

AN ABSTRACT OF THE THESIS OF

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Title: A STUDY OF CONTINUING PHARMACEUTICAL EDUCATION AND OTHER
FACTORS CORRELATING WITH PHARMACEUTICAL COMPETENCY IN THE
STATES OF OREGON AND IDAHO

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Abstract approved: _____
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The purpose of this study was to determine if a relationship exists between a Competency Index Score and the following: educational background, professional attitudes toward the changing role of the pharmacist, participation in continuing pharmaceutical education, and various demographic and miscellaneous characteristics.

A mail questionnaire was sent to a random sample of 400 pharmacists within the states of Oregon and Idaho. A second mailing was sent to nonrespondents. The total number of usable questionnaires returned in both mailings was 224, which was a 56.0% response rate.

The chi-square statistic was used to test for significant relationships between the Competency Index Score and other variables. A strong relationship ($P < 0.05$) was found between competency scores and the following: (1) length of education; (2) year of graduation from pharmacy school; (3) professional attitudes toward the changing

role of the pharmacist; (4) age; (5) practice setting; (6) sex; and (7) the types of pharmaceutical journals read most often.

There was no statistically significant relationship found between the Competency Index Score and the following: (1) participation in an externship; (2) participation in a clinical experience; (3) participation in a residency program; (4) participation in continuing pharmaceutical education programs; (5) part-time versus full-time employment; (6) membership in professional organizations; (7) distance traveled to continuing education programs; (8) opinion on mandatory continuing education; and (9) the respondent's opinion on the usefulness of continuing education programs.

A Study of Continuing Pharmaceutical Education and
Other Factors Correlating with Pharmaceutical
Competency in the States of
Oregon and Idaho

by

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To my husband, Cliff

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A STUDY OF CONTINUING PHARMACEUTICAL EDUCATION AND
OTHER FACTORS CORRELATING WITH PHARMACEUTICAL
COMPETENCY IN THE STATES OF
OREGON AND IDAHO

INTRODUCTION

Purpose

The purpose of this study is to determine if a relationship exists between pharmaceutical competence¹ and the following: educational background, professional attitudes², participation in continuing pharmaceutical education, and various demographic and miscellaneous characteristics.

Background

It is a primary goal of the pharmacy profession to maintain a high level of competency among its practitioners. Some pharmacists

¹"Competence" as used here is measured by the self-assessment test produced by the Blue Ribbon Committee of the National Association of Boards of Pharmacy (13).

²"Professional Attitudes" as used here is derived from the "Report of the Task Force on the Pharmacist's Clinical Role" (14).

do not feel that this is currently being done. Mitchem and Jackson (1) state the following:

Pharmacy is passing through what could well become its pivotal period. It is on the threshold of achieving a measure of the professional status for which it has longed It can become a more viable member of the health team, or it can maintain the status quo. If pharmacy is to improve in the eyes of the members of the health team, changes must take place. Change is imminent and many believe continuing education is a process to direct and effect that change in pharmacy (1).

Thus Mitchem and Jackson claim that pharmacy does not now enjoy the esteem that it should. They blame this on a lack of competency by the practitioners of pharmacy. Studies by Knapp (2) and Miller (3) support this claim. The Knapp study attempted to evaluate the pharmacist's performance as a drug consultant to the physician. Six questions were telephoned to each of 36 pharmacists in a large metropolitan area. Each pharmacist was given a score between zero and 100% on each of his answers to the six questions. The scores on each question were then averaged over all pharmacists. The highest mean score on any question was 61%, while the lowest mean score was 29%.

Miller also attempted to show how well pharmacists are able to provide drug information to physicians. Miller showed that out of 57 pharmacists studied, "Only two pharmacists, both of hospital pharmacies, displayed an ability as a therapeutic consultant in the author's estimation" (3).

Mitchem and Jackson see mandatory continuing pharmaceutical

education as a means to improve the lack of competency shown in the Knapp and Miller studies. They do not, however, attempt to investigate whether or not such continuing education does produce competency.

Continuing education has been defined as "all organized and directed educational activity beyond the period of formal education, in which the goal is continuous improvement in the vocational competency of the learner . . ." (4). Although the goal of continuing education is defined above as increased competency, there remains much controversy as to whether continuing education programs actually do produce an increased level of professional competence as an end result. Until proven, it cannot be assumed that a causal relationship exists between continuing education and increased competence (5,6,7,8,9). The main problems presently with continuing education seem to be its lack of structure, regulation, and standardization with respect to competency, its goal. If indeed the goal of continuing education is to increase competency, then the program planners must strive to meet predetermined competency standards. As of now, no defined standards exist; however, it is hoped that these standards will soon be defined in the results of an unprecedented study undertaken jointly by the American Association of Colleges of Pharmacy (AACP) and the American Pharmaceutical Association (APhA). The AACP-APhA study results will be published some time this year.

Rosinski (9) has pointed out that making continuing pharmaceutical education mandatory is an effort by certain state legislatures to increase the pharmacist's competency. By the legislatures' making continuing education mandatory, the profession of pharmacy has been indicted for apathy. The legislatures have concluded that " . . . pharmacists were neither maintaining nor continuing their professional competence: consequently, they must be required to do so by law" (9).

Gross (7) conducted a study of New Jersey pharmacists in 1973 to determine the conditions under which pharmacists were most likely to voluntarily participate in continuing pharmaceutical education programs. He also explored the relationship of this participation to professional attitudes toward the changing role of the pharmacist and to a competency measure. Gross devised his own tests for determining competency and professional attitudes, and has shown that those pharmacists who score higher in the competency test also possess high professional attitudes toward the changing role of the pharmacist, participate voluntarily in continuing education, are young, and have more education. Thus, he has shown the positive relationship between continuing education and competency which Mitchem and Jackson were assuming. Since Gross' study was not longitudinal, his results cannot be taken to prove that participation in continuing education causes competence. He admits this himself and states, "Although the association among these variables

has been made clear, one cannot assume that participation in continuing education insures or 'causes' competency" (7).

In this regard it is interesting to note the results of a study by Kirk, Weinswig, and Ohvall of women in pharmacy. They found the following:

Women pharmacists, particularly those in hospital pharmacy, support mandatory continuing education for relicensure The number of years as a pharmacist did not influence appreciably the number of continuing education programs attended by the respondents (10).

This is interesting since even though they show that older women pharmacists participate in continuing education programs as much as their younger counterparts, Gross has shown that older pharmacists in general do not show a positive relationship to competency. This could indicate sampling problems in the studies cited; for example, the data may not be valid or representative of the populations. This could also indicate that continuing education is not doing its job of keeping pharmacists competent as they get older.

All of the above comments, then, show a current interest and need to determine what factors relate to competency in pharmaceutical practice. Among the factors to be considered in this study will be professional attitudes toward the changing role of the pharmacist, practice setting, and participation in continuing education programs. The relationship of competency to participation in professional organizations and types of journals read also will be studied. Other factors to be examined will be demographics such as age, sex,

and part-time versus full-time employment. Another dimension to be studied will be that of educational background, specifically as it relates to such things as length of pharmacy education, year of graduation from pharmacy school, and the presence or absence of any type of practical or "clinical" experience. While previous studies in this area centered around the relationship of participation in continuing pharmaceutical education programs to various other factors (7,11,12), this paper will concentrate on finding relationships between competency and the above mentioned factors.

METHODOLOGY

A mail questionnaire was sent to a random sample of pharmacists within the states of Oregon and Idaho. A list of registered pharmacists in each state was obtained from the Oregon and Idaho State Boards of Pharmacy. Since this study was just to include pharmacists registered and residing in these two states, all names with out-of-state addresses were eliminated. That left 657 Idaho pharmacists registered and residing in that state, and 1,760 Oregon pharmacists registered and residing in Oregon. The researcher and six other Oregon pharmacists who pretested the questionnaire were omitted from the Oregon population, thus making the total of Oregon pharmacists 1,753. The total population from which the sample was taken was 2,410.

The purpose for including Idaho pharmacists in this survey originally was to increase the accuracy of responses to the question of how much continuing education the pharmacists had obtained during a two year period when it was not mandatory. A pharmacist was considered voluntary if he took four or more units of continuing education during each of those two years. Using this criterion, the Idaho pharmacists' responses were judged to be more accurate since continuing education has never been required there, and they would only have to recall the last two years. Since continuing

education has been mandatory in Oregon since 1976, Oregon pharmacists would have to remember back to 1974-1976.

