

Success of an Independent Study Course in Geriatric Pharmacy for Undergraduates

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INTRODUCTION

The increasing geriatric population and its use of both prescription and nonprescription drugs are apparent. In 1988, persons over 65 years of age constituted about 11% of the U.S. population. The elderly population is projected to increase to 26% by 1999. Approximately 30% of all prescription drugs are consumed by the elderly at an annual cost of \$2-\$3 billion. Nearly 32% of the elderly patients in a study of long-term care facilities received 8 or more different medications daily, while some received as many as 15 drugs (1). Pharmacy services that meet the needs of the elderly are becoming more of a necessity than an option. Several schools and colleges of pharmacy have used the Lilly/AACP Geriatric Curriculum Project for continuing education (2). Certificate programs, continuing education seminars, and university credit courses were the modes of learning used. Two professional associations have made certificate programs available to members using the text *Pharmacy Practice for the Geriatric Patient*.

At the undergraduate level, the American Association of Colleges of Pharmacy found in its 1985 survey of pharmacy schools

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that of 43 institutions responding about the use of the materials in the Geriatric Curriculum Project, 40 planned to incorporate all or part of the curriculum into required or elective course work. Thirty schools would use the materials to increase course content or expand course offerings. Previously, ten of the schools offered no course in geriatrics. Thirty-three of the schools also planned to use the materials for continuing education programs (3).

Three sets of student texts and instructor guides were furnished to each of 72 schools of pharmacy. No summative data are available to determine how widely the materials were used in undergraduate instruction (4). Students, as part of their elective requirement, were taking or had taken courses in gerontology and death and dying in other departments of the university. There was a need at the undergraduate level for a course in geriatric pharmacy because such a course had not been offered for four years. There was a second need for educational transition. That transition involved exposing students, as young adults, to andragogical learning situations such as independent study (5). The ultimate intent of the transition was to allow students to develop the desire for lifelong learning in order to remain competent professionals.

Smith and colleagues have reported on pharmacist performance on pretests of the questions from the Geriatric Curriculum Project (6). No published studies were apparent, however, that indicated the geriatric curriculum text had been used as an independent study approach to learning for an undergraduate pharmacy elective. The primary objective of this course, therefore, was to make an elective course in geriatric pharmacy available to interested students. A secondary objective included measuring the learning ability of students involved in an independent study course. The success of the course would be dependent upon passing grades, a course evaluation, and unsolicited student comments. The final objective was to assess the adequacy of the text's test questions by objective analysis.

Selection of independent study as a format for learning exemplifies the trait of adaptation in students. They are willing to take a risk contingent on their learning abilities and learning style. A 1987 study of pharmacy students described the majority of students in the sample as having the learning styles of accommodators or convergers (7). These learning styles possess a dominant learning mode

of active experimentation (8). Active experimentation is a form of risk taking that is inherent in problem solving. The students' problem was that they saw a need for knowledge about geriatric pharmacy, and they were willing to take the risk of independent study to acquire that knowledge. Risk taking and learning style have been listed as two of the five components of adaptation (9). As a group, most pharmacy students surveyed do not possess a truly dominant learning style but border on a central zone in the learning style quadrant best described as an adaptive style. The adaptive trait or style, coupled with a propensity for active experimentation as a learning mode, may be an indicator for identifying those students who would be most likely to select and benefit from independent study and ultimately be lifelong learners.

Interest in the elective course was expressed by 46 fourth- and fifth-year students. Preregistration permit cards were used as the mechanism to assess interest. Announcements had been made in several classes about the availability of *Pharmacy Practice for the Geriatric Patient* (Geriatric Curriculum Project) as developed by the American Association of Colleges of Pharmacy (AACP) and Eli Lilly and Company. The text and test question booklets were supplied by the Health Sciences Consortium, Inc. of Carrboro, NC. The course was given as a four-credit-hour elective. Interest in the four-credit-hour elective was due to several factors. Students were intrigued with the idea of being able to study on their own, especially in a subject for which they saw a great need in their future practice. The four credit hours of pharmacy electives would leave only six hours remaining of the ten required pharmacy elective hours. Because most pharmacy electives offered were three credit hours, the four-credit-hour geriatric course would meld nicely into students' curricular plans.

COURSE FORMAT AND REQUIREMENTS

Two faculty members and two graduate students assisted in administering the course. Major responsibility resided with a faculty member in the Department of Behavioral and Administrative Pharmacy and the Clinical Clerkship Coordinator. An initial caveat was expressed to the students concerning the chapters on therapeutics

being in need of updating. They were advised to accept the therapies discussed in the therapeutic chapters as being accurate only in completing the exams. New drugs and regimens that outdated some of the material in those chapters were being taught in other classes.

