

Evaluation of Novel Teaching Approaches in the Texas Tech University HSC School of Pharmacy Elective, Drugs of Abuse

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ABSTRACT. A major issue in schools of pharmacy, as well as other health professional schools, is the difficulty students face in retaining material learned in the curriculum and applying it to practice. In pharmacy, as in other health professions, students are required to be active learners rather than passive learners. In this study, different methods of instruction were evaluated. The effect on learning of video and audio systems used to connect students in distance sites was also evaluated. The findings indicate that students view the unique teaching methods fa-

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vorably and that such methods can be effective teaching tools. In addition, no major differences were found between students in the different locations with regard to perception of these methods. This is an indication that with proper planning and by engaging all students in various locations the use of video link equipment can be as effective as if the instructors and students were in the same location. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress.com> © 2003 by The Haworth Press, Inc. All rights reserved.]

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INTRODUCTION

Drug abuse and the use of illicit drugs cause significant health problems in the United States. Table 1 gives estimates of the United States population that abuses various substances (1). The National Household Survey on Drug Abuse (NHSDA) estimated that 147.5 million people will smoke cigarettes in their lifetime and that approximately 50.1 million have smoked cigarettes in the previous month (2). Other major

TABLE 1. Estimates of the U.S. Population That Uses Substances of Abuse.

Drug	Number of Users (in Millions)	
	Lifetime	Past Month
Alcohol	173.3	102.8
Cigarettes	147.5	50.1
Cocaine	23.5	1.3
Marijuana	69.9	8.9
Heroin	2.3	0.08
Hallucinogens	18.0	0.52
Stimulants	12.5	0.72
Anabolic Steroids	0.75	0.08
Inhalants	10.4	0.89

Data adapted from: Friedman L. Source book of substance abuse and addiction. Baltimore: Williams & Wilkins; 1996.

abused substances include marijuana, cocaine, inhalants, and hallucinogens.

Substance abuse is a problem among health care professionals as well. One study showed that 2.3% of pharmacists and 3.9% of pharmacy students have some level of drug dependence (3). Another study found 5.2% of medical students to be drug dependent (4). More than 75% of pharmacy students were reported to consume alcohol (5).

To prevent persons at risk from being affected by substance abuse, pharmacy students and pharmacists need to be educated about issues regarding drugs of abuse (6). One study suggested that almost 60% of pharmacy students surveyed indicated a need for a drug awareness program, while in a study by Szeinbach and Banahan, two-thirds of pharmacy students interviewed indicated a need for alcohol and drug abuse awareness programs (7, 8). Baldwin found that only one-third of pharmacy faculty thought that the curriculum was adequate in providing substance abuse education (9).

Courses on Substance Abuse

McAuley and Akers evaluated the impact of a substance abuse program on pharmacy students (6). It was found that study participants had an impressive change from the pre- to post-program scores. The study provides support for a course in substance abuse in pharmacy school curricula. A major finding of the study was that a person's ability to manage a situation involving a drug of abuse can be best improved by learning from real-life experiences such as attending talks and discussions led by qualified personnel.

Teaching Approaches

Faculty at the Medical College of Virginia designed a continuing medical education program for primary care physicians to provide them with information relating to drugs with abuse liability (10). The program was designed to help in prescribing appropriately, recognizing addiction, helping addicted patients, and referring patients to addiction medicine specialists. The program incorporated a variety of learning experiences to encourage active participation throughout the program. This included patient demonstration, a computerized clinical judgment analysis exercise, computerized clinical case simulations, and group discussions. The course evaluations indicated the mix of instructional methods to be good learning strategies in group settings.

Harm Reduction

Harm reduction is a very contentious issue and has supporters and detractors. The basis of harm reduction strategy is to move away from a strategy of drug-use prevention to a strategy of drug-abuse prevention. Harm reduction is a concept that aims to prevent the potential problems that are related to drug use, rather than trying to prevent the use of the drug itself (11). This concept may be especially appealing to health care professionals, as many prescription drugs written for legitimate purposes have the potential to be abused. Harm reduction is based on the premise that people will continue to use drugs and the approach is to determine a way of doing so safely, with less effect on society (12). In the 1970s, harm reduction strategy was applied to the responsible use of alcohol (13).

