

Data Sources

the US or increase their advantage in overall tertiary attainment (25-64 year-olds) over time, according to *Education at a Glance*. Countries such as Korea, Japan, Norway, Ireland, and Sweden, among others, already have high levels of tertiary attainment, but are expected to see that advantage increase in the coming years. In contrast, the United States, Israel, the Russian Federation, and Finland, among others, will see other countries approaching or surpassing their levels of educational attainment. Poland, Chile, and Portugal are expected to move closer to the OECD average in the coming years, while a handful of countries, including Austria, Brazil, and Germany, are expected to fall further behind in tertiary attainment.

The United States ranks higher in educational attainment when tertiary-type B programs are excluded. Among all OECD countries in 2009, 31% of all 25-64 year-olds in the United States had earned a tertiary-type A credential or higher, equivalent to a US bachelor's degree or higher. This figure was second only to Norway, where 34% had achieved this level of educational attainment. Once again, however, the US ranked lower for 25-34 year-olds (11th) than 55-64 year-olds (1st), indicating that other countries will soon surpass the US in the attainment of tertiary-type A credentials or higher.

Over the past decade (1999 to 2009), the average annual growth rate in tertiary attainment (tertiary-type B or higher) in the United States was 1.4%. This compares with an OECD average of 3.7%, and rates as high as 6.6% for Luxembourg, 6.5% for Poland, and 5.8% for Ireland. The 1.4% average

annual rate of increase for the United States was the lowest of all OECD countries.

While the United States has long been a leader in educational attainment, the OECD data clearly show that the United States' ranking has slipped over time and that it may soon be surpassed by even more countries in the near future. In order for the United States to remain competitive in the 21st century global marketplace, it must increase educational attainment for its citizenry, particularly graduate degree recipients with "the advanced knowledge and skills that will secure our future intellectual leadership in the knowledge economy" (Wendler et al., 2010, pp. 1).

By Nathan E. Bell, Director, Research and Policy Analysis

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Automation of System-wide PSM Program Management, Advertising, Professional Skills Assessment, Academic Planning, and Electronic Mentoring

Professional Science Master's (PSM) programs provide interdisciplinary coursework in the natural sciences, technology, engineering, mathematics and/or computational sciences in combination with professional trade-specific management training essential for careers in industry, government or nonprofit organizations. North Carolina State University, which has many years of experience with PSM programs and building employer alliances, is leading the University of North Carolina (UNC) System-wide PSM Initiative and providing multiple services to UNC campuses with PSM programs.

Electronic administration is essential in the quest to minimize resource consumption and the need for additional personnel when planning, developing, launching or managing PSM programs. Several innovative tools have been developed and are made available to PSM directors and PSM students through the new PSM information management system (PIMS). It is our hope that the provision of the PIMS portal with its many tools will ease the management and

advertisement workload for the PSM directors, will promote professional skills training in additional courses, will be a cornerstone in thorough academic planning of new programs and collaboration between campuses, and will inspire new relations between students and industry professionals. In this article, we describe the capabilities and operation of PIMS. The PIMS portal can soon be accessed at <http://www.ncsu.edu/grad/psm>.

The PIMS Portal Login

The PIMS Portal allows members of the UNC community (students or staff at any campus of the UNC System) to access a suite of online data entry and reporting tools after login. The server hosting the PIMS portal at North Carolina State University has been established as a service provider for the UNC General Administration Federation. When the user selects the "Sign In" link under the PSM Quick Tools heading on the PSM home page, the user is prompted to pick a campus from a drop-down list. After the campus is selected, the user is transferred to a login screen from the home

campus so that the authorization is leveraged against the user's home campus authorization method instead of depending on a complete list of portal users.

Selected PIMS Tools

PSM Program Information Entry, Management, and Report Creation. PSM directors can enter and update basic program descriptions in PIMS. Such information includes program name, launch date, duration, mission, contact information, link to the curriculum home, number of credit hours, percentage of STEM classes, additional educational options, such as MBA or other dual degree overlays and certificates, career track examples, and types of interaction with companies (such as case studies, projects, and internships). PSM directors can also post employer project information (examples are employer information, project start, project length, name of project, mission, goals, deliverables, student and employer feedback), alumni feedback, and relevant statistics. These statistics may include, for each academic year, the number of applications, students admitted, students enrolled, number of graduates, number of graduates employed, and number of graduates in continued education. PSM directors are prompted to enter or edit data on an annual basis. Users can browse the data and generate selective reports with information from one or more of the data collections. Since this information is accessible to all members of the UNC community, it serves as a method for sharing, publicizing and marketing the features and statistics of the PSM programs. A scrolled list of all the UNC System's PSM programs divided by institution can be used to choose one, more, or all programs to be included in a customized, electronic and/or printable report. This feature makes it possible to instantly tailor reports or advertisement material for a variety of audiences such as university administrators, PSM directors, students, employers and lawmakers.

