

## RESEARCH ARTICLES

### Status of PharmD/PhD Programs in Colleges of Pharmacy: The University of Tennessee Dual PharmD/PhD Program

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**Objectives.** To describe the University of Tennessee PharmD/PhD program and assess the prevalence and characteristics of PharmD/PhD programs in the United States.

**Methods.** Survey instruments were mailed in May 2004 to UT dual-degree program participants and deans of US colleges and schools of pharmacy.

**Results.** University of Tennessee PharmD/PhD students completed more than 30 hours of graduate credit before obtaining their PharmD and 72.2% agreed or strongly agreed that the program met their professional goals. More than 40% of US pharmacy colleges and schools have or plan to have PharmD/PhD programs. A wide variation exists in the level of integration, PhD concentrations offered, entrance requirements, and student benefits. Most schools with PharmD/PhD programs had few students enrolled in the program, but attrition rates were low (<20%) for 69% of the schools.

**Conclusions.** Dual-degree programs attract and retain pharmacy students in research programs and 47.6% of graduates entered academia and industry.

**Keywords:** dual-degree programs, faculty shortage, pharmacy education, PharmD/PhD, graduate education

## INTRODUCTION

A headline in a recent news release from the American Foundation for Pharmaceutical Education reads, "Acute Shortage of Faculty at U.S. Pharmacy Schools Threatens Efforts to Solve Nation's Pharmacists Shortage." The news release cited a report prepared by the American Association of Colleges of Pharmacy (AACP) and indicates a severe faculty shortage now and in the future.<sup>1</sup> A recent survey conducted by AACP to determine the extent of faculty shortages showed 417 vacant full-time faculty positions, which is an average of more than 6 vacancies per college or school of pharmacy. Of the 85 colleges of pharmacy in the United States surveyed, 67 responded to the survey. The majority of the vacancies were in pharmacy practice (223 vacancies), with pharmaceutical sciences indicating 190 vacancies.<sup>1</sup> The reasons that the deans indicated for the shortage were (1) reduced application to postgraduate programs by recent PharmD graduates who are US citizens, (2) the graying of faculty, and (3) the increased number of pharmacy schools.

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## Faculty Manpower

The problems faced by colleges in rectifying the faculty shortage include: (1) lack of competitive salaries offered by colleges, and (2) lack of qualified candidates vs. number of open positions. Lucinda Maine, Executive Vice President of AACP, has stated, "The shortage of pharmacy faculty members, now and in the future, represents a serious public health threat in the face of the rapidly growing consumer demand for prescription drugs."<sup>1</sup> The AACP report further states that the shortfall in faculty members is a brain drain from the nation's pharmacy schools as professors are being recruited for higher paying jobs in clinical practice and positions in the pharmaceutical industry.<sup>1</sup> Depletion of experienced pharmacy faculty members perpetuates the costly cycle of recruitment and training. For example, the average starting salary for an assistant professor in colleges of pharmacy in 2004-2005 was \$70,836, while the average starting salary for a newly graduated PharmD entering the non-academic workforce was in excess of \$94,000. When salary differences are small, faculty members can be recruited based upon fringe benefits and job opportunities. However, when salary differences exceed \$15,000, and as student loans and debt increase, it is more difficult to retain and recruit faculty members. The rise in starting salaries for pharmacists has also significantly reduced the number of US applications

to graduate programs in the pharmaceutical sciences. The result has been an increased influx of international students into pharmaceutical sciences graduate programs.<sup>2</sup>

The pharmacy manpower shortage has become such an issue that Congress has taken action to ease the shortage. In 2003, Congress passed the Pharmacy Education Aid Act.<sup>3</sup> The Act provides educational loan repayment for pharmacists serving in "critical shortage facilities," such as health care facilities for the Department of Veterans Affairs, the Armed Forces, the Bureau of Prisons, and the US public Health Service's Indian Health Service, and for pharmacy faculty members.<sup>3</sup> By providing loan repayment of up to \$35,000 per year for an individual who serves in one of the aforementioned capacities, Congress has created an incentive plan to attract pharmacy graduates to academia.<sup>3</sup> The Pharmacy Education Aid Act gives academia the support it needs to competitively vie with retail pharmacies and the pharmaceutical industry for pharmacy graduates.

The most challenging manpower issue facing colleges of pharmacy is the graying of the faculty. The AACP faculty profile shows that the majority of faculty members is approaching retirement age. Approximately 20% of current pharmacy faculty members will be retired by 2012.<sup>4</sup> This is a trend that will likely continue in the future. The AACP data indicate that 37% of current pharmacy faculty members are 50 years or older and 24% of the deans in colleges of pharmacy are 60 years or older.<sup>4</sup>