Critics of harm reduction advocate abstinence rather than abuse reduction. In such circumstances, the best way of educating health care professionals is to educate them about the pros and cons of a harm reduction program so they can make an informed decision.

Pharmacists are gatekeepers—defined as individuals who can help patients—in the health care professions (14). To help pharmacists in their role as gatekeepers, the School of Pharmacy at Texas Tech University offers a course entitled Drugs of Abuse, an elective course for the third-year doctor of pharmacy students. One of the teaching strategies used in the Drugs of Abuse course is harm reduction debate, where students present and argue their position on the harm reduction strategy. As this is a novel means of teaching students about drug abuse, this method was evaluated for effectiveness.

Drugs of Abuse Class

The Drugs of Abuse class is a two-hour credit introductory course dealing with drugs and substances that are abused or misused. It is designed to familiarize doctor of pharmacy students with general principles and the implications of drug abuse. Areas covered in this course include the epidemiology of substance abuse, cultural perspectives on substance abuse, relationships and family dynamics with respect to substance abuse, and substance abuse within the health care community. Other areas covered include the specific effects of drugs on the fetus, substance abuse and mental illness, and issues in pain management. To provide real experiences to students, members of law enforcement narcotics units gave presentations at the three different teaching sites

where the students were located (Amarillo, Lubbock, and Dallas). The presentations covered an overview of the drug abuse problems in the local area and a demonstration on how to recognize drug paraphernalia and drug products. The premise was that presentations by narcotics unit members of the police force would lead to a better interaction between pharmacists and members of law enforcement.

The final session of the course was called the “harm reduction debate” and involved students taking opposing views on the strategy of harm reduction. The purpose behind debating the pros and cons of harm reduction was to help students better understand the concept as well as the fact that people have very different views on the subject.

METHODOLOGY

A pre-post, nonrandomized study design was used to collect and analyze data. Participants in the study were third-year pharmacy students enrolled in the Drugs of Abuse class. The students in this class were physically located in three different cities, with the School of Pharmacy location in Amarillo referred to as the main campus. Most faculty members were stationed on the main campus, but some lectures originated from Lubbock. Students on the Lubbock and Dallas campuses interacted via video-audio link to the main campus. This allows interaction between students and faculty and among the students themselves on the different campuses.

The dependent variable, level of familiarity, was calculated from a series of ten questions assessing the students’ familiarity with ten different substances of abuse listed in Table 3. Level of familiarity was defined as amount of knowledge regarding the specific substances of abuse. The second dependent variable, perceived level of applicability, was similarly calculated with reference to the substances listed in Table 3. Perceived level of applicability was defined as how useful the students view their knowledge of substances of abuse in their career. The other dependent variables were evaluation of the harm reduction debate and evaluation of the presentations by the law enforcement officers as means of learning about substance abuse. The independent variable was the location of the students. This independent variable was chosen to demonstrate that distance learning could be an effective means of instruction in schools of pharmacy. A major concern is how well students learn on campuses that are away from the main site in Amarillo. For purposes of anonymity and to maintain confidentiality, the three in-

structors for the class are indicated as Instructor 1, Instructor 2, and Instructor 3, in no particular order. This labeling of the instructors will be kept constant throughout this paper.

The impact of using a debate to understand harm reduction was evaluated by four criteria:

1. Students' awareness of harm reduction ideas
2. Students' critical thinking skills
3. Students' consideration of others' viewpoints
4. Students' overall development of pharmaceutical care plans.

The members of the class voted on which harm reduction policy would be selected for the debate two weeks prior to the debate session. For the harm reduction debate, students at each site were divided into two groups, one supporting the harm reduction policy and the other taking an opposing view. Students were required to participate at least once in a two-hour session, their participation in which was recorded by the debate moderator who was a member of the course teaching team.

