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AVERAGE GRADUATE EFFICIENCY INDEXES FOR UNIVERSITY OF WASHINGTON UNDERGRADUATE DEGREE PROGRAMS

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Definition and Rationale

As greater numbers of potential students are predicted to desire access to higher education, legislatures and coordinating boards seek improvement in the efficiency with which students are educated. One commonly used measure of efficiency in higher education is the average calendar time from when undergraduates matriculate until they graduate (time to degree). Gillmore and Hoffman have introduced the Graduation Efficiency Index (GEI) as an alternative measure of efficiency².

The GEI is computed retrospectively *for each graduate* as follows:

$$\text{GEI} = \frac{(\text{Minimum Required Credits for the Degree} - \text{Transfer Credits})}{\text{Sum of Enrollment Census Day Credits}^3} \times 100$$

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² Gillmore, G. M. and Hoffman P. H. The Graduation efficiency index: validity and use as an accountability and research measure, **Research in Higher Education**, (Forthcoming, Vol. 38, No. 6, December 1997).

³ At UW, census day credits are those for which students are enrolled after the 10th day of the quarter. If a course is dropped after the tenth day, it remains part of this sum.

Gillmore and Hoffman argued that, relative to time to degree, this index is a much more defensible measure of the efficiency with which an institution is producing graduates in that it takes the following five variables into account:

The total number of credits that have been earned. Earning more credits than the degree demands reduces efficiency.

The number of credits for courses that have been dropped. Dropped courses, leaving empty seats, adds to inefficiency.

The number of credits for courses that have been repeated, including failures. Students who fill the same seat twice add to inefficiency.

The minimum number of credits required by the major for graduation. Degree programs that legitimately require more credits do not necessarily add to inefficiency.

*The number of credits that have been transferred.*⁴ Given that students move from institution to institution, prior work needs to be recognized but not credited to the degree granting institution.⁵

The GEI varies from 0 to 100% and is readily interpretable. For example, an efficiency rate of 90% has familiar meaning, being commonly applied to furnaces and engines. It can be used at all degree levels and all institutions where there is a standard and acceptable minimum number of required credits for a degree. (We have chosen to restrict our attention to undergraduate degrees here, but this restriction is not necessary.) It is equally applicable to full-time and part-time students. It can be averaged for subsets of students; e. g., for each degree type, for each department, and for transfer vs. non-transfer students. Thus, it is an index that is very useful as a dependent or correlative variable for research and for illuminating problem areas, and it can be easily tracked over time to assess affects of interventions and policy changes to improve efficiency, either locally or globally.

Time-to-degree, on the other hand, does not directly measure efficiency in that the mere fact of a student taking more time to graduate does not necessary adversely affect the number of students who can be educated. The student who enrolls part time takes up no more total enrollment space than the one who enrolls full time if they both take the same number of total credits over the course of their studies. Furthermore, the assumption that all students should graduate in four years may be inappropriate for those economically disadvantaged students for whom a college education is not affordable without an extensive work schedule that renders a full-load of courses difficult if not impossible. Stressing the importance of a high four year graduation rate has the unfortunate side-effect of encouraging institutions to serve only those students who fit the traditional "mold" and have the highest probability of graduating within four years. Students with family obligations or financial hardship may pay an unexpected and unfair price for an emphasis on a four year graduation rate.

⁴ At UW, the number of transfer credits used in calculating the index include credits earned at other two-year and four-year institutions and by distance learning, advance placement, credit by exam, and extension services of other universities.

⁵ Gillmore and Hoffman, p. 4.

Limitations of the GEI

Conceptually, there are three major limitations to the GEI. First, the efficiency of the academic programs of transfer students at the sending institution must be inferred from the efficiency demonstrated at the degree-granting institution, and inefficiency cannot be partitioned between the two (or more) institutions. A superior method would be to capture the entire transcript from the sending institution, including late withdrawals and non-transferable credits. So doing would present a more accurate calculation of the total inefficiency but one still would not be able to apportion it to each institution attended.

Secondly, the GEI is a measure that at this stage of development can be only applied to students who have obtained degrees. Taken alone, it implies that the goal of undergraduate education is fully or at least primarily embodied in these degrees, and it ignores students who matriculate but fail to graduate. The GEI is not a measure of graduation rates, and the latter should be considered as a separate indicator of institutional efficiency.

