Gardner Institute

Digging into the Disciplines: The Impact of Gateway Courses in Accounting, Calculus, and Chemistry on Student Success

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Introduction

Many faculty and institutional officials know well the role and impact of gateway STEM courses in chemistry and math on student success. However, to date there has been little work on the connection between gateway business courses, such as Principles of Accounting , and undergraduate persistence. The non-profit Gardner Institute now has new data, based on the transcripts of some 51,000 students at more than 30colleges and universities, which suggest that accounting must now be considered on par with math and chemistry as one of the critical gatewaycourses in the conversation about student success.

This is a significant finding. Business is the top major among entering first-year students and also largest field for undergraduate degrees –and noone can earn a business degree without competing Principles of Accounting. This document addresses the role of accounting in student success,and offers some initial perspectives about why failure in accounting, as well as math (algebra or calculus) and chemistry, really matter – forstudents, for the institutions they attend, and for the communities and industries these institutions serve.

About the Data

The content found on this document comes from a broader study examining the rates of D, F, W (for any form of withdrawal on the transcript), and I (for incomplete) grades (DFWI rates) in introductory courses at thirty-six different colleges and universities in the United States. The thirty-six institutions include seven community colleges, two proprietary (for-profit) four-year institutions, eight independent (private) four-year institutions, and nineteen public four-year institutions – twenty-nine four-year and seven two-year total. The twenty-nine total four-year institutions further break down into six Baccalaureate Colleges, fourteen Masters Colleges and Universities, and nine Doctoral Universities

The data displayed in this document includes aggregate and disaggregate DFWI rates for Principles of / Introductory Accounting courses at 32 of the aforementioned institutions (18,217 students earning grades), Introductory Calculus courses at 32 of the institutions (13,253 students earning grades), and Introductory Chemistry courses at 31 of the institutions (20,987 students earning grades).

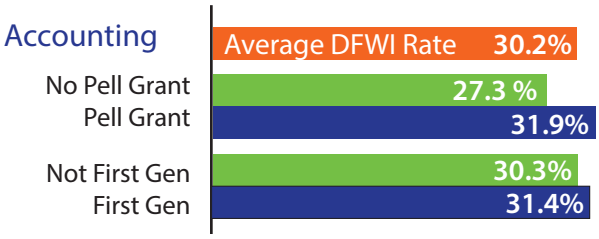
A detailed report that explores the issue and describes the data, method, limitations, and implications of this research, written by Drs. Andrew Koch and Brent Drake, will be released by the Gardner Institute in early 2019.

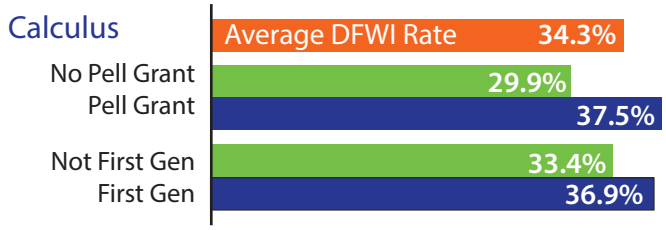
A. Average DFWI Rates by Course

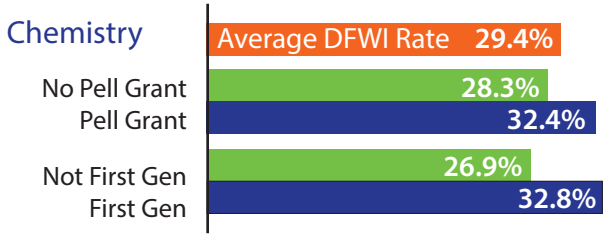
The average DFWI rate by course ranges between 29.42% for Introductory Chemistry to 34.33% for Introductory Calculus. Introductory Accounting courses have a DFWI rate of 30.17% – higher than that of the chemistry courses but lower than that of the calculus courses included in the study.

