Trends in Masters and Doctoral Graduates

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Abstract

A comparative analysis is presented of trends in Masters and Doctoral graduates in the agricultural and natural resources sciences between academic years 1975/76 and 1987/88. In contrast to baccalaureate graduates in these fields, trends in graduates with advanced degrees are relatively stable. Trends in Masters graduates are similar to those at the baccalaureate level, while Doctoral graduates remain fairly constant. Numbers of Masters and Doctoral graduates in the agricultural social sciences, forestry and natural resource management have increase over this period. Minorities have represented 6 to 7 percent of Masters and Doctoral graduates since 1975/76.

Introduction

In a recent article published in this journal, the authors discussed trends in baccalaureate graduates in the agricultural and natural resource sciences (NACTA, 1989). Several conclusions were drawn from that study. One, the numbers of baccalaureate graduates declined significantly since 1975. Two, despite these losses, the number of women holding bachelors degrees increased substantially, especially in the natural resource fields. Three, the number of minority graduates remained fairly constant.

That study presented only half of the story. Because baccalaureate (BS) graduates in the agricultural and natural resource (AGNR) sciences form the primary pool for graduate students in the same fields, declining numbers of BS graduates would be expected to reduce the number of available graduate students and ultimately the number of AGNR scientists.

This paper presents a comparative analysis of graduates holding advanced degrees in the AGNR sciences for academic years 1975/76 through 1987/88. Comparisons of graduates are made with Masters and Doctoral (M&D) graduates in other fields. Then trends in M&D graduates are presented and analyzed by degree level, academic area, sex, and minority status.

Background

As was the case for the baccalaureate study, the data source for this study was the Food and Agricultural Education Information System (FAEIS). FAEIS acquires data from many primary sources in order to provide complete, consistent, and timely information on the educational structure and trends in the AGNR sciences. One of the primary sources of degrees awarded data for FAEIS, used in this study, was the U. S. Department of Education (USED). Also, by using the same data source as that in the baccalaureate study, comparisons between BS and M&D trends can be made with greater confidence. The most current data from USED is for academic year 1987/88. Data collected by RICOP, AASCARR, and NAPFSC, and incorporated into FAEIS, were used to analyze recent trends in M&D minority graduates by academic area. As a note, the degree program specialties used by FAEIS throughout its system is the Classification of Instruction Programs (CIPS) established by USED in 1981 (USED, 1981).

A potential problem for any trend analysis that relies on secondary data is change in data definition and collection procedures. For instance, in 1981/82 USED significantly modified the taxonomy used to classify instructional programs through its annual HEGIS survey. In 1985 USED again modified the taxonomy, dropping many specializations, and renamed its survey the Integrated Postsecondary Education Data System (USED, 1985). Most of the eliminated degree programs came from the AGNR sciences, about 25 out of 100 degree programs. Though often necessary to keep pace with real changes in the direction of education programs nationally, many programs that were deleted from the taxonomy are now being reconsidered for replacement. Additionally, surveys of institutions of higher education rarely elicit 100 percent response and vary from year to year.

FAEIS has been collecting and storing educational data on the AGNR sciences, home economics, and veterinary medicine since 1981. One of its key responsibilities is to maintain consistency so that usable information on higher education is available to the public, even as definitions and quality of the data vary.

Graduate Supply Trends

Figure 1 depicts the trend in the supply of graduates (degrees awarded) with advanced degrees from 1975/76 to 1987/88 in engineering (CIPS 14.0101 through 15.9999), business (CIPS 06.0101 through 06.9999), social sciences

Figure 1. Masters and Doctoral degrees awarded in business, engineering, social sciences, and agriculture/natural resources between 1975/76 and 1987.

