

## INSTRUCTIONAL DESIGN AND ASSESSMENT

### Poster Project to Emphasize Public Health in the Pharmacy Curriculum

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**Objective.** To implement and assess a required public health poster project in a doctor of pharmacy (PharmD) program.

**Design.** Third-year PharmD students collaborated in pairs to research a public health topic relating to pharmacy practice. Each student group prepared an informational poster, while receiving feedback from a faculty mentor at each stage of the project. The students presented their completed posters at a statewide pharmacy conference.

**Assessment.** Faculty members evaluated the posters with a grading rubric, and students completed a survey instrument that assessed the overall experience. In general, faculty members rated the class highly across all domains of the grading rubric. The class generally agreed that the poster project increased their awareness of public health issues related to pharmacy practice, overall knowledge of public health, and presentation skills.

**Conclusion.** The implementation of a poster project was well received by students and faculty members as an effective method for enhancing public health instruction in the PharmD program at North Dakota State University.

**Keywords:** poster presentations, public health, active-learning

## INTRODUCTION

The American Public Health Association (APHA) defines public health as the practice of preventing disease and promoting good health within groups of people, from small communities to entire countries.<sup>1</sup> Public health, rather than being a single discipline, includes health professionals from many fields with the common purpose of protecting the health of a population.<sup>2</sup> Historically, the role of pharmacists in public health has not been well defined. However, several groups and organizations, including the APHA, have recognized that the unique expertise of pharmacists, coupled with their often easily-accessed practice setting, puts them in an ideal position to be information resources and health care providers focusing on health promotion and disease prevention.<sup>3</sup> Each decade, the Healthy People program, under the United States Department of Health and Human Services, identifies emerging public health priorities that help to align health-promotion resources, strategies, and research for the nation. Babb and Babb concluded that more than 50 of the 467 objectives within the Healthy People 2010 document deserve special attention from pharmacists.<sup>4</sup> The release of Healthy People 2020

in 2010 will likely invite similar or even greater pharmacist involvement.<sup>5</sup>

In 2007, the Accreditation Council for Pharmacy Education (ACPE) placed greater emphasis on the provision of public health-related education in the curricula of colleges and schools of pharmacy, stating in Standard 12 that programs must ensure that graduates are able to “promote health improvement, wellness, and disease prevention,” and “promote the availability of effective health and disease prevention services. . .”<sup>6</sup>

In many colleges and schools of pharmacy in the United States and around the world, public health material has been implemented in integrated public health courses within the PharmD curriculum, many of which involve traditional classroom instruction supplemented by brief active learning or application exercises.<sup>7-10</sup> Prior to the fall 2005 semester, this also was the case at the North Dakota State University (NDSU) College of Pharmacy, Nursing and Allied Sciences. Public health material was taught using traditional lecture and case studies and assessed using multiple-choice examinations and case study assignments. However, curricular weaknesses noted by the curriculum committee, the development of ability-based outcomes, and the evolving nature of public health as a discipline provoked the redesign of the content and delivery of public health material to PharmD students at NDSU. This motivated faculty members to develop innovative approaches to

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teaching public health material that illustrated to students the proactive nature of public health topics and provided the opportunity to present to their peers. These areas were felt to be high priority as necessitated by accreditation standards for pharmacy education. Specifically, ACPE Standard 11, Guideline 11.1 stipulates that “Students should also be encouraged to participate and assist in participating in the education of others, including. . .other students, and health care providers.”<sup>6</sup> In addition, an innovative approach to teaching public health material was sought to illustrate to students the proactive nature of health promotion activities. Faculty members speculated that an active approach to learning might be the best method for students to develop their interest and skills in communicating about and preventing population health issues.

To our knowledge no other report has been published describing the use of a poster project as an active-learning technique in pharmacy public health education. A similar project has been implemented successfully in a medical school curriculum; however, little formal evaluation of the project has been reported.<sup>11</sup> Our focus is similar to another nontraditional approach to teaching public health within a PharmD curriculum where pharmacy students developed health promotion programs targeted to an underserved Latino population and presented them at health fairs and schools in the community. The majority of students reported that the experience was valuable to them and positive student comments were documented.<sup>12</sup> However, neither the students’ perceptions of their learning nor assessment of learning by the faculty members was reported in that study.