The impact of the narcotics unit presentations by members of law enforcement was assessed by:

1. Students' recognition of drug paraphernalia
2. Students' appreciation of the interaction between pharmacists and law enforcement
3. Students' appreciation of the police approach to the problems of drug abuse
4. Students' understanding of the seriousness of drug abuse problems in the areas where they were located.

The presentations by law enforcement officers on the subject of drug abuse were considered for the class as an interaction between police officers and pharmacy students. Also, it may help students better understand approaches taken by members of law enforcement in dealing with drug abuse problems.

The questionnaire contained questions assessing the students' familiarity and perceived level of applicability of the issues concerning substance abuse to their pharmacy career. Students were asked to indicate their level of familiarity on a five-point Likert scale, with the endpoints being 1 = not at all familiar and 5 = very familiar and likewise for perceived level of applicability, 1 = not at all applicable and 5 = very applicable, respectively. There were a total of 32 student participants. In

addition to the above data, demographic and course evaluation information were also collected.

We hypothesized there would be no differences between Amarillo- and non-Amarillo-based students in the following factors:

1. Perceived level of applicability
2. Depth of familiarity
3. Evaluation of the harm reduction debate exercise
4. Evaluation of the presentations by law enforcement officers.

We also predicted an increase from pre- to post-test levels in the perceived level of applicability and depth of familiarity for the various drugs of abuse discussed in the class. It was also hypothesized there would be no difference in the evaluation of the instructors.

RESULTS

A total of 32 students were enrolled in the class. Eighteen students were female and fourteen students were male. The students were physically located at three different sites during their third year of pharmacy school. Of the 32 students enrolled in the class, 18 were on the Amarillo campus and 7 were located at the Lubbock and Dallas campuses.

Nineteen students were working in a pharmacy setting at the time of the Drugs of Abuse class. Of these 19 students, 17 students were pharmacy interns and 2 students were working as technicians. The distribution of students working in different pharmacy areas and areas of interest after graduation is shown in Table 2.

Table 3 gives results of the depth of familiarity of various substances that may be abused. The mean scores on familiarity of each of the substances of abuse increased from the pre-test to the post-test scores. The smallest increase was observed for nicotine, which increased 0.68 units, while the biggest increase was observed for inhalants, where the scores increased 2.13 units.

The students were asked to indicate their perceived level of applicability of discussing each substance of abuse. While some substances such as alcohol and nicotine may be perceived to be of value, others may not be due to a lack of knowledge of the substances involved. The results indicated that inhalants had the highest increase in the perceived level of applicability at the end of the course. On the other hand, alcohol and nicotine had the smallest increases in perceived level of applicabil-

TABLE 2. Area of Pharmacy Practice Students Were Working in and Areas of Practice Students Were Interested in Working in After Graduation.

Area of Practice	Students Working at Present	Students Interested After Graduation
Independent Community Practice	1	2
Chain Community Practice	17	20
Hospital Practice	-	6
Academe	-	2
Pharmaceutical Industry	-	8
Other	1	1

TABLE 3. Depth of Familiarity^a About Each Substance of Abuse, Before and After Taking the Class.

Substance	Pre-Test (<i>n</i> = 30)		Post-Test (<i>n</i> = 32)	
	Mean	Std. Dev.	Mean	Std. Dev.
Alcohol	3.70	0.75	4.50	0.62
Nicotine	3.63	0.76	4.31	0.64
Cocaine	2.57	0.68	4.28	0.73
Marijuana	2.87	0.90	4.44	0.67
Opiates	3.07	0.91	4.31	0.64
Hallucinogens	2.20	0.81	4.09	0.64
Sedatives	2.60	0.77	4.09	0.73
Stimulants	2.70	0.92	4.31	0.64
Anabolic Steroids	2.17	0.79	3.75	0.80
Inhalants	1.93	0.74	4.06	0.72

^aLikert scale from 1 = not at all familiar to 5 = very familiar

ity. However, nicotine, with a mean of 4.78, had the highest mean score of being perceived as applicable, followed by sedatives with a post-test mean score of 4.75 and alcohol with a mean score of 4.68 (Table 4).

