethnicity	Number	Percent
African American	149	2.9
Asian	507	9.8
Filipino	217	4.2
Hispanic	548	10.6
Native American	90	1.7
Other	115	2.2
Pacific Islander	38	.7
White	3,530	68.0

Gender:

Gender	Number	Percent
Male	2,897	51.0
Female	2,783	49.0

Success Rates in Target Courses

Aggregated Data for Chemistry and History for Fall, 1994 and Spring, 1995

N = 6,235

Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
No	51.4%	17.3%	31.3%
Yes	69.5%	12.6%	17.9%

$P < .01$

Students with the prerequisite skills in either CAN Chemistry 2 or advisory requisite in CAN History 8 were 18.1% more successful in the target course than were their counterparts without the requisite skills. Additionally, the withdraw rate was 13.4% higher for students without the requisite skills.

Aggregated Data for Chemistry for Fall, 1994 and Spring, 1995

N = 1422

Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
No	38.5%	13.1%	48.4%
Yes	61.0%	11.6%	27.4%

$P < .01$

CAN Chemistry 2 students with the prerequisite computational skills were 22.5% more successful than were their counterparts without the prerequisite computational skills. Additionally, the withdraw rate was 21% higher for students without the prerequisite computational skills.

Aggregated Data for History for Fall, 1994 and Spring, 1995

N = 4813

Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
No	55.2%	18.6%	26.1%
Yes	72.0%	12.9%	15.2%

$P < .01$

CAN History 8 students with the advisory requisite reading and writing skills were 16.8% more successful than were their counterparts without the advisory requisite reading and writing skills. Additionally, the withdraw rate was 10.9% higher for students without the advisory requisite reading and writing skills.

Success rate in Target Course Using English Test or Course Prerequisite: History, Fall, 1994 and Spring, 1995

N = 3019

Way Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
Test	57.7%	22.9%	19.4%
Course	70.2%	12.4%	17.4%

$P < .01$

Students who met the advisory requisite writing skills with a class were 12.5% more successful than were students who met the advisory requisite writing skills for CAN History 8 with an assessment measure. The withdraw rate for students who met the advisory requisite for CAN History 8 with an assessment measure was 2% higher than for students who met the advisory requisite with a course. The non-success rate for students meeting the advisory requisite for writing skills for CAN History 8 with an assessment measure was 10.5% higher than for students meeting the advisory requisite with a course.

Success rate in Target Course using Reading Test or Course Prerequisite: History, Fall, 1994 and Spring, 1995

N = 2,387

Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
Test	58.7%	21.0%	20.3%
Course	75.0%	10.5%	14.5%

$P < .01$

Students who met the advisory requisite reading skills with a class were 16.3% more successful than were students who met the advisory requisite reading skills for CAN History 8 with an assessment measure. The withdraw rate for students who met the advisory requisite for CAN History 8 with an assessment measure was 5.8% higher than for students who met the advisory requisite with a course. The non-success rate for students meeting the advisory requisite for reading skills for CAN History 8 with an assessment measure was 10.5% higher than for students meeting the advisory requisite with a course.

Success rate in Target Course using Math Test or Course Prerequisite: History, Fall, 1994 and Spring, 1995

N = 1,040

Prerequisite Met?	Success (A, B, C, or CR)	Non-Success (D, F or NC)	Withdrawal (W)
Test	63.3%	16.5%	20.3%
Course	57.6%	10.6%	31.7%

$P < .01$

The success rate for students meeting the computational prerequisite for CAN Chemistry 2 with an assessment measure was 5.7% higher than those meeting the computational prerequisite with a course. The withdraw rate for students meeting the computational prerequisite for CAN Chemistry 2 with a course was 11.4% higher than for those students meeting the computational prerequisite for CAN Chemistry 2 with an assessment measure.