### **MD/PhD Programs**

One program that set the precedent for the PharmD/PhD program was the MD/PhD program. The National Institutes of Health (NIH) provided a considerable incentive for physicians to obtain a PhD degree when it formed the Medical Scientist Training Program (MSTP) in 1964.<sup>5</sup> The purpose of the program was ". . .to train investigators who could better bridge the gap between basic science and clinical research. . ." according to The National Institute of General Medical Sciences (NIGMS), the facilitator of the program.<sup>6</sup> Initially limited to 3 medical schools, the program is now operational in 40 institutions.<sup>6</sup> This expansion of the MSTP program facilitates the entrance of about 170 new students in the program each year with approximately 930 students in the program at any given time.<sup>7</sup> Members of the program are supported by their tuition being paid and a stipend provided in the range of \$20,000 annually for a total of 6 years.<sup>7,8</sup> In a typical program, students complete the first 2 years of medical school and then complete the PhD portion of the program. The student completes the final 2 years of medical school upon completion of the PhD degree.<sup>9</sup> Attainment of both degrees typically requires approximately 7 years.<sup>6</sup>

Graduates of the MSTP program have had fairly consistent career paths. A study of those who completed the MSTP program at Duke University medical school during 1970-1990 demonstrated that a substantial fraction (74%) of the graduates were participating in academia or research "employed in academic or research settings"?, while 68% functioned as primary investigators (PI) on grants supported by the National Institutes of Health.<sup>10</sup> Similarly, an analysis of graduates of the University of Pennsylvania MD/PhD program from 1992-1998 indicated that a majority of participants (83.6%) were faculty members, while an additional 5.7% were engaged in research at government or private research institutions.<sup>11</sup> Furthermore, an overwhelming majority (93%) had published a peer-reviewed manuscript during the preceding year.<sup>11</sup> The versatility of these individuals is indicated by the fact that 99% completed a residency and almost three fourths had a clinical practice.<sup>11</sup> These outcomes mirror the results found nationwide in a National Institute of General Medical Sciences study.

Although the MSTP program receives much attention, it is not the exclusive pathway for physicians to become physician-scientists. Only 2.5% of medical school graduates each year are part of the MSTP program,<sup>12</sup> yet 10% of matriculating medical school students express an interest in conducting research.<sup>13</sup> Institutions that have a MSTP program also offer joint degree programs for those not accepted into the MSTP programs, as well as 75 institutions that do not offer MSTP programs.<sup>7</sup> The PhD may be obtained in an eclectic array of areas such as the biological, chemical, and physical sciences, in addition to other areas such as computer science, economics, epidemiology, and public health. The NIGMS study also found that approximately 70% of these graduates held academic positions.<sup>6</sup> Moreover, graduates of these programs who obtained their PhD between 1986 and 1990 had published more than 10 peer-reviewed manuscripts.<sup>6</sup> These data help to explain why MD/PhD researchers, despite their small numbers, receive 30% of grants awarded to physicians.<sup>8</sup>

## **METHODS**

### **Establishing the UT Program**

In order to establish a candidate pool from which the next generation of pharmacy faculty members could be drawn, in April 1991 the University of Tennessee College of Pharmacy proposed a dual-degree PharmD/PhD program to the University's Board of Trustees. The dual-degree program was also intended to increase the number of US citizens pursuing a PharmD degree and a graduate degree. The proposal was approved by the Board of Trustees in June 1991 and implemented in the fall of 1992.

Program objectives for the dual PharmD/PhD program were as follows:

- (1) Increase number of US citizens in pharmacy graduate programs.
- (2) Increase number of students with pharmacy degrees in pharmaceutical sciences graduate programs (Pharmaceutical Sciences and Health Science Administration).
- (3) Maintain the academic integrity of both programs while at the same time reducing the total time to obtain both degrees.
- (4) Development of faculty members who have the ability to interface between the clinical and the pharmaceutical sciences.
- (5) To prepare pharmaceutical scientists who have a degree in pharmacy, are US citizens, and who will contribute to the improvement of health care through their research.
- (6) To develop the ability of the graduates to conduct translational research and to utilize their clinical skills and knowledge to enhance their basic research.

The Pharmaceutical Science program of the PharmD/PhD program was begun in 1992, and the Health Science Administration program begun in 1995. There has been one graduate with a MS residency in Health Science Administration, and one with the PharmD/Masters in Pharmaceutical Sciences, and 6 students have now graduated with a PharmD and a PhD in the Pharmaceutical Sciences.

#### **Administration and Funding of the UT Program**

The admissions requirements for the UT dual PharmD/PhD program are as follows:

- (1) Minimum of 3 years of university “postsecondary education” or “college” but a BS degree is preferred;
- (2) Students in pharmaceutical sciences should have had courses in physical chemistry. Students in health sciences administration should have had courses in accounting, economics, and/or management;
- (3) Students must be US citizens;
- (4) Grade point average above 3.0;
- (5) Graduate Record Examination score greater than 1,000, with 3.5 out of 6 on the writing section;
- (6) Three letters of reference and an interview; and
- (7) Admission to the PharmD program prior to admission to the PhD program.

Key points in the program are listed in Table 1. Because this was an integrated dual-degree program, stu-

dents were enrolled in the PharmD degree and took courses in the graduate program. During the summers between the P-1 and P-2, and P-2 and P3 years, the student selected one area to focus on and gained experience with a faculty mentor. Some students continued to explore areas of interests (working in multiple areas) during their second summer. However, by the third summer, all students were working in a focused area. Students were not formally admitted to the graduate program until they had completed their PharmD degree. A typical course schedule for students in the PharmD/PhD program at UT in Pharmaceutical Sciences or Health Science Administration is available at [http://cop.utmem.edu/pharmacy/PharmD\\_Program\\_Pages/Dual.htm](http://cop.utmem.edu/pharmacy/PharmD_Program_Pages/Dual.htm).

