APLU'S POWERED BY PUBLICS SCALING STUDENT SUCCESS

Powered by Publics Learning Memo: The Big Ten Academic Alliance Cluster is Exploring Foundational Course DFW Rates, Equity Gaps, and Progress to Degree

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Each cluster in APLU's Powered by Publics initiative is working to refine, implement, and scale innovative practices that address shared challenges among the participating institutions. This memo highlights universities in the Big Ten Academic Alliance Cluster (a list of institutions is at the end of this memo).

The Big Ten Academic Alliance (BTAA) Cluster is examining student course data and the practices and policies affecting success rates in entry-level courses, with an emphasis on closing achievement gaps for historically underserved student populations. The following learning memo highlights the cluster's work to examine how an analysis of DFW rates reveals equity gaps to better understand how these grade markers correlate with student retention and graduation outcomes.

What are DFW rates and why do they matter?

The "DFW" rate for a course is the percentage of grades of D or F or of students withdrawing from the course entirely mid-semester. High DFW rates tend to indicate a disconnect between instruction and student success and highlight the courses in which students are most struggling. They also point to opportunities for improvement – whether by allowing for targeted student supports, adjusting course design and delivery, or examining the institutional policies that impact student course placement and degree progression.

In general, large gateway courses tend to have higher DFW rates than courses with fewer students. There are also often significant equity gaps in these early courses. DFW rates are often a leading indicator of other student outcomes, such as decreased retention, decreased completion, and extended time to degree.

Based on this knowledge and with a number of campus-specific DFW initiatives already underway, the BTAA cluster pursued a collaborative data investigation and comparison of DFW rates, identified where equity gaps exist, and explored how this data impacts student progression and completion.

Equity in Course Outcomes

Process

To explore course outcomes, institutions in the cluster first submitted a list of high-enrollment undergraduate courses. The institutions then identified a set of 20 common priority courses for cross-cluster comparison. Courses represented a wide variety of colleges and degree programs.

Next, institutions exchanged course data for six terms from Fall 2016 to Spring 2019, which included total enrollment on census date, number of F grades, number of D grades, and number of withdrawals[1] from these courses.

To capture the equity implications, data was disaggregated by Pell status (as defined by institutions), first-generation status (as defined by institutions), and gender (using IPEDS standard), and historically underrepresented minority (URM) status (Black or African American, Hispanic/Latinx, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and two or more races). A data subgroup helped create a template, set common data definitions and standards, and establish a collection process for the cluster. The DFW rate was calculated by taking the total combined number of Ds, Fs, and course withdrawals for each cohort and calculating it as a percentage of enrollment.

Findings

Data were collected, compiled, and analyzed to compare across institutions and subgroups and identify the areas in which the greatest gaps in course outcomes were present. Overall, the data supported the thesis that there were significant equity gaps in gateway course success.

Across the board, institutions in the cluster saw higher DFW rates for first-generation students, Pell-eligible students, historically underrepresented minority students, and male students compared to the average DFW rate for the course. These findings were consistent across most institutions and courses, with a few exceptions. Furthermore, in most cases, these same sub-cohorts of students experienced higher DFW rates compared with their non-first generation, non-Pell eligible, represented majority, and female peers.

