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Ph.D. Completion Project: Preliminary Results from Baseline Data

by Daniel D. Denecke, Director, Best Practices, Council of Graduate Schools and Helen S. Frasier, Program Manager, Best Practices, Council of Graduate Schools

The Ph.D. Completion Project is a major, three-year initiative generously sponsored by Pfizer Inc and the Ford Foundation to address the issues of doctoral attrition and completion in the fields of physical sciences and mathematics, engineering, life sciences, social sciences and humanities. Forty-five universities in the U.S. and Canada are participating in the project, which will study completion rates and attrition patterns and highlight replicable and scalable strategies for optimizing Ph.D. completion in contexts that vary by field, program, and institutional type. The ultimate intent of the project is to reduce rates of Ph.D. attrition and increase completion, as proven intervention strategies are widely disseminated and adopted by doctoral departments and programs. Special emphasis is directed to increasing completion rates for minority and women students.

At the Summer Workshop in Santa Fe, New Mexico, July 2005, CGS hosted a "Technical Workshop" on the Ph.D. Completion Project. Deans and project leaders gathered to discuss data collection, research tools, institutional activities, and preliminary data analysis. Graduate deans Richard Wheeler (University of Illinois-Urbana Champaign), Lewis Siegel (Duke University), and Orlando Taylor (Howard University) presented on their institutional data and activities. CGS project staff addressed overarching issues of data collection and analysis and discussed preliminary 7- and 10-year completion rate data, both comprehensive and by broad field area. They also discussed how demographic trends within the project's dataset compare to national doctoral completion trends by demographic group, with a focus on underrepresented minorities. This article provides an update, using a now nearly complete baseline dataset, on the preliminary descriptions of baseline completion and attrition data first presented at that workshop.

The Ph.D. Completion Project Database

Participating universities submitted completion, attrition, and aggregate demographic data on 54,390 students (38,660 students at funded Research Partner universities and an additional 15,730 students at Project Partner universities who are participating in the Ph.D. Completion Project on a voluntary basis) [all numbers cited as of October 19, 2005, unless otherwise noted]. Of students represented in the project database, 64% are from doctoral programs in SEM (science, engineering, and mathematics) fields; 34% are from programs in the social sciences and humanities; and 2% from other fields.

The database contains completion, attrition, and aggregate demographic data from the 21 Research Partner universities and from 8 of the 24 Project Partners. Completion and attrition data currently reflect 247 participating Research Partner programs (including 158 SEM programs and 89 humanities and social sciences programs) and 137 Project Partner programs (70 in SEM, 52 in the humanities and social sciences, and 15 from other fields).

The Council of Graduate Schools (CGS) will maintain its commitment to respecting the confidentiality of data submitted by its member institutions to the Ph.D. Completion Project. CGS will work with participating universities and programs to explore ways to use these data in ways that allow for effective peer comparisons and benchmarking without violating that confidentiality.

The Numbers: At First Glance

Completion Data

Overall, participating universities have submitted baseline completion data for 384 programs from 29 universities (including the 21 Research Partners and 8 Project Partners). Among students within participating doctoral programs, the distribution across broad field areas is: physical sciences and mathematics = 31%; life sciences = 15%; engineering = 17 %; social sciences = 19%; humanities = 15%; and other fields = 2%.

The database currently reflects 10-year completion data for 3 cohorts for the period 1992-3 through 1994-5. By the end of the grant period, the dataset will reflect 10-year completion data for 5 cohorts (1992-3 through 1996-7). In the future, we hope to be able to support the submission of data on additional cohorts (1997-8 through 2003-4) for whom 10-year data will not yet be available at the end of the grant period. These additional data would enable us to work with graduate deans to develop a more complete picture of Ph.D. completion, and to better measure the impact of policy interventions on the completion rates and attrition patterns of more recently enrolled students who stand

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to benefit most from the institutional changes supported by the project. Seven-year completion rates are meaningful in many fields where time to degree is characteristically shorter. The Ph.D. Completion Project currently has 7-year completion data for 6 cohorts (1992-3 through 1996-7); this 7-year metric reflects twice the number of students included in the preliminary analysis of baseline data on 10-year completion rates.

Attrition Data

Meaningful attrition rates cannot be calculated simply by subtracting the number of students who complete from the number of enrolled students. Twenty-four universities have submitted baseline attrition data as of October 19, 2005. The Ph.D. Completion Project has collected attrition data separately from completion data in order to capture nuanced information about the various kinds of attrition that are most common across fields and across programs, such as: attrition before and after candidacy, attrition with and without an "en route" master's degree, non-continuous enrollment ("stop-out," or temporary attrition), and transfer to another program at the institution or to another institution (the attrition template is available in Excel and PDF formats at: www.phdcompletion.org/tools/index.asp). While institutions' capacity to collect data in such detail varies, understanding this variation in attrition is essential to analyzing attrition at the program level, for benchmarking attrition patterns of specific programs against others and against a field of study in general, and for achieving a better grasp of the meaning of early and late attrition in field- and program-specific contexts. Some of these attrition data are easily tracked by the graduate school and/or at the central university level, while other data may require communication between the graduate school, the university's institutional research office, and the participating departments. Many of the participating universities have reported that one of the best and unanticipated benefits of participating in the Ph.D. Completion Project has been increased communication between these separate arms of the university, resulting in "cleaner" data and a better collective understanding of the meaning and usefulness of those data.

Demographic Data

Twenty-seven U.S. universities have submitted aggregate demographic data on completion rates by broad field area for participating programs by gender, race/ethnicity, and citizenship [Canadian universities are prohibited by law from collecting data on the race and ethnicity of students]. Overall, the numbers of underrepresented minorities (and, in some cases, of women and international students) are very small. While minority representation within participating programs is approximately proportionate to that within doctoral education, nationally, there is not parity. Among participating programs in SEM fields, Black = 2%; Hispanic = 2%; Asian = 5%; American Indian = <1%; in SEM fields nationally, these percentages are =3%, =4%, =8%, and =<1%, respectively. The percentages of minorities in social science and humanities doctoral programs are for most groups higher, where Black = 6%; Hispanic = 4%; Asian = 4%; and American Indian = 1%; in social sciences and humanities, nationally, Black = 5%; Hispanic = 5%; Asian = 4% and American Indian = 1%. The female to male percentage ratio in participating programs in SEM fields and in social science and humanities fields is comparable to national percentages at 30/70 and 52/48, respectively [For national percentages, see Hoffer et.al. 2004].

Because of the small numbers of minority students in many programs, it was not feasible to collect completion rate data by demographic group for each program separately, as this would have often required institutions to report data that identified specific individuals. Attrition is a sensitive issue, and institutional review boards are increasingly cautious about publishing information that compromises the anonymity of individual students. Collecting this program data aggregated by broad field area resulted in expeditious approval of the research design by the participating universities' respective institutional research boards, and will enable us to conduct meaningful analyses and draw conclusions about the impact of the project on completion rates of underrepresented minorities by field. By examining these data in conjunction with the other quantitative and qualitative data collected by the project and by universities independently, we hope to enable graduate deans and others responsible for ensuring success in graduate programs to make conclusions about the impact of interventions on the completion rates of underrepresented minorities at the program level as well.