Table 1. Key Points Related to the University of Tennessee College of Pharmacy PharmD/PhD Dual-Degree Program

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- Students are admitted to the PharmD/PhD program after admission to PharmD program. During the summer prior to their first professional year, students rotate through 3 research areas.
  - Students sign a contract when they enter the program (available on UT web site).
  - During the academic year, students receive a scholarship equal to the resident tuition.
  - A maximum of 4 students per year who are non-Tennessee residents are classified as Tennessee residents because of the dual-degree program.
  - Students spend 6-8 hours per week working with a graduate faculty member-during the academic year (P1, P2, and P3).
  - During the summers between the P1 and P2, and P2 and P3 years, the student selects one area to focus on and gains experience with a faculty mentor.
  - Students select, in concert with the program/director chair, a major professor, prior to beginning their third professional year (no later than the start of their fourth professional year).
  - In the summer between the P3 and P4 years, the student may be involved in rotations and therefore not working in research.
  - Student’s rotation schedules are prepared so that they can complete their rotations by December of their 4th professional year.
  - Students should have completed 30-40 semester hours of graduate credit, and selected a faculty advisor and research topic by the time they graduate from the PharmD program.
  - The student completes the PharmD degree and then matriculates directly into the graduate program full time. The stipend at that point is increased to the regular graduate stipend.
  - Graduate coursework taken during the PharmD program counts toward graduate credits.
  - A student can complete the PhD degree within 4-5 semesters after graduation from the PharmD program.
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### **Administration and Funding of the UT Program**

Stipends for the PharmD/PhD program were provided through endowments within the College of Pharmacy, as well as funds provided through graduate faculty members' extramural funding. Students received a summer stipend of \$4,000 and the in-state residency tuition rate for each semester the student was registered in the PharmD program. In the 2004-2005 academic year, PharmD/PhD students received \$4,000 during the summer and \$10,337 for tuition and fees for the 2004-2005 academic year. Students paid their resident tuition from these funds (up to 4 PharmD/PhD students per year were classified as Tennessee residents). After the student completed the PharmD degree, the stipend is increased to the graduate stipend of \$19,500.00 per year plus a tuition waiver. Current funding of the UT program will provide funds for up to 16 students in the PharmD portion of the program, plus 12 students in the PhD component. Funding for the PharmD component of the program came from the following sources: Seldon D. Feurt Memorial Fund, 5 students at \$15,013 per year (total of \$75,065 in 2005-06); Minority Center of Excellence, 6 students at \$14,000 per year (total of \$84,000); Van Vleet Endowment, 1 student at \$15,013 per year; First Tennessee Chair of Excellence, 1 student at \$15,013 per year; and College of Pharmacy Education Fund, 3 students at \$15,013, plus any additional funds needed to fund the 16 students. For the 2005-06 academic year, there were 11 students in the PharmD portion of the program and 5 in the PhD component. Faculty mentors provided funding from their extramural funds for stipends for the PhD component of the program for up to 12 students at \$19,500 per year plus tuition waiver.

PharmD/PhD students had to sign an agreement with the College (sample contract available at [http://cop.utm.edu/pharmacy/PharmD\\_Program\\_Pages/Dual.htm](http://cop.utm.edu/pharmacy/PharmD_Program_Pages/Dual.htm)). The agreement focused on the student's and the school's responsibilities. If the student dropped out of the program, the academic scholarship during the academic year reverted to a loan that the student had to repay. If the student was dropped from the program or left because of health problems, the loan was forgiven. Students could supplement the scholarship with other scholarships and grants that the student received on a competitive basis. The goal was to admit 4 new students to the dual-degree program each year.

### **Status of US PharmD/PhD Dual-Degree Programs**

A 13-item survey instrument was mailed to the 89 deans of schools accredited by the Accreditation Council for Pharmacy Education. (The survey instrument is available from the corresponding author by request). An

8-item survey instrument was mailed to the 26 students and graduates of the University of Tennessee PharmD/PhD program (Appendix 2). The survey instruments were administered beforehand to personnel within the UT College of Pharmacy to identify ambiguous questions. A cover letter and self-addressed stamped envelope were included with each survey instrument. Packets were sent out in May 2004, and responses were accepted as late as July 10, 2004. Names and addresses of respondents were not solicited so that participants could remain anonymous.

### **UT PharmD/PhD Student Survey**

Surveys mailed to current and past participants of the UT PharmD/PhD program obtained information on the individual's current educational status and completion of significant objectives within the dual-degree program. Information was also collected to assess the graduate credit hours completed at the survey participant's latest available point of enrollment in the PharmD curriculum, reasons for entering the program, the level of satisfaction with the program, and the likelihood of entering a dual-degree program if presented with the scenario again. Those who had to withdraw from the program were asked to cite the circumstances of their withdrawal.