B. DFWI Rates in the Courses for Pell Recipients and First-Generation Students Compared to Their Peers

Students from low-income backgrounds (defined as receiving a Pell Grant) or with less social capital (defined as being first-generation) have higher DFWI rates in all three gateway courses. The differences are greatest for first-generation students in chemistry and Pell grant recipients in calculus, but the fact that this is a consistent trend across all courses is a cause for concern.

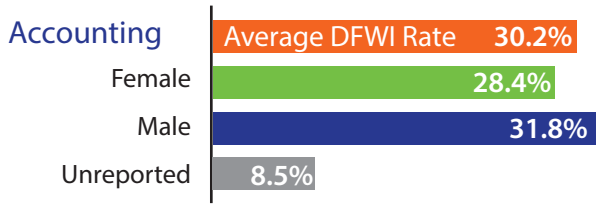


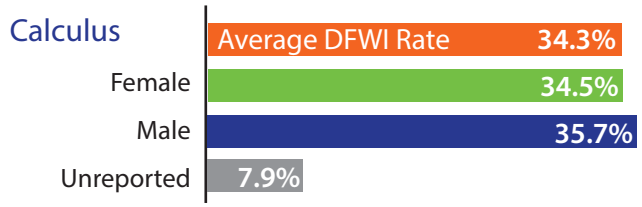


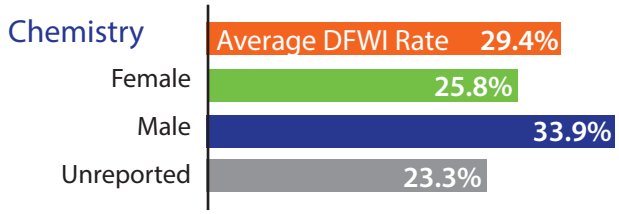


C. DFWI Rates in the Courses for Men and Women

Males consistently have a higher DFWI rates when compared to their female counterparts in these three key gateway courses. The differences are greatest in chemistry, followed by accounting, and then calculus. These outcomes raise interesting questions about the cultural dynamics at work in the occupations that these courses support. In other words, if women do better than their male counterparts in these foundational courses, why are they underrepresented in the STEM majors and many STEM occupations?





