Delaware, Dickeson, Assessment and How You Can Help

by

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Abstract:

How much release time should a chair receive? What is the cost per unit for a particular academic program? What is a student credit hour (SCH) anyway and why would anyone care? Why are so many boards enamored of Delaware, Dickeson and Assessment? The answer to these and many related questions will be presented in this paper. Analytics and various "efficiency measures" are becoming increasingly important in higher education and mathematicians and computer scientists are being regularly recruited to help university administrators make meaning from large volumes of data. This paper describes the issue and provides some examples of how faculty can help.

Introduction: Assessment, Delaware and Dickeson

For the last ten years, the documentation and reporting of the assessment of student learning has been part of the annual work of all academic departments. Much of the formalization of this process has been driven by regional accrediting bodies who have demanded answers to two questions:

- What do you expect your students to learn?
- Can you demonstrate that they are learning these things?

The scrutiny of each university's answers to these questions has increased in the last few years. Since the 2008 downturn in the global economy, a third question has been added to this list:

- What is the value of a college degree? In particular, are your students prepared for a profession when they graduate?

Publications such as Arum and Roska's *Academically Adrift* (Arum, 2011), which claims to demonstrate that students learn very little in the areas of writing, complex reasoning and critical thinking in their first two years of college, have increased the concern about the value of a degree. Certainly criticism of the methods used and conclusions drawn by Arum and Roska abound, but their criticism of higher education is now part of the political debate about the future of higher education. While data consistently demonstrate that a college degree significantly improves an individual's earning potential, new studies have reinforced the notion that what you major in matters (Zaback, 2012 and Grusky, 2013). While assessment is nothing new, the volume of data gathered and analyzed is going to continue to increase as federal reporting requirements grow in the next several years.

Since the release of *A Test of Leadership: Charting the Future of U.S. Higher Education* (aka "The Spellings Report") in 2006, several key words have entered into the administrative lexicon of higher education. These words are: access, affordability, learning/quality, accountability and innovation (Spellings, 2006). To some extent, existing assessment processes address issues related to tracking and improving quality, however, there are increasing expectations for greater transparency of learning outcomes data. That means public access to summary data about student achievement, which requires a fairly high level of skill in summarizing and presenting data in ways that are meaningful to students, their families, the general public and legislators.

Since 2008, the issue of the affordability of higher education and the transparency in reporting costs has been prominently discussed in the media. This has led academic leaders to ask the question:

- Are our programs and departments functioning as efficiently and cost-effectively as possible?

Most institutions are looking at the expenses related to each of their academic programs in an attempt to reduce costs in order to hold down tuition increases. The National Study of Instructional Costs and Productivity – University of Delaware (www.udel.edu/IR/cost/) or just the Delaware Study is an attempt to benchmark instructional costs by program using very careful definitions and methodology. The study does recognize that there are real differences in the costs of programs (for example nursing programs are more expensive than literature programs) and the data provided by the Delaware Study gives each institution an indication of how its costs program by program compare with a national pool as well as a self-selected pool of 10 or more comparator institutions. This process was first begun by Michael Middaugh when he was at the University of Delaware and some of his findings can be found in *Understanding Faculty Productivity: Standards and Benchmarks for Colleges and Universities* (Middaugh, 2000) as well as in his subsequent book *Planning and Assessment in Higher Education: Demonstrating Institutional Effectiveness* (Middaugh, 2009). Some examples of the work that is involved in computing the main statistic for the Delaware Study, the student credit hour (SCH), are given in the examples below.

While the Delaware Study produces some useful information about benchmarking, it does not provide benchmarks for non-curricular units in the university. Academic program and services prioritization, which in fact encompasses non-academic units as well as academic units, attempts to address three questions:

- How do we make judgments about the efficiency and effectiveness of non-curricular areas of the university?
- How do we make decisions based on the data from all university departments?
- How are resources allocated to strengthen the institution?