Skill Level Completed Versus Faculty Expectation
Course: Chemistry
Spring 1995

(N = 241)

Skill Level Completed (Reported by Student)	Faculty Expectation - Chemistry				N
	Very Unlikely to Succeed	Unlikely to Succeed	Likely to Succeed	Very Likely to Succeed	
Pre-Algebra	32.6%	26.1%	28.3%	13.0%	46
Beginning Algebra	29.4%	25.5%	29.4%	15.7%	51
Intermediate Algebra	27.8%	17.7%	34.2%	20.3%	79
Other Mathematics	24.6%	23.1%	33.8%	18.5%	65

Student Expectation Versus Actual Performance
Course: Chemistry
Spring 1995

Prepared Students

Expectation of Students Who Completed Prerequisite (Database Check)	Actual Performance			N
	Success	Non-Success	Withdrawal	
Unsure/Unknown	48.8%	14.6%	36.6%	41
Probably Pass	45.5%	4.5%	50.0%	22
Definitely Pass	62.6%	9.8%	27.6%	123

P > .10 (N = 186)

Unprepared Students

Too few unprepared students enrolled to produce a meaningful table

Student Expectation Versus Actual Performance
Course: History
Spring 1995

Prepared Students

Expectation of Students Who Completed Prerequisite (Database Check)	Actual Performance			N
	Success	Non-Success	Withdrawal	
Unsure/Unknown	60.6%	17.3%	22.1%	104
Probably Pass	45.5%	33.3%	21.2%	33
Definitely Pass	67.9%	24.4%	7.6%	131

P < .01 (N = 268)

Unprepared Students

Expectation of Students Who Did Not Complete Prerequisite (Database Check)	Actual Performance			N
	Success	Non-Success	Withdrawal	
Unsure/Unknown	31.3%	35.4%	33.3%	48
Probably Pass	34.8%	39.1%	26.1%	23
Definitely Pass	64.7%	19.1%	16.2%	68

P < .01 (N = 139)

Skill Level Completed Versus Faculty Expectation
Course: History
Spring 1995

(N = 242)	Faculty Expectation - History				
Skill Level Completed (Reported by Student)	Very Unlikely to Succeed	Unlikely to Succeed	Likely to Succeed	Very Likely to Succeed	N
Pre-College Writing	5.3%	25.7%	60.2%	8.8%	113
College Level Writing	3.1%	20.2%	56.6%	20.2%	129

(N = 130)					
Pre-College Reading	8.8%	17.6%	57.4%	16.2%	68
College Level Reading	4.8%	21.0%	53.2%	21.0%	62

DISCUSSION:

Quantitative Data for Chemistry and History for Fall, 1994, and Spring, 1995

Students with prerequisite or advisory cross-discipline computational and communication skills were more successful in the target course then were students without the pre- or advisory computational and communication requisites. This suggests that possession of requisite skills prior to enrolling in a target course has a positive effect on student success in the target course.

The data when separated by subject matter (CAN Chemistry 2, CAN History 8) continue to support the notion that student acquisition of prerequisite and advisory skills prior to enrollment in the specific target course has a positive effect on student outcome. It is interesting to note that how students meet the requisite is significant. In the case of CAN Chemistry 2, students meeting the requisite with a math assessment measure had slightly higher success rates and slightly lower drop rates than students meeting the requisite by course completion. This result may be unreliable due to a small number of students completing the math assessment test versus those that completed a course. Furthermore, the results were not statistically significant.

In CAN History 8, the results were the opposite. Students meeting the requisite with a course in reading and/or writing skills rather than an assessment test were considerably more likely to succeed than their counterparts meeting the requisite with an assessment score. Furthermore, students with course work in reading and writing had lower drop rates than did students with only a qualifying assessment score.

It can be argued that students who have had courses in reading and/or writing may be more adept at using communication skills in other subject matters than are students who merely meet the requisite by scoring well on an assessment test. This, however, is not to suggest that the assessment measures are not good measures; only that students with course work in the specific areas may have a deeper knowledge which they can use in applied situations.