It was found that, although there were some differences in the mean scores between the Amarillo and non-Amarillo students, there were no significant differences between the two groups of students for familiarity and perceived level of applicability of the various substances of abuse. We chose to compare Amarillo students to non-Amarillo stu-

dents as most of the instructors for this class were based in Amarillo with most lectures originating from that campus.

In the evaluation of the Harm Reduction Debate, no significant difference was found between Amarillo and non-Amarillo students. Mean values are shown in Table 5.

TABLE 4. Perceived Level of Applicability^a of Each Substance of Abuse, Pre- and Post-Test.

Substance	Pre-Test (<i>n</i> = 30)		Post-Test (<i>n</i> = 32)	
	Mean	Std. Dev.	Mean	Std. Dev.
Alcohol	4.30	1.09	4.69	0.54
Nicotine	4.50	0.97	4.78	0.49
Cocaine	3.20	1.00	4.03	0.78
Marijuana	3.40	0.97	4.22	0.75
Opiates	4.07	1.14	4.75	0.57
Hallucinogens	3.20	0.92	4.09	0.59
Sedatives	4.17	1.05	4.75	0.57
Stimulants	3.90	1.03	4.53	0.62
Anabolic Steroids	3.33	1.15	4.09	0.73
Inhalants	3.23	1.22	4.16	0.72

^aLikert scale from 1 = not at all applicable to 5 = very applicable

TABLE 5. Evaluation of Harm Reduction Debate Exercise.^a

Criteria	Overall (<i>n</i> = 32)		Amarillo (<i>n</i> = 18)		Non-Amarillo (<i>n</i> = 14)		<i>P</i> Value
	Mean	SD	Mean	SD	Mean	SD	
Making you aware of detailed issues relating to harm reduction ideas	3.9	.21	4.11	.28	3.71	.32	0.36
Helping you to think critically to solve problems	3.8	.20	4.00	.27	3.50	.31	0.23
Helping to take into consideration viewpoints other than your own	4.0	.21	4.22	.25	3.71	.35	0.24
Helping in overall development of pharmaceutical care plans	3.3	.22	3.39	.28	2.93	.41	0.35

^aLikert scale from 1 = not at all helpful to 5 = very helpful

Table 6 gives the means for the criteria used in assessing the usefulness of the presentations by the narcotics units of the local police. The overall mean as well as means for the Amarillo and non-Amarillo students are given. In this study, a significant difference ($p < 0.04$) was found between Amarillo and non-Amarillo students in assessing the helpfulness of the presentations to get an appreciation of the interaction between pharmacists and law enforcement officers.

Table 7 gives the overall mean as well as means for the Amarillo- and non-Amarillo-based students in evaluating the Drugs of Abuse course. From the mean scores given in Table 7, it can be seen that the only significant difference was for Instructor 1, where the non-Amarillo students rated Instructor 1 significantly different from the Amarillo students. It is also noted that Instructors 1 and 3 had the highest mean scores in the Amarillo-based group of students. While both instructors had higher scores than Instructor 2 in the non-Amarillo-based group of students, both their scores were lower than for the Amarillo group. The overall assessment of the course was strong, as was the course organization and the value of material learned toward students' education.

The students evaluated all of the three instructors very favorably. The summary of the overall evaluation of the instructors is given in Table 8. An ANOVA indicates a significant difference between the instructors in their evaluation. A Bonferroni's post hoc test indicated a significant

TABLE 6. Evaluation of the Presentations by Officers of Law Enforcement in Helping Students.^a

Criteria	Overall (<i>n</i> = 32)		Amarillo (<i>n</i> = 18)		Non-Amarillo (<i>n</i> = 14)		P Value
	Mean	SD	Mean	SD	Mean	SD	
Get an idea of the drug abuse problems in the local area	4.7	.13	4.67	.20	4.69	.17	0.93
Get an appreciation of how police approach problems of drug abuse	4.7	.14	4.61	.20	4.69	.17	0.77
Recognize drug paraphernalia and products	4.3	.19	4.28	.23	4.46	.45	0.69
Get an appreciation of the interaction betw. pharmacists & law enforcement	4.4	.16	4.11	.23	4.77	.17	0.04

^aLikert scale from 1 = not at all helpful to 5 = very helpful

TABLE 7. Evaluation of Drugs of Abuse Course;^a Overall Ratings and Comparison Between Amarillo and Non-Amarillo Students.