Scheduling for the exams created some logistical problems. Flexible testing periods resolved many of the scheduling constraints for the fifth-year students. They were in their final semester and needed to acquire internship hours on nonclass days to qualify for the licensure examination given shortly after graduation. Although the course was originally planned to be entirely independent study, the possibility of collusion in test completion necessitated monitoring weekly testing of the open-book exams. In addition, fourth-year students were carrying a maximum 19 hours and, therefore, might find it difficult to complete the course in the required 16 weeks unless held to a testing schedule. Graduate assistants monitored the weekly exams. The text incorporated 30 chapters covering 1,007 pages, and the test booklets contained 31 exams for a total of 729 questions. Consequently, the material fit neatly into the 16-week semester. To prevent laggards, 2 one and one-half hour testing sessions were scheduled twice a week. Students could take up to two chapter tests at any session. A critique session after chapter exams was not established. Because students were on different exam schedule days and a few were behind schedule, exam keys were posted only after all students had completed a chapter. During spring break, three-day weekends, and holidays, students were allowed to take exams at home upon signing a contract stipulating that all work would be their own and that it would be returned by a specified time.

No final exam was required. In lieu of a final exam, a term paper of 12 typed, double-spaced pages (minimum) and 12 separate references accounted for 25% of the course grade. A list of reading references was distributed to assist students in locating appropriate resources. The topic of the paper was to be a contemporary issue in geriatrics or geriatric pharmacy practice. Instructors were to approve the topic by mid-semester. The topics selected by students are listed in Table 1.

TABLE 1. Geriatric Pharmacy Term Paper Topics Completed by Students

1. Alzheimer's Disease
2. An Overview of Hospice Care for the Pharmacist
3. Death and Dying
4. Diabetes Mellitus: Type II
5. Geriatric Dermatology
6. Health Care and the Economics of the Geriatric Population
7. Hearing Impairment in the Elderly
8. Influenza and the Elderly
9. Noncompliance: A Crisis in American Medicine?
10. Noncompliance in the Elderly Patient
11. Noncompliance in the Geriatric Patient
12. Nutrition in the Elderly
13. Osteoporosis: Causes, Detection and Treatment
14. Osteoporosis in Women Today
15. Overmedication in the Elderly
16. Patient Education Programs for the Aging
17. Retirement--Is It Really a Golden Opportunity?
18. Rheumatoid Arthritis
19. Sexuality in the Elderly Population
20. Sleep Aids in the Elderly: Is It Misuse or Abuse?
21. The Geriatric Population's Greatest Fear: Alzheimer's Disease
22. The Medicare Catastrophic Coverage Act of 1988*
23. The Medicare Catastrophic Coverage Act of 1988*
24. Therapy Costs and Comparisons in Osteoporosis
25. Urinary Tract Infections in the Elderly*
26. Urinary Tract Infections in the Elderly*

*Topic term paper submitted by two separate students.

RESULTS

Tests were graded using the Mermac Test Grading and Analysis package. Both descriptive and parametric statistics were generated using SAS procedures on the IBM 3081d. Item analysis revealed that adjustments to 19 of 729 (2.6%) questions in 13 of the 31 chapters were subject to instructor review and adjudication (Table 2).

No problems with cheating were apparent. Students in the class, however, reported that students intending to take the course the following year were removing and photocopying the posted exam keys. When this was reported, no further exam keys were posted. Students taking the class were dismayed that others were not interested in learning the material for practical use. The reporting students did not want to divulge the names of the offenders, and because the offenders were not cheating in the course per se, the instructors chose not to take administrative action.

T-tests using two bifurcations of sex and year in school were performed on the score averages for the first and second halves of the semester, as well as on the final test average of all scores. An initial hypothesis was made concerning the final scores on the tests. It was assumed that the fifth-year professional students would score significantly higher than the fourth-year students. This assumption was predicated on the fact that fifth-year students had completed all their required course work, including clinical rotations. Fourth-year students were just starting the second semester of their second professional year, which included the second course in pharmacotherapeutics and a course in principles of medicine. They were taking a maximum of 19 hours. Fifth-year students might have a maximum of 16 hours of electives, but most were taking only 12 hours. No significant differences were apparent in *t*-tests at the 0.05 level of significance. The *F* test for equality of variance ($F = 1.36$; $df = 14, 10$; $PR > F = 0.0461$) revealed that, based on year in school the semester score averages had inequality of variances that is attributable to the fifth-year students' scores having a wider range and larger standard deviation. Descriptive statistics of the students are reported in Table 3.