Average DFW Rates Across Cluster in Listed Courses by Subgroup, Spring 2019

Generic Course Name	Average DFW Rate	Non Pell DFW	Pell DFW	Majority DFW	URM DFW	Female DFW	Male DFW	Non-First Gen DFW	First Gen DFW
College Algebra	**32.4%**	30.3%	31.5%	27.5%	33.9%	28.3%	36.5%	28.2%	34.0%
Precalculus	**28.1%**	28.0%	26.6%	27.8%	25.3%	29.5%	26.8%	25.9%	22.5%
Calculus 1	**33.2%**	31.2%	41.9%	31.9%	39.6%	30.2%	34.9%	32.7%	38.2%
Calculus 2	**23.8%**	23.5%	28.2%	21.0%	30.3%	18.3%	26.4%	23.7%	23.6%
Business Calculus (without proofs)	**23.6%**	21.0%	36.6%	21.2%	35.1%	21.8%	24.6%	21.3%	31.6%
Intro Statistics (with Algebra)	**13.9%**	12.3%	19.8%	12.5%	21.8%	13.5%	14.3%	12.2%	20.0%
Introductory Biology	**15.1%**	12.7%	25.4%	13.7%	25.3%	14.4%	16.2%	12.9%	22.2%
Introductory Chemistry	**25.1%**	21.1%	32.9%	21.5%	38.1%	22.3%	30.3%	21.2%	33.5%
General Chemistry 1	**23.0%**	20.8%	31.3%	21.1%	31.7%	23.0%	23.0%	20.8%	29.0%
General Chemistry 2	**16.2%**	14.6%	25.7%	15.2%	26.0%	16.2%	16.3%	14.0%	25.3%
General Physics (with calculus)	**13.8%**	12.9%	18.3%	14.1%	21.4%	12.1%	14.3%	12.8%	16.7%
Physics: Electricity & Magnetism	**15.0%**	13.3%	22.1%	15.5%	23.1%	15.2%	16.7%	14.0%	19.0%
Introductory Coding (for STEM majors)	**24.7%**	23.3%	15.4%	22.1%	31.7%	24.0%	25.0%	23.0%	32.5%
Introductory Psychology	**12.0%**	10.5%	18.1%	12.5%	19.1%	9.8%	14.9%	10.8%	15.2%
Introductory Sociology	**10.0%**	8.7%	14.9%	11.2%	14.5%	8.0%	12.6%	8.6%	16.7%
Principles of Macroeconomics	**15.3%**	14.1%	24.0%	13.0%	23.2%	14.5%	15.6%	14.2%	20.1%
Principles of Microeconomics	**15.8%**	14.1%	24.6%	15.0%	27.8%	17.1%	15.0%	13.7%	24.2%
Introductory Accounting	**14.2%**	13.8%	17.7%	11.8%	22.6%	13.9%	14.4%	12.9%	18.0%
Introductory English: Writing & Rhetoric	**7.5%**	6.6%	10.3%	8.5%	11.1%	6.0%	8.9%	6.5%	10.9%
Business Communication	**3.9%**	3.7%	4.4%	4.8%	5.0%	2.8%	4.6%	3.5%	5.0%

Notes:

Green cells signal lower the average rates for the course and red cells signal above average rates for the course

Rates are the sum of D and F grades plus withdrawal from the course after drop deadline divided by total census date enrollment for each cohort

Course codes and titles varied across institutions. Course descriptions were analzed to capture and collect data on most similar courses

[1] Institutions use different terminology for these grade markers. Some use the term “drop” or “late drop” and some use the term “withdrawal” to indicate students who leave a course after the drop deadline. To maintain consistency, “withdrawal” is used throughout this brief

Additionally, when comparing DFW rates between courses, College Algebra, Precalculus, and Calculus I, and Introductory Chemistry see the highest average DFW rates, with more than a quarter of students receiving a D, F, or withdrawing from the course mid-semester. For students pursuing STEM degrees, these gateway courses are critical to future success in their degree.

These findings indicate significant discrepancies in student support and success in these key gateway courses and the need for further examination into the policies, practices, and pedagogy that is having significant differential impact on student populations.

DFW Rates and Progress to Degree

To illustrate this connection between grade markers and progress to degree, BTAA cluster institutions decided to collect student retention and completion metrics based on D and F grades in the first term.

