

INNOVATIONS IN TEACHING

Learning Motivational Interviewing: Scripting a Virtual Patient

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Objectives. This article describes a written assignment for a first-year professional communication course to facilitate the understanding and mastery of motivational interviewing in dealing with patient ambivalence and resistance. The goal was to immerse students in how motivational interviewing differs from traditional biomedical counseling with regard to phrasing individual responses to the patient and managing the flow of interaction.

Methods. Students were required to write a script for a working prototype of the *Auburn University Virtual Patient*. The script had to specify the text for the virtual patient's comments, 2-5 possible responses for the student pharmacist to choose from, and multiple interactional paths representing motivational interviewing, biomedical counseling, and a mix of the 2.

Results. Student feedback and test results are reported. Qualitative analysis of written student feedback indicated that (1) the project took too much time because of the complexities of the computer procedures resulting from the *Virtual Patient* being a prototype, and (2) the computer procedures deflected attention from the critical thinking involved in writing the script. Quantitative item analysis of final examination results indicated that students scored an average one full-letter grade better on the questions about motivational interviewing than on the questions covering other topics.

Conclusion. The scriptwriting assignment is a challenging exercise in assimilating the verbal skills necessary for using motivational interviewing in patient counseling. Many students exhibited greater interest in motivational interviewing, greater knowledge of why motivational interviewing is successful, greater facility with wording responses, and greater confidence in their ability to use motivational interviewing in the future. Because almost all students had negative reactions to the difficulty and time involved in making their scripts actually work with the virtual patient prototype, future assignments should delete this requirement.

Keywords: motivational interviewing, virtual patient, patient counseling, interview

INTRODUCTION

Professional Communication is a required first-year course taught at Auburn University's Harrison School of Pharmacy. The primary focus of the course is to provide pharmacy students with an understanding and mastery of how to counsel patients about medications and lifestyle changes required by their treatment regimens in order to improve outcomes.

The early part of the course requires students to follow a checklist in counseling a patient about a new prescription. The checklist is explained using a lecture format with specific concepts illustrated by videotaped

interaction and student-professor role playing. Then in a major assignment, the students role play a pharmacist counseling a patient presenting a prescription as specified in the assignment. Each student submits a videotape of his/her counseling session (enacted with another student or friend playing the role of the patient). The student is graded on whether he/she accomplished all of the required counseling functions in a clear and accurate fashion.

The latter part of the course teaches motivational interviewing as the basis for more comprehensive patient counseling, focusing on health behavior change. The emphasis is on how motivational interviewing responds to treatment nonadherence resulting from patient ambivalence and resistance. Several lectures and required readings are used to present the foundational concepts of I-You vs. I-It relationships¹; self-betrayal, self-justification, and self-deception²; the stages of change of the Transtheoretical Model of Change³; and the counseling strategies of

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motivational interviewing.⁴ However, until the fall 2004 semester, students were only tested on this material in a multiple-choice final examination. There was no major assignment to allow students to struggle with how to incorporate motivational interviewing into counseling a specific patient. No opportunities were provided for the students to experience how and why motivational interviewing leads to improved patient adherence. In simplest terms, the students were presented with the conceptual foundations of motivational interviewing but did not practice how to use motivational interviewing.

Motivational Interviewing

Motivational interviewing is an approach to improving treatment adherence that was first reported in the addiction literature by Miller and Rollnick.⁴ It is a process used to determine a patient's readiness to engage in a target behavior (taking a medicine as prescribed) in order to apply specific verbal skills and strategies that respect the patient's autonomy and facilitate the patient's decision making. Motivational interviewing increases treatment adherence by stimulating or enhancing the patient's intrinsic motivation to change in order to address and resolve ambivalence and resistance (major barriers to adherence). In contrast, traditional patient counseling, henceforth referred to as the biomedical model of counseling, usually attempts to persuade or convince a patient to make a significant health behavior change by providing extrinsic motivation in the form of arguments, advice, orders, and judgments. Typically, the biomedical counseling approach decreases the patient's autonomy by telling the patient what he/she must do, and loses face for the patient by judging the patient as "bad" if he/she fails to follow the orders. Consequently, the biomedical counseling approach often increases a patient's resistance rather than resolving that resistance.