Professional Skills Assessment. Resembling the peer performance assessment often carried out by companies, the Professional Skills Assessment tool is a comprehensive application based on the model currently used by the Analytics PSM program at North Carolina State University. PSM directors and PSM students can use this tool to measure student performance of work performed in teams and enhance essential skills such as effective communication, teamwork, and leadership. Program directors create teams and evaluation rubrics, and generate reports to assess individual student professional skills levels. The assessment tool contains a dashboard containing a list of all classes for which the director is performing assessments as well as options to add a course, add questions to the question bank, create a questionnaire from questions in the question bank, or display assessment reports. The dashboard options for each course include specifying students who are enrolled, creating an assessment for each course and creating reports for each assessment. The detailed report displays individual student assessment scores where each question in the questionnaire is listed, followed by the answer provided by each of the fellow students in the team, as well as the student's self assessment scores for each question. Another

report, the Class Report, provides self evaluation and peer evaluation average scores for the class for each question. Scores are evaluated statistically and deviations are marked to encourage action. Students increase awareness about their professional capabilities and are incentivized by their peers to excel. The tool is easily transposable to all courses in which teamwork is a requirement.

Geospatial Information Science Academic Planning Tool. A web-based academic strategic planning tool has been developed by the Geospatial Information Science and Technology PSM program at North Carolina State University. The tool features interactive mapping of North Carolina's potential for PSM development by visualizing where PSMs can connect to industry clusters, individual companies, non-profits, and government entities as well as individual UNC campus strengths and existing PSM programs. Users can specify resources to be displayed on a map with street and aerial view options, and zoom in and out and click on a resource to show detailed information. Typical queries for a UNC administrator may be:

- "Which universities have PSM programs and how many of each kind are needed?"
- "What does the local graduate market base look like, i.e., bachelors within a given field, and where is it sufficient to support a new graduate program?"
- "Where are the areas of high unemployment/poverty which could benefit from a PSM program?"

Typical queries for a PSM director:

- "Do other universities have this program and or faculty/strengths within the field?"
- "Where are the relevant companies and are there other organizations that support this field?"

The intent is to ensure that academic planning is well-coordinated, all relevant industries have access to PSM programs, duplicate efforts are avoided, and that resources are shared in an equitable and effective manner. The tool is expected to be useful at multiple levels for program development, and for university-wide and system-wide academic planning purposes.

Electronic Mentoring. Connecting with industry leaders is something that is expected to benefit all PSM students. Many years ago, the successful mentorship program entitled "Adopt A Professional Student" was started by the Microbial Biotechnology PSM program at North Carolina State University. The program serves as the model for a new updated version of mentor-mentee match-making, the "e-mentoring" program. It facilitates interaction between PSM students and industry personnel. The e-mentoring program is being launched this fall on UNC online, a platform that is developed and maintained by UNC General Administration and offers online course sharing and exam proctoring. PSM directors invite mentors into the program and manage the match-making to the extent they desire. Mentors list their information details (name, field of expertise, experience,

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Automation of System-wide PSM Program management

topics and professional skills they are willing to discuss), and a range of other parameters relating to personal or electronic meeting logistics, where after students can browse the information and select a mentor. Annual assessments of both the mentor and mentee experience are included. The e-mentoring program is anticipated to improve retention rates and job creation/job offer frequencies, as well as be a venue for the provision of “live professional skills training.” The pilot phase will include all PSM programs in the UNC System. Once completed, e-mentoring will be available for other programs across UNC and may be extended to other entities such as the North Carolina Community College System (NCCCS). It is anticipated that numerous additional mentor-mentee groups will utilize this tool. Examples are industry professionals - faculty, faculty - students, faculty - faculty, and students - students.

PSMs as Drivers for Innovation

North Carolina State University has a dynamic PSM Council of PSM directors in highly diverse fields. It is through the sharing of ideas with these directors and the

interaction with the UNC General Administration that the new tools were born. The PIMS and all the tools therein are examples of how PSM program-specific expertise can catalyze innovation and transform education while providing transposable tools to non-PSM enterprises at all higher education institutions.

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