One process for addressing these questions is contained in the book *Prioritizing Academic Programs and Services: Reallocating Resources to Achieve Strategic Balance* (Dickeson, 2010). What Dickeson and Ikenberry suggest in the book is quite radical. They suggest assessing the strength of programs using a number of metrics and then deciding which programs to eliminate and which programs to retain based on those metrics. Dickenson and Ikenberry call for the bottom *one-third* of programs to be eliminated. Because of the extremely sensitive nature of this process, it is essential that individuals with good skills in

pulling, combining and analyzing data are involved in defining the metrics and generating the values for those metrics.

In addition to trying to cut costs, universities are looking for ways to increase revenue. Much of that conversation has been centered on the word innovation and the book *The Innovative University: Changing the DNA of Higher Education from the Inside Out* (Christensen, 2011). It is not surprising that much of what is discussed in this book relates to the use of technology in education. It is essential that faculty with a knowledge of both the strengths and the limitations of technology engage fully in the campus conversation. Too often, the administrators making significant decisions about the use of technology have very limited experience with technology; they need honest open counsel from faculty experts.

Why Does Your Board Care about Assessment, Delaware, Dickeson and Innovation?

First and foremost, your Board is interested in these issues because they hold your institution in trust. That means that they must be concerned with the long-term viability of the school. A general consensus is emerging that higher education has entered a "new normal" and that even as the economy recovers, the higher educational context will not return to what it was before 2008. This is attributed to many factors including a slow recovery in the economy, a shift in employer expectations for new graduates and the increasing use of technology in higher education (with the conversation fueled by the emergence of MOOCs and the money funding them). All of this means that trustees have to ask more in-depth questions about:

- The cost of institutional programs and processes;
- The affordability of the institution with a particular focus on the size of annual tuition increases that can be sustained;
- Ways that technology can improve student learning and keep costs down; and
- Possible new initiatives that can diversify the university's revenue streams.

Many of these ideas come from the business world, and like it or not, the United States Department of Education is requiring ever more detailed reporting on business processes. Because all of our universities are financially dependent on our students' ability to receive federal and state financial aid, it is impossible to not do as the Department of Education and the associated regional accrediting bodies ask. These requirements are generally organized around the "Spellings Report" criteria of access, affordability, quality, accountability and (sometimes) innovation.

Your Board is reading much of the same material that you are reading about higher education. This means that they are also concerned about:

- The role of for-profit institutions and the ways that they have cut into market share for traditional higher education;
- The emergence of MOOCs (Massively Open Online Courses) backed by well-funded organizations such as Coursera, Udacity and edX and the uncertainty about whether or not MOOCs will have a significant impact on higher education; and
- Online degrees from major institutions which have the potential to reduce what our institutions can charge for degrees targeted at adult learners. For example, Georgia Tech just announced a

partnership with Udacity and AT&T to offer a $7,000 master's degree in Computer Science that will be a Georgia Tech degree.

Finally, there are significant demographic changes at work among the college aged population in the United States. Those attending university are much more diverse in both race/ethnicity and age than they have been in the past. This has a number of implications for admissions, financial aid, student support and curriculum. If universities are going to provide educational access for more than just traditional 18-22 year old students from middle class families, changes are going to have to be made. One of the most significant of these changes is trying to determine how to address the needs of adult learners. Additionally, data from the National Center for Educational Statistics (NCES) (http://nces.ed.gov/programs/digest/2012menu_tables.asp) shows that number of students attending university increased by 25% from 1997-2007 and is expected to increase by 25% in the 10 years ending in 2017. Someone will provide that education.

			1997-2007	
Undergraduates	**1997**	**2007**	**Change**	**%Change**
Full-Time	7,418,598	9,840,978	2,422,380	32.7%
Part-Time	5,031,989	5,762,793	730,804	14.5%
Total	12,450,587	15,603,771	3,153,184	25.3%

		Projected	2007-2017	
Undergraduates	**2007**	**2017**	**Change**	**%Change**
Full-Time	9,840,978	12,141,135	2,300,157	23.4%
Part-Time	5,762,793	7,374,008	1,611,215	28.0%
Total	15,603,771	19,515,143	3,911,372	25.1%

Boards know that in order for our institutions to remain financially healthy, it is necessary to find ways to attract and educate the growing number of individuals participating in higher education.