### **School of Pharmacy Dean's Survey**

The survey instrument sent to the deans of colleges and schools of pharmacy solicited information regarding the presence of a dual-degree program. If a dual-degree program was not present at the time of the survey, deans were asked if they were planning to implement a dual-degree program. If a dual-degree program was present, respondents were asked to comment on the level of integration and graduate concentrations available to dual-degree students. In addition, respondents at schools with dual-degree programs were asked when the dual-degree program was initiated, the cumulative and current number of participants in the program, the employment sites of graduates, the attrition rates, and the time needed to complete both degrees. Finally, deans at schools were asked about their program's entrance requirements and the benefits offered to participants in the program.

The results were analyzed using Microsoft *Excel*. For the participants in the University of Tennessee dual-degree program, the descriptive statistics that were developed illustrate the performance of the dual-degree participants in progression through the program, the number of graduate credit hours accrued while in the PharmD curriculum, and the reason for any participants withdrawing from the program. In addition, the results were used to evaluate the participants' expectations of the program before they entered it, and their satisfaction with the program after they entered it.

## RESULTS

### UT PharmD/PhD Program Participants

Of the 16 students enrolled in the PharmD/PhD program at the time the survey was conducted, 5 were enrolled in the Health Science Administration program and 11 were enrolled in the Pharmaceutical Sciences program. Nineteen of the 26 survey instruments mailed were returned for a response rate of 73.1%. Most of the respondents (68%) had already obtained their PharmD degree (Figure 1). Of those, 67% had completed their PhD or were working towards obtaining it.

Overall program attrition was approximately 26.3%. There was no dominant reason for withdrawing from the program as no single reason accounted for at least half of the withdrawals. However, the most common reasons given for not completing the program include: (1) health reasons, (2) financial issues, (3) family issues, and (4) academic issues. As the program has developed, the attrition rate has dropped.

Current enrollment in the health science administration program includes 2 students in the P1 year, both of whom are minorities; 1 student in the P4 year, and 2 students who have completed the PharmD, and are now in the PhD part of the program. In the pharmaceutical sciences, there are 11 students currently enrolled with 2 in P1, 2 in

P2, 1 in P4, and 3 who are in the PhD component of the program. Due to the integrative nature of the program, students have been able to complete as many as 39 semester hours of graduate course credit by the time they complete the PharmD program. Even though only 12 participants answered this question, the data show that as the program has evolved, students have been able to complete more graduate hours during the PharmD degree. Students who have already obtained their PharmD were able to complete nearly 31 graduate credit hours while in the PharmD curriculum. Those students currently in the PharmD curriculum of the program are on pace to exceed 35 graduate credit hours by the end of their third year in the program.

### Participants Expectations of the Program

Figure 2 shows that reasons cited by the majority of participants for entering the program included intellectual stimulation (74%) and preparation for a career in research (58%). Other considerable factors for students to enter the program included preparation for academia (42%) and the financial incentives provided during the program (37%).

### Student Satisfaction with Program

In general, participants were satisfied with the program. Most of the participants (72%) either agreed or