After the questionnaire mailing, however, it was decided to consider a pharmacist a voluntary participant if he took four or more units per year more than the number required by state law. This eliminated the need for Oregon pharmacists to remember any further back than the Idaho pharmacists, and therefore increased the overall accuracy of the responses.

It was observed from previous questionnaire surveys in the literature (1,7,10,11) that the average response rate was about 40% to 50%. Since 200 responses are considered a good sample size on which to perform cross-tabulation and chi-square statistics, a mailing size of 400 was selected. This represented 16.6% of the total population. The same percent was taken from both states, so 109 questionnaires were sent to Idaho pharmacists and 291 questionnaires were sent to Oregon pharmacists.

The random sampling was done differently in the two states. Since the Oregon list of pharmacists was alphabetical, every sixth name on the list was chosen to receive a questionnaire. The Idaho list of pharmacists was not alphabetical, so a random numbers table was used to select questionnaire recipients.

The first questionnaires were mailed January 23, 1978. Those recipients not responding by February 10, 1978, received the questionnaire a second time with an extra note added on the original

cover letter. The second mailing took place on February 13, 1978. The cut-off date for accepting returned questionnaires was set as March 7, 1978.

The questionnaire included questions concerning educational background, the amount of continuing pharmaceutical education participation, demographic characteristics, and miscellaneous information. The questionnaire is shown in Appendix C. Also included were questions attempting to measure pharmaceutical competence and professional attitudes toward the changing role of the pharmacist. These last two seemingly intangible concepts were measured by two indices developed by Gross in a study of continuing education and competency in the state of New Jersey. Before discussing the use of these two indices, their validity should first be explained.

The Competency Index is "intended to measure knowledge of pharmacy fundamentals basic to professional competence" (7). It is comprised of ten questions taken from the self-assessment test produced by the Blue Ribbon Committee of the National Association of Boards of Pharmacy (13). The ten questions from the 101 on the test were selected by Gross after administering the entire test (all 101 questions) to a panel of nine judges consisting of pharmacy practitioners and educators. Each question was rated on a scale of one to five, with one being the most relevant to pharmacy practice and five being the least relevant. The ten

questions chosen to comprise the Competency Index were those with the best relevance ratings. Then Gross gave the entire 101-question test to ten practicing pharmacists and correlated the scores between the ten selected questions and all 101 questions. A Pearson zero-order correlation coefficient of 0.89 was obtained. Thus the performance on the ten chosen questions was considered to be highly correlated with the expected performance on the entire 101-question test.

It must be mentioned that one question of the ten in Gross' Competency Index just described was changed. It was a question concerning a new drug that had just come out on the market a few months before Gross had mailed his questionnaire which included this Competency Index. Since Gross did his study in 1973, and that particular question no longer served the same purpose, i.e., to see if pharmacists were keeping abreast of new drug products, another question was substituted for it concerning a new drug that appeared on the market several months before this study was made. None of the other questions were changed.

The ten competency questions in the survey were multiple choice questions. The respondent was asked to indicate with a check mark the one answer he thought to be the best for each particular question. If more than one answer was checked for one question, it was considered a wrong answer. A lack of response was also considered a wrong answer when other questions were answered.

The total number of correct answers was tallied for each respondent with a possible scoring range of zero to ten correct answers. A respondent was classified as having low competence (a low Competency Index Score) if he scored zero to four correct answers; as having moderate competence if he scored five or six correct answers; and as having high competence if he scored seven or more correct answers out of a possible ten.

This method of classifying competencies into a low, moderate, or a high bracket differed from that of Gross, presumably because of the one changed question. Gross' categories for competence were as follows: zero to three correct answers were defined as low competence; four to six correct answers were defined as a moderate competence; and high competence was defined as seven to ten correct answers. Gross' results showed a normal distribution when he used the above scale to classify competencies. This study also showed a normal distribution, but with a mean of one unit higher than in Gross' study.

In this study, the word competence will be used when referring to or describing the relative scores obtained by respondents in the Competency Index. The use of the word competence hereafter in no way implies anything other than this score.

The Professional Attitudes Index is a ten-item Likert scale that was developed by Gross in 1973 from the "Report of the Task Force on the Pharmacist's Clinical Role" (14). As Gross says, "This

document represents an attempt by expert 'judges' to define the role of the pharmacist in relationship to the changing health care system" (7). A Pearson zero-order correlation coefficient of 0.85 was obtained between the two pretest administrations of his scale which provided evidence of its reliability.

The Professional Attitudes Index is a series of ten statements which attempts, by analyzing the answers of respondents, to measure professional attitudes toward the changing role of the pharmacist. It is this measurement, then, that hereafter will be referred to as professional attitudes. Each of the ten statements could be responded to on a scale of one to five by circling the number that best indicated the extent to which the pharmacist agreed or disagreed with the statement. Strong agreement was indicated if the number one was circled, while strong disagreement was indicated if the number five was circled.

The ten statements were arranged so that seven of them required a one or "strongly agree" response to indicate a high professional attitude. The remaining three required a five or "strongly disagree" response to indicate the same attitude.

The responses to these ten statements were then recoded so that a one in any of the statements would indicate a high professional attitude. The responses were summed and divided by the total number of statements answered to give a professional attitudes score. The minimum number of responses acceptable to obtain a

professional attitudes score was eight, so anyone responding to less than eight statements was not given a score.

The scoring results of Gross' Professional Attitudes Index were as follows: a high attitude score was defined as 1.0 through 2.3, and a low attitude score was defined as being between 2.3 and 5.0, on a scale of five. This scoring used by Gross to define low and high professional attitudes was the standard used in this study.

Concerning Gross' Competency Index and Professional Attitudes Index, the point must be stressed that this study used these indices presuming that the sources upon which they are based do indeed accurately measure one aspect of pharmaceutical competence and professional attitudes.

Once the competency and professional attitudes scores were obtained, competency was related to continuing pharmaceutical education participation, professional attitudes, educational background, and some demographic and miscellaneous characteristics of the population. All of these variables are straightforward and need no explanation with the exception of participation in continuing pharmaceutical education programs.

Questionnaire respondents were classified as either voluntary participants or involuntary participants in continuing education. A voluntary participant was defined as one who took at least four units of continuing education beyond what he was required to take in each of the licensing years 1975-1976 and 1976-1977. If in one

of those two years, however, he took only one to three units more than required, then the licensing year of 1974-1975 was considered as a tie breaker. If the pharmacist took four or more units in excess in 1974-1975, then he was considered a voluntary participant in continuing education. All those who did not qualify as voluntary participants were categorized as involuntary participants.

Since Idaho does not require continuing education for relicensure, a pharmacist registered only in Idaho would need to have at least four units of continuing education for each of the two specified years in order to be qualified as a voluntary participant. Oregon pharmacists registered only in Oregon, on the other hand, would need at least four units for the 1975-1976 licensing year, but at least nineteen units for the 1976-1977 year. The increase in the second year is due to a new Oregon law requiring a minimum of fifteen units per year of mandatory continuing education for relicensure.

RESULTS

There were 143 questionnaires returned from the first mailing. An additional 90 questionnaires were received after the second mailing. The total number of returned questionnaires was 233, but since nine were returned blank, there were only 224 usable questionnaires.

There were 170 usable questionnaires returned from Oregon for a 58.4% response rate. There were 54 usable questionnaires returned from Idaho for a 49.5% response rate. The overall usable response rate was 56.0% of the sample.

Cross-tabular analysis as well as the chi-square statistic was used to determine if a relationship existed between the Competency Index Score and the selected variables of educational background, professional attitudes, participation in continuing pharmaceutical education programs, and various demographic and miscellaneous characteristics. An explanation of the statistical techniques utilized can be found in Appendix D.

Competence Versus Educational Background

The first relationship to be explored in this category was that of competence and years of educational training received,

specifically, whether the questionnaire respondents classified their educational training for their first degree in pharmacy as a two, three, four, five, or six year degree. Because there were only eight respondents that had less than a four year degree, and only one respondent that had a six year degree, the educational categories were narrowed down to two: four years and under, and five years and over. This resulted in the elimination of all short cells.

The two educational categories were compared to low, moderate, and high Competency Index Scores. It was found that a strong relationship exists between length of education and competency scores. Those pharmacists with a five or six year degree generally had higher competency scores than those obtaining their degrees in four years or less. This relationship is shown in Table 1.

