

The Proliferation of Prerequisites: Balancing Good Intentions with Understanding

Presented by

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Speaking of Institutional Research

“Data-driven predictions [and decisions] can succeed—and they can fail. It’s when we deny our role in the process that the odds of failure rise. Before we demand more of our data, we need to demand more of ourselves.”

-Nate Silver

“... good intentions may do as much harm as malevolence if they lack understanding.”

-Albert Camus



Issue 1

Prerequisite English Placement Cut Scores

- Collin's college-level English faculty felt that too many underprepared students were being placed into their English courses by TASP.
- They proposed and received approval to implement a local assessment based on a writing sample.
- Writing samples were evaluated by a single English professor who taught college-level courses.
- After the local assessment was implemented, the proportion of students placed into developmental English increased substantially and the proportion placed into college-level English decreased substantially.
- One summer, the sole evaluator of the writing samples went on sabbatical leave, and another professor took over the responsibility.



Issue 1-2

Prerequisite English Placement Cut Scores

- That summer, not a single student placed into college-level English.
- The President was overwhelmed by telephone calls, email messages, and letters from angry students, parents, and high school teachers.
- The President asked IR to look into the issue.
- The fact that a change in evaluators resulted in such a dramatic difference in the assessment outcomes clearly indicated that the assessment had poor reliability and, thus, by definition, poor validity. There had been no attempt on the part of the faculty to establish reliability and validity for the assessment.



Issue 1-3

Prerequisite English Placement Cut Scores

- IR's analysis of TASP scores, developmental English grades, and ENGL1301 grades suggested that, in general, placement into ENGL1301 was limited to students who already had the knowledge and skills taught in ENGL1301. (Basically, the only grades awarded in ENGL1301 were A and B.)
- After discussion with the President and the academic administration, IR raised concerns about the lack of demonstrable reliability and validity of the assessment. This, in turn, caused IR to raise concerns about the possibility of legal liabilities associated with placement decisions.
- The administration eliminated the local English assessment.



Issue 2

Prerequisite Course Review Prior to Banner Implementation

- Collin was preparing for migration from its old administrative software system to Banner scheduled for fall 2008.
- Faculty were asked to review all course prerequisites to make certain that existing prerequisites were still relevant and to determine if new prerequisites were needed.
- Faculty recommended that ENGL1301 become a prerequisite for nearly every academic course in the College's catalog.
- The academic administration was reluctant to make such a sweeping change without looking at data, so IR was asked to conduct an analysis and make recommendations.



Issue 2-2

Prerequisite Course Review Prior to Banner Implementation

- IR worked with academic administrators to identify a set of academic courses that involved sufficiently intensive writing as to be reasonably representative of writing expectations within the population of academic courses. Six courses were identified: GOVT2301, GOVT2302, HIST1301, HIST1302, HUMA1301, and PHIL1301.
- A total of nearly 8,000 student records were extracted from the student information system representing performance in ENGL1301 and the six designated courses over a period of three years.
- Data were analyzed using a series of multinomial logistic regression models.



Issue 2 Variable Coding

Independent Variables

Description	Coding
TSI Readiness on Initial Entry at Collin	0 = Not TSI Ready on Initial Entry 1 = TSI Ready on Initial Entry
ENGL1301 First Non-W Grade	0 = F 1 = D 2 = C 3 = B 4 = A
ENGL1301 vs. GOVT2301 Chronology	-1 = ENGL1301 taken before given intensive writing course 0 = ENGL1301 taken concurrently with given intensive writing course 1 = ENGL1301 taken after given intensive writing course
ENGL1301 vs. GOVT2302 Chronology	
ENGL1301 vs. HIST1301 Chronology	
ENGL1301 vs. HIST1302 Chronology	
ENGL1301 vs. HUMA1301 Chronology	
ENGL1301 vs. PHIL1301 Chronology	

Dependent Variables

Description	Coding
3-Category GOVT2301 First Attempt Grade	1 = Withdrawn (Grade of W) 2 = NonSuccess (Grades D or F) 3 = Success (Grades A-C)
3-Category GOVT2302 First Attempt Grade	
3-Category HIST1301 First Attempt Grade	
3-Category HIST1302 First Attempt Grade	
3-Category HUMA1301 First Attempt Grade	
3-Category PHIL1301 First Attempt Grade	

Issue 2 Conclusions

- Students with strong writing skills were less likely to experience adverse outcomes in intensive writing courses, but ENGL1301 had no significant relationship with performance in intensive writing courses.
- Students who were not TSI-ready on initial entry were more likely to experience adverse outcomes in intensive writing courses.
- There was insufficient evidence of a meaningful causal relationship between ENGL1301 and intensive writing courses to warrant recommending that ENGL1301 become a prerequisite for intensive writing courses.