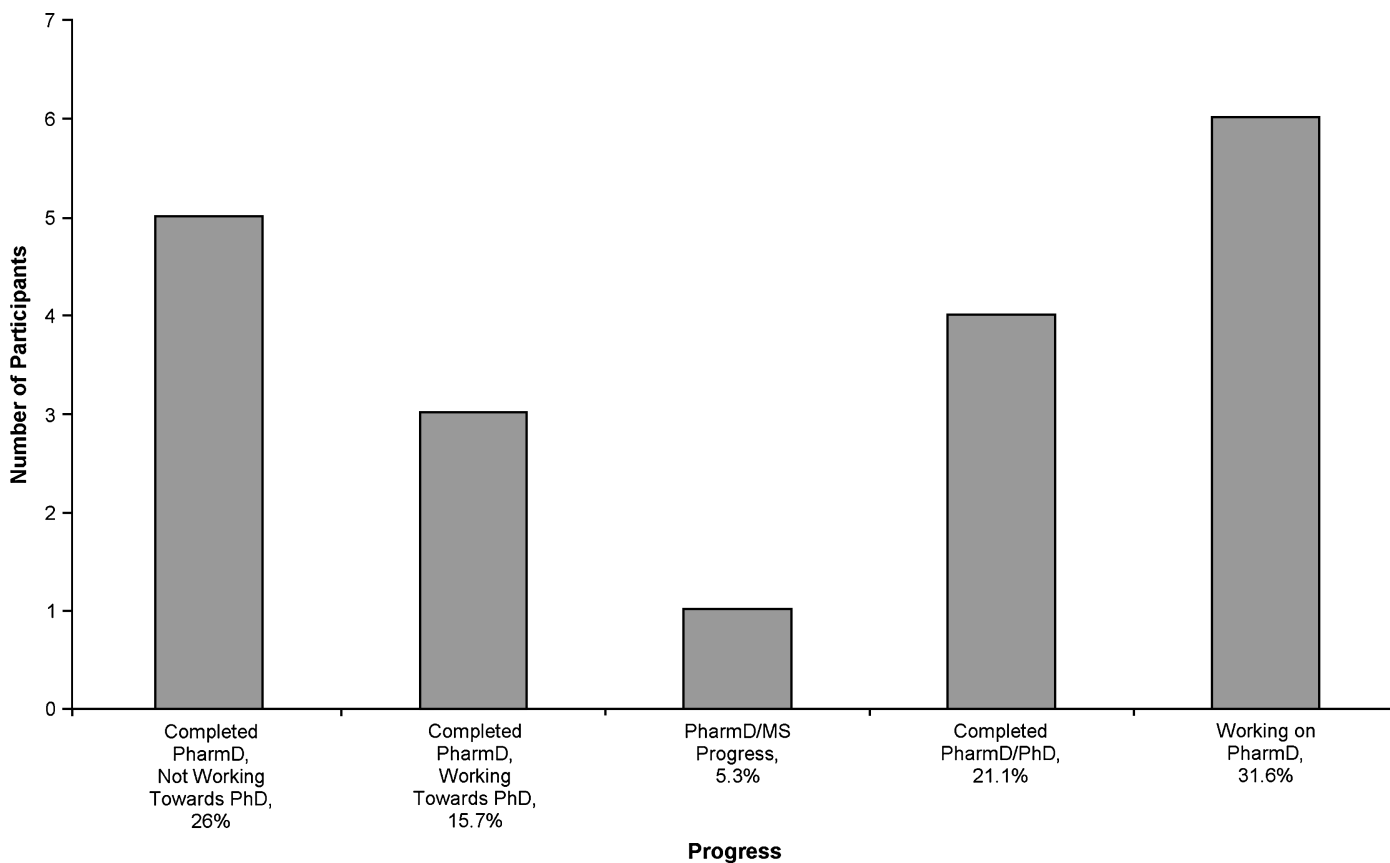


Figure 1. Progress of participants in UT PharmD/PhD program.

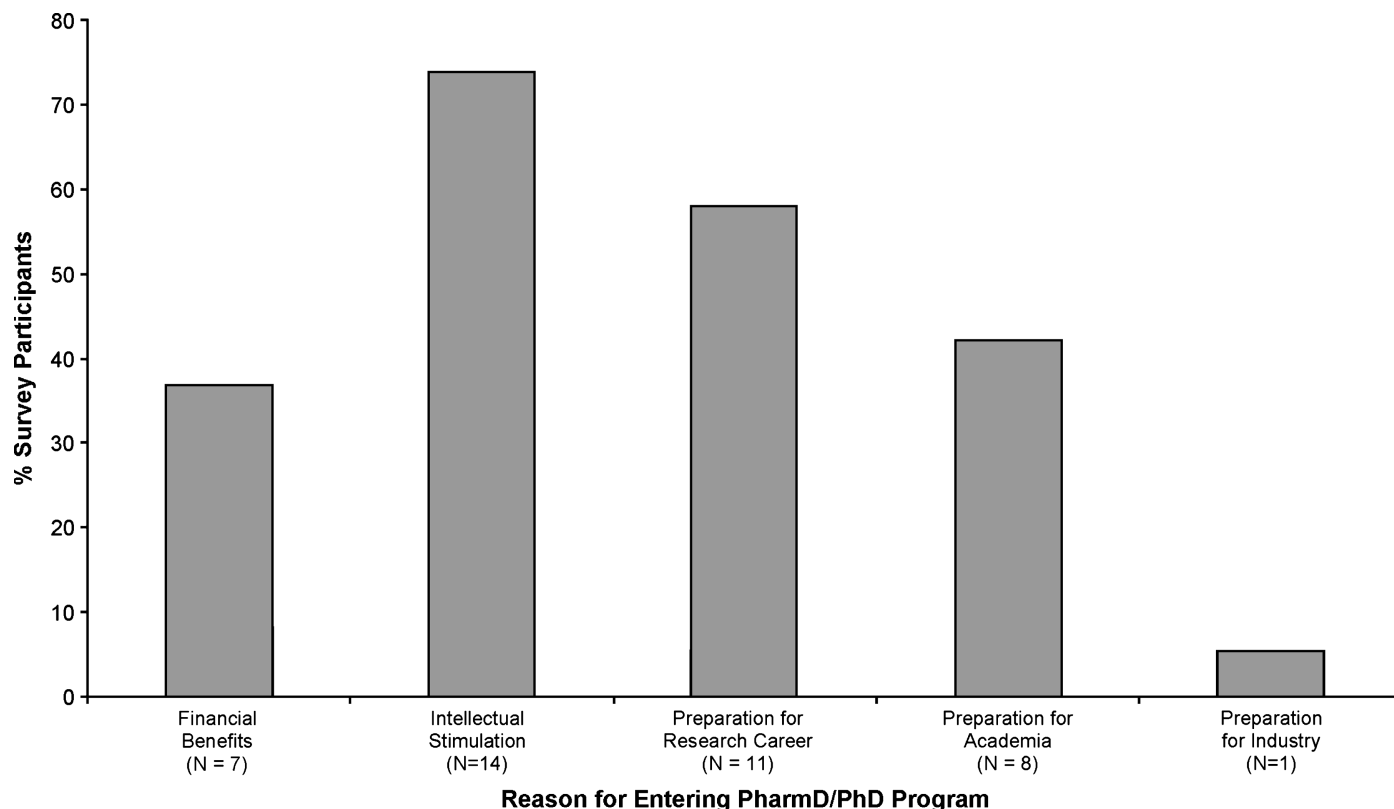


Figure 2. Percentage of participants identifying reasons for entering a PharmD/PhD program.

strongly agreed that the program did a good job of meeting their expectations. Only 6% of program participants strongly disagreed and 22% were unsure.