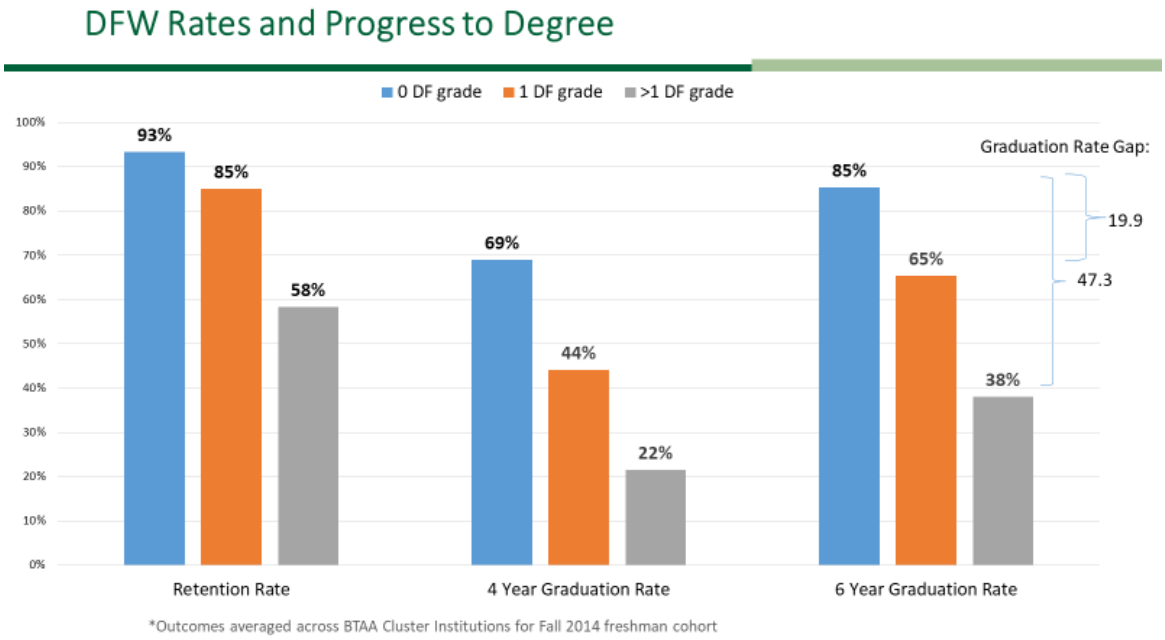
Students from the 2014 new freshman entrance cohort were sorted based on the number of DF grades in the first term, and retention and completion data were collected based on these cohorts.

The outcomes were significant. Averaged across the eight institutions in the cluster, students saw an 8.5% retention differential with 1 DF grade in the first term and a 35% retention differential with >1 DF grade as compared to students with no DFs in the first term.

Subcohort	Metric
0 DF grade	Retention Rate
	4 Year Graduation Rate
	6 Year Graduation Rate
1 DF grade	Retention Rate
	4 Year Graduation Rate
	6 Year Graduation Rate
>1 DF grade	Retention Rate
	4 Year Graduation Rate
	6 Year Graduation Rate

Completion metrics showed an even more significant gap. The 4-year completion rate was 24.9 percentage points lower for students with 1 DF grade and 47.5 points lower for students with >1 DF grade than students with no DFs in the first term. The 6-year completion rate was 19.9 percentage points lower for students with 1 DF grade and 47.3 points lower for students with >1 DF grade than students with no DFs in the first term. While these findings represent averages across institutions in the BTAA cluster, outcomes were consistent for each of the eight institutions in the cluster.

Although this data is not causal, early grade markers are clearly correlated with student progress to degree.



Use on campus

DFW data was already an institutional priority for many institutions in the cluster, and since the cluster analysis process, campuses have continued to prioritize it in many ways, especially by pushing for wider and more consistent data-sharing across campus and making sure the data is in the hands of top leadership, department deans, and individual faculty.

For example:

- At **Indiana University**, the Institutional Research department created dashboards and built DFW data into retention reports so campuses can see the impact on student outcomes. Data is being used with campuses to get them to pay more attention to the first-year experience.
- **Pennsylvania State University** shared detailed results with deans of colleges in which the selected courses are taught. Data on the calculus courses was timely in light of the Eberly College of Science's investment in bringing together a curriculum redesign team whose work is now moving from pilot to broader implementation. Steering committee members have also been describing the project at university-wide meetings to showcase of the value of collaborative data efforts like this.
- **Rutgers University** shared the DFW data with the deans and undergraduate education leadership to stimulate broader discussion of how to promote more inclusive student success and encourage pedagogical innovation in the gateway courses. The DFW data was also shared with the faculty in some of the departments offering these gateway courses to promote more targeted examination of the barriers to student success. As a result of the consultation with the Math Department, Rutgers is now chairing a cross-cluster math faculty working group to collectively discuss ways to support and improve student success and equitable course outcomes.
- **The University of Illinois at Urbana-Champaign** has been incorporating some of data into campus its Student Success Initiative and has an implementation team specifically looking at these and related data.
- **The University of Iowa** shared the data with campus via the university's student success strategic plan workgroup. Additionally, the data are being utilized by departments as the part of the "Hawkeye Introductory Course" redesign initiative. The goal of the initiative is for departments to redesign introductory STEM courses using research-based practices and data-driven decision making to reduce the number of students who receive a "D" or an "F" or "W" grade.
- **The University of Minnesota** (UMN) has a gateway course initiative convening a small group of collegiate leaders, faculty, and advisors to assess challenges and brainstorm solutions. They have been distributing DFW reports to stakeholders such as directors, faculty, and deans to get the information in the hands of people who can make a direct difference. UMN has also been targeting courses with high rates for the university's ECoach tool and working with units on course placement.
- **The University of Nebraska-Lincoln** (UNL) hired a Faculty Director of Undergraduate Analytics to support units in analyzing course performance, program retention, and graduation reports with a particular focus on equity metrics. The DFW data has been shared with UNL's Faculty Senate and departments and programs, and all faculty were invited to a "Seeing Equity" workshop. UNL also used DFW data to measure impact of a Department of Mathematics active learning initiative and is currently conducting focus groups with students who took lower-division math courses in fall 2020.
- **The University of Wisconsin-Madison** (UW) shared the collective cluster data with top leadership and the topic is present in the progress-to-degree plan. UW also hosted series of webinars covering topics such as course outcome metrics and student progression data for the campus community. Prior to this project, UW had distributed DFW data on campus for 15 years and has used it to inform course redesign initiatives, a multi-year course requisite project, and in the context of instructional improvement efforts.

Conclusions

This BTAA Cluster analysis illustrates that success in early courses supports success in timely degree completion. DFW rates are not the only indicators of students who may be at risk of stopping out; however, these markers do indicate a high degree of likelihood a student would benefit from additional academic and institutional support.

For this reason, institutions must implement policies and processes that assure there is a match between student preparation and course content and that course pedagogy supports student success. It is important to have a student-centered campus culture and to implement policies that support student success and progression, all the way from course placement to course completion.

Additionally, progress to degree findings highlight the importance of addressing the equity gaps seen in the DFW course analysis, since these markers are so strongly predictive of student progression and completion. Institutions must ask what about the course delivery is leading to such differential student outcomes. Without addressing the early indicators of differential outcomes, institutions will continue to see graduation and retention gaps.

Throughout the process, institutions in the cluster emphasized the importance of sharing just-in-time data such as these with key leadership and stakeholders across campus, ranging from faculty to deans and department heads to top administration. Awareness is the first step towards adjusting teaching and classroom practices to equitably support students in the classroom. Institutions must support instructors in creating stronger first-year experiences for students in large courses.

Next Steps

- Campuses are continuing to share DFW data and reports across the institution and with instructors, build dashboards, and integrate into planning
- The BTAA Cluster is convening math instructors to collectively discuss ways to support and improve student success and equitable course outcomes
- To continue to understand the impact of these courses on progress to degree, the cluster is looking at curriculum mapping through tools such as Curricular Analytics and planning to collect additional data on time to degree
- The cluster is continuing to compile, compare, and discuss the policies and practices that contribute to student success with a current focus on examining advising practices

Institutions in the BTAA Cluster

- Indiana University-Bloomington/System
- Rutgers University-New Brunswick
- The Pennsylvania State University
- University of Illinois at Urbana-Champaign
- University of Iowa
- University of Minnesota-Twin Cities
- University of Nebraska-Lincoln
- University of Wisconsin-Madison