	Overall (n = 32)		Amarillo (n = 18)		Non-Amarillo (n = 14)		P Value
	Mean	SD	Mean	SD	Mean	SD	
Value of material learned in this course to your education	4.4	.10	4.56	.15	4.29	.16	0.23
Your background for this course	3.7	.20	3.83	.27	3.43	.29	0.32
Course organization	4.3	.16	4.39	.24	4.07	.16	0.32
Course Instructors							
Instructor 1	4.5	.13	4.78	.13	4.21	.24	0.04
Instructor 2	3.8	.18	3.61	.27	3.93	.22	0.39
Instructor 3	4.6	.10	4.78	.13	4.43	.14	0.08
Overall Assessment	4.2	.10	4.33	.14	4.00	.35	0.34

^aLikert scale from 1 = weak to 5 = strong

TABLE 8. Summary of Evaluation of Instructors; Overall Model and Between Instructors.

Purpose of Analysis	Type of Analysis	P Value	Inference
Test for diff. in evaluation of instructors	ANOVA	0.0001	Indicates significant difference in evaluation among the 3 instructors
Test to determine sign. diff. betw. instructors	Bonferroni		
Betw. Instructors 1 and 2		0.0001	Sign. diff. in evaluation betw. Inst. 1 & 2
Betw. Instructors 2 and 3		0.0001	Sign. diff. in evaluation betw. Inst. 1 & 2
Betw. Instructors 1 and 3		0.5752	No sign. diff. in evaluation betw. Inst. 1 & 3

difference between Instructors 1 and 2 and Instructors 2 and 3. Instructors 1 and 3 were not significantly different in their overall evaluation.

DISCUSSION

The Drugs of Abuse class was designed to give pharmacy students an understanding and appreciation of drug abuse problems. Such under-

standing of drug abuse problems should help students as pharmacists to identify potential abusers of drugs and pharmaceuticals. A better understanding of drug abuse problems will help pharmacists counsel and provide pharmacists with the tools to recognize patients with substance abuse problems and refer them to qualified professionals. Thus, pharmacists can make an impact as gatekeepers in health care.

Most of the students working in a pharmacy setting were working in a chain community practice. This reflects the interests of students, as the majority of students evaluated stated they wanted to work in a chain community practice. The relatively large available number of openings in chain community practice may also be an indication of the majority of students working in that environment. This reflects the continuing efforts made by chain pharmacies to provide opportunities for students with the intention of hiring them as pharmacists.

In evaluating depth of familiarity of abused substances, mean scores increased for all the substances of abuse discussed in the course. Nicotine and alcohol were substances with which students were most familiar at the beginning of the class. This finding is rational in that alcohol and nicotine are better-known substances of abuse. The fact that the mean scores increased dramatically for inhalants is an indication that the course material was of value to students in achieving the objectives of the course. The pattern of change in the mean scores for level of perceived applicability of the abused substances was similar to familiarity of the substances. Many pharmacists and health care professionals counsel patients on the ill effects of these substances. The knowledge of the harmful effects of alcohol and nicotine abuse is widely disseminated. The post-test results indicate that the course helps students realize the applicability of issues in substance abuse in relation to their pharmacy career and practice.

In teaching a class with multiple sites, it is always a concern that students at sites away from the instructor are learning as much as students with the instructor in their classroom. No significant differences were found between the Amarillo students, where most instructors were located, and the non-Amarillo students in the post-tests of both the familiarity and perceived level of applicability. This finding may be an indication that our off-site instructional delivery is effective. In addition, it may be that the course instructors were able to engage students, irrespective of their locations, in learning and understanding the issues concerned.