Motivational interviewing uses a menu of strategies and 5 principles to assess readiness to change and to address ambivalence and resistance on the part of the patient. The menu of strategies guides the "workup" of the patient to determine the patient's understanding of the illness, the treatment plan, and how drug therapy fits with treatment goals. In addition, the menu of strategies explores the patient's lifestyle, a typical day, and perception of the pros and cons of carrying out the treatment plan. It is vital that the patient understand the benefits of the treatment plan and how to overcome any barriers. The menu of strategies is comprehensive but does not need to be used with every patient since patients will vary in their degree of readiness for and progression in managing their illness.

Five principles are used within the menu of strategies to encourage change toward the target behaviors or treat-

ment goals. The combined first letters of each of the principles form the acronym READS: roll with resistance, express empathy, avoid argumentation, develop discrepancies, and support self-efficacy.

The menu of strategies and the 5 principles are the centerpieces of motivational interviewing for student pharmacists. In summary, motivational interviewing focuses on addressing ambivalence and resistance by using the 5 principles and assisting the patient in setting therapy goals that are meaningful to the patient.

This article focuses on a new pedagogical approach that immerses students in using the strategies and principles of motivational interviewing to counsel a patient with a chronic medical condition in order to improve the patient's treatment adherence. This innovation invites students to consider what to say next in the utterance-by-utterance flow of an intensive counseling episode, and then to experience how the interaction develops in either a productive or nonproductive fashion. Essentially, we required groups of 2-4 students to write a script for a prototype *Virtual Patient* program. Thus, there is an innovative class assignment nested within the framework of an innovative pedagogical tool for interaction skills training.

METHODS

The Auburn University Virtual Patient

Major advances in computer technology, speech recognition, and digital video have made virtual reality the cutting edge in teaching verbal interaction skills such as counseling techniques to student health care professionals. Several interactive virtual patients have been developed during the past 10-15 years. Generally, they can be divided into 3 classes.

The first class of virtual patients employs a restricted set of questions that the student health care professional can ask the patient by clicking on the text of the question. For each question there is a digital video file of the patient answering the question. Each question/answer set is independent so that the questions can be asked in any order. Consequently, there is no interconnected flow to the virtual interaction. Included in this class of virtual patients are the *PsyIMM* (Psychosocial Aspects of Bioterrorism Interactive Multimedia Module),⁵ the commercially marketed *DxR* (Diagnostic Reasoning Program),⁶ and the *ISP* (Interactive Simulated Patient).⁷

The second class of virtual patients also uses a restricted set of responses from which the students select. However, these responses are scripted to simulate the flow of natural interaction. Typically, the patient's comment is played in a video window followed by a menu of possible responses for the student. After the student selects a response, the program determines the proper video file

to be played as the patient's next utterance. With careful scripting, the interaction can grow in a coherent and dynamic fashion. In other words, the interaction is dynamic insofar as the course of interaction is determined by the sequence of decisions made by the student. Representative of this class is the *Heart of the Problem Virtual Patient*,⁸ in which students choose their response by clicking on text displayed on the screen, and the *Virtual Conversations for STD/HIV Risk Assessment* program,⁹ which appears to use a proprietary engine to identify which choice was spoken by the student user. (The exact interface and mechanism of speech recognition used could not be determined by viewing the program online).