Student Exit Survey Data

The exit survey template developed by CGS captures perspectives from departing students (both completers and non-completers) in seven areas: selection/admissions; mentoring/advising; financial support; program environment; curricular processes and procedures; research experience; and career placement and development. These areas correspond to the broad categories of interventions that universities and departments are implementing as a result of the Ph.D. Completion Project, as solicited by the Request for Proposals. This survey has been implemented and data submitted by about half of the Research Partners, while other universities now in the process of implementing the survey will submit data in December 2005. At the request of participants, an alternative "short form" of the survey has been developed, and an online version of both short and standard-length surveys is now available (see www.phdcompletion.org/tools/index.asp). Preliminary analysis of these data will be shared with the CGS community in the near future.

A Preliminary Description of Baseline Data Trends and Patterns

**Any reference to the baseline data represented in this article should indicate the fact that this is a preliminary description.*

The Ph.D. Completion Project database contains data on 14 program areas in which 10 or more institutions are represented: Biology, Chemistry, Computer Sciences, English, Foreign Languages, Health & Medical Sciences, History, Mathematics, Mechanical Engineering, Molecular & Cellular Biology, Physics, Political Science, Psychology, and Sociology. [For another 11 program areas there are 5 or more institutions represented: Anthropology and Archaeology, Biomedical Engineering, Chemical Engineering, Civil Engineering, Communications, Economics, Electrical and Electronics Engineering, Genetics, Microbiology and Immunology, Neuroscience, and Philosophy.] The data allow comparisons based on program-level definitions of candidacy, admission requirements regarding awarded master's degrees prior to doctoral enrollment, and (in many cases) distinction between master's and doctoral objective.

Completion

Cumulative 10-year completion rates by broad field are relatively consistent with those reported in previous studies, with engineering exhibiting the highest average completion rate (64%), followed by the life sciences (62%), physical sciences and social sciences (both at 55%), and humanities

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Selection and Attrition

by Peter Diffley, Associate Dean of the Graduate School, University of Notre Dame

Introduction

When a graduate student leaves his or her program without a Ph.D., it is a costly event. The university loses money, faculty time, and a satisfied alumnus. Given that some attrition is inevitable, how can graduate schools minimize its cost to both the students and the university? The admissions process is an obvious place to begin to answer this very complex question. My first study reveals an interesting relationship between the size of the applicant pool and early attrition (i.e., the first three years of enrollment).

Why early attrition? First, over half of the attrition of Notre Dame graduate students occurs in their first three years. Therefore, if the goal is to reduce overall attrition, this time is critical. Second, if certain admissions procedures are responsible for high attrition, problems should become apparent early in training. Third, if the study is restricted to the first three years of training, recent incoming classes can be used in the study. (Departmental administrators pay attention to what happens 'on their watch'.)

Student population

All incoming doctoral students between 1985 and 1992 in 14 Notre Dame departments were considered in this study (n=3991 students). Two overlapping datasets were compared and analyzed. The first set, which was collected for a grant proposal to CGS, included incoming students to doctoral programs between 1985 and 1995. Few of these students are still enrolled. The second dataset, collected in response to a CGS request, included doctoral students between 1992 and 2002. All of these students have quit or progressed beyond three years of training but many are still enrolled.

Table 1: Relation between applications for admission and early attrition

	Incoming classes between: 1985-1995		1992-2002	
	Early attrition*	Applicants per opening**	Early attrition*	Applicants per opening**
Psychology	16%	21	20%	20
Philosophy	17%	16	15%	14
English	18%	18	15%	22
Mathematics	**19%**	**23**	**27%**	**13**
Physics	19%	18	23%	13
Biology	20%	9	22%	9
Political Science	21%	19	23%	18
Sociology	25%	8	30%	9
Civil Engr	25%	9	30%	11
Chemistry	26%	10	29%	12
Chemical Engr	28%	10	22%	13
History	**37%**	**11**	**22%**	**16**
Electrical Engr	41%	11	38%	12
Mechanical Engr	44%	14	39%	8

** Early attrition: percentage of doctoral students who quit in the first 3 years of training.*
*** Applicants per opening: number of doctoral applicants per incoming student.*

Though in very different academic programs over a large span of time, these doctoral students shared a similar academic environment. All were full-time students studying on campus for at least their first three years. All received full tuition scholarships and academic year stipends for at least the first four years of training. Stipend-related work was restricted to a maximum of 17.5 hours per week. About two-thirds of the students were single when they entered graduate school and only a third of married students had children. Incoming classes in the 14 departments averaged 14+4 students. Doctoral intent was indicated in the application for admission and none of the academic programs required a master's degree for application to the doctoral program.

The relation between the applicant pool and early attrition

It is not merely the number of applications that a department receives but the number of applications per available position that is an important measure of selectivity. Dividing the number of applicants in a particular department by the number of its incoming students yields the following results (Table 1).

The seven departments with lower early attrition (16-21%) in the 1985-95 dataset averaged 18 applicants for every incoming student (Table 1). The seven departments with higher early attrition (25-44%) only averaged 10.5 applicants per slot. For the most part, these results were replicated in the 1992-02 dataset except for three departments that had large reversals of fortune. Between 1992 and 2002, the Department of Mathematics had 10 fewer applications per slot and recorded an 8% increase in attrition. During the same time-period, the Department of History increased its applicant pool by 5 per slot and decreased its early attrition 15%. Therefore, what happened to Math and History, further supports the thesis that more applications means less attrition.

None of these results was absolute. The Department of Biology, for example, maintained a low early attrition rate with a low ratio of applicants per incoming student. The Department of Chemical Engineering dropped its early attrition from 28% to 22% with only a modest increase in applications (3/slot). However, for most of the departments in both datasets, a high ratio of applicants to incoming students was followed by a low early attrition rate. In this study, departments with more than 15 applicants competing for the same slot never lost more than a quarter of their incoming students in their first three years of enrollment. Seven out of eight departments with fewer than 12 applications per slot lost at least a quarter of their incoming classes in the first three years of training. Therefore, the break point between high and low early attrition appears to be between 12 and 15 applications per open position.

Admissions committee structure and function

The way applications are processed also affects applicant pool size, selectivity and early attrition. After interviews with directors of graduate studies, I linked their departmental admissions procedures to their early attrition rates. Centralized admissions committees choose from the entire applicant pool; sub-disciplinary committees evaluate a smaller fraction; and individual faculty members may only rank the best of two or three applicants who indicate an interest in his or her research area. It therefore comes as no surprise that all but one of the departments with low early attrition use a centralized admissions committee to make the final admission decision. The exception, the Department of Biology (a deeply fractionated field), recently moved to sub-disciplinary admissions committees. Among the five departments with consistent high early attrition, three use faculty recommendations to start the admissions process.