In the case of CAN Chemistry 2 and its math requisite, students placed with assessment scores may have more than met the requisite for CAN Chemistry 2, which in most instances was completion of intermediate algebra and in some instances was completion of beginning algebra. Student Self-Certification questionnaires revealed that some students had completed trigonometry and calculus in addition to the requisite required.

The question arises: What is meant by the statement "that without the pre- or advisory requisite, the student is highly unlikely to succeed"? The Model Policy leaves the definition of the term to local districts and each district and/or college will have to decide how the term will be operationalized. Though this study looked at only two courses, in all cases, there were significant differences in

student success between those with the pre- or advisory requisite and those who did not have the pre- or advisory requisite.

Additionally, this study only looked at student success and nonsuccess. Success was defined as a grade of A, B, C or Credit and Nonsuccess was defined as a grade of D, F, or No Credit.

QUALITATIVE DATA

Faculty and student perception data reflected results similar to those of the quantitative data. Those students with the appropriate requisite preparation for both CAN Chemistry 2 and CAN History 8 were perceived by instructors to be more likely to succeed than their counterparts without the appropriate requisite preparation.

Students, too, perceived a positive effect of requisites on their success, thus validating both traditional wisdom and quantitative data indicating that requisites improve student outcomes. The combined weight of traditional wisdom, quantitive data, and student perceptions may make it easier to withstand possible individual student challenges to the requisite in the future.

Students who perceived themselves as definitely passing were more likely to succeed than their less confident cohorts, regardless of requisite preparation. This outcome should be examined in terms of student self-confidence and its effect on positive student outcomes relative to requisite issues.

It needs to be noted here that the numbers for the qualitative perception portion of this study were relatively small and that the outcomes should be interpreted with this in mind. Such small numbers on a state-wide study may indicate the problems existent in collecting such data on local campuses.

One problem in obtaining Faculty Perception data is that faculty were, in many instances, unwilling to render a perception without having a significant body of student work to judge. Faculty were reluctant to evaluate student preparedness in the first four weeks of the semester. Most waited unti the eighth week of the semester before completing the survey. In reality then, the perception is based on teacher intervention (teaching) rather than student preparedness at the time of entry into the class. Additionally, the question must then be asked, "Is there a 'halo effect' operating in terms of student success?"

In terms of student perceptions, the issue of self-reporting reliability needs to be addressed. Part of this reliability issue relates to how students perceive the language in which the self-certifications are presented. It was the experience of the research participants in this study that students needed very specific directions and clarification of terms used in the self-reporting document.

From a practical standpoint, it was easier to obtain student perceptions of requisites than it was to obtain faculty perceptions. Students were willing to participate in the self-certification study, and most faculty were willing to allow

the 10 to 15 minutes required to obtain this data. Faculty perceptions, on the other hand, demanded a significant amount of instructor time and were therefore harder to obtain than were student perceptions.

ALIGNMENT ISSUES

The alignment issue is of critical importance to the discussion of requisites. If faculty say that a course requires specific entrance level requisites and then do not require students to use the requisite skills in the target class, then in fact, the requisites may not be relevant. However, if faculty require students to use requisite skills in the target course, then requisites should play a critical role in student outcome. The more requisite-dependent the target course is, the greater the effect possession of the requisite should have on producing positive student outcomes.

It is important in this discussion to distinguish between curricular and instructional alignment. Curricular alignment refers to the match that exists between the official Curriculum Course of Study forms and what faculty have students learn in the classroom. Instructional alignment refers to the match between what we say we want students to be able to do and what we actually ask them to do.

An example of curricular alignment would be the degree to which an individual course syllabus matches the outcomes found on the official Course of Study form found in the Instruction office. Course syllabi that mirror the official Course of Study form would be judged to have goodcurricular alignment.

Curricular alignment may not actually reflect classroom activity or actual student outcomes. Instructional alignment more appropriately addresses the issue of how closely aligned actual student assignments are with stated student outcomes on course syllabi as opposed to the official Curriculum Course of Study form. Ideally, student assignments and intended student outcomes should match.