The final class of virtual patients emphasizes the flexible dynamic development of virtual interaction by allowing freeform spoken input by the student and then by using a smart emotive avatar to represent the patient instead of playing a fixed video. The advantage of an avatar is that the computer can strategically determine at runtime the exact wording of the patient's response in light of what has happened previously in the interaction. Then a text-to-speech engine and an emotive behavior engine generate the audio and graphics required for the avatar to speak these words on screen. This class of virtual patients is an implementation of a more general approach to training via avatars programmed with *AVAtalk*.¹⁰⁻¹² The programming required is extensive because it involves a speech recognition engine, a semantic/pragmatic interpreter, a response strategy selector, a text-to-speech engine, and an emotive behavior engine. While the dynamism of the interaction is improved, the richness of the patient response is decreased because of the constrained artificial behavior of the avatar, which looks similar to a cartoon character. Also, the realistic timing of the interaction is lost because the increased computer processing time slows down the virtual patient's response time.

The *Auburn University Virtual Patient (AUVP)* has been developed in the Department of Pharmacy Care Systems of Auburn University's Harrison School of Pharmacy. The basic goal of the *AUVP* is to give first-year pharmacy students (P1s) in *Professional Communication* a chance to experience the difference in patient reactions to traditional biomedical counseling versus motivational interviewing, and to practice using motivational interviewing principles and strategies. The following characteristics were deemed necessary for the *AUVP* to achieve these goals.

- (1) A restricted set of responses appropriate for students who are new to using motivational interviewing and need some guidance.
- (2) A script allowing for the dynamic and coherent development of several paths through the in-

teraction. In other words, student pharmacist responses should affect the subsequent flow of the interaction.

- (3) The student pharmacists should actually say their chosen responses to improve multi-sensory learning and to allow their responses to be recorded so that the whole counseling episode can be replayed.
- (4) The patient's utterances should be represented by the playback of high quality video that allows the students to perceive the rich non-verbal aspects of the patient's message.

The working prototype of the *Auburn University Virtual Patient* was programmed for Microsoft Windows computers in *Visual Basic* 6.0 SP2. It uses Microsoft's *SAPI* 5.1 for its speech recognition engine and Microsoft's *Windows Media Player* 9.0 to play high quality video of patient responses portrayed by an actor. The scripted interaction is divided into a series of "states" consisting of a patient utterance followed by the student's response. When the interaction progresses to a new state, the digital video of the patient's utterance is played first. Then 2-5 possible responses are displayed on the screen. After the student actually says his/her chosen response, the speech recognition program identifies the response. Minor variations in wording such as paraphrases are usually accommodated by the system. When the student has finished speaking, within 1-2 seconds the program starts playing the proper video file containing the patient's response. If there are 5 possible utterances for the student pharmacist to choose from, there can be up to 5 different patient responses specified, ie, one for each possible student choice. With such branching capabilities, *AUVP* scripts can easily offer a complex variety of paths through the virtual counseling session.

The *AUVP* program is run by a script.ini file, which stores the information required to process each possible state in the interaction. The information fields for a typical state would look as follows:

```
[S11]
Patient = Hey. That Flovent didn't work.
Video = S11.wmv
Choice1 = It's frustrating when your medicine doesn't
          work. What happened?
Action1 = S12
Choice2 = Did you take it every day as prescribed?
Action2 = S112
```

The "Patient" field scripts what the patient says in the *Windows Media* file specified in the "Video" field. The 2 possible student responses are listed in the fields labeled "Choice1" and "Choice2." The "Action" fields specify the destination state associated with each "Choice" field.