Another departmental practice is rolling admissions where an automatic decision is made upon receipt of the application based on minimally acceptable standards. This essentially reduces the applicant pool size to one, disallows any comparisons, and reduces the department's ability to accept very good late applications. Only two Notre Dame departments

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Coming Soon to Your Campus: The Revised GRE® General Test and TOEFL® iBT

by David G. Payne, Executive Director, GRE Program, Educational Testing Service; Kurt F. Geisinger, Chair, GRE Board, University of Saint Thomas, Houston; and Rob Seltzer, Chair, TOEFL Board, University of Wisconsin, Madison

The GRE® General Test and the Test of English as a Foreign Language™ (TOEFL®) play important roles in graduate admissions and funding decisions at virtually all CGS institutions. Over the years the GRE and TOEFL Boards have worked closely with ETS to ensure that these tests are continually improved and in recent years there have been major efforts to redesign these tests in response to the needs of the higher education community. The revisions to these two widely used tests have resulted in new tests in which new skills are being assessed and new score scales will be used. Taken together, these changes will mean that institutions will have better information available for use in admissions, placement and funding decisions.

In order for the changes in the GRE General Test and TOEFL Test to have their maximal utility, it is important that graduate deans, faculty and graduate school staff members be familiar with the changes in the tests and the information that will be available to the institutions that receive scores. Toward that goal, we will describe the skills assessed in each test, the basic structure of the tests, the new score scales and the information that will be available from the tests, and important aspects of the test administration and delivery. We will begin with the TOEFL test as this test is being launched in September 2005 to be followed by the new GRE General Test in October 2006.

TOEFL iBT

TOEFL measures the ability of nonnative speakers of English to use and understand English. Until recently there have been two versions of TOEFL, a computer-based test (CBT) and a paper-based test (PBT). Most deans, graduate faculty and admissions staff are very familiar with these two tests and have been using the scores from these tests for years. Starting in September 2005, ETS will deliver a new TOEFL test that will be a better measure of what colleges and universities need to know, namely a prospective student's ability to use English as it is spoken, heard, read, and written in college and university settings.

The new test, called the TOEFL Internet-based test (TOEFL iBT), assesses all four language skills that are important for effective communication: speaking, listening, reading, and writing. The new Speaking section evaluates a person's ability to use spoken English. TOEFL iBT also emphasizes integrated skills and provides better information to institutions about students' ability to communicate in an academic setting and their readiness for academic coursework. The new integrated Writing and Speaking tasks measure the ability to combine information from more than one source and communicate about it.

Score Scales for TOEFL iBT

Scores from the TOEFL iBT provide information about performance in each of the four skills areas as well as an overall score. Because of the significant differences between TOEFL iBT and the current versions of the TOEFL test, the score scales will change. The scores for each of the four skill areas will be on a 0-30 scale and the total score will be a simple summing of the four, 0-120. ETS recommends that score users should consider the four skills scores separately, and not just the total score in making admissions, funding and placement decisions. ETS has made available information to assist institutions in understanding the new TOEFL iBT scores and in setting appropriate local standards for score use. A standard setting manual and all associated materials are available on CD-Rom and can be obtained by writing to toeflnews@ets.org. A score comparison chart has also been developed, based on a 2003-04 field test of 3000 students in 30 countries who took both the TOEFL CBT and the new iBT test. Score comparisons can be useful for understanding relationships between tests, but they should be used with caution since significant differences in the tests can make it difficult to establish exact comparisons. ETS suggests institutions also consider the field study percentile data and the Standard Error of Measurement when setting initial score requirements. This information, along with other useful materials on the new test, is available on the TOEFL Website that can be accessed from the ETS Website (www.ets.org/toefl).

Phased Launch

TOEFL iBT is being introduced in phases to maintain test and score integrity and ensure a quality administration for test takers. TOEFL iBT was first administered in the United States (excluding U.S. Territories) on September 24, 2005, followed by test delivery in Canada, France, Germany, and Italy on October 22, 2005. By May 2006, the test will be available in almost all countries.[1]

The Test of Spoken English (TSE) and the CBT and PBT versions of the TOEFL test will continue to be available until the Internet-based version is implemented in a particular location. Because of the phased introduction of the test, and because scores are valid for two years, starting in Fall of 2005, applicants may be submitting TOEFL iBT, CBT, or PBT scores, and TSE scores, depending upon where and when they took the test.

Revised GRE General Test

The current GRE General Test measures critical thinking, analytical writing, verbal reasoning, and quantitative reasoning skills that have been acquired over a long period of time. The current General Test provides scores on three sections, Analytical Writing, Verbal Reasoning and Quantitative Reasoning, and this basic structure will be maintained in the Revised General Test that will be launched worldwide in October 2006. Like the TOEFL iBT, the Revised GRE General Test will be administered in ETS' new internet-based testing network, which will mean that examinees worldwide will have access to a much larger testing network. Unlike the revolutionary changes to the TOEFL iBT, the GRE changes are more evolutionary.

The changes to the GRE General test are being made in order to increase the validity of the test, to provide faculty with better information on applicants' performance, to enhance security measures, and, in so doing, to make better use of advances in technology and psychometric design.[2] In the Verbal section of the test, there will be a greater emphasis on skills related to graduate work, such as complex reasoning and critical reading. More specifically, there will be greater emphasis on higher-level cognitive skills and substantially less dependence on vocabulary. In the Revised test the antonym and analogy question types will be dropped and replaced by more text-based questions, such as reading passages involving a broader selection of reading materials. There will also

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be an expansion of complex editing tasks that are computer-enabled (e.g., highlighting a sentence in a passage as an answer to a specific question). Sample questions for the Revised General Test are posted on the GRE Web site at www.ets.org/gre.

As in the Verbal section of the test, in the Quantitative section we will assess Quantitative reasoning skills that are closer to skills generally used in graduate school by varying the number and specific types of questions included in the test. For example, the proportion of questions involving data interpretation and "real-life" scenarios will be increased and the proportion of Geometry questions decreased. There will also be an on-screen calculator and a greater use of computer-enabled question types (e.g., numeric entry questions).

In the Analytical Writing section we will be retaining the two basic writing tasks, namely to evaluate and analyze an argument and to present one's own perspective on an issue. Each of these tasks will be 30 minutes in the revised test (in the current test the Issue task is 45 minutes and the Argument is 30 minutes). A major change in the tasks will be that we will be using new, more focused prompts that will reduce the utility of reliance on memorized materials. An important new feature of the Analytical Writing measure will be that institutions that receive GRE scores from examinees will also have electronic access to the actual essay responses produced by applicants. This new feature will be free to institutional score recipients.