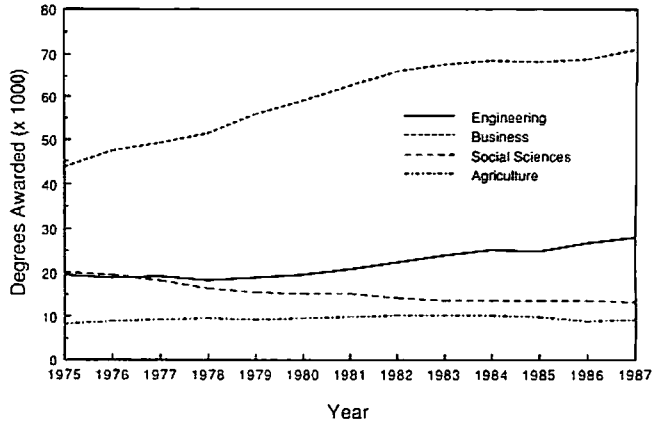

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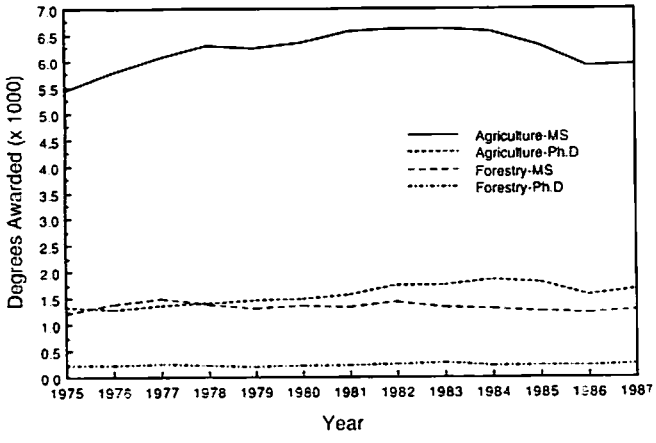
Figure 2. Masters and Doctoral degrees awarded in agriculture and natural resources by degree level between 1975/76 and 1987/88.



(CIPS 45.0101 through 45.9999), and agriculture/natural resources (FAEIS, 1987). The dominance of business M&D graduates is evident in both number in any year and in the growth over the period (up 63%). Engineering shows a sizeable increase (up 44%), while AGNR has had modest growth (up 12%). However, the social sciences show a slight loss (down 34%).

Figure 2 presents total AGNR M&D graduates broken down by type of degree (Masters or Doctorate) and primary AGNR academic area (agricultural or natural resource sciences). The relative consistency in M&D degrees awarded in each category is notable. These relatively stable trends contrast with baccalaureate trends for both primary academic areas. Whereas, BS graduates in the natural resources declined almost continuously during this period, trends in both Masters and Doctoral graduates remained relatively constant. Likewise, in the agricultural sciences, numbers of BS graduates increased during the 1970s and then decreased through the late 1980s, but M&D graduate supply changed little over this period. However, the trend in Masters graduates in the agricultural sciences did approximate the trend in BS graduates with an expected two to three year lag between peaks in number of BS and Masters graduates.

Figure 3 presents recombined Masters and Doctoral graduates and then breaks down the data by sex for both the agricultural and natural resource sciences. There has been a significant and steady increase in the number of women graduates in both agriculture and natural resources (up 36% and 110%, respectively), even with the slight drop of women M&D graduates in agriculture in 1981. This roughly parallels the baccalaureate trends that, in contrast, experienced slight peaks in the early 1980s.

The AGNR sciences consist of a diversity of disciplines that relate closely to other disciplines in higher education. For example, agricultural economics and engineering have counterparts in economics and engineering. Because of these correspondences, it is important to decompose AGNR trends into its primary constituent academic areas. Figure 4 divides the agricultural sciences into their primary academic areas. Figure 5 does likewise for the natural resource disciplines. Because of the diversity of disciplines in agriculture, division into four logical categories results in a small percentage (about 10%) being left out.

Figure 4 illustrates a steady supply of M&D graduates in the four major areas of the agricultural sciences, despite some fluctuations particularly in the food and biological areas. Of all the areas, only the social science disciplines in agriculture demonstrate a steady upward trend in M&D graduates (up 20%). Most of these graduates are in agriculture business/economics. These M&D trends agree fairly well with baccalaureate trends, except in the animal and plant/soil sciences that experienced significant losses in BS graduates over a similar period (down in BS 30% and 46%, respectively).

The picture for the natural resource sciences is somewhat different. While all four areas showed almost uninterrupted declines in BS graduates, the trends in M&D graduates in forestry and natural resource management (NRM) are up (15% and 34%, respectively). Interestingly, the number of NRM and wildlife M&D graduates was steady and nearly identical until 1981 when some structural change relating to supply and demand conditions occurred.

Less data is available on minority students and graduates than that available on all students and graduates. USED collects minority graduate data biennially but with little degree specificity (agriculture and natural resources). Through various professional associations, FAEIS acquires annual

Figure 3. Masters and Doctoral degrees awarded to men and women in agriculture and natural resources between 1975/76 and 1987/88.

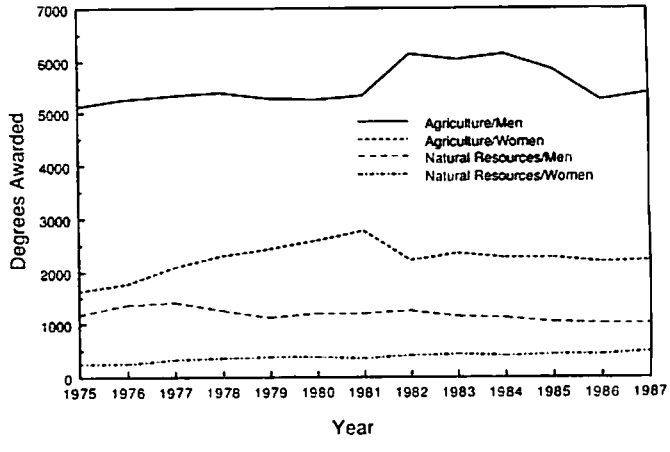


Figure 4. Masters and Doctoral degrees awarded in animal sciences, plant & soil sciences, agricultural social sciences (e.g., agric. economics), and food & related biological sciences between 1975/76 and 1987/88.