Other choices would be indicated with the optional fields “Choice3,” “Action3,” “Choice4,” “Action4,” “Choice5,” and “Action5.” If the action field of a prior state has specified that the computer advance to S11, the computer reads in the values of these fields. Then the video file S11.wmv is played and the 2 choices are displayed on the screen. When the speech recognition engine has determined which “Choice” was spoken, the computer advances to the state specified in the associated “Action” field. In this example state (S11), if the student says “Choice1,” the program advances to state S12. If the student says “Choice2,” the program advances to state S112. Thus, this state serves as a simple branching point in the script and allows the progression of the interaction to reflect what the student has chosen to say. In this example, “Choice1” represents a motivational interviewing response and directs the computer to state S12, which initiates a cooperative sequence of interactions. Conversely, “Choice2” represents the biomedical counseling approach and if the student gives this response to the patient, the program advances to state S112, which initiates a series of responses in which the patient becomes increasingly defensive and resistant. Thus, the student pharmacist can experience how patients open up in response to motivational interviewing responses and close down in response to biomedical counseling responses. Subsequent states can incorporate choices that allow a student to recover from a biomedical counseling response by selecting a motivational interviewing response.

The most critical aspect of writing such scripts for the *AUVP* is to ensure that any patient utterance and any student choice makes coherent sense regardless of the interactional path leading up to that utterance. As the length of a script increases, the number of possible paths through the interaction quickly increases and it becomes difficult to read through the text for each path in a word processor. Therefore, an *Authorware* program was written to compute all the possible paths for a script and to check for possible loops. In addition, if the script author clicks on any path, the program assembles the script for that path in an easily read format.

MI Scripting Assignment

Ultimately the *AUVP* is to be used in the *Professional Communication* course by assigning the students to work through several virtual patients immediately upon the conclusion of the class lectures on motivational interviewing. Subsequent assessment of their mastery of motivational interviewing would employ standardized patients in a face-to-face context. However, because the *AUVP* was still in the prototype stage, such virtual patients with full scripts and high-quality video had not

been produced. Therefore, students were assigned to write a script for the *AUVP* that would work with audio rather than video files of the patient’s responses. We felt that such an assignment would require the students to consider how they would use motivational interviewing on an utterance-by-utterance basis with a particular patient. While the processes and skills of motivational interviewing are theoretically understandable, using them in individual utterances requires a considerable adjustment of vocabulary, grammar, emotional tone, and rhetorical strategy. Trying to work through these adjustments in real time with a standardized patient is difficult. Considering and refining these adjustments in the course of writing a script is much easier and less stressful. The writing process also allows the students to assess how the interaction develops in the various paths through their script.

The project included (1) an introductory paper explaining their virtual patient’s assigned disease state, appropriate treatment, and prominent forms of patient noncompliance; (2) a specification of relevant background information about their fictional patient; (3) the VP script for counseling this patient about 3 major aspects of the treatment regimen, such as taking medicine properly, stopping smoking, and starting a low-fat diet; and (4) a CD with the necessary script files and media files for their virtual patient to work with the *AUVP* program on a computer. The script was required to have a minimum of 1 track that included only motivational interviewing dialogue, 1 track that included only biomedical counseling dialogue, and a third track with mistakes and corrections branching between the motivational interviewing and biomedical counseling tracks.

The students were given 5 weeks to complete the assignment. They arranged their own groups of 2 to 4 students. Of the 34 groups in the class, only 1 group was assembled by the professor from students who had not formed or joined a group on their own. Several requests for 5-person groups were denied. The groups were assigned to 1 of 6 disease states: arthritis, asthma, type 2 diabetes, gastroesophageal reflux disease, hypertension, and osteoporosis. Each group submitted their top 3 choices for a disease state. All groups were assigned 1 of their top 3 choices of disease states.

Implementation of the VP Scripting Assignment

Given the complexity of the computer procedures involved in installing *Microsoft SAPI 5.1*, *Windows Media Player 9* or *10*, the *Authorware* authoring program, and the *AUVP* program itself, each group sent a designated group member for special computer training. Several training sessions were required during the first 2 weeks of the assignment. In addition, 1 of the authors was

available most class days for consultation in his office. Such individual consultations were often necessary to overcome small computer glitches deriving from problems with the operating system, options being turned off in *SAPI*, and bugs in the prototype *AUVP* programming. Most of these problems were corrected by the end of the third week, except for groups that had postponed starting the assignment until the end. Major corrections were handled by reprogramming the *AUVP* program to correct several problems (such as implementing word wrap for longer choices displayed on the screen), compiling a list of required settings for *SAPI*, and using a different computer.