## US COLLEGES SURVEY RESULTS

### Status of PharmD/PhD Programs

Sixty-three survey instruments were returned from the 89 sent to deans of US colleges of pharmacy, for a response rate of 71%. The results of the survey demonstrated the considerable growth in the number of PharmD/PhD programs nationwide. Figure 3 shows that as late as 1994, there were only 5 PharmD/PhD programs in the United States, yet this number had more than tripled by 2004.

Moreover, there is considerable potential for continued growth in the number of dual-degree programs. A total of 11 colleges indicated that they were planning to implement programs. With this in consideration, Figure 4 shows that possibly 42% of the colleges and schools responding may have a dual-degree program in the near future.

The data revealed that there is no “typical” PharmD/PhD program. There was nearly an equal number of schools which integrated the PhD studies into the PharmD curriculum in either the P1 (4 schools), P2 (4 schools), or P3 (5 schools) year. The majority of schools (81%) had integrated the PhD studies into the PharmD curriculum by the P3 year of pharmacy school.

There are a wide number of concentrations offered to PharmD/PhD students, primarily in the pharmaceutical sciences. The 3 concentrations offered by the most programs were pharmacology (88%), medicinal chemistry (81%), and pharmaceutics (75%). Five colleges/schools had programs that offered study in pharmacoeconomics 5 offered health care administration, and 3 offered health policy.

The most frequently mentioned entrance requirement was the completion of the GRE (88%). Another common entrance requirement was a bachelor’s degree (50%). Entrance requirements mentioned less frequently were 3 years of college (31%), a minimum? 3.0 GPA in either pharmacy school or graduate school (31%), and United States citizenship (25%).

A variety of benefits were offered to PharmD/PhD program participants. Most of the colleges/schools (69%) provide students with a graduate tuition waiver. Half of the colleges/schools allowed students to replace pharmacy courses with graduate courses where appropriate. Approximately one third of the schools offered summer stipends (38%), PharmD tuition waivers (31%), and a stipend during the graduate program (31%). Only 1 school offered all of the benefits mentioned above.

Few students have been entering dual-degree programs in the United States. One possible reason is the