Score Scales for Revised General Test

As many graduate deans know, the score scales for the Verbal and Quantitative sections have slowly separated and the means for these two scales are now quite different (Mean Verbal = 470 and Mean Quantitative = 593). These differences are even more pronounced when one considers International Applicants (Mean V = 439, Mean Q = 686). In light of these and other factors, the GRE Board has approved the ETS recommendation that a new score scale be established for the Verbal and Quantitative measures. The exact details of the new score scales will depend upon the results of a large scale field study that is taking place this Fall, but the following details are known at this time. The new scale will continue to be a 3-digit scale. It will likely range somewhere between 100 and 199, which will ensure that the scores from the Revised General Test will not be confused with scores from either the current GRE General Test or the GRE Subject Tests. Finally, based on the nature of the revised test and the number of test questions, the number of score points on the new scale will most likely be about 45, in contrast to the current 61 point scale (i.e., 200 – 800 in 10 point increments).

A New Global Testing Network to Support Testing in the 21st Century

In the current GRE General Test and a portion of the TOEFL CBT, the multiple-choice sections of the tests are computer-adaptive tests (CAT). In a CAT, each examinee receives a set of questions that meet the test design and are generally appropriate for his or her performance level. While there are many psychometric advantages of a CAT, there are also some limitations to this delivery format, including the facts that there must be very large test question pools maintained to support the CAT, there is the possibility that questions in the pool may be compromised if examinees share information about specific questions, etc.

In light of these issues and in full consultation with its external boards, ETS has elected to change the type of test administration procedure used for the TOEFL and GRE tests. In the TOEFL iBT and Revised GRE General Test, those sections of the test that involve multiple-choice question types (e.g., Verbal and Quantitative for the GRE General Test) will be traditional linear tests in which each test form contains the same items. In addition, we will be changing from continuous testing in the CAT environment to fixed test administrations.

One consequence of the change from a continuously available CAT format to fixed administration dates is that there will be "spikes" in the capacity required to deliver tests on the test dates. In order to accommodate the total number of examinees who take these tests every year and the changes in capacity needs for the testing network, ETS has pioneered delivering high-stakes tests around the world using the Internet. This Internet-based testing (iBT) approach supports the critical technology needs of the new tests (and especially the TOEFL iBT) and also allows greater access for examinees worldwide. Testing centers around the world will administer ETS tests in proctored, secure testing sites that have access to the Internet. ETS will employ a systematic approach to managing the starting times for tests to avoid "time zone cheating." Staggered start times will prevent examinees from earlier time zones "forwarding" information to other test takers in other time zones. Finally, Thomson-Prometric will manage this testing network.

In terms of access, the testing network that ETS uses to deliver computer-based tests will be greatly expanded, going from approximately 500 test sites in 2004 to over 3,000 test sites projected for 2007. By leveraging widely available public infrastructure (i.e., the Internet), ETS is able to deliver tests efficiently and with much greater access for examinees than was the case in the earlier testing network. If your institution is interested in providing increased access for GRE and TOEFL examinees at your institution, please contact Rex Corlett (rorlett@ets.org, 609-683-2032).

Summary

The TOEFL test and the GRE General Test provide important pieces of data that are used in making critical graduate school admissions and financial aid decisions. The TOEFL and GRE Boards have been intimately involved in the development of the new tests that are being launched by these two major testing programs. We believe that the revised tests will offer significantly better data than has been available to date, and that these data will prove very helpful to graduate schools. The launch of TOEFL iBT is underway and the Revised GRE General Test will be launched in October 2006. As these new assessments become part of the admissions, placement and funding decision cycles we expect that faculty and staff will come to value the benefits of the tests. We also expect that examinees will perceive the extent to which these tests measure acquired skills and abilities that will allow them to succeed in graduate school.

[1]There are a small number of countries for which the exact schedule for launching the new TOEFL test has not yet been finalized.

[2]It is important to note that the predictive validity of the revised General Test cannot be measured until after the test has been used to make actual admissions decisions and students' progress and success in graduate school have been measured. The GRE Program is currently working to establish an extensive effort to collect these types of validity data. Institutions that would like to be part of this effort should contact David Payne (Dpayne@ets.org). As part of this effort the ETS Research and Development division will work with institutions to conduct validity studies and to help institutions address local validity issues.

Data Sources

by Heath Brown, Director of Research and Policy Analysis

The Council of Graduate Schools (CGS) has been engaged in a multi-year research project to investigate international graduate student flows into U.S. graduate schools. We have previously reported recent declines in graduate applications, admissions, and enrollment. This article summarizes the latest survey results to investigate final application figures and offers of admissions for 2005.[1] The primary finding of this report is a small (+3%) increase in the number of international students admitted over last year. This report also explores the loss of international students to other countries as well as new information on international student migration.

Final International Graduate Applications

The latest survey questionnaire was broken into two primary data elements: graduate applications and graduate admissions. Overall, 57% of respondents reported declines of graduate applications from international students leading to a 5% overall decline from 2004 to 2005 (See Table 1). The findings for institutions with large numbers of international students (defined in this analysis as those institutions in the top 25 in terms of international graduate enrollment) also saw similar declines of international applications.

Table 1: Percent Change of Applications and Admits '04 -05

	Applications '04 -'05	Admissions '04 -'05
International	-5%	+3%
Country of Origin		
China	-15%	-5%
India	-5%	+8%
Korea	+1%	+7%
Middle East	+7%	+12%
Field of Study		
Business	0%	0%
Education	-3%	-3%
Engineering	-7%	+3%
Humanities	0%	-1%
Life Sciences	-2%	-2%
Physical Sciences	-2%	+8%
Social Sciences	-2%	-1%

Source: CGS Findings from 2005 International Graduate Students Admissions Survey II: Final Applications and Admissions

Offers of Admissions

Following this aggregate loss of international applications, in 2005 compared to 2004, survey respondents admitted 3% more international students. Contributing to this change, over half of the institutions admitted more students than last year and the vast majority of large institutions admitted more students (See Table 2). This is a significant shift from last year when 18% fewer international students were admitted for study than the previous year.

Most revealing about the results of this survey are the disparate findings by country-of-origin and field-of-study. As compared to last year, where nearly every field and country experienced declines in the number of admits, this year there is more admissions variety. For instance, admits from India (+8%), Korea (+7%), and the Middle East (+12%) were balanced by a 5% decline in admits of Chinese students. This finding may be suggestive of the expanded options Chinese students now have at home institutions and the larger decline in Chinese applications (-15%) compared to India (-5%).

Table 2: Variation of International Admissions Change 2004 -2005

Size of Cohort	Percent Reporting Decrease in Int. Admits	Percent Reporting Increase in Int l. Admits
Large	18%	82%
Medium	40%	60%
Small	54%	4%
Overall	47%	53%

Source: CGS Findings from 2 005 International Graduate Students Admissions Survey II: Final Applications and Admissions

International Competition and Collaboration

Beyond the raw numbers of applications and admits, there are a number of additional compelling questions related to what these figures on applications and admits mean. For instance, are students who are admitted to U.S. institutions choosing to study elsewhere? If so, in which countries and in which fields of study?