During the last week and a half, computer problems centered around 2 issues: problems with audio recordings of the virtual patient's dialogue and debugging the script files. Most of the sound problems encountered were caused by a volume control deep in the operating system being turned down very low or even muted, resulting in the audio not recording or playing back at an audible level. In a number of cases, lavalier microphones were not of sufficient quality to run the speech recognition portion of the *AUVP* program. Purchasing a simple \$10 microphone corrected the problem. Most errors in the script files were introduced when the students typed their script in *Notepad* or *Word*, such as using a colon where there should have been an equals sign, eg, they typed "Choice1:" instead of typing "Choice1 =". When these scripts were loaded into the authoring program, error messages resulted. Debugging such mistakes proved to be very difficult for most students who did not understand how literal computers are in following programming. Most of these glitches were corrected during the last 4-5 days. In the case of irresolvable problems in running the script in the *AUVP* on a few individual computers, one of the authors either ascertained that the script would run on his office computer, or noted the problem so that an appropriate accommodation could be made in grading the assignment.

Extensive consultation was also provided with regard to the content of the scripts. While most student groups had no problems formulating the patient's utterances and the choices representing the biomedical counseling approach, most groups had some difficulties formulating utterances that represented high quality motivational interviewing responses. Consequently, one of the authors provided extensive consultation about writing good motivational interviewing responses. He generally found that he could more easily review their scripts from a printout of the script file rather than by loading the script into the authoring program and viewing it on screen. Most major problems with writing motivational interviewing

responses revolved around implementing the basic principles of motivational interviewing as previously described. In essence, these problems represented the pedagogical heart of the assignment, as is evident in the following examples.

- (1) Students were using closed-ended responses that allowed the patient to answer "Yes" or "No" rather than using open-ended responses that prompted the patient to elaborate, eg, "Are you taking your medication properly?" needed to be phrased, "Tell me how you are taking your medication."
- (2) The students had problems formulating empathic responses that reflected the patient's emotional state and the heart of the issue. If the patient said, "I really hate the idea of having to take medication to stay healthy," then a response of, "You don't like taking medication" needed to be improved to "Being dependent on medication really bothers you."
- (3) Empathic statements were often followed by negative criticism implicit in such conjunctions as "but." For example, "I'm proud of how you have avoided pigging out at buffets, but you still need to . . ." was changed to "I'm proud of how you have avoided pigging out at buffets. Tell me how you think you could further improve your diet."
- (4) Students had difficulty writing responses to highly resistant comments such as, "When are you folks going to stop pestering me about smoking?" The tendency was to argue about the importance of stopping smoking. Students needed assistance in wording a more nonargumentative approach that created more dissonance in the patient: "It sounds like you aren't ready to stop smoking. I want you to know that if you change your mind, there are several ways that I could be of assistance to you. I am really concerned about what can happen to your emphysema if you continue to smoke."
- (5) Many scripts avoided probing decisional balance with regard to how the patient perceived the pros vs. cons of following the prescribed treatment plan. Students had to be prompted to use a readiness ruler or envelope to determine what might tip the decisional balance in favor of greater compliance.
- (6) Students tended to be somewhat wordy in writing motivational interviewing responses. Two to 3 pharmacist responses could often be

condensed to 1 response, thereby saving several seconds. For example, if a patient said he was having difficulty remembering to take his medicine on time, the students might have the pharmacist say, "It is difficult to remember to take this medicine on time." If the patient then failed to elaborate and simply said, "Yeah, it's tough," the pharmacist would have to follow up with a question, such as, "What difficulties were you having in remembering to take it on time?" It would be quicker for the pharmacist to initially say, "It is difficult to remember to take this medicine on time. Tell me about what made it hard for you to remember."