So Why Did (or Should) That Administrator Call You?

The problems of interest to university Boards and administrators involve complex data management and analysis. Computer scientists and mathematicians bring a critical set of skills to the table. You:

- Can pull and store data so that it is useful;
- Can synthesize information from multiple sources;
- Can build models and create algorithms;
- Can keep *n* definitions in your head at the same time;
- Know data analysis;
- Can detect and make sense of patterns and anomalies that others miss;
- Can chase down outliers; and
- Have experience with communicating technical results to a non-technical audience.

These are essential skills for the task at hand.

In addition, mathematics and computer science are considered "useful" degree options that lead to stable and high paying careers. Thus you can more easily navigate some of the tough political issues because it is highly unlikely that programs in your department would be cut. However, that does not mean that your department will escape the need to change and you can bring a faculty perspective to conversations about the implications of particular institutional changes.

What Can You Do to Make Yourself Useful?

First and foremost, you need to read. Become conversant in the material in the books and articles at the end of this paper. Follow the higher education media by reading the daily summaries of trends. Some of the best are:

- Inside Higher Ed (free): www.insidehighered.com. You can sign up for their email updates.
- The Chronicle of Higher Education (this has a modest subscription fee, but more than likely you can access an electronic copy through your university library): www.chronicle.com.
- National Association of Independent Colleges and Universities (free and good if you are in a private institution): www.naicu.edu. You can sign up for their email updates.

Second, offer to help. Spend some time talking to institutional leaders (Provost, Deans, President, CFO) in order to get a better understanding of the issues with which they are wrestling and how your skills may assist them. The administrators in your institution may not realize that you have both the skills and the willingness to serve.

Some Specific Examples of Data Projects

Below we list a few samples of the types of data analysis projects on which the authors have worked in the last few years.

Faculty Load Release Time: Our institution has just completed a review of load releases within each academic department. One would assume that the academic unit head (either department chair or school dean) would be the recipient of the majority of the load release within their department or school. This was in fact the case in only a minority of departments. The best explanation is historical accretion of small amounts of load release for immediate compelling needs. Left unexamined over decades, this led to the bloat that was discovered.

The new allocations assign a total load release budget to each academic unit with a requirement that a minimum number of units be spent on academic administration, usually in the form of a chair or school dean. There is a certain "yuck factor" to performing the role of chair or school dean and this was assigned a yearly allotment of 6 semester credit hour base release for undergraduates and a complexity dependent base number of units for graduate programs (par value 8). This "yuck factor" covered the first 2500 undergraduate SCH's and the first 750 graduate SCH's per semester. Thereafter, a sliding scale was implemented based on the number of SCH's generated. The sheer number of full-time faculty and adjuncts to be managed created another sliding scale factor (about 0.2 units per FTE faculty member). To take one example, the department of Mathematical, Information, and Computer Sciences will now receive 6 units of base (the "yuck factor"), 3 units for SCH production, and 1 unit for faculty management.

The formula was arrived at by setting up a spreadsheet where the values of base SCH cut-offs and the SCH values needed for each additional unit of departmental release could be changed. In addition, the ratio of release units to FTE faculty managed was also changeable. The resulting cost of each change was displayed as a dollar figure above or below the current total allocation. In the end, some tweaking beyond the model was done by the provost. The result of the process was that it helped the academic leaders get a sense of the implications of their individual preferences within the model. Ultimately, the normalization of release time saved the school about $200,000 annually.

The Computation of the Cost of a Student Credit Hour (SCH): Since the goal of this work is to compare the revenues and costs in the same discipline within a host of institutions, it is necessary to compute the relevant values in a consistent manner. For the Delaware Study, the key ratio that is computed for a department or program is the cost per student credit hour. We will focus first on the revenue side of the equation. Even though many colleges have a flat tuition rate for taking between 12 and 17 credits per semester, we will use the Student Credit hour (SCH) as a proxy for revenue.