Table 1. Relationship of Competency Index Score to years of pharmacy education^a

Competency Index Score	Years of education			
	4 years and under		5 years and over	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low score (0-4 correct)	29.9	26	15.8	21
Moderate score (5-6 correct)	50.6	44	59.4	79
High score (7-10 correct)	19.5	17	24.8	33
Total	39.6 ^b	87	60.4	133

^aChi-square = 6.26, d.f. = 2, $P < 0.05$

^bPercent of all respondents

A second category of educational background to be compared to competence was the year of graduation of the respondents. By classifying respondents into the decade in which they graduated, it was found that a strong relationship exists between the year of graduation and competence. The most recent graduates scored a moderate or high Competency Index Score more often than did those who graduated before 1950. Table 2 illustrates this relationship.

Table 2. Relationship of Competency Index Score to year graduated from pharmacy school^a

Competency Index Score	Decade in which graduated							
	Before 1950		1950's		1960's		1970's	
	%	N	%	N	%	N	%	N
Low (0-4 correct)	40.5	17	22.0	11	18.0	11	11.9	8
Moderate (5-6 correct)	40.5	17	64.0	32	54.1	33	61.2	41
High (7-10 correct)	19.0	8	14.0	7	27.9	17	26.9	18
Total	19.1 ^b	42	22.7	50	27.7	61	30.5	67

^aChi-square = 16.18, d.f. = 6, $P < 0.025$

^bPercent of all respondents

It was hoped that instead of having to categorize all of the pre-1950 graduates together, that they could have been further divided into a 1940's group and a pre-1940 group. This could not be done, however, due to a short cell in the high competence bracket of the pre-1940 group.

A third relationship to be explored in educational background was that of competency and having participated in a residency program. (The term "residency" was not defined in the questionnaire.) Twenty-eight respondents indicated they had participated in such a program, but only twenty-seven answered the ten competency questions. The chi-square statistic for the cross-tabulation of this relationship was not good and the P value was 0.29. These results are shown in Table 3.

Table 3. Relationship of Competency Index Score to participation in a residency program^a

Competency Index Score	Residency		No Residency	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low (0-4 correct)	22.2	6	20.4	37
Moderate (5-6 correct)	44.5	12	58.6	106
High (7-10 correct)	33.3	9	21.0	38
Total	13.0 ^b	27	87.0	181

^aChi-square = 2.44, d.f. = 2, P = 0.29

^bPercent of all respondents

It appears, therefore, that the Competency Index Score and participation in a residency program are not related in this study. Due to this lack of relationship, it was decided to examine more carefully the characteristics of pharmacists who had participated in residencies. In checking the year of graduation, it was found

that eight of these pharmacists had graduated in the 1970's, nine in the 1960's, nine in the 1950's, and one each in 1941 and 1934. It was also noted that these pharmacists were distributed in their practice settings nearly identically to the population as a whole. These data are shown in Table 4.

Table 4. Comparison of residency participants and sample population to type of practice setting

	Practice setting					
	Community		Chain		Hospital	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Residency participants ^a	64.0	16	20.0	5	16.0	4
Sample population ^b	62.2	122	22.5	44	15.3	30

^aThree residency participants indicated that they were not currently working in a pharmacy

^bIncludes residency participants listed above

The last aspect of educational background to be considered in relation to competence was that of a "practical application" experience in undergraduate training. There were two categories described in the questionnaire that were classified as "practical application" experiences. The descriptions were as follows:

Clinical experience (may include such things as making rounds or being on the wards of a hospital looking at patient charts, having contact with doctors and other health professionals).

Externship (includes supervised experience in a community or hospital pharmacy during the school year as part of the school curriculum).

The respondent was asked to check either "Yes, had" or "Did not have" in the space provided by each definition. Each respondent was classified into one of four categories determined by their responses to the above question, depending on whether they participated in either one or both categories or neither. As demonstrated in Table 5, no relationship exists between these variables.

Table 5. Relationship of Competency Index Score to participation in clinical experience and/or externship^a

Competency Index Score	Clinical experience and/or externship							
	Neither		Clinical Only		Externship Only		Both	
	%	N	%	N	%	N	%	N
Low (0-4 correct)	27.7	33	11.4	4 ^b	20.0	5	15.4	4 ^c
Moderate (5-6 correct)	51.3	61	60.0	21	64.0	16	61.5	16
High (7-10 correct)	21.0	25	28.6	10	16.0	4 ^d	23.1	6
Total	58.0 ^e	119	17.1	35	12.2	25	12.7	26

^aChi-square = 6.19, d.f. = 6, P = 0.40

^bExpected frequency (f_e) = 7.85 ^c f_e = 5.83 ^d f_e = 5.49

^ePercent of all respondents

Although there may appear to be three short cells in Table 5, this is not the case. As long as the expected frequency, as opposed to the observed frequency, is five or larger, the cell is not considered to be a short cell. The expected frequency (f_e) for each instance is footnoted above.

Competence Versus Professional Attitudes

As described earlier, pharmacists were categorized as having either high or low professional attitudes toward the changing role of the pharmacist, depending on how they responded to a series of ten statements. Those scoring from 1.0 through 2.3 were classified as having high professional attitudes. Those whose scores averaged between 2.3 and 5.0 were classified as having low professional attitudes.

The cross-tabular analysis performed between competence and professional attitudes demonstrated that these variables are strongly related with a P value of less than 0.01 (see Table 6).

Table 6. Relationship of Competency Index Score to professional attitudes^a

Competency Index Score	Low Attitudes (> 2.3)		High Attitudes (1.0-2.3)	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low (0-4 correct)	37.2	16	16.0	26
Moderate (5-6 correct)	44.2	19	60.1	98
High (7-10 correct)	18.6	8	23.9	39
Total	20.9 ^b	43	79.1	163

^aChi-square = 9.49, d.f. = 2, P < 0.01

^bPercent of all respondents

Those pharmacists judged as having high professional attitudes generally had higher scores on the Competency Index than did those judged as having low professional attitudes.

Competence Versus Participation in Continuing Education

Each respondent was classified as a voluntary or involuntary participant in continuing education if he took a minimum of four units more than required by law for each of two years, as previously explained. Voluntary and involuntary participation were then compared to low, moderate, and high Competency Index Scores in a cross-tabular manner. There is a relationship between the two variables but the significance is not small enough to be of statistical value ($P = 0.12$). These variables, therefore, cannot be considered strongly related. Table 7 illustrates these findings.

Table 7. Relationship of Competency Index Score to participation in continuing education^a

Competency Index Score	Participation in continuing education			
	Involuntary		Voluntary	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low (0-4 correct)	26.7	32	15.3	15
Moderate (5-6 correct)	52.5	63	59.2	58
High (7-10 correct)	20.8	25	25.5	25
Total	55.0 ^b	120	45.0	98

^aChi-square = 4.18, d.f. = 2, $P = 0.12$

^bPercent of all respondents

If one ignores the categories of voluntary and involuntary, and compares the three levels of competency to the total number of continuing education hours taken, regardless of whether it is mandatory or not, there is still no relationship. Competency Index Scores were compared to three levels of continuing education and the P value was 0.75; thus it appears that competency is not related to the amount of continuing education taken. These data are illustrated in Table 8.

Table 8. Relationship of Competency Index Score to amount of continuing education taken in 1975-1976^a

Competency Index Score	0-6 units		7-15 units		16+ units	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low (0-4 correct)	22.9	19	19.2	10	19.7	14
Moderate (5-6 correct)	59.0	49	57.7	30	52.1	37
High (7-10 correct)	18.1	15	23.1	12	28.2	20
Total	40.3 ^b	83	25.2	52	34.5	71

^aChi-square = 2.33, d.f. = 4, P = 0.75

^bPercent of all respondents

Competence Versus Demographic Characteristics

The first demographic characteristic to be examined with respect to competence was age. As can be seen in Table 9, the younger pharmacists tended to have more medium and high competency

scores and less low competency scores. The reverse was true for the older pharmacists. The point at which this reverse trend started was in the age decade of 41-50.