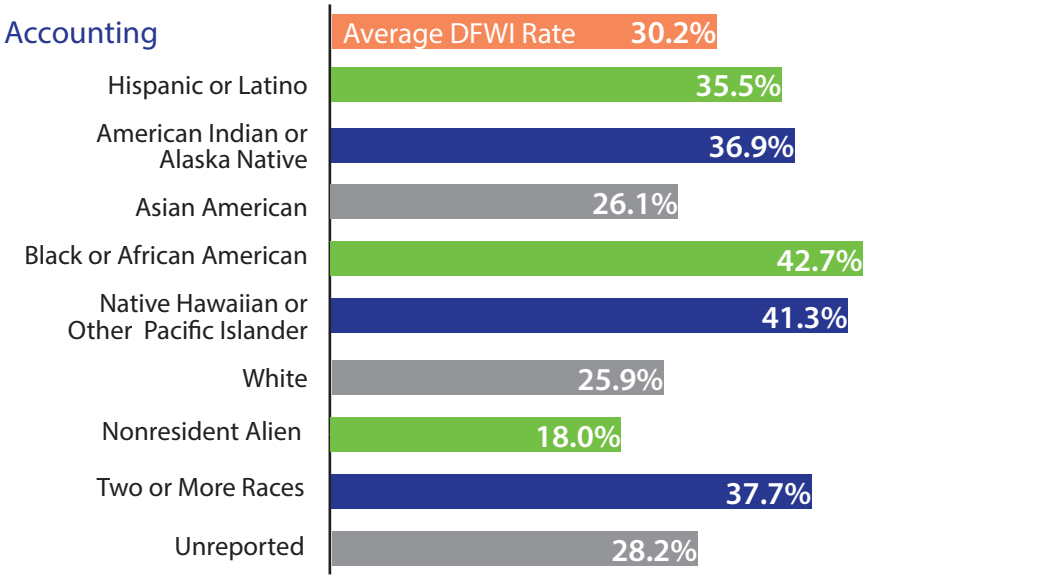


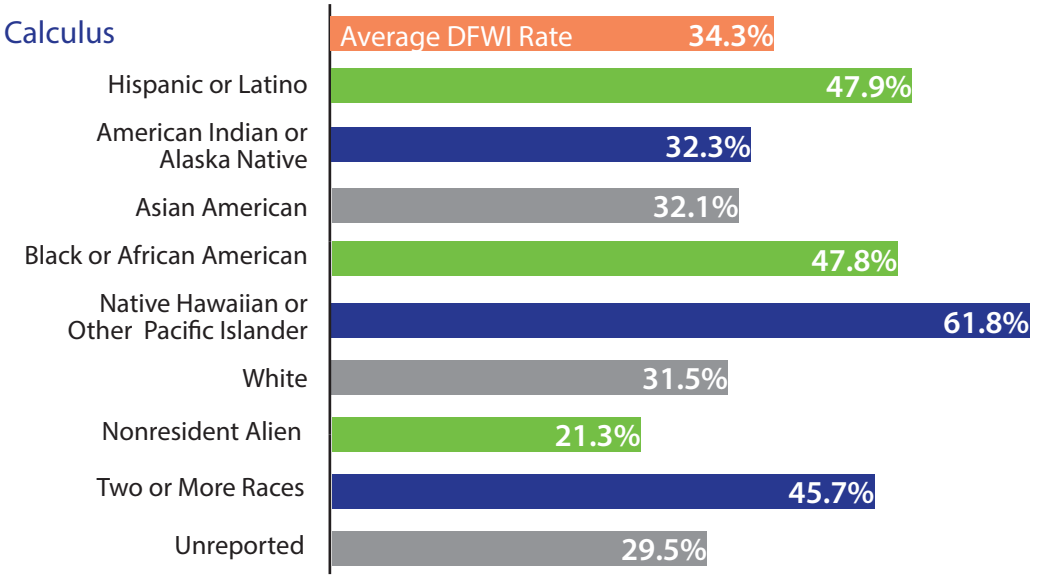
D. DFWI Rates in the Courses by Race / Ethnicity

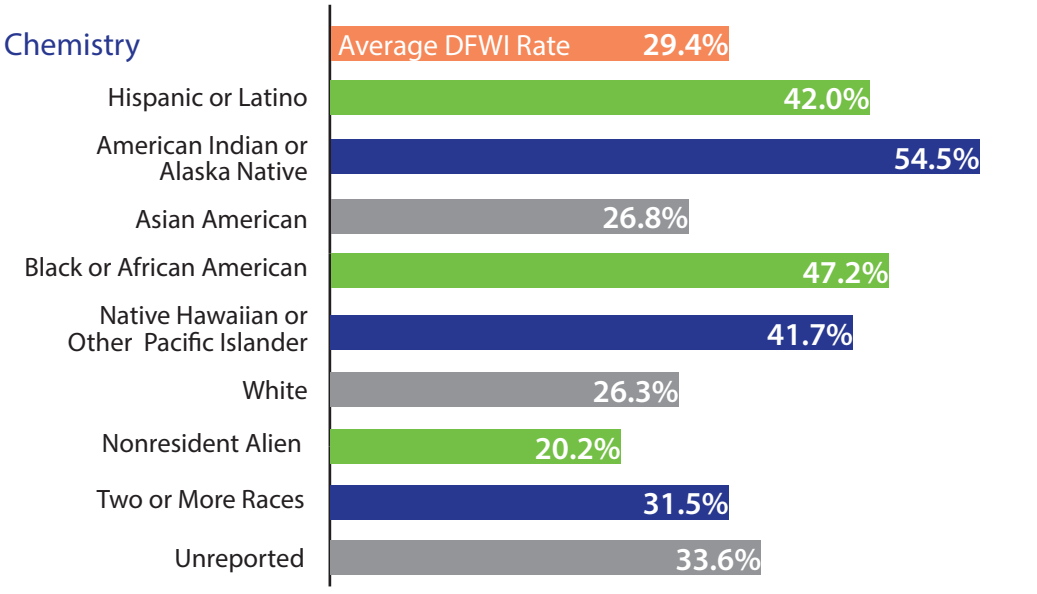
Students who report their race/ethnicity group as Caucasian / White, Asian-American, Non-Resident Alien (International) have DFWI rates lower than the course average in all three key gateway courses. Students who do not report a race/ethnicity (Unreported) have DFWI rates lower than the course average in both accounting and calculus. In contrast, and with the exception of American Indian / Alaskan Native students in calculus, students from all other race/ethnicity groups consistently have DFWI rates higher than the course average in all three courses – often substantially higher.