In response to the redesign of public health curricular content and delivery, a public health poster project was developed and implemented in the third year (P3) of the PharmD curriculum. The authors hypothesized that requiring students to actively research, prepare, and present an informational poster of a public health topic would increase their awareness and knowledge of public health issues related to pharmacy practice, as well as improve their presentation skills and communication of public health issues.

## **DESIGN**

A required public health poster project was incorporated into the final 2 semesters of the pharmaceutical care course series which take place in the P3 year. This required course series spans 6 semesters (P1-P3) and emphasizes knowledge, skills, and practical tools necessary to provide pharmacy services to patients, physicians, nurses, and other allied health care professionals. Prior to the P3 year, students received lecture-based instruction from public health pharmacy practice faculty members on the following public health topics: introduction to public health, public

safety, health policy, and behavioral models in previous pharmaceutical care courses.

The primary goals of the public health poster project were to improve the students’ awareness and knowledge of public health issues related to pharmacy practice, and to improve students’ abilities to communicate information regarding public health issues. These goals were developed by the course coordinator in collaboration with the public health pharmacy practice faculty members. The procedure for this project is illustrated in Figure 1. The course coordinator presented the poster project instructions to students on the first day of class. A syllabus was distributed to the students that included the aforementioned goals of the poster project, the project’s relevance to public health and pharmacy, suggested sources for topic selection and information, project timeline for outline and draft completion, and the grading rubric. Suggested sources for topic selection included Healthy People 2010: Challenges, Opportunities, and a Call to Action for America’s Pharmacists,<sup>13</sup> and Web sites from the North Dakota Department of Health, Minnesota Department of Health, Centers for Disease Control and Prevention, American Public Health Association, and Medscape Public Health and Prevention.

In the first step of the project, students selected a partner and e-mailed their partner’s name to the course coordinator. Unmatched students were assigned a partner. Twelve pharmacy practice faculty members volunteered to be poster mentors, and subsequently were given project instructions from the course coordinator. The course coordinator assigned a faculty mentor to each of the student groups and posted this information on the university’s course management Web site. Each mentor was responsible for 3 or 4 student groups. After the assigned mentors were posted on the university’s course management Web site, the student groups were instructed by the course coordinator to proactively schedule meetings with their mentors throughout the preparation process. Prior to each scheduled student group/mentor meeting, students were expected to send their working outline or draft via e-mail to their mentor to allow sufficient review time before the meeting.

The purpose of the first meeting between student groups and their mentor was to establish a working relationship, discuss potential poster topic ideas, identify publications/resources that would be used for the literature search, develop an understanding of how the topic relates to public health, and discuss potential poster design. After receiving approval from their mentor, each group of students submitted their preferences (at least 2) of public health poster topics to the course coordinator. The course coordinator assigned final topics based upon group preferences and relevance to the project objectives, while attempting to ensure topic variety and prevent duplication. Topics