In order to provide easy access to consultation about computer problems and motivational interviewing responses, 2 class periods were devoted to consultation during the week prior to the due date for the assignment. These sessions led to considerable discussion among the groups about motivational interviewing. In fact, students from different groups were spotted several times in the halls and study areas discussing their scripts. The last class of the semester, when the assignments were handed in, consisted of a spirited discussion of how to use motivational interviewing in responding to difficult situations with patients.

All of the assignments were graded by only one of the authors, because he knew which computer problems were irresolvable and which could have been avoided. The grade distribution was: 21 A's, 9 B's, 1 C, and 3 D's. The numerical scores for individual aspects of the project were supplemented by comments keyed to specific sections of the paper and the script, and by a final summary evaluation. Each project required 30 to 45 minutes to grade. Some of the outstanding projects had complex scripts that went well beyond the minimum requirements. The grader examined only 3 paths in detail: the motivational interviewing path, the biomedical counseling path, and the path that included all the mistakes and recoveries.

Lower grades were easily attributable to several causes. First, some groups were sloppy in assembling the final project packet. At least 2 groups fell from an A to a B because they failed to include either the first 2 pages of the paper or the required path diagram. Second, some groups had divided the work into independent sections assigned to individuals with no coordination among individuals. So an outstanding paper might be followed by a poor script. Third, the groups that received D's failed to consult with one of the instructors about the content of their scripts even though they had been advised to do so. They seemed to have regarded the assignment as a mechanical exercise in producing a script and had failed to

realize that the pedagogical challenge was to implement motivational interviewing in the script.

RESULTS

Qualitative analysis of feedback on the course indicated there were 2 interrelated reactions common across the entire class. First, students felt there were too many problems with the computer portion of the assignment. Second, students felt the project took too much time when many of them wanted to be studying for final examinations. Many students commented that they spent too much time getting the script to work with the *AUVP*. Clearly, the computer programs need to be stabilized and finalized if the project is repeated with future classes. In retrospect, the best alternative would be to introduce the students to the video of the *AUVP* and then have them write a script that would not have to actually work with the *AUVP*. This approach would allow the students to focus on improving their interviewing skills and dialogue and require them to use a computer only for word processing.

Other reactions clearly broke the class into 3 groups. One group was stimulated by the assignment and felt that writing the script had helped them to a clearer understanding of how to use motivational interviewing principles in counseling a patient. Some students appreciated the critical thinking required for scriptwriting. However, they also noted that the complexities of computer programming detracted from focusing on the script. These students appeared to have a very positive opinion of motivational interviewing and indicated they expected to utilize motivational interviewing in the future. They took the initiative to request (1) that an elective course be offered on advanced motivational interviewing, and (2) that the possibility of certification in motivational interviewing be explored. Currently, 7 students are enrolled in that elective course.

The second group, which formed the majority of the class, had mixed feelings about the assignment. They acknowledged that writing the report and the script was helpful; however, they felt overwhelmed with getting the computer programs to operate correctly. The students designated by their groups to attend the computer training sessions indicated that their computer backgrounds were minimal and did not feel learning these programs was going to benefit them as pharmacists. A few students remarked that the paper and the script would have been sufficient to achieve the goals of the assignment. Finally, many of these groups exhibited signs of unequal distribution of the workload. Some students remarked that they had handled much more work than other members of their group. In one group, 2 members were "social loafers" and did not work on the project. The other 2 members seemed

to feel that the assignment was at fault for this happening. We do feel that in future classes some accountability for individual contribution to the group needs to be built into the assignment.