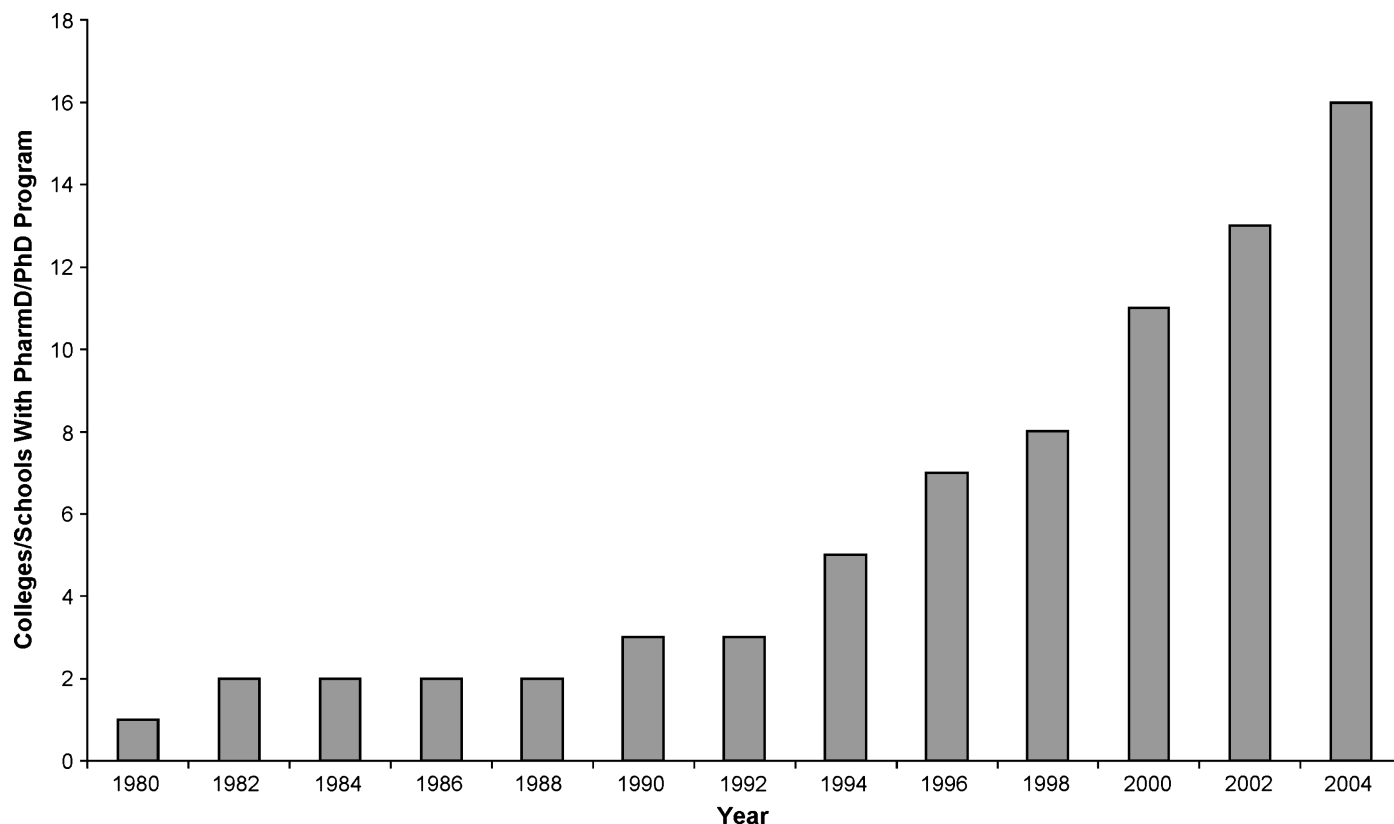


Figure 3. Increase in number of PharmD/PhD programs since 1980.

relatively small number of programs and limited amount of funding for students enrolled in them. The majority of schools responding to the question (86%), had less than 5 students enrolled in the program. However, one school had 16 students enrolled in the program.

For most schools, the attrition rate was fairly low. The attrition rate was defined by the percentage of students enrolling in the dual-degree program who withdrew from the PhD portion for any reason. In 9 of 13 schools responding (69%), the attrition rate was 20% or lower at the time of this survey. However, there was a small number of schools with relatively high attrition rates (3 with rates greater than 60% and 1 with a rate of 40%).

The 2 main employment areas of PharmD/PhD program graduates from the colleges/schools responding are academia (47%) and industry (43%). A small portion of graduates entered government (5%) or pharmacy practice (5%). No responses were recorded for the "other" category.

The data reported on the time to obtain both degrees were limited as only 7 colleges/schools responded to this question. At 1 school, students may complete both degrees before the end of 5 years in the program. There were 2 schools reporting that students could complete both degrees prior to year 6 of their program, while 2 others reported completion prior to year 7 of their program, and

2 other schools reporting completion prior to year 8 of their program.

## DISCUSSION

The University of Tennessee College of Pharmacy Faculty have readily accepted the PharmD/PhD program as a positive step forward in their efforts to increase the number of US citizens in graduate programs. This has worked exceedingly well, and faculty members have also grown to accept the program in terms of the number of students actively engaged in research and students' ability to move forward with research in a timely manner. The success of the program has been seen in terms of the number of applicants to the program, the number of US citizens applying, and the success of the students upon graduation. Students who have graduated from the program are now in academia and in the pharmaceutical industry.

A limiting factor of the program has been the availability of stipends. The student applicant pool has increased significantly, with 11 qualified students applying for the PharmD/PhD program for the fall of 2004, with stipends available for 4 students. The goal is to increase the number of student stipends in the future, with a total enrollment of 16 students in the PharmD portion of the program and 10-12 in the PhD component.