If student outcomes and student assignments match and if they reflect the requisite skills called for as entry level skills or requisites, then requisites should play a major role in student success. Program and Curriculum review processes currently being implemented on campuses state-wide should facilitate greater degrees of both curricular and instructional alignment. If improved alignment results from these review processes, then the issue of requisite preparation becomes a critical one in terms of student success.

In this study, instructional alignment of target courses ranged from moderately to highly aligned, and the data reflect that having the requisites did have a positive effect on student outcomes. However, some students did succeed without having the requisite required, which immediately raises the question "Why?" Several explanations may be offered here.

One explanation may be that students had equivalent requisite skills which were not tracked or documented by any of the protocols used in the study. A second explanation may be that the degree of instructional alignment was not as tight as it might be. Faculty, in many instances, have made accommodations in their teaching style for students who do not have the appropriate requisite skills. This accommodation factor may explain why students without the requisites did as well as they did.

A third explanation might be the degree of alignment between actual course grades and material learned in the course. Often grades reflect other measures not directly related to course competencies. Examples of this may include grades which reflect student attendance or classroom participation or extra credit assignments not related specifically to course competencies.

If there were tight instructional and curricular alignment without any accommodations built into the target course for those students lacking the appropriate requisite skills, then student success for non-prepared students would likely drop.

A secondary outcome from this study (which is anecdotal) is that faculty actually enjoyed the process of doing content review once their initial trepidation was overcome. It would appear that this is another instance where faculty benefit in more than one way from sitting down and working with their colleagues in a collegial fashion. Many faculty commented that it was nice to realize that there was agreement in terms of content and outcomes for the courses involved in the study.

CONCLUSIONS:

Does academic preparation in the form of prerequisites and advisories have an effect on course success and course retention?

The data in this study suggest that for CAN Chemistry 2 and CAN History 8, prerequisites and advisories had a positive effect on student outcomes. Students with requisite skills were more successful and were less likely to withdraw than were students without the requisite preparation. Though it would be impossible to generalize from the data in this study, the outcomes seem to suggest that cross-discipline computation and communication requisite preparation results in more favorable student outcomes. Students were more likely to succeed if they had the requisite skills than if they did not have the requisite skills.

Do multiple measures including age, gender, ethnicity, and recency have an effect on student outcomes when correlated with requisite preparation?

Age was the only additional measure beyond requisite preparation that had any effect on student outcomes. The older the student, the more likely they were to succeed. Gender and ethnicity had no effect on student outcomes. Recency was not addressed by this study.

Which approach to validating requisites works the best?

All approaches used in this study have advantages and disadvantages. Analyzing the quantitative data may be the easiest and most reliable method if the campus or district has the personnel and equipment to readily extract the necessary information from its data base. Alignment data are best obtained from faculty and have the added benefit of clearer outcomes, which may result in better coordination of instruction among faculty members in a department. Obtaining student perceptions provides a reasonable alternative to or added support for quantitative data analysis methods.

Faculty ranking of individual student preparedness requires a significant investment of faculty time and the results may not warrant the time and effort on the part of both faculty and researchers.

FURTHER QUESTIONS FOR STUDY

What effect does a student's computational skill level have on student outcomes in courses other than CAN Chemistry 2?

What effect does students' communications skill level have on student outcomes in courses other than CAN History 8?

What effect does student self-confidence as it relates to student preparation have on student outcomes ?

What is the relationship between the grade in the requisite course(s) and student grade in the target course?

What is the relationship between what is taught and what grade is assigned?

What effect does completion of the requisite at an external institution have on student performance in the target course at the host institution?

What role does articulation serve in student requisite preparation at feeder schools? Further, what effect does articulation have on student outcomes in target courses at the host school?

What other qualitative measures may be used to gather data?

What other quantitative measures may be used to gather data?