Finally, efficiency is clearly not equivalent to effectiveness. One criterion by which performance or accountability indicators should be judged is by the institutional behavior that they reinforce. While simple measures of calendar years from matriculation to graduation may lead to some unfortunate consequences, such as favoring students of wealth over students of economic disadvantage and favoring young, traditional students over older returning students, the GEI, itself, is not without the possibility of adverse consequences. For example, students who take additional credits, credits that do not count toward a degree but might contribute to further employment, or even who drop some courses may, in fact, receive a better education in terms of society's larger goals. Further, the GEI assumes that the academic units' determination of the curriculum and the minimum number of credits required for a degree is appropriate. However, by raising the minimum number of credits required for the degree, academic programs can artificially raise their measured efficiency levels while lowering actual efficiency. Clearly, care must be taken to assure that program credit requirement minimums that exceed the institution's minimum are grounded on academic necessity.

Prior Results

The previous Gillmore and Hoffman work, cited earlier, was based on the 1993-94 UW graduating class. In this research, freshman entrants were found to graduate with more efficiency than transfers and B. A. degree recipients with more efficiency than B. S. recipients. There was a significant interaction between these two variables such that transfers with B. S. degrees exhibited particularly low averages. Students transferring more than 120 credits had a very low average GEI, and students transferring from two-year schools were more efficient, on average, than those transferring from four year schools, even when controlling for total credits transferred. For B. A degree recipients, females tended to be more efficient, while for B. S. recipients, males tended to be more efficient. The GEI correlated only modestly with time to degree (about -.40). Part-time students (average of fewer than 12 credits per quarter) exhibited a mean GEI of 79%, while full-time students

(average of 15 or more credits per term) exhibited a mean GEI of 89%. Correlations of the GEI with admissions grade point averages and test scores were quite small.

Departmental Averages

In the table to follow, average GEI values are given for colleges, Arts and Sciences subcolleges, and departments of student majors. These averages are based on data from the bachelor degree recipients of the academic years 92-93, 93-94, and 94-95. Students with dual and double majors were excluded from the analyses. Generally, degree programs with fewer than ten remaining graduates are not listed. Values are presented separately for B. A. and B. S. degrees and for freshman and transfer admittees. The latter are defined as those who graduated with more than 30 transfer credits. College and sub-college data are shaded⁶.

Average Graduate Efficiency Indexes for Undergraduate Degree Programs 1992-95 Academic Year Graduates

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|----------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Total University | | | | |
| N | 4712 | 5010 | 2054 | 2089 |
| Avg GEI | 90.0 | 83.3 | 87.6 | 76.2 |
| Seattle Campus | | | | |
| N | 4700 | 4523 | 2054 | 1917 |
| Avg GEI | 90.0 | 83.2 | 87.6 | 76.6 |
| Arch & Urban Planning | | | | |
| N | 113 | 70 | 62 | 30 |
| Avg GEI | 87.0 | 70.8 | 81.4 | 74.9 |
| Building Construction | | | | |
| N | | | 62 | 30 |
| Avg GEI | | | 81.4 | 74.9 |
| Arch. & Urban Plan. | | | | |
| N | 112 | 69 | | |
| Avg GEI | 87.4 | 70.6 | | |
| Arts and Sciences | | | | |
| N | 3545 | 2950 | 753 | 526 |
| Avg GEI | 89.7 | 82.9 | 88.0 | 76.8 |
| A&S - Arts | | | | |
| N | 252 | 270 | | |
| Avg GEI | 85.6 | 77.3 | | |

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|----------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Art | | | | |
| N | 46 | 50 | | |
| Avg GEI | 86.7 | 77.7 | | |
| Art History | | | | |
| N | 45 | 43 | | |
| Avg GEI | 89.3 | 83.0 | | |
| Fine Arts | | | | |
| N | 70 | 70 | | |
| Avg GEI | 86.0 | 75.7 | | |
| Dance | | | | |
| N | 13 | 5 | | |
| Avg GEI | 78.5 | 64.0 | | |
| Drama | | | | |
| N | 47 | 66 | | |
| Avg GEI | 88.8 | 80.1 | | |
| Music | | | | |
| N | 16 | 17 | | |
| Avg GEI | 74.6 | 64.5 | | |
| Music Applied | | | | |
| N | 14 | 3 | | |
| Avg GEI | 81.9 | 57.0 | | |

⁶ Averages for the 1995-96 academic year are expected in mid January of 1997.