There has been clear evidence that the number of students studying at the graduate level has been on the rise in many countries (Science and Engineering Indicators 2004). The increasing number of Ph.D.s produced in China alone shows that larger numbers of Chinese students are remaining to study in Chinese institutions. However, it is not clear whether these students are the same students who would have come to the U.S. in the past, or whether this is a result of an improving educational system in China that produces many more students who are qualified for graduate study. Many stakeholders have been curious as to whether the worldwide pool of graduate students is simply growing, or whether the U.S. is now sharing the same fixed pool of students with more international competitors.

To investigate this question, we asked survey respondents the following question: *The capacity to provide graduate education is growing in countries around the world. Do you perceive that in fall 2004 your graduate programs lost admitted international students who chose to enroll in graduate programs outside of the U.S.?*

The majority of respondents reported that it was too hard to answer this question. This finding is not surprising since an applicant who opts to accept an offer of admission at another institution, in the U.S. or elsewhere, is not required to notify other institutions of this choice. The highly decentralized admissions system within an institution might also limit the ability of respondents to closely observe where individual students choose to attend.

In other cases, graduate admissions may be centrally managed by the graduate school. In these cases, the graduate dean has a unique ability to assess the admissions process and identify cases where international students chose to study elsewhere. Of these respondents, twice as many -- approximately a quarter of all respondents (22%) -- indicated that they had lost students to other countries as those who indicated they had not lost students.

Those respondents perceiving a loss of students consistently cited programs in Australia (16 respondents), Canada (13 respondents) and the United Kingdom (12 respondents) as the countries to which these admitted students were usually lost. While far from conclusive, this indicates that the majority losses of graduate students are to primarily English-speaking countries. This finding is further supported by recent reports from Statistics Canada of double-digit increases in international graduate enrollment, particularly from Asia (Statistics Canada 2005). Respondents also cited losing students to programs in other European countries as well as New Zealand, South Africa, China and Japan.

There was not a major difference between continued on page 9

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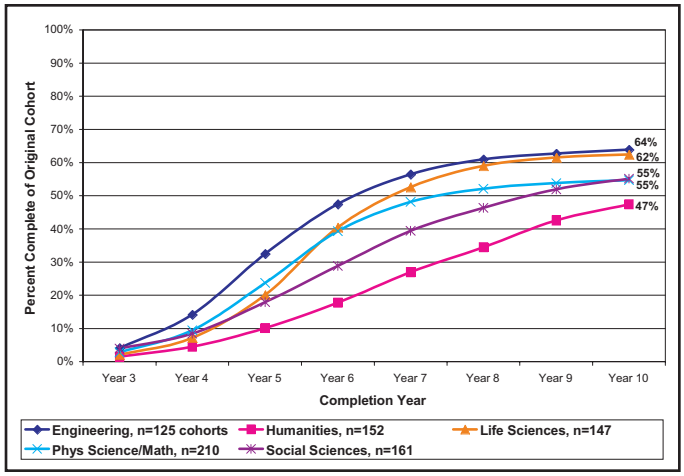
(47%). One can compare overall degree progress trends by broad field area by looking at the 50% completion mark (see Figure 1) and inquiring: at what point in time in each broad field area do 50% of the students complete their degrees? In engineering this occurs just after year 6; in life sciences this occurs at year 7; in physical sciences and mathematics this occurs at year 8; in the social sciences this occurs at year 9; and in the humanities, 50% of students have not completed their degrees by year 10.

In the social sciences, average completion rates by discipline ranged from 26% to 65%; and in humanities, from 29% to 63%. One of the main purposes of the Ph.D. Completion Project is to enable universities and programs to narrow and raise these ranges, so that those programs at the bottom end of each broad field range may be informed of and implement the policies and practices believed to be most effective for those disciplines at the top end of each broad field range, and thereby to enhance the successful completion of their doctoral students.

Figure 1. Cumulative 10-year Doctoral Completion Rates from Original Cohorts (1992-3 through 1994-5) by Broad Field



Cumulative 10-year completion rates across all fields (SEM and social science and humanities) are higher for majority students than for underrepresented minority students by approximately 2 percentage points (majority = 61%; underrepresented minority = 59%); higher for males (total) than for females (total) from the original cohort by about 4 points (male = 37% and female = 33%); and higher for males than females among candidates by about 7 points (male candidates = 62%, female candidates = 55%). [See the footnote to Figure 3 for the definitions of candidacy.] Ten-year completion rate differences between candidates and all enrolled students, generally, consistently hover at over 25%. Across all fields, international students represented in this study complete at a rate approximately 8 points higher than U.S. domestic students (citizens and permanent residents) at the five-year point (international candidates = 34% and U.S. candidates = 26%), but both groups complete at the same rate (60%) after 10 years.

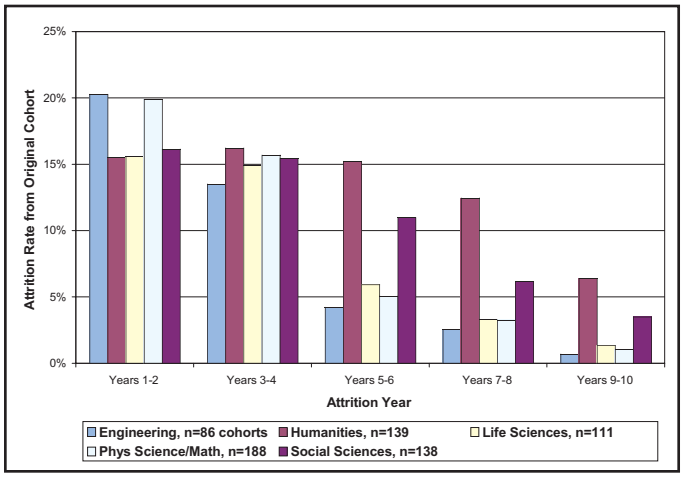
Program Cohort Size

Much of the research on doctoral attrition has shown that completion rates are higher in small programs than in large programs [e.g., Bowen and Rudenstine (1992), Bair and Haworth (1999); see Denecke and Slimowitz (2004)]. Clearly, there are a number of factors interacting to contribute to variance in completion and attrition rates, and the small number of universities and programs included in previous studies makes generalizing about the effect of program size from these studies a challenge. We looked at cohort size as an indicator of the effect of program size on completion rates, while acknowledging that annual fluctuations in cohort size occur, and that the size of cohorts may not always be representative of program size. Among cohorts in participating programs, 70% could be characterized as small (1-15 students); 23% as medium-sized (16-30 students); and 7% as large (30 students or more). Prior to year six, completion rates are consistently higher for students in small enrollment cohorts by just over 3 points. By year seven, the variance in completion rates between large, medium, and small cohorts levels out to approximately 1 percentage point. The 10-year completion rate is 60% for all cohort sizes.