A unique exercise in the course was the harm reduction debate, where students are required to make verbal statements and arguments

for their position. Students have differing levels of comfort with making statements in class and verbally challenging their classmates. In spite of the obvious difficulty in evaluating the helpfulness of the harm reduction debate as a learning tool without the interference of the “comfort” factor in verbal presentations and arguments, the overall means on the helpfulness of the session were above average in all criteria evaluated. This finding is important as it is an indication that such an exercise is important for students to think critically and to be able to listen to others’ views, to be able to evaluate critical elements in formulating effective pharmaceutical care plans for patients, and to provide effective patient counseling services. It may be difficult to get all students involved in an exercise such as a debate, especially when groups (campuses) alternate with no preplanned schedule of students debating their respective positions. However, with the proper audio and video facilities in place, the distraction of telecommunication equipment can be minimized. The fact that no significant difference was observed between Amarillo and non-Amarillo students is a testament to that view, bearing in mind the limitation of a small group in the non-Amarillo-based student population. This is an important issue, as many schools of pharmacy are increasingly using telecommunication links to expand the number of campuses, to increase the number of students, and to help serve a much larger population in a cost-effective manner.

Ormond states that merely learning a piece of information does not ensure a person will be able to recall that information at a later time (15). Many educators in schools of pharmacy are constantly deliberating on how best to present their course materials so that students will be able to recall that information later as practicing pharmacists. Based on that principle, students were found to be very receptive to the presentations of the law enforcement officers in understanding the issues of substance abuse. Students evaluated the presentations as very helpful in all criteria, indicating this novel approach was well received. Although the Amarillo group of students had a high mean score, the non-Amarillo group of students was found to have a significantly higher appreciation of the interaction with the police officers. This result was unexpected, as it was predicted that there would be no difference between the two groups of students. It is possible that the non-Amarillo group of students may have a higher appreciation of the interaction as they may have encountered more problems in their internship and their respective cities relating to substance abuse due to geographical area or population/size of their location. Thus, the interaction with the police officers may have given them a better appreciation of handling a difficult situation. While

we would not extrapolate inferences beyond these, there is the possibility that law enforcement officers in the other sites have had more experience helping pharmacists deal with fraudulent prescriptions and substance abuse.

In evaluating students from the various sites, it is important to consider their background for the course, as that may potentially affect the assessment of the course. There was no significant difference between the Amarillo and the non-Amarillo students as far as their background for the course was concerned. The value of the material and the course organization were evaluated favorably by both groups of students. This aspect may speak well for the instructors' efforts in planning and engaging the students. Instructor 1 had very favorable ratings as an instructor by both groups of students, with the Amarillo students giving this instructor a significantly higher rating than the non-Amarillo students. While there is no doubt a face-to-face interaction is valuable for learning and teaching, with proper planning of course presentations and content, students in distance sites can benefit from the instructor-student interaction just as much as students in the same location as their instructor.

The purpose of evaluating the instructors was to help them improve as teachers and communicators. It is in no way meant to indicate a ranking of instructors based on their evaluation. The fact that Instructors 1 and 3 were evaluated more favorably than Instructor 2 perhaps is an indication of more experience in teaching and communication. This is to be considered as valuable feedback to help in self-critique and self-improvement. Often, our teaching teams consist of junior and senior faculty members, in terms of teaching experience, thus providing the opportunity to interact in teaching and communication arenas. This has been a hallmark of the approach Texas Tech has taken since the inception of the school, one that continues today.

CONCLUSION

We conclude that the Drugs of Abuse course was well received by the students as contributing positively to their understanding of the course material and their careers. As a result of the course, students were found to have increased familiarity with abused substances. Further, students consider the knowledge gained as applicable in their future practice. The unique methods of instruction used, such as the harm reduction debate and presentations by members of law enforcement,

were found to be effective teaching tools. A limitation of the study was that students were not followed on an individual basis from the pre- to post-test, as no identification of the students was permitted. It is recommended that this study be continued to further monitor effectiveness of the teaching methods used. In future studies, other methods of teaching may also be incorporated and evaluated to bring about more effective learning and an understanding of whether these methods make a significant difference in the learning process.

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