Table 9. Relationship of Competency Index Score to age in years^a

Competency Index Score	30 and under		31-40		41-50		51-60		Over 60	
	%	N	%	N	%	N	%	N	%	N
Low (0-4 correct)	10.4	5	14.5	10	21.7	10	25.0	7	56.3	15
Moderate (5-6 correct)	60.4	29	58.0	40	60.9	28	53.6	15	39.3	11
High (7-10 correct)	29.2	14	27.5	19	17.4	8	21.4	6	7.1	2 ^b
Total	21.9 ^c	48	31.5	69	21.0	46	12.8	28	12.8	28

^aChi-square = 24.96, d.f. = 8, P < 0.005

^bf_e = 6.26

^cPercent of all respondents

The type of practice setting was also compared to competence. There were three general categories used here: community, chain, and hospital pharmacies. The results in Table 10 show that hospital pharmacists scored highest on the Competency Index, followed by the chain and then the community pharmacists.

Competency Index Scores were cross-tabulated with part-time and full-time employment as pharmacists. A part-time pharmacist was defined as a pharmacist working an average of 35 hours or less per week. A full-time pharmacist was defined as working 36 hours or more per week. No relationship was shown between these variables.

Table 10. Relationship of Competency Index Score to type of practice setting^a

Competency Index Score	Community		Chain		Hospital	
	%	N	%	N	%	N
Low (0-4 correct)	29.5	36	11.4	5	6.7	2 ^b
Moderate (5-6 correct)	51.6	63	68.2	30	56.6	17
High (7-10 correct)	18.9	23	20.4	9	36.7	11
Total	62.2 ^c	122	22.5	44	15.3	30

^aChi-square = 13.74, d.f. = 4, P < 0.01^bf_e = 6.58^cPercent of all respondents

In comparing competency scores to sex, it was found that a strong relationship exists. The female pharmacists scored higher on the Competency Index than did their male counterparts, as illustrated in Table 11.

Table 11. Relationship of Competency Index Score to sex^a

Competency Index Score	Male		Female	
	%	N	%	N
Low (0-4 correct)	26.2	43	7.1	4 ^b
Moderate (5-6 correct)	54.9	90	58.9	33
High (7-10 correct)	18.9	31	34.0	19
Total	74.5 ^c	164	25.5	56

^aChi-square = 11.38, d.f. = 2, P < 0.01^bf_e = 11.96^cPercent of all respondents

It was thought that perhaps the reason for women scoring higher than men in the Competency Index was because women pharmacists are generally younger than their male counterparts, and, as was previously shown, younger pharmacists score higher than older pharmacists. A cross-tabulation of sex and age, shown in Table 12, verified that women pharmacists are younger than male pharmacists with 71.4% of the women 40 years old or less, and only 47.2% of the men in the same age group. These results gave encouragement to the assumption that women scored higher on the Competency Index because they are younger.

Table 12. Relationship of sex to age group^a

Sex	Age group by decade									
	30 and under		31-40		41-50		51-60		Over 60	
	%	N	%	N	%	N	%	N	%	N
Male	54.2	26	73.9	51	82.6	38	78.6	22	92.9	26
Female	45.8	22	26.1	18	17.4	8	21.4	6	7.1	2 ^b
Total	21.9 ^c	48	31.5	69	21.0	46	12.8	28	12.8	28

^aChi-square = 17.24, d.f. = 4, $P < 0.005$

^b $f_e = 7.16$

^cPercent of all respondents

It was then decided to further test the assumption by cross-tabulating age versus competency for the women pharmacists only. The surprising result, shown in Table 13, was that there is no relationship at all between age and competency for women, which is

in contrast to the results for the population as a whole. Therefore, even though women pharmacists are in general younger than male pharmacists, this does not account for the fact that women are more competent than men.

Table 13. Relationship of Competency Index Score to age in years for women only^a

Competency Index Score	Age of women					
	30 and under		31-40		Over 40	
	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Low to Moderate (0-6 correct)	63.6	14	66.7	12	68.8	11
High (7-10 correct)	36.4	8	33.3	6	31.2	5
Total	39.3 ^b	22	32.1	18	28.6	16

^aChi-square = 0.11, d.f. = 2, P = 0.95

^bPercent of all respondents

It should be noted that the low and moderate competency categories had to be combined in Table 13 above in order to eliminate all short cells. Only four of the 56 women in the survey had a low score, and they were evenly distributed in the age groups as follows: two were in the over-40 age group, and one was in each of the other two age groups.

Competence Versus Miscellaneous Variables

When the Competency Index Score was cross-tabulated with the number of professional organizations to which the pharmacist belonged (categories of zero, one or two, three or four, and five or more), there was no relationship at all.

Pharmacists were asked to list the names of the journals they read most often. Those who read a majority of professionally-oriented journals such as New England Journal of Medicine, Drug Intelligence and Clinical Pharmacy, and U.S. Pharmacist were grouped together. Those who read mostly business-oriented journals such as Pharmacy Times, Drug Topics, and American Druggist also were grouped together. Those who read a mixture of professional and business journals, such as one of each or two of each, were classified into a third group. These three groups were then entitled "Professional," "Business," and "Mixture," respectively.

When competency scores were compared to the three categories of journals read, it was found that a strong relationship exists in which those pharmacists who are in the "Professional" category generally scored higher than those in the other two categories. These data are shown in Table 14. There are 45 missing observations in Table 14. In addition to those 45, seven pharmacists indicated that they read no journals at all.

Table 14. Relationship of Competency Index Score to types of journals read^a

Competency Index Score	Professional		Business		Mixture	
	%	N	%	N	%	N
Low (0-4 correct)	7.3	4 ^b	25.6	20	7.7	3 ^c
Moderate (5-6 correct)	60.0	33	52.6	41	71.8	28
High (7-10 correct)	32.7	18	21.8	17	20.5	8
Total	32.0 ^d	55	45.3	78	22.7	39

^aChi-square = 12.57, d.f. = 4, $P < 0.025$ ^b $f_e = 8.63$ ^c $f_e = 6.12$ ^dPercent of all respondents

When competency scores were compared to the "Professional" and "Business" categories only, the significance was improved from $P < 0.025$ to $P < 0.01$. Table 15 illustrates these data.

Table 15. Relationship of Competency Index Score to types of journals read^a

Competency Index Score	Professional		Business	
	%	N	%	N
Low (0-4 correct)	7.3	4 ^b	25.6	20
Moderate (5-6 correct)	60.0	33	52.6	41
High (7-10 correct)	32.7	18	21.8	17
Total	41.4 ^c	55	58.6	78

^aChi-square = 7.81, d.f. = 2, $P < 0.01$ ^b $f_e = 9.92$ ^cPercent of all respondents

As mentioned previously, there were 45 missing observations in Table 14. This means that a large percent (20.4%) of the respondents "missed" the question asking them to list the names of the journals they read most often. Perhaps it cannot be assumed that the question was missed purposely, since its placement at the top of a back page of the questionnaire might have lead to easy omission. On the contrary, neither can it be assumed that the question was omitted accidentally. Perhaps pharmacists assumed that no response to this question indicated that they read no journals at all.

With this in mind, then, it was decided to cross-tabulate competency with types of journals read in a third way. In addition to using the "Professional," "Business," and "Mixture" categories, a fourth category was added. This fourth category was entitled "None," indicating that no journals were read at all. This was an entirely speculative category, making the assumption that those who "missed" the question on journals read, actually read no journals at all. Those 45 who "missed" the question were classified along with those seven who indicated they read no journals. Once again, note that the significance of the implications of Table 16 showing these data is only speculation on the part of the researcher.

Competency scores were cross-tabulated with the average number of miles traveled to a continuing education program, as

Table 16. Relationship of Competency Index Score to types of journals read^a

Competency Index Score	None		Business		Mixture		Professional	
	%	N	%	N	%	N	%	N
Low (0-4 correct)	41.7	20	25.6	20	7.7	3 ^b	7.3	4 ^c
Moderate (5-6 correct)	43.7	21	52.6	41	71.8	28	60.0	33
High (7-10 correct)	14.6	7	21.8	17	20.5	8	32.7	18
Total	21.8 ^d	48	35.5	78	17.7	39	25.0	55

^aChi-square = 25.76, d.f. = 6, P < 0.005^bf_e = 8.33^cf_e = 11.75^dPercent of all respondents

shown in Table 17. A higher level of competency has a positive relationship with a smaller distance traveled, but it is not a statistically significant relationship (P > 0.05, but P < 0.10).