Let us begin with a straight-forward example from a History program which is housed in the History and Political Science department. In this case the cost per student credit hour for this History program will be compared with that of other History programs. For a single course example, consider HIS 233 which is a three credit semester-long course. Suppose that section 1 meets from 11:00-11:55 MWF for the whole semester. If there are 60 students taking HIS 233 section 1, then there are 3 x 60 = 180 student credit hours generated for this section of this course. This sort of section is the norm on many campuses and hence is easy to keep track of. However, some of the other sections of the same course may only have 2 or 3 students enrolled. With such a low enrollment, this is probably an independent study section. When looking at institutional records, the giveaway is that there is no time or room associated with most of the independent study sections. Local knowledge and relationships with the folks in the History and Political Science department will be necessary to figure out which of the low enrollment courses with assigned rooms and meeting times are in fact independent study sections. The Delaware Study has different roles for standard class sections, independent studies, practicums and labs in the computations of SCH.

For a less straight forward example, let us turn to the Biology program which is housed in its own department. The difficulty comes from lab sections. Suppose that BIO 214 is a five credit semester-long course. Suppose that section 1 meets from 11:00-12:10 MWF for the whole semester and for this lecture, the students receive 4 units of credit. It also meets from 2:30-5:30 T for a lab and for the laboratory students receiver 1 unit of credit. This follows the pattern of the earlier example. For the lecture portion, the 24 students enrolled in the course generate 4 x 24 = 96 SCH. For the lab portion, they generate 1 x 24 = 24 SCH. For this section then there are 120 SCH's generated. The same procedure would be used for each of the other sections. The difficulty arises in the quirky nature of the discipline. At our institution, and some other institutions, this type of course is actually in the catalog as a four hour course. The rationale is that the lab counts for zero credit. Thus only one section of the 4 semester hour of credit lecture for BIO 214 is listed in the schedule. Each lab section is listed separately for zero semester hours of credit. It is clearly the case that the faculty members do convince most of the students that this makes sense. Surprisingly, the faculty members themselves who teach the labs do not view them as having zero load credit for their own schedules or wages. In addition, Delaware's methodology does not allow for zero unit labs so an institutional reporting methodology needed to be created. For BIO214 and all other

courses with zero credit labs, ¾ of the units (in this case 3) are reported as lecture units and ¼ of the units (in this case 1) are reported as laboratory units.

We turn now to the expense side of the equation. That is, what does it cost to provide all of the SCH's generated in the program? All of the salaries, benefits, and taxes paid on behalf of each employee must be combined for all faculty (full and part-time) and for all support staff. In addition, direct program budget expenditures are recorded. The total cost is then divided by the total SCH's computed earlier to produce the cost per student credit hour. This ratio pertains to a single program and can be compared with the same program at other institutions.

The Delaware Study methodology uses faculty load records and contract information to determine full-time equivalent faculty members in the various employment categories (Tenure/Tenure Eligible, Other Regular faculty, Supplemental Faculty and Teaching Assistants). The fixed ratio is 12 units of faculty load counts as one FTE.

There are some interesting issues that come up when you go about opening program schedules and faculty load records for individual departments. The first question to ask is "Is this section cross-listed?" If it meets in the same room, at the same time, with the same instructor for some part of the course, then it is cross-listed. As we saw earlier, it can be rather difficult to determine if something is an independent study section of a course that typically meets in a regular manner. The rule of thumb is the Duck Standard: If it walks like a duck, and it sounds like a duck, it is a duck. If it sure seems like an independent study and clarity cannot be achieved from the available local knowledge, it is declared to be an independent study. If a class appears to be cross-listed, it is declared to be cross-listed.