Attrition

As Figure 2 illustrates, trends in early (years 1-4) and late attrition (years 5-10) are fairly pronounced and consistent by broad field. Early attrition is pronounced in engineering and in the physical sciences and mathematics, while late attrition is prominent in the humanities and somewhat prevalent in the social sciences. The policy implications for specific programs will require more nuanced analyses of program-level attrition patterns and a better understanding of the way that field characteristics such as the research mode, curricular structure, selection and admissions processes, and even employment opportunities may affect attrition patterns.

Figure 2. 10-year Doctoral Attrition Rates from Original Cohorts (1992-3 through 1994-5) by Broad Field



Encouraging a data-informed dialogue about best practices within each broad field-area and within specific program areas is one of the goals of this study so that participating programs can identify optimal completion targets and work to implement policies and practices designed to achieve those targets.

Are Completion Rates Improving?

The overarching assumption of this project is that Ph.D. completion rates by broad field and by program area are not intransigent and that they may be improved over time by a combination of enhanced policies and practices at the institutional and at the program or department level. The data collected thus far as a result of the Ph.D. Completion Project is baseline data, and it is too early to draw conclusions about the extent to which interventions supported by this project will have a long-term impact on overall completion and attrition, although changes

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Ph.D. Completion Project: Preliminary Results from Baseline Data

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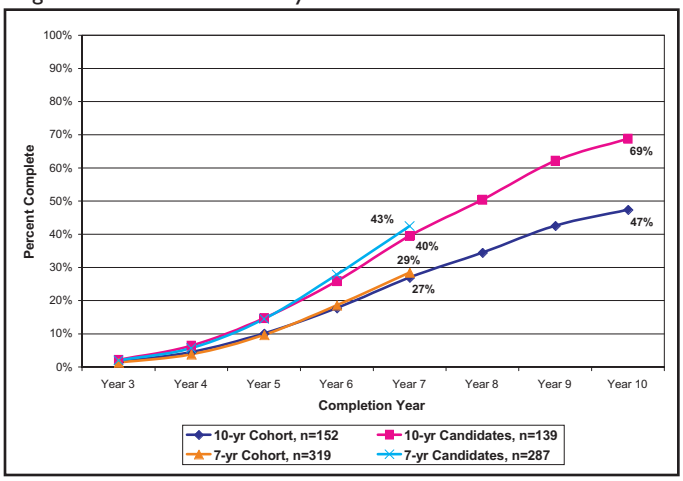
in early attrition patterns will likely be observable during the course of this grant. A comparison of 7- and 10-year completion rates by field reveals a difference of 1 percentage point or less between 7-year completion rates for program cohorts that have only 7-year completion data and 7-year completion rates for programs that have 10-year(+) completion rate data. This similarity suggests that completion rates have been relatively stable over the last decade in engineering, life sciences, physical sciences and mathematics, and social sciences. The only exception in the project dataset is humanities, illustrated by Figure 3, below, which has the highest late attrition and hence the greatest room for improvement in that area.

Figure 3 Humanities 7-yr vs. 10-yr Cumulative Completion from Original Cohort and Candidacy*



The majority (76%) reported that candidacy is defined as indicating "successful completion of coursework and qualifying examinations"; 12% reported that candidacy was defined as: "successful completion of preliminary examinations and/or defense of the dissertation prospectus"; for 7%, candidacy was not defined by the institution; less than 1% reported that candidacy was awarded upon conferral of a master's degree; and the remaining 4% reported defining candidacy in other ways.

Differences of 3 percentage points among candidates and 2 points among all enrolled students are noticeable between 7-year completion rates for those cohorts for whom only seven years of data are available and 7-year completion rates for those cohorts for whom 10-year completion rates are available. The 7-year only group includes more recent cohorts, 1995-6 through 1997-8, while the 10-year group reflects cohorts enrolled in 1992-3 through 1994-5. Although it is too early in the Ph.D. Completion Project to see the changes in completion rates and attrition patterns among participating programs that are expected of the interventions supported by the project, many of these programs are located at universities with strong graduate schools that have been making significant efforts to enhance the quality of their doctoral programs by participating in a variety of other graduate reform efforts such as the Council of Graduate School's Preparing Future Faculty program (www.preparing-faculty.org), the Carnegie Initiative on the Doctorate (www.carnegiefoundation.org/CID), and the Woodrow Wilson National Fellowship Foundation's Responsive Ph.D. (www.woodrow.org/responsivephd/). Many of the goals of these reform initiatives overlap with those of the Ph.D. Completion Project, such as enhancing the quality of the program environment for doctoral students, improving mentoring, and enhancing the selection and admissions process to ensure a better fit between students and programs/advisors, etc. A comparison of the baseline data submitted to CGS by participating universities with subsequent years of data, and a more detailed analysis of these data, will be required to ensure that improvements in completion and attrition are taking place and that their causes are knowable and replicable as a result of this project.

Upcoming Technical Workshop

A pre-meeting workshop on "Measuring Doctoral Attrition and Completion" will be held in conjunction with the CGS Annual Meeting in Palm Springs, California on Wednesday, December 7, 2005 from 9-11:30 am. The workshop will provide quantitative templates for measuring completion rates and attrition patterns as well as qualitative tools (such as sample exit interviews) for assessing the causes of attrition and for measuring the impact of policy and practice interventions designed to enhance doctoral completion rates. This interactive workshop is open to all CGS members, including those formally participating in the Ph.D. Completion Project as Research and Project Partners as well as other universities interested in issues of attrition, completion, data measurement, and analysis.

For more information about The Ph.D. Completion Project, please visit the Web site at: www.phdcompletion.org

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Hoffer, T.B., L. Selfa, V. Welch, Jr., K. Williams, M. Hess, J. Friedman, S.C. Reyes, K. Webber, and I Guzman-Barron. 2004. *Doctorate Recipients from United States Universities: Summary Report 2003*. Chicago: National Opinion Research Center.

Selection and Attrition continued from page 3

use rolling admissions and both have a consistently high attrition rate.

Conclusion

The more applications that an admissions committee evaluates, the more likely the incoming student will survive his or her first three years of enrollment. In other words, improved selectivity will result in improved rates of degree completion. The break point between high and low early attrition in this study was between 12 and 15 applications per opening. Therefore, one way to improve degree completion is to stimulate more interest in the program at the onset.

Acknowledgments: Thanks to Barb Turpin and Terry Akai for editing the manuscript.

Data Sources continued from page 6

the perceptions of respondents from large institutions compared to all other respondents in terms of the reporting of losses of students to other countries. This suggests, consistent with the similar trends for applications and admits in institutions of varying size, that all institutions are experiencing a similar environment for attracting international students.

International Student Flows

More than anything else, the findings from the latest survey report call attention to the need to better understand the phenomenon of international student migration. One important project aimed at addressing this issue is Project Atlas. Project Atlas, led by the Institution for International Education (IIE), tracks migration trends of the millions of students who pursue education outside of their home countries each year (See: http://www.atlas.iienetwork.org/). Data are collected on student movement patterns, country of origin, as well as leading destinations for trans-national higher education. Project Atlas is the product of a partnership between the Institute of International Education (IIE) and organizations including the Association of Indian Universities (AIU), British Council, China Scholarship Council (CSC), IDP Education Australia, and others.