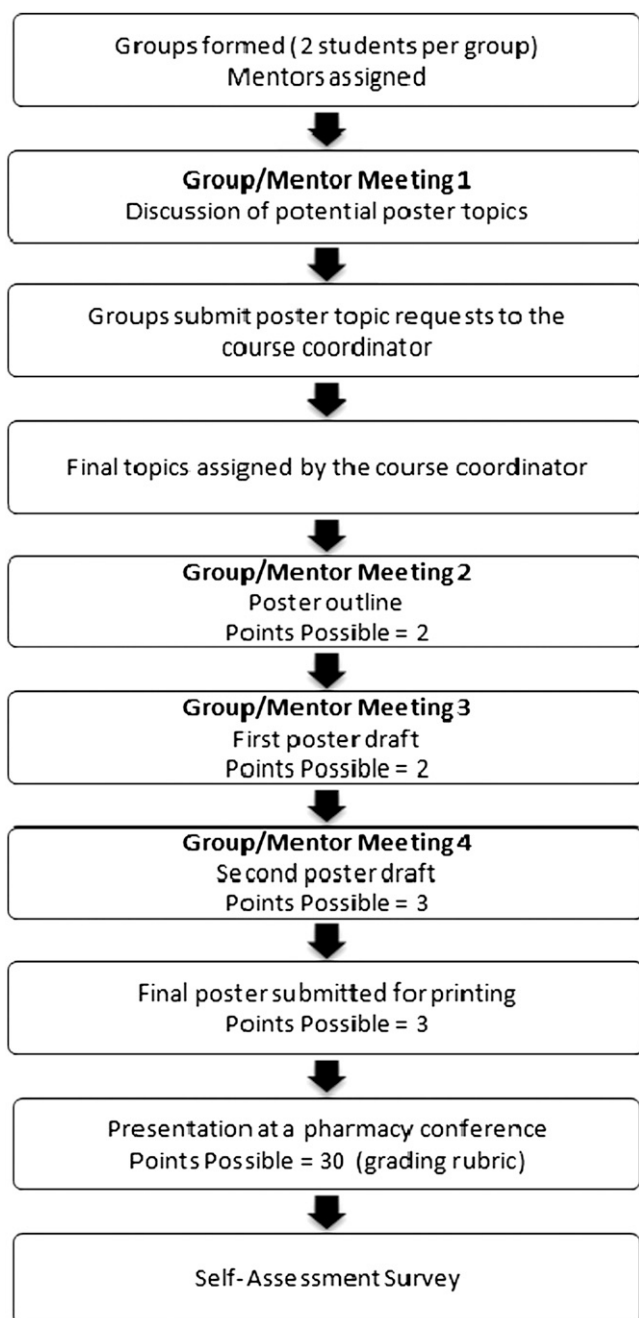


Figure 1. Procedure flowchart for poster presentation

selected and presented by the student groups are listed in Table 1.

The second group/mentor meeting involved a discussion of the mentor's feedback regarding the poster outline prepared by the student group. This meeting occurred approximately 2 weeks after the final topics were assigned. The outline included the proposed major headings and ideas for content. The groups were instructed by the course coordinator to prepare the outline using either Microsoft Word or Microsoft PowerPoint.

Table 1. Topics for Public Health Selected and Presented by Student Groups (n=42)

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Smoking Cessation - Yes You Can!
Pregnancy and Drug Abuse
Prevention of Prescription Narcotic Abuse in Healthcare Workers
Habits and Triggers Associated with Quitting Smoking
Head Lice
Vitamin D Deficiency, Supplementation, and Effects on Health
Human Papillomavirus: Prevention and Treatment
Antioxidants for Our Health
Varicella and its Vaccine
Proper Drug Disposal and Repository Program
Fertility and Family Planning
Patient Assistance Medication Programs
Celiac Disease - Gluten in Diet and Medications
Vaccine Controversies
Skin Health and Cancer Prevention
Nonprescription Medication Safety and Awareness (Tylenol, Cough/Cold Products, etc)
Peanut Allergy
Probiotics
Postpartum Depression
Lyme Disease
Improving Patient Adherence in Cardiovascular Medications
Expanding Patient Access to MTM through Telepharmacy
Childhood Obesity
Measles, Mumps, and Rubella Vaccine
Serotonin Syndrome
Sleep Apnea
Plan B
Hepatitis B
Tetanus, Diphtheria, and Pertussis Vaccine
Travelers' Health and Vaccines
Teen/College Alcohol Abuse and Risky Behaviors
Prenatal Health
Community-acquired and Healthcare-associated Methicillin-Resistant <i>Staphylococcus aureus</i>
Caffeine: How Much is Too Much?
Genetic Testing/Gene Therapy and Ethical, Legal, and Social Issues
Toxoplasmosis
Diet vs. Exercise for Weight Loss
DASH Diet and its Effect on Hypertension and Kidney Stones
Influenza A Virus Subtype H1N1: Prevention and Treatment
Meningitis Vaccines
Zostavax
Non-Prescription Treatments of Insomnia

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The third group/mentor meeting consisted of a discussion of the mentor's feedback regarding the first draft of the poster prepared by the student group. This meeting occurred approximately 4 weeks after the outlines were completed. Students created their posters with Microsoft PowerPoint. The Information Technology Services (ITS) department at NDSU created a tutorial document to assist the students with poster formatting and design in PowerPoint.