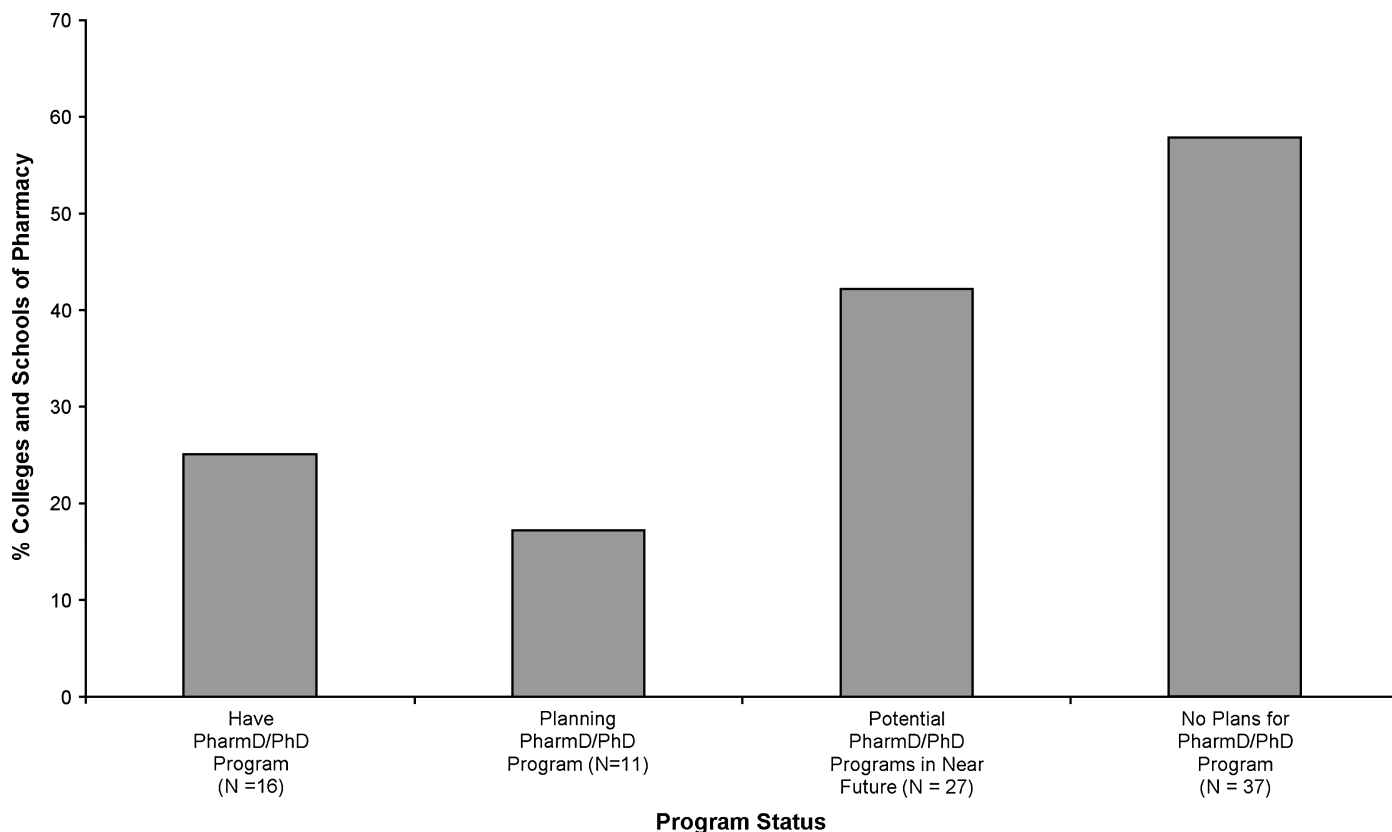


Figure 4. Status of PharmD/PhD programs in US colleges of pharmacy.

The dual PharmD/PhD Program addresses a critical need for pharmaceutical scientists for positions in academia, government, and the pharmaceutical industry. The program offers additional opportunity to strengthen the research programs within the UT College of Pharmacy. The construct of the dual-degree program presents a new option and provides cooperation among faculty members rather than competition for graduate students. This program significantly increases the capabilities of students who are in graduate programs and/or clinical research fellowships. This program is not meant to compete with residency training programs but to offer students another option for entering academic settings and other areas. This is evidenced at UT by 35 out of 99 graduates entering residencies and 3 students moving from the PharmD component of the program to the PhD component in 2005. These 2 programs exist together and provide greater opportunities for students.

The recruitment plan wherein students are identified and funded provides an opportunity for students who may not have otherwise considered a career in the pharmaceutical sciences or research. A major challenge of the program is to identify new stipends (students receive a stipend for a total of 7 years). The PharmD/PhD program curricu-

lum provides a framework for joint programs and maintains the essential components of a professional program while embracing the critical elements of graduate education in the pharmaceutical sciences and/or health science administration. Conversion of up to 3 non-specified elective clerkship rotations to laboratory or clinical research is reasonable and does not adversely affect the professional development of the student. The program was designed as a unified, education process that capitalizes upon the strengths of both professional and graduate education. Generally, professional programs are highly structured, whereas graduate programs are much less structured. Therefore, the curriculum design of the combined program should capture the flexibility of graduate education while accommodating the structural essentials of professional education. This program accomplishes that goal.

Even though other colleges of pharmacy throughout the nation are rapidly realizing the efficacy of implementing dual-degree programs, the majority of colleges still have no plans to implement dual-degree programs in the near future. If the interest among pharmacy students for conducting research is anywhere close to the 10% expressed among medical students, then the supply

for dual-degree programs in pharmacy falls far below the demand. While the colleges matriculating students into the dual-degree programs do a commendable job of developing those students into capable academic or industrial scientists, the numbers remain low compared to the medical profession. Some of the deficiencies in admittances are undoubtedly due to a lack of funding; there is no federal program designed to directly support funding for “pharmacist scientists” as there is for “physician scientists.” Nevertheless, several schools still train physician scientists without the benefit of the medical scientist training program, so this cannot be the primary hindrance to the development of dual-degree programs. The potential impact that dual-degree graduates may have on the pharmacy profession can not be denied as they may be the catalysts needed to propel pharmacy forward in its journey towards a new identity. Both a dual-degree graduate in pharmaceutical sciences and a PharmD graduate see a patient with an insufficient response to medication and have a working knowledge of what improvements in the medication may lead to a healthier patient. However, dual-degree graduates will be in a better position to lead research to actually bring an improved medication or a new medication delivery system to market. Also, like many pharmacists today, both a dual-degree graduate in pharmacoeconomics and a PharmD graduate may recognize wasteful spending at a local hospital. Yet, the dual-degree graduate will be better equipped to devise a more efficient system based on pharmacoeconomic principles.

If we in pharmacy are to reap the full benefit of dual-degree programs, we must all assist in whatever way possible to educate those who want to go the extra mile. This program will answer in part the faculty shortage if it is embraced by the colleges of pharmacy in the United States.

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