Table 3: Snapshot of International Student Migration
Cells present s ending country and percent of students (undergraduate and graduate) from that country

	Canada	Australia	China	India	US
1	S. Korea 21%	China 19%	S. Korea 45.5%	Nepal 10.35%	India 13.9%
2	China 16%	Hong Kong 8%	Japan 16.4%	Malaysia 10.18%	China 10.8%
3	Japan 8%	Korea, Republic of 7%	US 4.8%	Kenya 6.73%	Korea, Rep. of 9.2%
4	US 6%	Indonesia 7%	Vietnam 4.5%	Sri Lanka 5.05%	Japan 7.1%
5	France 6%	Malaysia 7%	Indonesia 3.3%	Bangladesh 4.81%	Canada 4.7%
6	India 4%	Japan 6%	Thailand 2%	Mauritius 4.73%	Taiwan 4.6%
7	Mexico 3%	Thailand 6%	Germany 1.6%	Iran 4.34%	Mexico 2.3%
8	Germany 3%	India 5%	Russia 1.5%	Thailand 3.79%	Turkey 2%
9	Taiwan 2%	US 4%	Nepal 1.5%	US 3.15%	Thailand 1.6%
10	Hong Kong 2%	Singapore 4%	Mongolia 1.4%	Yemen 3.13%	Indonesia 1.6%
Total Int. Students	61,303	188,406	77,715	7,738	572,509

Source: Atlas of Student Mobility, IIE, http://www.atlas.iienetwork.org/

One of the initial outcomes of Project Atlas is a way to compare the flow of international students into countries across the world. From Table 3, we can gather some interesting comparative information about how different several major countries are in terms of from where their international students reside. First, the United States attracts the largest number of international student visitors by a large margin. Only Australia is even somewhat close in terms of overall international students.

Second, China is clearly the major sending country world-wide: ranked first in the U.S. and in Australia, and second in Canada. Between 2003 and 2004 Chinese students increased over 40% in Canada alone. Third, the pattern for Indian students is much less consistent. India ranks first in the U.S., yet it ranks sixth in Canada and eighth in Australia. This is a testament to the historic open relationship between India and the U.S., particularly for continued on page 12

Dean of Graduate Studies
Western Michigan University

Western Michigan University seeks nominations/applications for position of Dean, Graduate Studies. The dean reports to provost & vice president for academic affairs, serves as responsible administrative official for graduate/postgraduate studies, advancing University's graduate programs, graduate student recruitment/retention, seeking financial support for graduate programs & students. The dean participates in University governance as member of Provost's Council, Deans' Council, Research Policies Council, and Graduate Studies Council.

Formal responsibilities: providing academic & administrative leadership to graduate studies; articulating WMU's vision of graduate education; increasing the size of the graduate student population; strengthening recruitment of diverse students; developing & implementing an innovative & effective retention program; reviewing & approving all theses & dissertations & approving the awarding of all graduate degrees; approving requests for student leaves of absence, waivers of fees & deadlines; providing oversight of internal competitive programs to support graduate student research & travel; providing oversight of services for graduate students, including the Graduate Student Advisory Committee; reviewing appointment of members of graduate faculty; providing oversight/guidance to programs that support postdoctoral education. **Successful candidates requirements:** earned doctorate from accredited institution with a scholarship & publication record of achievement to qualify for appointment as a tenured professor; at least seven years' higher education administrative experience either at the level of department chair or above in academic units with ongoing graduate programs; substantial record of directing master's & doctoral candidates to timely completion of degrees; in-depth knowledge & technical competence across a broad range of graduate policies & operations; experience in advancing graduate education & research through the development of courses, curricula, & or specific degree programs; success in attracting resources for the organization; operational experience with the recruitment & retention of graduate students; leadership style that values service, initiative, integrity, collaboration, diversity, & multiculturalism; exceptional interpersonal & communication skills to articulate WMU's mission, goals, and vision for graduate education; demonstrated fiscal responsibility and ability to manage budgets is required. **Preferred qualifications:** understanding of national issues/initiatives in graduate education, demonstrated ability to apply innovative/creative approaches in the development graduate studies policy, success in obtaining external funding for graduate programs & students.

With about 28,000 students, Western Michigan University is one of 148 institutions nationwide that is classified as Doctoral/Research University-Extensive. The University currently offers about 150 undergraduate program offerings, 70 master's programs, two specialist, & 30 doctoral degree programs. The main campus is located in Kalamazoo, Michigan with the College of Engineering & Applied Sciences on the separate Kalamazoo Parkview campus, & with the College of Aviation located in the nearby community of Battle Creek. The University has seven extended university campuses located throughout Michigan. Western Michigan University also sponsors a Business Technology & Research (BTR) Park that currently is home to 28 companies, including an incubator for high-tech, life science start-ups.

A letter of application with a curriculum vita is welcome until November 11, 2005. The review of applications will begin immediately. Electronic submission of applications is also welcome.

Professor Joseph Reish at joe.reish@wmich.edu Dean, University Libraries; Chairperson, Dean of Graduate Studies Search Committee, 3006 Waldo Library, 1903 West Michigan Avenue; Kalamazoo, MI 49008-5353. Western Michigan University is an equal opportunity / affirmative action employer. Applications from qualified women & members of minority groups are particularly encouraged.

UNIVERSITY OF HARTFORD

Dean of Graduate Studies

The University of Hartford invites applications and nominations for its first full-time Dean of Graduate Studies. With seven distinctive schools and colleges, the University of Hartford is a private, independent, comprehensive university located on a scenic 340-acre wooded main campus in suburban West Hartford, Connecticut. The University has 325 full-time and 400 part-time faculty members, and enrolls 5,600 undergraduate students and 1,700 graduate students. In addition to offering 80 undergraduate programs, the University awards 17 graduate degrees and six certificates/diplomas in 31 fields.

The University of Hartford seeks a dynamic and innovative individual to provide academic, administrative, and fiscal leadership for graduate studies. The Dean of Graduate Studies, a key member of the senior academic leadership team, reports to the Provost, is a member of the Council of Deans, and chairs the Graduate Council. S/he will develop, implement, and oversee university-wide policies and procedures to recruit and retain graduate students and to assure the academic integrity and quality of graduate studies.

The successful candidate must have an earned doctorate or equivalent terminal degree, a strong record of and commitment to teaching and scholarly/creative achievement, and qualifications commensurate with the rank of full professor. Candidates must have three to five years of administrative experience, preferably in graduate education, with evidence of experience in strategic planning, fiscal management, and intellectual leadership. In addition, candidates must have a demonstrated commitment to and experience working with a diverse array of students, faculty, and programs. Further information about the position can be found at www.hartford.edu/provost.