For example, Black / African-American students have DFWI rates that range from16.3 percentage points (52.0%) higher in calculus, 16.8 percentage points (65.0%) higher in accounting, and 20.9 percentage points (79.58%) higher in chemistry than that of their White / Caucasian counterparts.

Historically, these outcomes are often cited as being indicative of inadequate prior academic preparation for college. However, the outcomes also suggest that the courses do little to mitigate inequality. In other words, these courses are often structured to push students out rather than to provide an instruction experience that lifts them up toward their education and occupational goals. In fact, the current design of many of these critical gateway courses may perpetuate and exacerbate inequitable outcomes.





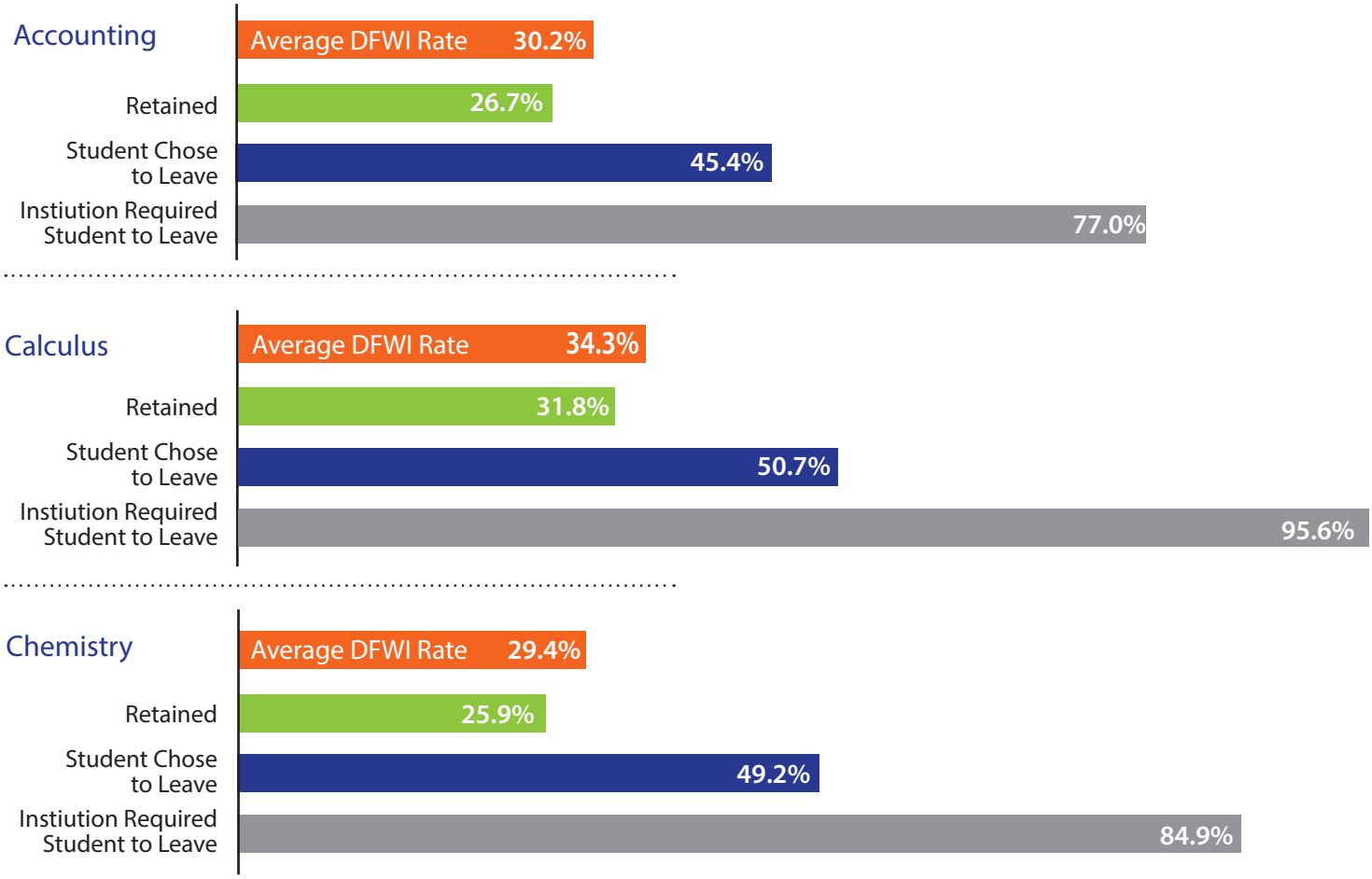


E. DFWI Rates in the Courses Correlated with Retention Status

In all three courses, students who took the course and returned the next year to the same institution (identified as Retained on the graphs below) had the lowest DFWI rates. Students who were dismissed from the institution for either academic or disciplinary reasons (identified as Institution Required Student to Leave on the graphs below) had the highest DFWI rates.

The DFWI rate for students who chose to leave the institution (identified as Student Chose to Leave on the graphs below) should be of particular concern to the campus officials. These students were eligible to return to the institution because they were in good academic standing (2.0 grade point average or better). They took the course included in the study, earned a D, F, W, or I grade, and elected not to return to the institution the next year.