Table 17. Relationship of Competency Index Score to average miles traveled to attend a continuing education program^a

Competency Index Score	Average miles traveled					
	0-30		31-75		Over 75	
	%	N	%	N	%	N
Low (0-4 correct)	13.6	14	29.2	14	25.0	13
Moderate (5-6 correct)	60.2	62	45.8	22	59.6	31
High (7-10 correct)	26.2	27	25.0	12	15.4	8
Total	50.7 ^b	103	23.7	48	25.6	52

^aChi-square = 7.88, d.f. = 4, P < 0.10^bPercent of all respondents

Then it was decided to cross-tabulate the number of continuing education units obtained by the respondents with the average number of miles traveled to a continuing education program. It was theorized that those who live closer to continuing education programs would obtain more units voluntarily. This might help to explain the relationship described above between increased competency scores and the smaller number of miles traveled. The year studied was 1975-1976, when neither Oregon nor Idaho required continuing education. This theory was not supported by the data, however, as illustrated in Table 18.

Table 18. Relationship of continuing education units obtained in 1975-1976 to average miles traveled to a program^a

Units Obtained	Average miles traveled					
	0-30		31-75		Over 75	
	%	N	%	N	%	N
0-6 units	39.1	41	35.6	21	37.7	20
7-15 units	25.7	27	18.6	11	24.5	13
Over 15 units	35.2	37	45.8	27	37.7	20
Total	48.4 ^b	105	27.2	59	24.4	53

^aChi-square = 2.05, d.f. = 4, P = 0.78

^bPercent of all respondents

Pharmacists were asked whether they are in favor of or opposed to mandatory continuing education. It was thought that those with the higher Competency Index Scores would be in favor of a mandatory

program as a means to maintain that competence. When the scores were cross-tabulated with whether or not the pharmacists were in favor of mandatory continuing education, no relationship was found.

The pharmacists also were asked how helpful they think the continuing education programs are in keeping them informed on current pharmacy practice and changes within the profession. They had four choices they could check: very helpful, somewhat helpful, not too helpful, and not at all helpful. Only pharmacists who had attended continuing education programs answered this question. It was thought that those with higher competency scores would tend to think the programs are helpful, while those with lower scores would think the programs are not helpful; however, no relationship was shown between these variables.

DISCUSSION

In cross-tabulating Competency Index Scores with different variables, it was found that the chi-square values obtained were statistically significant ($P < 0.05$) for the following: length of pharmacy education, year of graduation from pharmacy school, professional attitudes, age, type of practice setting, sex, and the types of pharmaceutical journals read most often.

Two of the above relationships agree with those found in Gross' study of New Jersey pharmacists. Those relationships are between competency and professional attitudes toward the changing role of the pharmacist, and competency and the type of practice setting.

Three of the other relationships shown—those between competency and length of pharmacy education, year of graduation from pharmacy school, and age—may not be three independent relationships. The year of graduation and length of pharmacy education in most cases are likely to be a reflection of the pharmacist's age.

One of the most obvious reasons for younger pharmacists performing better than older pharmacists on the Competency Index probably is that they have not been out of school for as long. Those who graduated ten years ago are likely to have less recall than recent graduates; those who graduated twenty years ago are

likely to have even less recall, and so forth. This would seem to imply that older pharmacists are not maintaining their level of competence.

Another reason for younger pharmacists performing better on the Competency Index could be that the length and complexity of pharmacy education has increased through the years. Not only have pharmacy students been subjected to longer programs—five or six years now instead of what was once a six-month internship—but the course work is also more comprehensive.

What must also be considered is that some pharmacists may have been practicing in a setting which demanded only rare use of their technical knowledge. It is probable that a pharmacist's lack of use of technical or even fundamental knowledge contributes to his inability to retain it. A continuance of this disuse results in more and more of the pharmacist's knowledge being lost. This type of phenomenon can happen to anyone; it is not reserved for pharmacists only.

Also as was stated, there is a strong positive relationship between competency scores and professional attitudes. Whether or not one of these variables is caused by the other is unknown; there may be other reasons which cause this relationship to exist. Perhaps one or a combination of variables mentioned in this study, such as age, participation in continuing education, or year of graduation causes this relationship to exist. There is also the

possibility that variables not studied here may be responsible for such a relationship. These variables might include background, job satisfaction, professional goals, and the intangible and perhaps immeasurable factor of motivation. For whatever reasons, the data clearly show that a strong relationship exists between competency and professional attitudes.

The strong relationship shown between sex and Competency Index Scores was unexpected. Even though there are more young women in general than there are young men, and younger pharmacists were found to score higher than older pharmacists, this is not the reason that women scored higher on the Competency Index. A cross-tabulation of age and competency scores for women pharmacists showed that there is no relationship between these two variables. An in-depth study on this phenomenon by a future researcher would be of great interest.

The strong relationship shown between competency and the types of pharmaceutical journals read most often is not surprising. It is easily understood why reading professionally-oriented journals probably not only reinforces the pharmacist's present knowledge, but also augments it. Once again, there may be other variables causing this relationship to exist, but it does exist.

There is no statistically significant relationship shown between a high score on the Competency Index and having participated in any of the following types of educational experiences: an externship, a clinical experience, or neither or both of these.

Having participated in a residency showed the same results: no strong relationship. Nor is there a relationship between competency scores and the following other categories: participation in continuing education programs, part-time versus full-time employment, membership in professional organizations, distance traveled to continuing education programs, opinion on mandatory continuing education, and how helpful the participants considered continuing education to be. Contrary to Gross' results, this study did not show any dependency, or strong relationship, between Competency Index Scores and participation in continuing education programs.

It was thought that having participated in an externship, a residency, or some type of clinical experience might have a positive relationship to a high score on the Competency Index, but this is not the case. It is possible that one reason for this is that the definition of externship might have been confused with that of internship by some of the respondents, and some of them may have unintentionally given incorrect information because of this. For example, a 1927 graduate and a 1931 graduate both said they had participated in externships.

The lack of a strong relationship between these types of educational experiences and a high score on the Competency Index can best be understood when one considers that the Competency Index is designed to "measure knowledge of pharmacy fundamentals basic to professional competence" (7). Perhaps an externship or a

residency does not significantly increase one's knowledge in these areas.

The lack of relationship between the Competency Index Score and participation in a residency could be due to reasons other than those mentioned above. For example, with eight graduates from the 1970's, nine from the 1960's, and eleven from before 1960, maybe the year of graduation and the age are more important factors with respect to competency than is participation in a residency. Also, residency participants are distributed in practice settings almost identically to the entire sample population, with only 16.0% (N = 4) now in hospital practice, according to this study. Perhaps practice setting has more of a bearing on the Competency Index Score than does a residency.

It would be interesting to study further the relationship between clinical programs and competency using a more complete measure of competency. Such a measure of competency could be derived from the results of the AACP-APhA study coming out later this year.

It was theorized that perhaps the level of competency might be related to the distance traveled to attend continuing education courses. If a causal relationship does exist between competency and continuing education, even though it could not be proven, then accessibility to the continuing education would indirectly affect competency. Thus, if pharmacists who live closer to continuing

education programs attend significantly more programs than those who live farther away, then it could be concluded that those who live closer to programs would be more competent. The chi-square statistic did not show the existence of such a relationship.

Competency Index Scores were also cross-tabulated with the pharmacist's position on mandatory continuing education—whether opposed to or in favor of its being mandatory. This was done to investigate the possibility that those who are highly competent see the need to attend such programs in order to maintain that competency, and thus would be in favor of mandatory continuing education. Such a relationship was not found. Perhaps this was due to some pharmacists being in favor of voluntary, but not mandatory, continuing education.

Since increased competency scores have a mild relationship ($P = 0.12$) with voluntary participation, it was thought that perhaps competency might have a similar or strong relationship with how helpful pharmacists considered continuing education programs to be. This relationship does not exist. Thus, even though the pharmacists who scored higher in the Competency Index tend to participate voluntarily, they do not tend to do so because they think the programs are helpful. Perhaps they participate because continuing education is mandatory for them.

The term "competence" traditionally denotes knowledge—it is assumed that if one is knowledgeable in a particular field, then

one is competent in that field. One of the important findings of the Task Force on Continuing Competence in Pharmacy, however, is that competence involves not only knowledge, but also skills, motivation, and performance (15). This particular study was undertaken to measure competence in terms of knowledge only. Therefore, the results of this study should be considered to be meaningfully related only to this narrow definition of competence.