A post hoc analysis of the first half-semester score average as

TABLE 2. Exam Questions Adjusted

Type	No. (%) of Questions (n = 729)
Poor Questions*	9 (1.2)
Multiple Correct Answer†	10 (1.4)
Total	19 (2.6)

*Poor questions are those presuming too much previous knowledge or addressing material not covered in the respective chapter.

†Multiple correct answers were determined by the instructor after item analysis and chapter reading.

TABLE 3. Descriptive Statistics of Students Taking the Course

Class Year in College	No. in Class Year (%)	Sex by Class (%)	
		<u>Female</u>	<u>Male</u>
Fourth	11 (42)	8 (73)	3 (27)
Fifth	15 (58)	11 (73)	4 (27)
Total	26 (100)*	19 (73)	7 (27)

*Of the 46 students originally preregistered for the course, 26 (57%) remained when chapter testing was changed from independent completion to set weekly exam schedules.

compared to the second half-semester average revealed a lowering of average scores. A paired *t*-test confirmed a significant difference ($t = 13.45$; $PR > t = 0.0001$). The exact cause or causes of the lowering of second half-semester scores cannot be ascertained based on sex or year in school. Several factors are presumed to have had an effect. First, the second half of the semester consisted of 11 of 15 chapters dealing with pathophysiology and therapy of common disorders. Fourteen of the first fifteen chapters in the first half-semester dealt with issues less technical for patient treatment. Second, after mid-semester the students began serious work on their term paper topics and may not have had as much time to spend studying the chapters. Third, because students were allowed—under contract—to declare the chapter exams they wished to complete over long weekends, holidays, and spring break, they may not have been exposed to the best study environments. Fourth, the advent of tests and requirements in other courses, including final exams, may have been an expected distraction.

A standard university course evaluation was administered to students. Summaries of the standard questions indicated all item evaluations were on par with the majority of university instruction, with no deficiencies noted. Unstructured question responses on the standard evaluation and unsolicited responses were very enlightening and revealed many positive attributes of the structure and format of the course. The fifth-year students praised the opportunity to take a needed course in geriatric pharmacy, especially by the independent study process. Additionally, they stated that the chapters dealing with therapeutics were a good review for state board exams. Fourth-year students were most appreciative of being able to take the geriatric course as an elective by independent study. In addition, the four-hour elective would reduce the hours in their fifth-year elective semester.

Other enlightening comments revealed that all students appreciated being able to complete take-home exams over breaks to complete the course early and devote more time to their term papers. One fourth-year student was in an automobile accident and suffered a brain concussion. She missed the first three weeks of testing but finished the course on schedule. A fifth-year student took the course

and nonpharmacy electives off-campus while her husband was attending a distant medical school.

All 26 students finished the course by final exam week, with the lowest grade being a "C" and the majority "A's." Term papers were reviewed twice; the lowest score was 80%, and the class average was 91%.

CONCLUSION

Based upon the course results, the independent study approach in learning geriatric pharmacy was a decided success. Part of the success could be attributed to the learning style of the students taking the course. Their adaptive learning style and the apparent dominant learning mode of active experimentation are two of the predisposing factors affecting the selection of this pharmacy elective course.

RECOMMENDATIONS FOR IMPROVEMENT

Testing schedules should be firmly established so that internship or other outside employment schedules will not interfere. Periods for critiques of the exams should be scheduled in lieu of posting exam keys. Many chapters of the text, especially those dealing with drug therapy, must be updated. When updated, the chapters could be packaged separately.

INSTRUCTORS' COMMENTS

The AACP/Lilly Geriatric Curriculum Project should be re-funded to update the excellent area coverages. For those schools and colleges where curriculum saturation does not allow sufficient flexibility to incorporate the geriatric pharmacy course as a separate entity, the following suggestions are made:

1. The major sections of the text could logically be incorporated into other appropriate courses.
2. The material as delineated and separated in the major sections could be taught during more than one semester or quarter and the hours adjusted accordingly.

3. The course could and probably should be either a required core curriculum course or a required pharmacy elective.
4. For those students choosing or required to do an externship in a nursing home, the text or applicable chapters should be required reading either before or during the rotation.

In keeping with the theme of a well-rounded intellectual professional, all sections and chapters of the text should be used.

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