The fourth and final assigned group/mentor meeting involved a peer review session of the second draft of the poster. This meeting occurred approximately 4 weeks after the first drafts were completed, and this meeting was unique because it involved all of the mentor's student groups (average of 6 to 8 students per session). This peer review session typically lasted 1 hour, and provided an opportunity for students to provide informal formative feedback to each other. The groups' faculty mentor primarily served as a moderator at this session and provided feedback when necessary.

Mentors provided constructive comments on the poster outline and drafts to ensure adequate depth, accuracy, and compliance with the project requirements throughout the development process. Formative feedback to students regarding the documents was communicated verbally during the scheduled group/mentor meetings, or in some cases, by e-mail. Feedback included suggestions regarding spelling, grammar, missing document requirements, depth of literature search, visual aesthetics, and relevance to public health and pharmacy practice. Approximately 2 weeks after the second draft of the posters were completed, they were reviewed by Information Technology Services for optimal resolution, color, and format, and then sent to NDSU's printing center.

The 49" x 36" posters were displayed by the student groups at the annual North Dakota Midwinter Pharmacy Conference at the beginning of the spring semester. This annual continuing education conference, which is sponsored by the NDSU College of Pharmacy, Nursing, and Allied Sciences, is held each January and attended by approximately 200 pharmacists, pharmacy technicians, and pharmacy students from across North Dakota. Students were expected to prepare a 5-minute verbal presentation about their poster, and anticipate a variety of questions from conference attendees. The posters (n = 42) were displayed by the student groups for 3 hours in the morning session of the conference. Pharmacists, pharmacy technicians, faculty and staff members, and pharmacy students were invited to the conference through marketing efforts by NDSU. The Director of Continuing Pharmacy Education at NDSU submitted the required paperwork to ACPE, which authorized 1 hour of CE credit for every 5 posters that were reviewed by each pharmacist using a standardized form.

Pharmacists were asked to identify 3 learning points from each poster to receive continuing education credit. Pharmacists attending the poster session viewed the posters and interacted with the students, but did not participate in the student/poster grading.

Faculty time regarding coordination of the project, providing formative feedback to the student groups, and attending the poster session was one resource utilized to implement this project. Approximately 4 hours per student group were required for providing formative feedback throughout the entire preparation process, moderating a peer review session, and grading at the poster session. Other resources for this project included the costs of poster printing and obtaining CE credit to provide an incentive for pharmacists to view the posters at the conference.

The NDSU Institutional Review Board (IRB) granted exempt status for the research proposal involving this project; however, students were required to sign a consent form that included a Family Educational Rights Privacy Act (FERPA) release of their poster scores to the investigators.

## **EVALUATION AND ASSESSMENT**

The public health poster project represented 10% of the fall semester course grade. Project grades for the fall were assigned by each group's mentor and were based on the students satisfactorily meeting deadlines for the outline, first draft, second draft, and final poster (Figure 1). Points were deducted (1 point per business day) for missing deadlines throughout poster development in the fall semester. The project represented 30% of the spring semester course grade. Project grades for the spring were assigned by the group's mentor and 2 additional mentors at the poster session, based upon criteria identified in the grading rubric (available upon request from the author). The average of the 3 mentors' total scores was the group's final spring semester poster project score. Both students in the group received the same score. A passing score on this project was required for successful completion of the fall and spring pharmaceutical care courses to ensure adequate student focus and time investment.