IMPLICATIONS

The American Association of Colleges of Pharmacy has stated that the goal of continuing education "is continuous improvement in the vocational competency of the learner" (4). This was mentioned earlier in this paper. If this is the case, then there are some important implications in this study for continuing education program planners.

(1) The Competency Index developed by Gross was intended to "measure knowledge of pharmacy fundamentals basic to professional competence" (7). Since about 21% of the pharmacists surveyed in this study scored in the low competency category, more than an insignificant percent of pharmacists are weak in basic pharmaceutical knowledge. Perhaps some continuing education planners should consider giving more emphasis on pharmaceutical basics in some of their programs.

(2) Continuing education planners might try to concentrate on reaching the community pharmacists, since about 30% of these had a low competency score.

(3) There is not a strong relationship between continuing education and competency in this study population. Therefore, continuing education does not seem to be helping these pharmacists to become more competent, or to maintain a high level of competency.

This contrasts with the New Jersey study mentioned where the same two variables, continuing education and competency, are related. The implication is that New Jersey has better continuing education programs and that perhaps continuing education program planners in Oregon and Idaho should study programs in New Jersey or other states where competency is related to continuing education. Perhaps there should be more coordination of continuing education programs and communication between states concerning successful programs.

(4) There is also an implication for the Oregon and Idaho State Boards of Pharmacy. It was shown in this study that younger pharmacists tended to score significantly higher on the Competency Index than older pharmacists. It was demonstrated that as the age of pharmacists increased, competency scores generally decreased. This might imply that older pharmacists have not maintained their level of competence. This might also imply that older pharmacists need to take more continuing education than their younger colleagues. One way in which this could be accomplished would be to have a sliding scale for obtaining the number of mandatory units, with older pharmacists being required to take more units than younger pharmacists.

(5) Finally, there is an important implication for pharmacy educators. Respondents indicating that they read mostly professionally-oriented journals, as opposed to business-oriented journals,

tended to score higher on the Competency Index. This might imply that perhaps pharmacists should be encouraged to read more professional journals. This encouragement could be given by the various pharmaceutical associations to which the pharmacist belongs. However, since not all pharmacists belong to a pharmaceutical association, the best approach would be one that could reach all pharmacists. It would seem, therefore, that the best environment in which to culture the habit of reading the professional literature regularly would be the university setting, or specifically, the schools of pharmacy. This seems to be a logical approach since one's reading habits are formed during the younger or school years. This approach would reach the entire population of future pharmacists.

BIBLIOGRAPHY

1. Mitchem, M.H. and Jackson, R.A., "Mandatory Continuing Education: Pharmacist Characteristics Versus Opinions," Am. J. Pharm. 145: 189-197 (Nov-Dec) 1973.
2. Knapp, D.A., Wolf, H.H., Knapp, D.E., and Rudy, T.A., "The Pharmacist as a Drug Advisor," J. Am. Pharm. Assoc. NS 9: 502-505, 543 (Oct) 1969.
3. Miller, M.L., "Expanding the Role of the Community Pharmacist . . . Source of Information to the Physician," J. Am. Pharm. Assoc. NS 1: 151-154 (Mar) 1961.
4. "Guidelines for Continuing Pharmaceutical Education," Proceedings AACP Section of Teachers of Continuing Education, American Association of Colleges of Pharmacy, Bethesda, Md. (1972), p. 4.
5. Anon., "Preliminary Report—AACP/APhA Task Force on Continuing Competence in Pharmacy: The Continuing Competence of Pharmacists," J. Am. Pharm. Assoc. NS 14: 340-345 (Jul) 1974.
6. Berlow, L. and Blaug, S., "What's the Dilemma of Groups That Now Provide Continuing Education?," Pharm. Times 41: 68-75 (Jun) 1975.
7. Gross, S.M., "Demographic Study of the Relationship of Continuing Pharmaceutical Education to Selected Attitudinal- and Competence-Related Criteria," Am. J. Pharm. Educ. 40: 141-148 (May) 1976.
8. Gross, S.M., Romano, J.A., and Wiener, M.B., "Continuing Education in a Large Metropolitan Area—New York City," Am. J. Pharm. Educ. 39: 271-274 (Aug) 1975.
9. Rosinski, E.F., "Strengthening Professional Competence," J. Am. Pharm. Assoc. NS 13: 403-405, 412 (Aug) 1973.
10. Kirk, K.W., Weinswig, M.H., and Ohvall, R.A., "Opinions of Women Pharmacists Toward Continuing Education," Am. J. Pharm. Educ. 37: 72-79 (Feb) 1973.

11. Arndt, J.R., De Muth, J.E., and Weinswig, M.H., "Participation of Wisconsin Pharmacists in Continuing Education, 1969-1973: A Preliminary Report," Am. J. Pharm. Educ. 39: 264-266 (Aug) 1975.
12. Bernardi, V.W., "An Analysis of Pharmacist Participation in and Attitude Towards Continuing Education," Am. J. Pharm. Educ. 39: 266-271 (Aug) 1975.
13. Anon., Self-Assessment Examination for the Practicing Pharmacist, National Association of Boards of Pharmacy, Chicago, Illinois (1973).
14. U.S. Government, Department of Health, Education and Welfare, Public Health Service, "Report of the Task Force on the Pharmacist's Clinical Role," National Center for Health Services Research and Development, Washington DC (1971), Brief No. 4, pp. 2-9.
15. Anon., "Final Report—AAP/APhA Task Force on Continuing Competence in Pharmacy: The Continuing Competence of Pharmacists," J. Am. Pharm. Assoc. NS 15: 432-437, 457 (Aug) 1975.
16. Anon., "Professor's Advice: Start Mandatory Continuing Education Immediately," Aust. J. Pharm. 57: 253-256 (May) 1976.
17. Henley, S., Tester, W.W., and Knapp, R., "Dissemination of Drug Information," Hospitals, J.A.H.A. 42: 99-102, 105 (Jun) 1968.
18. Houle, C.O., "The Nature of Continuing Professional Education," J. Am. Pharm. Assoc. NS 15: 438-441, 460 (Aug) 1975.
19. Kalman, S.H., "Competency in Pharmacy: Where Are We?," J. Am. Pharm. Assoc. NS 17: 344-345 (Jun) 1977.
20. Kalman, S.H. and Schlegel, J.F., "Measuring Up: Don't Let the Courts Set the Practice Standards," American Pharmacy NS 18: 24, 54 (Apr) 1978.
21. McConnell, W.E., "The Lilly Invitational Lecture—1974: Continuing Education and Professional Competence," Can. J. Hosp. Pharm. 27: 85-89 (May-Jun) 1974.

22. Schlegel, J.F. and Kalman, S.H., "Measuring Up: Unprecedented Pharmacy Study to Provide Assessment Yardstick," American Pharmacy NS 18: 14-16 (Mar) 1978.
23. Summers, J.L., Editorial: "Continuing Education—A Weariness of the Flesh?," Can. J. Hosp. Pharm. 27: 7 (Jan-Feb) 1974.
24. Weaver, J.C., "Competence—Whose Responsibility?," J. Am. Pharm. Assoc. NS 13: 564-565, 567 (Oct) 1973.

APPENDICES

APPENDIX A

Cover Letter on First Mailing of Questionnaire

School of Pharmacy



Corvallis, Oregon 97331 (503) 754-3725

Dear Pharmacist:

I am a graduate student at the Oregon State University School of Pharmacy. The following questionnaire and its statistical analysis comprise my master's thesis, which is a required part of my graduate program. Your cooperation in answering this questionnaire is vitally important to me, and I sincerely hope that you will donate a few minutes of your time to fill it out, and return it in the envelope provided.

The purpose of this questionnaire is to survey pharmacists in the states of Oregon and Idaho concerning the following: (1) the pharmacists' educational background; (2) their attitudes towards various issues in pharmacy practice; (3) pharmacist participation in and thoughts about continuing pharmaceutical education; and (4) certain demographic characteristics. Among other things, it is hoped that your responses to this questionnaire will enable continuing education program planners to develop more meaningful programs.

I am asking you to help me study the areas mentioned above by completing and returning the questionnaire which begins on the next page. Your name was chosen by scientifically-selected methods and your response is a vital part of my sample. There is no way I can substitute for the information you, yourself, provide.