Average Graduate Efficiency Indexes for Undergraduate Degree Programs (Continued)

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| A&S - Humanities | | | | |
| N | 855 | 659 | | |
| Avg GEI | 90.1 | 82.6 | | |
| Asian - Chinese | | | | |
| N | 7 | 11 | | |
| Avg GEI | 77.6 | 70.6 | | |
| Asian - Japanese | | | | |
| N | 15 | 9 | | |
| Avg GEI | 93.6 | 80.1 | | |
| Compar Literature | | | | |
| N | 13 | 12 | | |
| Avg GEI | 92.0 | 74.1 | | |
| English | | | | |
| N | 511 | 396 | | |
| Avg GEI | 90.1 | 83.4 | | |
| German | | | | |
| N | 21 | 21 | | |
| Avg GEI | 87.6 | 78.6 | | |
| Linguistics | | | | |
| N | 9 | 16 | | |
| Avg GEI | 83.7 | 85.6 | | |
| Rom Lang - French | | | | |
| N | 29 | 14 | | |
| Avg GEI | 89.7 | 79.2 | | |
| Rom Lang - Spanish | | | | |
| N | 31 | 43 | | |
| Avg GEI | 85.7 | 82.4 | | |
| Slavic - Russian | | | | |
| N | 14 | 13 | | |
| Avg GEI | 80.2 | 69.2 | | |
| Speech Communications | | | | |
| N | 182 | 103 | | |
| Avg GEI | 92.8 | 86.2 | | |

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|---------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| A&S - Science | | | | |
| N | 456 | 457 | 753 | 525 |
| Avg GEI | 89.6 | 83.2 | 88.0 | 76.8 |
| Atmospheric Science | | | | |
| N | | | 11 | 9 |
| Avg GEI | | | 85.9 | 96.4 |
| Biology | | | | |
| N | | | 148 | 92 |
| Avg GEI | | | 88.4 | 73.1 |
| Botany | | | | |
| N | 7 | 7 | 16 | 14 |
| Avg GEI | 85.2 | 86.0 | 87.0 | 66.6 |
| Biochemistry | | | | |
| N | | | 68 | 34 |
| Avg GEI | | | 92.5 | 80.5 |
| Chemistry | | | | |
| N | 17 | 14 | 19 | 21 |
| Avg GEI | 83.2 | 67.8 | 87.4 | 77.3 |
| Geological Science | | | | |
| N | | | 21 | 24 |
| Avg GEI | | | 80.2 | 75.5 |
| Mathematics | | | | |
| N | 38 | 38 | 50 | 51 |
| Avg GEI | 83.9 | 75.2 | 83.4 | 73.2 |
| Physics | | | | |
| N | | | 38 | 31 |
| Avg GEI | | | 81.0 | 72.4 |
| Psychology | | | | |
| N | 366 | 368 | 182 | 110 |
| Avg GEI | 90.5 | 85.7 | 89.8 | 80.6 |
| Speech & Hearing Sci | | | | |
| N | | | 35 | 35 |
| Avg GEI | | | 90.4 | 80.1 |
| Zoology | | | | |
| N | 28 | 27 | 160 | 101 |
| Avg GEI | 91.5 | 73.6 | 87.9 | 76.2 |

Average Graduate Efficiency Indexes for Undergraduate Degree Programs (Continued)

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|---------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| A&S - Social Science | | | | |
| N | 1982 | 1564 | | |
| Avg GEI | 90.0 | 83.9 | | |
| Amer. Ethnic Studies | | | | |
| N | 48 | 37 | | |
| Avg GEI | 85.0 | 77.0 | | |
| Anthropology | | | | |
| N | 93 | 138 | | |
| Avg GEI | 88.1 | 80.9 | | |
| Communications | | | | |
| N | 308 | 186 | | |
| Avg GEI | 93.0 | 87.1 | | |
| Economics | | | | |
| N | 353 | 209 | | |
| Avg GEI | 89.4 | 84.3 | | |
| SIS - E. Asia | | | | |
| N | 22 | 12 | | |
| Avg GEI | 88.9 | 80.6 | | |
| SIS - Intern Studies | | | | |
| N | 101 | 77 | | |
| Avg GEI | 90.7 | 83.1 | | |
| SIS - Comp Religion | | | | |
| N | 5 | 15 | | |
| Avg GEI | 81.5 | 79.3 | | |
| SIS - East Europe | | | | |
| N | 7 | 13 | | |
| Avg GEI | 85.2 | 80.3 | | |
| Geography | | | | |
| N | 104 | 92 | | |
| Avg GEI | 87.7 | 81.8 | | |
| History | | | | |
| N | 212 | 204 | | |
| Avg GEI | 89.1 | 84.0 | | |
| Philosophy | | | | |
| N | 16 | 32 | | |
| Avg GEI | 92.2 | 82.9 | | |
| Political Sci. | | | | |
| N | 359 | 256 | | |
| Avg GEI | 89.6 | 84.8 | | |