The grading rubric domains and descriptors were evaluated for clarity and design by the poster mentors, chairs of the college's curriculum and assessment committees, the college's associate dean for academic affairs, and the pharmacy practice department chair. A copy of the grading rubric was included in the poster project syllabus that was given to the students at the beginning of the project. Approximately 1 month before the poster session, electronic copies of each poster were uploaded to the pharmacy practice department's shared computer storage drive. This allowed more time for grading content, freed up more time for grading the verbal presentation section at the poster

session, and provided an opportunity for more thoughtful questions by the graders because of content familiarity.

Table 2 contains grading results from the 12 faculty members who volunteered to mentor the student groups and grade the posters. Faculty members assessed 6 domains for each poster using a grading rubric. Each of the 6 domains received a score of 1 to 5 points, for a maximum possible score of 30 points. The mean score for each domain ranged from 4.4 to 4.9. The mean verbal presentation score was 4.9 and the average total score was 28. Of the 71 participants in this study, 12 students achieved a perfect total score.

After the completion of the poster project and presentation, students were given an electronic survey instrument to assess their perceptions of the project. Questions selected for the survey instrument were evaluated for clarity and design by the chairs of the college’s curriculum and assessment committees, the college’s associate dean for academic affairs, and the pharmacy practice department chair. The survey instrument asked the students to evaluate the statements shown in Table 3. All questions were evaluated on a 5-point Likert scale. Also, open-ended survey questions were included for the students to provide comments regarding the experience. The open-ended questions asked what was most enjoyable, if anything, about the poster project, and what changes, if any, were recommended for future projects. Seventy-one students (85% of the class enrollment) completed the consent form and survey instrument, and released their poster scores to the investigators for evaluation.

Table 3 contains student self-assessment survey results. The class generally agreed that the poster project increased their awareness of public health issues related to pharmacy practice and overall knowledge of public

health. Students generally agreed that the poster project increased their ability to present material verbally to a group of health professionals. Regarding the preparation phase of the poster, the class generally agreed that this project increased their drug information skills and ability to collaborate with others. The class generally agreed that the poster project was weighted appropriately in the course for the required effort, and generally disagreed when asked if they would prefer to take an extra examination, related to public health, instead of the poster project.

Parametric analysis of variance (ANOVA) and non-parametric (Kruskal-Wallis) techniques were used to assess the significance of associations between student self-assessment ratings and average poster project total scores as assigned by faculty mentors. Additionally, the Fisher exact test (2-sided) was used to assess the significant associations between student self-assessment ratings and perfect scores on each poster domain as assigned by the faculty mentors. Those students who strongly agreed that “The poster project improved my ability to select literature that represents the most current and best evidence available” scored a significantly higher overall poster score compared with students who did not strongly agree with this statement ( $p = 0.03$ ). Similarly, students who strongly agreed with the aforementioned statement were more likely to achieve a perfect score in the third domain of the scoring rubric, Literature Search ( $p = 0.03$ ). Strong agreement with the statement, “Two students is the optimal number to work as a group on a poster project,” also was associated with a higher overall poster score ( $p = 0.04$ ). Strong agreement with statements in all other areas of the student self-assessment survey instrument was not associated with achievement of a higher overall poster score. However, strong agreement with the statement, “The poster project enhanced my overall knowledge of public health,” was associated with achievement of a perfect score in the third domain of the scoring rubric, Literature Search ( $p = 0.02$ ). In addition, strong agreement with the statements, “The poster project enhanced my overall knowledge of public health,” and “The poster project increased my ability to organize and critically evaluate information related to public health” were associated with achievement of a perfect score in the fifth domain of the scoring rubric, Critical Thinking ( $p = 0.01$  and  $p = 0.05$ , respectively). The complete analysis of variance is available upon request from the corresponding author.