I would like to receive your completed questionnaire by January 26, 1978, at the latest. A self-addressed envelope is enclosed in which to return the questionnaire. No stamp is needed. I am doing this study in cooperation with the Survey Research Center at Oregon State University which is why their address is on the return envelope.

A final note. You will see that your questionnaire is numbered. This is to provide a way by which reminders may be sent, if necessary, without further imposing on those who have completed and returned their questionnaire. With this, I can assure you that the information I gather will be used for statistical summaries only and in no way will your responses be linked to your name.

Your prompt response to this questionnaire will be greatly appreciated. A summary of the survey results will be mailed to participants upon request. Thank you for your courtesy and help.

Sincerely

Marlys Warner
Graduate Student
c/o Survey Research Center

APPENDIX B

Cover Letter on Second Mailing of Questionnaire

School of Pharmacy

Oregon
State
University

Corvallis, Oregon 97331

Please -- February 10, 1978
Would you be kind enough to fill out
this questionnaire? This data is needed
and I would appreciate your help

-- Thank you

Dear Pharmacist:

I am a graduate student at the Oregon State University School of Pharmacy. The following questionnaire and its statistical analysis comprise my master's thesis, which is a required part of my graduate program. Your cooperation in answering this questionnaire is vitally important to me, and I sincerely hope that you will donate a few minutes of your time to fill it out, and return it in the envelope provided.

The purpose of this questionnaire is to survey pharmacists in the states of Oregon and Idaho concerning the following: (1) the pharmacists' educational background; (2) their attitudes towards various issues in pharmacy practice; (3) pharmacist participation in and thoughts about continuing pharmaceutical education; and (4) certain demographic characteristics. Among other things, it is hoped that your responses to this questionnaire will enable continuing education program planners to develop more meaningful programs.

I am asking you to help me study the areas mentioned above by completing and returning the questionnaire which begins on the next page. Your name was chosen by scientifically-selected methods and your response is a vital part of my sample. There is no way I can substitute for the information you, yourself, provide.

I would like to receive your completed questionnaire by February 8, 1978, at the latest. A self-addressed envelope is enclosed in which to return the questionnaire. No stamp is needed. I am doing this study in cooperation with the Survey Research Center at Oregon State University which is why their address is on the return envelope.

A final note. You will see that your questionnaire is numbered. This is to provide a way by which reminders may be sent, if necessary, without further imposing on those who have completed and returned their questionnaire. With this, I can assure you that the information I gather will be used for statistical summaries only and in no way will your responses be linked to your name.

Your prompt response to this questionnaire will be greatly appreciated. A summary of the survey results will be mailed to participants upon request. Thank you for your courtesy and help.

Sincerely

Marlys Warner
Graduate Student
c/o Survey Research Center

APPENDIX C

Questionnaire

PHARMACY QUESTIONNAIRE

Please indicate your responses below by marking the appropriate space.
The abbreviation, CE, will be used to denote "continuing education."

1. What type of pharmacy do you currently work in? (Please check one).

- ☐ Community chain
☐ Community independent
☐ Clinic
☐ Small to medium size hospital (under 200 beds)
☐ Large hospital (200 beds or over)
☐ Not currently working in a pharmacy
☐ Other (please specify) _____
-

2. What is the type of pharmacy position you currently hold?

- | | |
|---|--|
| <input type="checkbox"/> Employee | <input type="checkbox"/> Staff hospital pharmacist |
| <input type="checkbox"/> Manager | <input type="checkbox"/> Chief pharmacist or other |
| <input type="checkbox"/> Owner | <input type="checkbox"/> administrative position in |
| <input type="checkbox"/> Retired (Skip to Question 4) | <input type="checkbox"/> a hospital pharmacy |
| <input type="checkbox"/> Not currently working in a
pharmacy | <input type="checkbox"/> Other (please specify)
_____ |
-

3. How many hours per week (average) do you work?

☐ 10 and under ☐ 11-35 ☐ 36 and over

4. The following statements refer to the practice of pharmacy. On the scale of "1" to "5" please circle the number which indicates the extent to which you "agree" or "disagree" with each statement:

A. The pharmacist should freely discuss with the patient the medication prescribed.

Strongly agree 1 2 3 4 5 Strongly disagree

B. The pharmacist should refuse to furnish medication when the best evidence supports this position.

Strongly agree 1 2 3 4 5 Strongly disagree

C. The pharmacist should not question the physician's judgement even if a question arises as to the appropriateness of a drug or a drug product in light of the patient's condition.

Strongly agree 1 2 3 4 5 Strongly disagree

D. When a prescription is written generically, the pharmacist should be able to select a therapeutically effective drug product on the basis of bioavailability data.

Strongly agree 1 2 3 4 5 Strongly disagree

E. The pharmacist has no obligation to detect potential drug incompatibilities.

Strongly agree 1 2 3 4 5 Strongly disagree

2

- F. The pharmacist should be able to prescribe medication in emergency situations when it appears to be in the best interest of the patient.
- Strongly agree 1 2 3 4 5 Strongly disagree
- G. It is not necessary to obtain drug histories from patients (allergies, idiosyncrasies, medications currently in use, etc.).
- Strongly agree 1 2 3 4 5 Strongly disagree
- H. Pharmacists should provide instructions for home use of medications: how and when to take, how to store, cautions in use, when to reorder, expiration date, when to see the physician.
- Strongly agree 1 2 3 4 5 Strongly disagree
- I. Pharmacists should play a greater role in primary care, i.e., diagnosis and treatment of simple ailments.
- Strongly agree 1 2 3 4 5 Strongly disagree
- J. Pharmacists should spend more time with individual patients.
- Strongly agree 1 2 3 4 5 Strongly disagree
5. Which one of the following best describes your educational training for your first degree in pharmacy?
- | | |
|---------------------|-----------------------|
| 2 year degree | 5 year B.A. or B.S. |
| 3 year degree | 6 year Pharm. D. |
| 4 year B.A. or B.S. | Other (specify) _____ |
6. Please list the year you graduated from pharmacy school with your first degree.
- _____
7. From what school did you receive your first pharmacy degree?
- | | |
|---|-----------------------------------|
| Idaho State University | University of Southern California |
| Oregon State University | University of Washington |
| University of California, San Francisco | Washington State University |
| University of the Pacific | Other (specify) _____ |
8. Do you hold an advanced pharmacy degree?
- Yes (Go to 8a.)
- No (Skip to Question 9)
- No, but I hold an advanced degree in another field (Skip to Q. 9)
- 8a. If yes, please indicate the degree you hold.
- | | |
|------------------------------|-----------|
| M.Ph. | Pharm. D. |
| M.A. or M.S. | Ph. D. |
| Other (Please specify) _____ | |
9. Has any of your training included a residency program?
- Yes No

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10. Please indicate if you had either of the following types of school-supervised "practical application" experience in your undergraduate training, or not. (Check each line once).

Yes, Did not
had have

_____ Clinical experience (may include such things as making rounds or being on the wards of a hospital looking at patient charts, having contact with doctors and other health professionals).

_____ Externship (includes supervised experience in a community or hospital pharmacy during the school year as part of the school curriculum).

11. Please indicate in which of the following organizations, if any, you are a member. (Check all that apply).

_____ County or other local	_____ State hospital association
_____ pharmaceutical association	_____ NARD
_____ State pharmaceutical association	_____ ASHP
_____ APHA	_____ Other (Please list)
_____ I am not a member of any of the above organizations	

12. Do you favor or oppose mandatory continuing education (CE) for pharmacists?

_____ Favor (Skip to Question 13)
_____ Oppose (Go to 12a.)
_____ Don't know (Skip to Question 13)

- 12a. If opposed to mandatory CE, why? (Check all that apply).

_____ ~~The expensive.~~
_____ Often difficult to get coverage at work, if required to attend courses.
_____ We should voluntarily attend CE programs because it is our professional responsibility.
_____ Difficult to find extra time to devote for educational purposes (takes time away from family, etc.).
_____ It is difficult to see the necessity of attending CE in the first place.
_____ CE is not readily available nearby. If the state wants to make it mandatory, they should also make it accessible.
_____ Other (Please list) _____

13. Since 1974, have you attended any CE courses in pharmacy, or not?

_____ Yes (Answer Questions 14 through 18a.)
_____ No (Skip to Question 19)

14. If you have participated in CE, how helpful do you think it has been in keeping you informed on current pharmacy practice and changes within the profession (i.e., new drugs, new laws, etc.)?