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|-------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Society & Justice | | | | |
| N | 47 | 34 | | |
| Avg GEI | 92.1 | 85.2 | | |
| Sociology | | | | |
| N | 289 | 223 | | |
| Avg GEI | 90.6 | 86.2 | | |
| Women's Studies | | | | |
| N | 3 | 12 | | |
| Avg GEI | 86.8 | 70.3 | | |
| Evening Degree Program | | | | |
| N | 36 | 234 | | |
| Avg GEI | 82.9 | 79.9 | | |
| English | | | | |
| N | 4 | 26 | | |
| Avg GEI | 86.5 | 78.3 | | |
| Humanities | | | | |
| N | 5 | 33 | | |
| Avg GEI | 75.1 | 76.2 | | |
| Psychology | | | | |
| N | 6 | 34 | | |
| Avg GEI | 81.3 | 82.9 | | |
| Sociology | | | | |
| N | 4 | 11 | | |
| Avg GEI | 74.2 | 88.6 | | |
| History | | | | |
| N | | 12 | | |
| Avg GEI | | 84.8 | | |
| Political Sci. | | | | |
| N | 3 | 17 | | |
| Avg GEI | 88.7 | 87.0 | | |
| Social Sci. | | | | |
| N | 14 | 101 | | |
| Avg GEI | 86.5 | 77.8 | | |
| Business Administ. | | | | |
| N | 847 | 1043 | | |
| Avg GEI | 92.9 | 86.0 | | |
| Accounting | | | | |
| N | 298 | 361 | | |
| Avg GEI | 92.6 | 83.4 | | |
| Busi. Admin | | | | |
| N | 549 | 682 | | |
| Avg GEI | 93.1 | 87.3 | | |

Average Graduate Efficiency Indexes for Undergraduate Degree Programs (Continued)

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|--------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Education | | | | |
| N | 18 | 29 | | |
| Avg GEI | 86.5 | 67.7 | | |
| Engineering | | | | |
| N | | | 873 | 856 |
| Avg GEI | | | 88.6 | 76.3 |
| Technical Commun | | | | |
| N | | | 18 | 16 |
| Avg GEI | | | 83.4 | 80.1 |
| Aero & Astro | | | | |
| N | | | 62 | 49 |
| Avg GEI | | | 89.7 | 74.2 |
| Chemical | | | | |
| N | | | 65 | 46 |
| Avg GEI | | | 90.4 | 79.6 |
| Civil | | | | |
| N | | | 176 | 164 |
| Avg GEI | | | 87.6 | 75.3 |
| Electrical | | | | |
| N | | | 182 | 245 |
| Avg GEI | | | 88.7 | 75.4 |
| Computer Sciences | | | | |
| N | | | 54 | 67 |
| Avg GEI | | | 88.5 | 77.5 |
| Computer Eng | | | | |
| N | | | 50 | 41 |
| Avg GEI | | | 88.3 | 75.3 |
| Industrial | | | | |
| N | | | 50 | 35 |
| Avg GEI | | | 86.3 | 70.8 |
| Mechanical | | | | |
| N | | | 183 | 179 |
| Avg GEI | | | 91.0 | 78.6 |
| Ceramic | | | | |
| N | | | 17 | 12 |
| Avg GEI | | | 82.4 | 77.1 |
| Metallurgical | | | | |
| N | | | 16 | 5 |
| Avg GEI | | | 79.2 | 75.5 |