The majority of student responses on open-ended questions were positive. Students felt they gained more knowledge about public health issues, especially their own topics. Also, they thought the project improved their presentation skills, and they enjoyed presenting their findings to other health care professionals. Finally, they felt the project was

Table 2. Pharmacy Students’ Scores in Six Domains Used to Grade Public Health Posters

Poster Domain	Mean (SD) <sup>a</sup>	Perfect Scores No. (%)
Poster Layout/Appearance	4.7 (0.4)	29 (41)
Organization of Thoughts	4.8 (0.3)	32 (45)
Literature Search	4.5 (0.4)	21 (30)
Content: Understanding of Topic & Public Health Principles	4.4 (0.5)	20 (28)
Persuasiveness/Critical Thinking	4.7 (0.3)	27 (38)
Verbal Poster Presentation	4.9 (0.2)	58 (82)
Total Score (30 possible points)	28.0 (1.3)	12 (17)

Scale: 1 = poor, 2 = fair, 3 = average, 4 = good, 5 = excellent. see Faculty Assessment Grading Rubric, available upon request from the author

<sup>a</sup> n=71

Table 3. Student Self-Assessment Survey Results Regarding a Public Health Poster Project

Question	Mean (SD) <sup>a</sup>	Strongly Agreed, No. (%)
1. The poster project increased my awareness of public health issues related to pharmacy practice.	4.4 (0.6)	30 (42)
2. The poster project enhanced my overall knowledge of public health.	4.3 (0.7)	28 (39)
3. The poster project increased my ability to select literature that represents the most current and best evidence available.	4.3 (0.7)	26 (37)
4. The poster project increased my ability to organize and critically evaluate information related to public health.	4.4 (0.5)	31 (44)
5. I supported my poster conclusions with evidence-based content and logic.	4.5 (0.6)	37 (52)
6. I was able to use knowledge from several courses in the Doctor of Pharmacy curriculum to successfully complete the poster project.	4.1 (0.9)	27 (38)
7. The poster project increased my ability to verbally present material to a group of health professionals.	4.6 (0.6)	43 (61)
8. My assigned faculty mentor provided valuable feedback to improve my poster project.	4.2 (1.0)	35 (49)
9. My partner and I collaborated well on this project.	4.6 (0.9)	53 (75)
10. Two students is the optimal number to work as a group on a poster project.	4.7 (0.8)	51 (72)
11. I would prefer to take an extra exam, related to public health topics, instead of the poster project.	1.9 (1.0)	29 (41) <sup>b</sup>
12. The overall weight of the poster project grade in the pharmaceutical care course is appropriate for the required effort.	4.1 (0.9)	21 (30)
All questions (with question #11 reverse scored)	4.4 (0.4)	

Scale: 1 = strongly disagree, 2 = disagree, 3 = in between, 4 = agree, 5 = strongly agree.

<sup>a</sup> n = 71

<sup>b</sup> Reverse scored for strongly disagree

well organized, and they preferred this method of learning compared to taking an examination on similar material.

## DISCUSSION

The authors hypothesized that this poster project would enhance students' knowledge regarding public health content and would also improve students' abilities in the areas of presentation skills and communication. Results from the students' self-assessment survey illustrate that the poster project was valuable in increasing knowledge and awareness of public health issues while simultaneously enhancing verbal presentation abilities. Students were able to learn public health material while actively researching, preparing, and presenting their topic, and while peer-evaluating the posters of other students. Also, students were able to practice delivering educational content to health care professionals, which in and of itself served as a public health outreach activity. This project demonstrated to students the utility of a proactive approach in public health, reinforcing the concepts of health promotion as they actively engaged in promoting health.

In addition to positive results from student self-assessment, high scores in faculty grading of poster content and delivery supported the value of the poster project. Faculty members generally were impressed with the appearance and organization of the students' posters and rated

students' understanding of the public health impact of their topic highly.

In addition to significantly enhancing public health knowledge and presentation skills of students, this project had other strengths. The designation of 2 members per group and allowing students to choose their own groups likely contributed to students strongly agreeing that they collaborated well with one another in their groups. Student buy-in to the project was high, with the majority of students supporting the active-learning activity and assessment in lieu of an examination on public health material related to pharmacy practice. Finally, the project provided an opportunity for the university and college to serve the community and alumni by providing engaging live continuing education.