Review of applications will begin immediately. For best consideration, applications and nominations should be submitted electronically by December 15, 2005, to:

Dr. Katherine A. Black
Chair of the Search Committee
Office of the Provost
University of Hartford
200 Bloomfield Avenue
West Hartford, CT 06117
(860) 768-4504 (telephone); (860) 768-4070 (facsimile)
pmahon@hartford.edu

Applications should include a letter addressing experience, qualifications, and philosophy of graduate education and administration. In addition, please enclose a current vita and the names and contact information of four references. All inquiries, nominations, and applications will be held in strictest confidence.

Members of under-represented groups are encouraged to apply. EEO/AA/M/F/D/V

Northern Illinois University - The Graduate School
Division of Research and Graduate Studies

Associate Dean of the Graduate School

Job Description: Northern Illinois University (NIU) is seeking a dynamic leader as the Associate Dean of the Graduate School who is committed to serving both graduate students and faculty members. The Associate Dean is responsible for the management and daily operations of the office of the Graduate School. The Graduate School is the central administrative office for all graduate programs at NIU that enroll over 6,500 students in 16 doctoral and 55 masters programs. The Associate Dean reports to the Vice President for Research and Dean of the Graduate School.

Qualifications: The successful candidate must have distinguished academic credentials and experience to qualify for a tenured appointment at an advanced level. The candidate must have detailed knowledge and experience in graduate admissions, understanding of issues related to graduate education, and curriculum development and revisions. The candidate must have excellent interpersonal skills to work closely and collaboratively with chairs, directors, and deans, and must be committed to fostering diversity among graduate students. In addition, the candidate must have management skills to work collegially with admission officers and supervise a staff of fourteen.

The Institution: Northern Illinois University, a doctoral/research-extensive institution, located 65 miles west of downtown Chicago, employs 3,700 faculty and staff and enrolls 25,000 students (over 6,500 of whom are at the graduate level) in programs in business, education, engineering and technology, health and human sciences, law, humanities, social sciences, sciences, and visual and performing arts. NIU offers 55 master's programs and 16 doctoral degree programs. In FY 2005, the university secured over $60 million in extramural funds for research, instruction, and public service projects. NIU is a member of the National Association of State Universities and Land-Grant Colleges (NASULGC), Council of Graduate Schools (CGS), and the Universities Research Association (URA), including many other professional associations.

Interested candidates are invited to submit a cover letter, resume, and three current professional letters of reference to:

Dr. Rathindra N. Bose
Vice President for Research & Dean of the Graduate School
Division of Research and Graduate Studies
301 Lowden Hall
Northern Illinois University
DeKalb, IL 60115

Attn: Associate Dean Search

Review of completed applications will begin December 1, 2005, and will be held in strict confidence. Applications will be accepted until the position is filled. Northern Illinois University is an affirmative action/equal opportunity employer.

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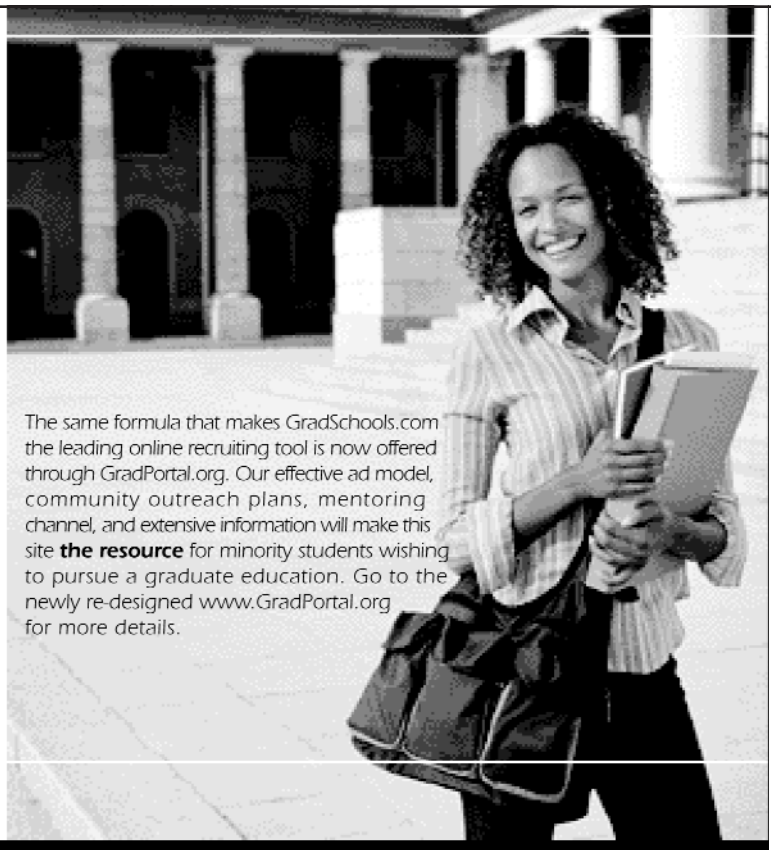

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Data Sources continued from page 9

Indian students traveling to the U.S. in engineering and the sciences. Finally, South Korea is a major sending country in Canada (1st), Australia, (3rd), China, (1st), and the U.S. (3rd). With the large higher educational investments being made by the Korean government, it would be interesting to examine these same trends in 5 or 10 years to see if Korea begins to educate more of its students at home.

The Project Atlas data provide a useful set international student migration comparisons, yet not without significant limitations. The primary limitation for the graduate education community is that these figures are not disaggregated by degree level. This is an understandable limitation given the lack of comprehensive data collection in many countries and the tradition of reporting 'tertiary' students as a group. However, to truly understand international student migration, it is imperative that we better understand these trends with more precision. For instance, CGS has recently sought to better understand graduate enrollment by disaggregating master's and doctoral enrollment, and one of the primary aims of the Ph.D. Completion Project is to ascertain best practices through more standardized data collection of completion and attrition statistics. New efforts by the National Science Foundation to produce more internationally comparable statistics at the graduate level are also at the forefront of research to meet these needs. Beyond volumes of students, the NSF is helping coordinate graduate data collection on other student outcomes across countries through the use of similar survey instruments. CGS is addressing these challenges by exploring ways to work with current projects and establishing new links with graduate education data collectors. This will also be a significant part of this year's Annual Meeting.

[1] *Portions of this article were adapted from: Findings from the 2005 CGS International Graduate Student Admissions Survey II: Final Applications and Admissions.*

Citations

Statistics Canada. (2005). *The Daily*. October 11, 2005.

The National Science Foundation. (2004). *Science and Engineering Indicators*.

Position Announcement
NSF's Division of Graduate Education

Nationally significant opportunity to lead NSF's Division of Graduate Education: http://www.nsf.gov/pubs/2006/s20060003/s20060003ipa.txt: NSF seeks an individual with expertise in graduate education, who has professional standing in the science, technology, engineering or mathematics (STEM) community and knowledge of trends in participation in the STEM workforce, who can lead a strong team to meet the needs of graduate education in the 21st century.

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