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|---------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Ocean & Fisheries | | | | |
| N | | | 55 | 41 |
| Avg GEI | | | 86.4 | 77.3 |
| Fisheries | | | | |
| N | | | 23 | 16 |
| Avg GEI | | | 86.1 | 74.3 |
| Oceanography | | | | |
| N | | | 29 | 21 |
| Avg GEI | | | 87.0 | 80.4 |
| Forest Resources | | | | |
| N | | | 60 | 39 |
| Avg GEI | | | 89.2 | 75.7 |
| Con Wildlife Res. | | | | |
| N | | | 9 | 7 |
| Avg GEI | | | 88.3 | 68.1 |
| Forest Management | | | | |
| N | | | 8 | 16 |
| Avg GEI | | | 93.7 | 78.6 |
| Pulp & Paper Science | | | | |
| N | | | 27 | 8 |
| Avg GEI | | | 91.9 | 83.2 |
| Wildlife Scien | | | | |
| N | | | 7 | 6 |
| Avg GEI | | | 83.1 | 65.9 |
| Social Work | | | | |
| N | 48 | 88 | | |
| Avg GEI | 88.4 | 86.3 | | |
| Social Welfare | | | | |
| N | 23 | 47 | | |
| Avg GEI | 87.3 | 90.4 | | |
| Social Work | | | | |
| N | 25 | 41 | | |
| Avg GEI | 89.4 | 81.7 | | |

Average Graduate Efficiency Indexes for Undergraduate Degree Programs (Continued)

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|--------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Undergrad Education | | | | |
| N | 92 | 109 | 9 | 30 |
| Avg GEI | 85.9 | 81.1 | 81.7 | 78.1 |
| Gen. Studies | | | | |
| N | 67 | 82 | 9 | 30 |
| Avg GEI | 84.5 | 80.6 | 81.7 | 78.1 |
| Comp History of Ideas | | | | |
| N | 25 | 27 | | |
| Avg GEI | 89.7 | 82.6 | | |
| University Extension | | | | |
| N | 36 | 234 | | |
| Avg GEI | 82.9 | 79.9 | | |
| Dentistry (Dental Hyg.) | | | | |
| N | | | | 20 |
| Avg GEI | | | | 72.2 |
| Medicine | | | | |
| N | | | 95 | 108 |
| Avg GEI | | | 81.2 | 68.0 |
| Prosthetics & Orth. | | | | |
| N | | | 5 | 11 |
| Avg GEI | | | 75.3 | 70.2 |
| Physical Therapy | | | | |
| N | | | 2 | 7 |
| Avg GEI | | | 76.2 | 53.6 |
| Rehab. Med. | | | | |
| N | | | 14 | 33 |
| Avg GEI | | | 74.2 | 68.7 |
| Medical Technology | | | | |
| N | | | 23 | 19 |
| Avg GEI | | | 75.8 | 68.6 |
| Microbiology | | | | |
| N | | | 51 | 38 |
| Avg GEI | | | 86.2 | 69.2 |
| Nursing | | | | |
| N | | | 83 | 145 |
| Avg GEI | | | 85.6 | 76.9 |

| UNIT | Bachelor of Arts | | Bachelor of Science | |
|--------------------------------------|------------------|-------|---------------------|-------|
| | Fresh | Trans | Fresh | Trans |
| Pharmacy | | | | |
| N | | | 47 | 103 |
| Avg GEI | | | 89.9 | 87.9 |
| Public Health (Envir. Health) | | | | |
| N | | | 17 | 16 |
| Avg GEI | | | 74.6 | 70.4 |
| Bothell | | | | |
| N | | 193 | | 86 |
| Avg GEI | | 84.6 | | 72.0 |
| General Stud. | | | | |
| N | | 174 | | |
| Avg GEI | | 83.9 | | |
| Liberal Stud. | | | | |
| N | | 19 | | |
| Avg GEI | | 91.2 | | |
| Nursing | | | | |
| N | | | | 86 |
| Avg GEI | | | | 72.0 |
| Tacoma | | | | |
| N | | 294 | | 86 |
| Avg GEI | | 84.1 | | 72.3 |
| General Stud. | | | | |
| N | | 149 | | |
| Avg GEI | | 85 | | |
| Liberal Stud. | | | | |
| N | | 22 | | |
| Avg GEI | | 86.8 | | |
| International Studies | | | | |
| N | | 123 | | |
| Avg GEI | | 82.5 | | |
| Nursing | | | | |
| N | | | | 86 |
| Avg GEI | | | | 72.3 |