Students' ratings on the self-assessment survey instrument generally did not reflect their actual overall poster scores or their subscores in several of the individual domains on the grading rubric. However, the students who felt strongly that their abilities in literature searching were improved scored highest in overall poster score, possibly indicating that those students who put the most work into searching the literature and obtained the most from their searches performed best on their poster. This finding is corroborated by the significant association between strong agreement with question 3 on the self-assessment survey instrument (Table 3) and achievement of a perfect score in rubric

domain 3, Literature Search. In the area of literature searching, students were able to interpret accurately and assess their learning. Strong agreement with statement 10 of the self-assessment survey instrument (Table 3) with higher overall poster score likely indicates that student groups who worked well together scored higher on their poster as a result. This may indicate that it is easier to create a more effective presentation when students are allowed to choose their own partner.

The lack of a significant association between strong agreement with other items in the self-assessment survey instrument and overall poster scores is most likely attributed to high mean scores. However, it may also indicate that students are not able or willing to rate their performance accurately in comparison with what faculty mentors rated. Possible reasons for this may include that students may be judging their performance based on their effort in a particular area rather than on their actual performance. In this way, a student who put in a lot of time working on being able to support his or her poster's conclusions with evidence-based content and logic may have strongly agreed with statement 5 of the self-assessment survey instrument (Table 3), but really may not have delivered an evidence-based conclusion by the faculty mentors' standards. Students may have limited global understanding of the concept/project because this was the first time they experienced such a project. If students were to be assigned a subsequent poster project after receiving feedback on this first one, they may be more likely to evaluate themselves more critically and possibly more in line with faculty mentors' evaluations. Also, students were given the opportunity to choose their topic (in which they already had an interest and most likely baseline knowledge) and therefore may have perceived a lower level of increase in their knowledge base about the public health material than if they had been assigned a topic previously unknown to them.

The project had some limitations. Although the class generally agreed that their faculty mentor provided valuable feedback to improve their poster, the standard deviation for this response was the largest among all responses ( $4.2 \pm 1.0$ ). This finding may indicate the need for continuing mentor training and grading standardization, or may be due to the subjective nature of the assessment used in the evaluation of posters. Faculty time required for the project has made recruitment of mentors challenging at times. Fortunately a satisfactory group to mentor ratio (3 or 4 to 1) has been achieved. Finally, securing a large enough venue for displaying the poster project during the pharmacy convention was a challenge, but has been overcome with earlier planning.

The majority of student comments regarding dislikes and suggested improvements was consistent. Students

would have liked more time to view their classmates' posters, and suggested inviting the NDSU nursing students in future years. Also, they would have appreciated the opportunity to present their posters to various public groups (eg, schools, long-term care facilities, clinics). Finally, the students suggested that faculty members should collaborate more to better standardize poster grading.

Student comments and faculty members' observations will assist with further enhancement of this project. During the 2010 - 2011 school year, this project will be moved from the pharmaceutical care course series to the introductory pharmacy practice experience (IPPE) course series to allow students to receive IPPE credit for their poster preparation and presentation hours. A second change will expand the poster presentations to community outreach groups. A pilot project was completed during the 2009-2010 school year which involved students presenting a Zostavax (Herpes Zoster vaccine) poster at a local assisted-living facility. This activity was well received by the audience and the facility's director. Another future use of the posters will be the creation of an expanded, interdisciplinary poster session at NDSU for the 2010-2011 school year. Nursing students at NDSU will present posters at the same session, and subsequently nursing professionals will be invited to attend the session for continuing education credit. Additional time, before the session opens to the audience, will be added to allow fellow classmates the opportunity to view other posters and learn additional public health information from their classmates. The poster mentors will meet prior to initiation of the 2010-2011 project to review mentoring expectations and grading criteria to help improve consistency in all areas of the project.

## CONCLUSION

The implementation of a required public health poster project further integrated public health and population disease prevention issues into a PharmD curriculum. In addition, this project enhanced the public health awareness and knowledge of our students, as well as communication of public health issues to the profession. The poster project was well received by students and faculty members and is amenable to adaptation and expansion into interprofessional education, experiential learning, and community outreach.

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