_____ Very helpful	_____ Not too helpful
_____ Somewhat helpful	_____ Not at all helpful

15. How many miles on the average do you travel to attend CE courses?
(Miles travelled one way).

 0 - 15 miles 31 - 50 miles 76 - 100 miles
 16 - 30 miles 51 - 75 miles over 100 miles

16. What type of CE do you prefer? (Please check only one).

 Short seminar (i.e., 1 or 2 hours at a local pharmaceutical
association meeting)
 All-day seminar
 Correspondence courses (audio tapes, programmed learning)
 Other (please list) _____

17. Some people feel satisfied with the CE programs as they are while others are dissatisfied. Are you satisfied or dissatisfied with CE programs?

 Satisfied (Skip to Question 18)
 Dissatisfied (Go on to 17a.)

- 17a. If dissatisfied with CE programs, what do you feel the disadvantages are? (Check all that apply)

 Programs are not of compelling interest
 Programs are too expensive
 Programs are irrelevant to the practice of pharmacy
 Programs are too far away from where I live (distance
and time problems)
 Other (please list) _____

18. For the licensing years listed below, please indicate with a check mark the approximate number of hours of CE that you obtained.

Licensing Year	Hours of CE					
	0-3	4-6	7-10	11-15	16-18	19+
A. July 1, 1974 - June 30, 1975						
B. July 1, 1975 - June 30, 1976						
C. July 1, 1976 - June 30, 1977						
D. July 1, 1977 - Present						

- 18a. Were you required to participate in continuing education to renew your license during any of the licensing years listed below?

	YES	NO
A. 1974-1975	<u> </u>	<u> </u>
B. 1975-1976	<u> </u>	<u> </u>
C. 1976-1977	<u> </u>	<u> </u>
D. 1977-1978	<u> </u>	<u> </u>

19. What professional journals, if any, do you read most often? (Please list by name below, and place a check mark by the journal that you read the most).
- _____
- _____

20. The following questions are not intended as a test. Please do not use reference materials, but answer the questions as best you can. Please check the one best answer for each question. Responses will enable CE program planners to develop more meaningful continuing education programs.

- A. Phenothiazine derivatives may cause certain adverse reactions. Which of the following groups of symptoms may be controlled with anticholinergic drugs:

_____ Photosensitivity, nasal stuffiness, sneezing, hallucinations.
_____ Trembling, muscular rigidity, peculiar gait, drooling.
_____ Narcolepsy, sore throat, anorexia.
_____ Diarrhea, apathy, malaise.

- B. Within recent months, a new medication used to treat ulcers has appeared on the market. That drug is:

_____ Norpace* (Disopyramide phosphate)
_____ Magan* (Magnesium salicylate)
_____ Flexeril* (Cyclobenzaprine hydrochloride)
_____ Tagamet* (Cimetidine)
_____ Colectid* (Colestipol hydrochloride)

- C. Which of the following drugs or drug combinations given intramuscularly represents the best therapy for severe lead poisoning (plumbism—more than 100 micrograms per milliliter of lead in the blood stream) in children who have ingested chips of lead paint:

_____ EDTA (calcium disodium edetate, USP)
_____ Dimercaprol
_____ EDTA and Dimercaprol
_____ Penicillamine
_____ Penicillamine and EDTA

- D. A parent phones to inform you that her four-year old child has swallowed the bulb end of a fever thermometer. She wants to know what she should do. Which of the following statements represents the most rational advice of the pharmacist:

_____ The small quantity of mercury metal will go through the gastrointestinal tract mostly unchanged.

(answers continued on next page)

(Part D, continued)

- ☐ There is a serious hazard, since the metal will combine with the hydrochloric acid to form soluble mercuric chloride.
- ☐ The mercury will form calomel (Hg_2Cl_2) which acts as a natural laxative; no problem.
- ☐ The mercury metal is so heavy that it can always roll out of the stomach if the patient is inverted.
- ☐ All of the above.

E. An ulcer patient develops a urinary tract infection and presents you with a prescription calling for tetracycline capsules, 250mg, q. 6 h., for 10 days. Your advice to the patient is:

- ☐ Avoid taking milk products with the medication.
- ☐ Avoid taking antacids with the medication.
- ☐ Take the capsules one hour before or two hours after meals.
- ☐ All three of the above statements should be communicated to the patient.
- ☐ Communicate only the directions of the doctor.

F. Which of the following might be considered a drug of choice in the treatment of atrial fibrillation?

- ☐ Lidocaine
- ☐ Procainamide hydrochloride
- ☐ Propranolol
- ☐ Diphenylhydantoin (Phenytoin)
- ☐ None of the above

G. Patients taking monoamine oxidase inhibitors should be cautioned against taking which of the following foods:

- ☐ Cheese
- ☐ Fruits
- ☐ Lean meats
- ☐ Vegetables

H. A person has trouble getting to sleep at night but once asleep does not wake up until morning. Which of the following barbiturates might a physician prescribe?

- ☐ Secobarbital (Seconal*)
- ☐ Amobarbital (Amytal*)
- ☐ Phenobarbital
- ☐ Sodium Pentothal
- ☐ None of the above

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- I. An elderly person needs an antianxiety agent. One which the physician would not prescribe because elderly people are very sensitive to its CNS depressant effects is:

☐ Phenaglycodol (Ultran*)
☐ Meprobamate (Miltown*)
☐ Chlordiazepoxide (Librium*)
☐ Hydroxyzine (Atarax*)
☐ None of the above

- J. A patient complains to the physician that she is quite anxious, apprehensive and has no appetite. The physician notes several nervous mannerisms are manifested. Which one of the following drugs might he prescribe for this individual for daytime use?

☐ Librium* 10mg
☐ Seconal* 100mg
☐ Imipramine (Tofranil*) 10mg
☐ Chlorpromazine (Thorazine*) 50mg
☐ Phenobarbital 1/4 gr.

21. What is your present age?

<input type="checkbox"/> 25 and under	<input type="checkbox"/> 36-40	<input type="checkbox"/> 51-55
<input type="checkbox"/> 26-30	<input type="checkbox"/> 41-45	<input type="checkbox"/> 56-60
<input type="checkbox"/> 31-35	<input type="checkbox"/> 46-50	<input type="checkbox"/> over 60

22. In which state do you live?

☐ Oregon ☐ Idaho

23. What sex are you?

☐ Male ☐ Female

24. Is there anything else you would like to say about CE or this questionnaire?

THANK YOU FOR YOUR TIME AND COOPERATION

APPENDIX D

Explanation of Statistical Techniques

The information computed from the cross-tabulations included the chi-square statistic, the number of degrees of freedom, and the statistical significance (P value) of the relationship between the variables being compared. In general, for the same number of degrees of freedom, a larger chi-square statistic implies a stronger relationship. Conversely, for the same magnitude of chi-square statistic, the relationship with the fewer number of degrees of freedom would be stronger. As can be seen, then, the strength of the relationship depends in an intricate way upon both the magnitude of the chi-square statistic and the number of degrees of freedom.

The statistic that ties the chi-square value and the number of degrees of freedom together into one measure of the relationship's strength is the P value, also known as the significance. The P value ranges in magnitude between one and zero. A one implies no relationship at all exists between the variables under comparison, and a zero implies the strongest possible relationship. The widely accepted standard is that a P value of 0.05 or less implies a statistically significant strong relationship.

In order to have a full understanding of the cross-tabulation results, it is helpful to discuss the meaning of a 0.05 P value as it relates to sampling theory. Assume there is a cross-tabulation, containing groupings of respondents, which shows that respondents with highly professional attitudes are more likely to score high

on the Competency Index. The possibility exists that this relationship does not actually occur in the population as a whole, but showed up in the cross-tabulation only because the particular sample taken was not truly representative of the entire population. The P value of 0.05 implies that under the assumption that no relationship exists at all in the entire population, only five of 100 random samples would show as strong a relationship between variables as did the survey under study. Since it is highly unlikely that the survey under study is one of those five, the relationship exhibited by the cross-tabulation is considered to be truly representative of the entire population and is considered to be strong.

Theoretically, one should try to eliminate all short cells from a cross-tabulation. A short cell is any category with an expected frequency of less than five responses. This elimination makes the P value and chi-square statistics more meaningful.