In all cases, the DFWI rates for students who chose to leave are much higher than that for their retained counterparts. The differences ranges between 18.6 percentage points (69.7%) higher in accounting (26.7% DFWI rate for retained students compared to 45.3% DFWI rate for students who chose to leave), 18.9 percentage points (59.5%) higher in calculus (31.7% DFWI rate for retained students compared to 50.6% DFWI rate for students who chose to leave), and 23.2 percentage points (89.6%) higher in chemistry (25.9% DFWI rate for retained students compared to 49.2% DFWI rate for students who chose to leave). These outcomes clearly indicate the relationship between doing poorly in a course and not persisting at the institution.



Brief Summary and Conclusion

The gender, income (Pell), first-generation, and retention differences in critical gatesway courses highlighted in this document point to significant equity issue. Given changing national demographics as well as labor market and societial needs, these differences cannot continue if colleges and universities hope to help all students realize their educational and occupational aspirations.

The solution for addressing the issues identified by this study is not to blame the students or to "lower standards and give everyone an A." The solution is also not to blame faculty. Those approaches would perpetuate inequity in other ways.

The findings strongly suggest that course redesign is essential – redesign that employs evidence-based pedagogies, embedded support, reward structures for faculty, and other methods that better serve a steadily diversifying, twenty-first century student body. While it is beyond the scope of this document to go into those approaches, it merits noting that use of these kinds of practices are shown to increase student engagement, learning, and success. This document shows what is occurring in the absence of widespread action, and suggests what is at stake if current trends persist.