Issue 3

College Algebra/Statistics as Prerequisites for BIOL1407

- Collin's academic administrators were concerned about a THECB proposal to require either College Algebra or Statistics as prerequisites for BIOL1407 (General Biology II), since such a move would have a significant impact on nursing students.
- IR was asked to conduct an analysis to determine whether or not data supported this proposal.
- Nearly 2,000 student records were extracted from Collin's Banner Student System representing student performance in BIOL1407, College Algebra, and Statistics over a period of three years.
- Data for BIOL1407 performance were crosstabulated with data for College Algebra and Statistics. Comparisons of observed vs. expected values were analyzed along with Chi-Square and Lambda, a nominal-level asymmetric measure of association, to understand the relationships between performance in the two math courses and performance in BIOL1407.



Issue 3 Variable Coding

Independent Variables

Description	Coding
MATH1314/1414 (College Algebra) Performance and Timing	0 = Not Attempted 1 = Attempted, but NonSuccess (Grades other than A-C) 2 = Success (Grades A-C), Taken after BIOL1407 3 = Success, Taken concurrently with BIOL1407 4 = Success, Taken before BIOL1407
MATH1342 (Statistics) Performance and Timing	0 = Not Attempted 1 = Attempted, but NonSuccess 2 = Success, Taken after BIOL1407 3 = Success, Taken concurrently with BIOL1407 4 = Success, Taken before BIOL1407

Dependent Variable

Description	Coding
BIOL1407 Performance	0 = NonSuccess (Grades other than A-C) 1 = Success (Grades of A-C)



Issue 3-3 Conclusions

- Lambda statistics for both College Algebra and Statistics performance were nonsignificant and quite low (0.011 and 0.023, respectively). This suggests that neither performance in College Algebra nor performance in Statistics was particularly useful for reducing error in predicting success or nonsuccess in BIOL1407.
- While the Chi-Square statistics for both College Algebra and Statistics performance crosstabulated with BIOL1407 performance were significant, analysis of the observed and expected values suggested that the relationship was not straightforward.



Issue 3-4 Conclusions

- College Algebra (MATH1314/MATH1414)
 - Students who had taken no College Algebra were more likely than expected to succeed in BIOL1407.
 - Students who had taken College Algebra but had not succeeded were more likely than expected not to succeed in BIOL1407.
 - Students who completed and succeeded in College Algebra were neither more nor less likely than expected to succeed in BIOL1407 regardless of whether they took College Algebra before, after, or concurrently with BIOL1407.
 - The data suggest that performance in BIOL1407 was relatively independent of performance in College Algebra.



Issue 3-5 Conclusions

- Statistics (MATH1342)
 - Students who had taken no Statistics were neither more nor less likely than expected to succeed in BIOL1407.
 - Students who had taken Statistics but had not succeeded were more likely than expected not to succeed in BIOL1407.
 - Students who completed and succeeded in College Algebra were slightly more likely than expected to succeed in BIOL1407, but this was true regardless of whether they took Statistics before, after, or concurrently with BIOL1407.
 - The data suggest that any advantage in BIOL1407 performance related to MATH1342 was probably an indirect effect; perhaps because outcomes in both MATH1342 and BIOL1407 share relationships with variables such as overall math readiness or overall academic ability.



General Conclusions

- Faculty, administrators, policy makers, student services professionals, support staff, and IR professionals are all committed to the best interests of our students.
- However, our good intentions sometimes produce results that are inconsistent with those intentions if, as Camus said, those intentions “lack understanding.”
- How education works is not always clearly understood. In the absence of understanding, we sometimes depend too much on heuristics, “common sense,” or “gut feel.”
- Nate Silver’s statement from the beginning of this presentation suggests that it is the responsibility of those who understand data, prediction, and analysis to help provide that understanding—to differentiate the signal from the noise—but we may need to demand more of ourselves.



Questions and Discussion

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