Another set of interesting issues comes up when two different programs claim the same class. The Delaware Study methodology is to assign the course to the department from which the instructor's salary is drawn. A more difficult setting is where the faculty load records for multiple programs claim the same 12 students who meet at the same time in the same room. In this case, a keen political sense is needed. It is tricky to know when to point out that you have just opened a door and been hit with a falling skeleton. Sometimes, the right approach is to quietly put the bones back and then to save the knowledge until it can actually be acted on by the right person at the right time. In short, you have to anticipate who will be upset and why. Political skill matters!

Data Management: The examples above concern only a few of the variables that need to be calculated for the Delaware Study. To complete the study required a collection of spreadsheets. One contained salary and benefit data for all the professors and for the staff whose work directly supported the academic departments and schools. Another contained the faculty load records for each of the collections of academic departments which are organized as say "The College of Arts and Sciences." The actual fall schedules with individual course enrollments were stored in another spreadsheet. Some of this data was supplied by units such as HR, but the majority was simply pulled from the Informix database using ODBC connectivity and Microsoft's® Query functionality sitting on top of Excel®.

Beyond that we found it very helpful to have all of data for the programs in a single department stored and analyzed in the same spreadsheet. We kept versions of such spreadsheets to allow for surface level reasonableness checks and for more systematic auditing.

Communicating Results: When the technical results are in place, it is incumbent on the researcher to find the right language and pictures to convey the information to each of the audiences. The books by Edward R. Tufte come to mind as helpful (Tufte, 2001). Often the numerical results must be conveyed in narrative form. At other times, graphical presentation works best. Usually it is a combination of the two forms that will best communicate the ideas to the audience.

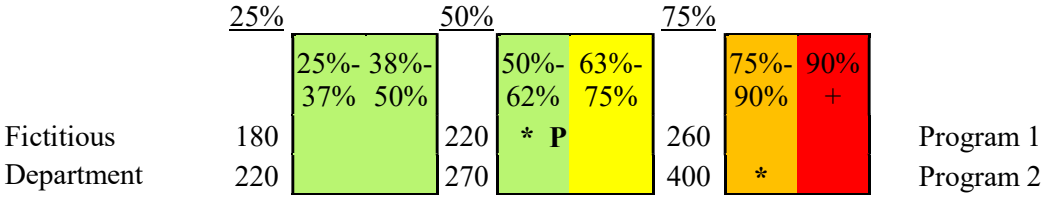
Below is an example of how the Delaware Study data was presented for all of the academic departments. What is shown below is fictitious data with the formatting that we developed.

White Columns: When providing the data for the national comparison group, the Delaware Study provides 25th, 50th and 75th percentile levels for the cost of each program in your Carnegie class in their data base. Those values are indicated in the white columns for Program 1 and Program 2 in Fictitious Department. Note that the costs are quite different between programs with Program 2 being much more expensive nationally.

Colored Columns: A linear approximation was used to identify the 37th, 62nd and 90th percentile levels. This information was simply used to give departments some sense of where their values were in relationship to the overall data.

The Asterisk: This indicates where the cost per student credit hour falls for Program 1 and Program 2 in Fictitious Department. As you can see Program 1's cost is in the 50th-62nd percentile range, as indicated by the green shading, within institutional expectations. But Program 2's cost is in the 75th-90th percentile range. That is higher than expected as is indicated by the orange shading.

The P: The Delaware Study allows each institution to select a set of at least 10 peer institutions to also use for benchmarking. We found that not all of the programs offered in our institution were offered by our peers, but if there is a peer comparison, it is marked with a P. So Program 1 had a peer comparator number and it looks like Program 1 aligns well with the costs of our selected peers for the same program.



While it took multiple days to identify a way to present all of the relevant data in a single graphic, the net result was that academic leaders from all disciplines could make meaning from the data. There were many subsequent conversations that started with questions of the type "What factors are making the cost per credit hour for Program 2 so high?" This data gave us a starting point to have those conversations.

As you can see, the data management, analysis and presentation work that is needed by higher education institutions is as complex as it is important. The authors of this paper encourage you to get involved, you have skills that your institution needs.

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