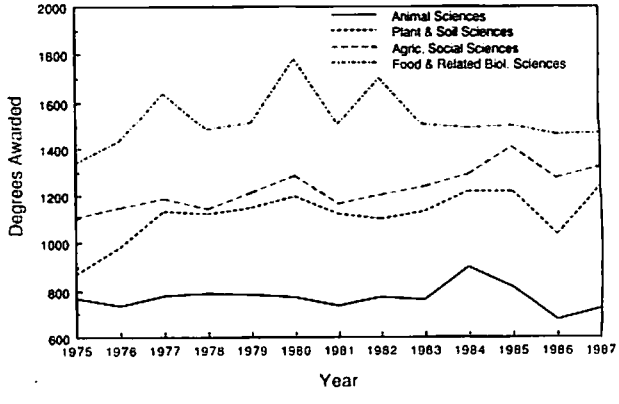
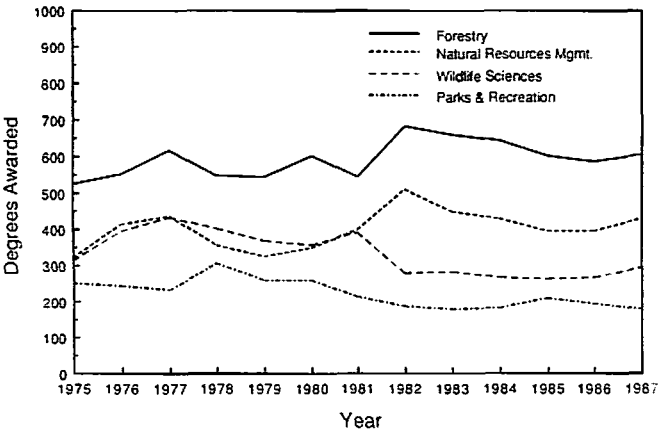


Figure 5. Masters and Doctoral degrees awarded in forestry, natural resource management, wildlife sciences, and parks & recreation between 1975/76 and 1987/88.



data on minorities using the CIPS taxonomy, but response rates are quite low making trend analysis difficult.

In academic year 1986/87, USED data showed minority students (Black, Hispanic, Asian, and American Indian) representing 6% of the BS graduates and 7% of M&D graduates in the AGNR sciences. These percentages have changed very little since 1976/77 when minorities represented 4% and 6% of BS and M&D graduates, respectively. Data from professional associations reveal over the last 5 years minority trends again match the graduate trends of different AGNR academic areas[1].

Conclusions

The following conclusions can be drawn from this analysis of graduate trends.

1. In general, different trends exist at the M&D level than at the BS level in the AGNR sciences. Trends in M&D graduates are much more stable, even indicating an increase over this period despite declining BS graduates. This implies that either greater proportions of BS AGNR graduates are seeking advanced degrees and there is an increased influx of non-AGNR graduate students. The authors suspect both are occurring.
2. There is a modest difference in trends between Masters and Doctoral graduates. This also applies to male and female M&D graduates. The fact that Masters graduates more closely approximate the BS trends supports the conjecture that BS degrees in the AGNR sciences (and many other fields) are no longer sufficient to meet the needs of the market for professionals ("racheting-up" of degree value). And increasing numbers of women BS graduates are appearing at the graduate levels.
3. By in large, trends in graduates with advanced degrees in the AGNR academic areas are stable, particularly in relation to the baccalaureate level. The supply of M&D graduates in agricultural social sciences, forestry and natural resource management is increasing, while only the wildlife and parks and recreation fields are experiencing a noticeable decline in numbers of M&D graduates.
4. Based upon less complete data, minority M&D graduates represent a small but steady proportion (around 6%) of all AGNR M&D graduates. Increasingly, the employment sector has been using FAEIS to identify the availability of minority graduates with the requisite education and skills. Given the importance of this information, higher education institutions should consider means of rapidly improving their tracking of minority students.

[1]The Resident Instruction Committee on Organization and Policy (RICOP) of the Division of Agriculture in the National Association of State Universities and Land Grant Colleges (NASULGC), the American Association of State Colleges of Agriculture and Renewable Resources (AASCARR), and the National Association of Professional Forestry Schools and Colleges (NAPFSC).

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