The final group was comprised of students with very negative attitudes about the assignment. They resented the amount of time it required, especially because they saw no value in learning to use motivational interviewing. They perceived motivational interviewing to be an esoteric topic that they would never use. They saw no learning benefits from the assignment. In more negative terms, one student commented that you cannot “teach talking” to student pharmacists; they either get it or they do not. Therefore, “don’t waste our time.” Another student contended that the paper was enough; there was no need to write the script. The feeling of this student’s group was that they had lots of facts to learn for their final examinations. Underlying this attitude seemed to be (1) a conviction that they already knew how to talk, and (2) a belief that education was a matter of memorizing what they were given to learn. Eliminating the computer programming element may allow some of these students to be stimulated by the assignment. However, the underlying attitudes make this unlikely.

The worst deficiency in the scriptwriting assignment was exposed by those groups of 3 to 4 students who divided the assignment into separate tasks with each member handling only those tasks he/she was assigned. This approach guaranteed that 1 to 3 students were never involved in writing the script. The worst situation was that faced by the “computer expert” in each group who handled all of the data entry and computer tasks but did not help with authoring either the report or the script. We plan to correct this deficiency in future classes by (1) assigning the project to pairs of students, and (2) limiting the assignment to researching the disease state and writing a script for the *AUVP*. In that format, the assignment could be used in any professional communication course.

A quantitative analysis was performed of the 100 multiple-choice questions on the final examination. The questions were divided into 3 groups. The first group tested motivational interviewing with a dialogue format. In a special 10-question section, the students were to choose the most appropriate motivational interviewing response to a patient’s utterance. The questions were sequenced to form an ongoing dialogue with the same patient. A sample question follows:

Patient: *I know I need it. I don’t like the idea of having to take a drug every day.*

Pharmacist:

- a. *At least you can afford to take medicine every day.*

- b. *You don’t understand why this is necessary.*
- c. *You don’t like having to depend on taking medicine.* (correct answer)
- d. *It’s really your choice.*

Along with 4 other dialogue-based motivational interviewing questions elsewhere in the examination, there were a total of 14 such questions. Each student’s total score on these questions was converted to a percentage. The second group of questions included typical multiple-choice questions testing the foundational theoretical concepts of motivational interviewing. There were 37 such questions. The final group was composed of 49 multiple-choice questions testing other topics in the course. The descriptive statistics (mean \pm SD) were as follows: dialogue-based motivational interviewing questions (88.6% \pm 8.8%), theory-based motivational interviewing questions (87.0% \pm 8.3%), and other questions (76% \pm 7.6%). Given that 2 scores were not normally distributed, tests of these paired means were conducted using *Proc Univariate* in *SAS* 9.1. All 3 two-tailed Wilcoxon signed rank tests were significant. The students scored approximately 1 percentage point better on the dialogue-based motivational interviewing questions than on the theory-based motivational interviewing questions ($p < 0.022$). Scores on both types of motivational interviewing questions were significantly better than scores on the other questions ($p < 0.0001$). This difference amounted to slightly more than a full letter grade.

Although the authors expected the students to have difficulty with the dialogue-based questions, the students answered them significantly better than any other questions on the examination. The students answered both the dialogic and theoretical motivational interviewing questions significantly better than the other questions on the examination. We suspect that the active-learning involved in the scriptwriting assignment helped students not only to master what to say in motivational interviewing but also to understand the theory accounting for the effectiveness of motivational interviewing. An analysis of the questions from the prior year’s final examination indicated that the motivational interviewing questions had not been answered significantly better than the other questions.

DISCUSSION

Scriptwriting Assignment

The assignment of writing a script for a virtual patient is easily used in any professional communication course, especially if the assignment is divorced from the requirement of having the script actually work with the *AUVP* engine. In other words, students could be shown the *AUVP*, and then asked to write a script much as a content

matter expert might do. The format for the script could be simplified down to its most basic form. In this manner, all the computer problems encountered in our project would be avoided. The students would derive the educational benefit of struggling with how to word their motivational interviewing responses. Professors considering this assignment should be aware that much of the pedagogical benefit is derived from the numerous consultations with individuals, small groups, and large groups. The time investment required of the professor was considerable. With a class of 125 students, the authors spent approximately 30 hours consulting about motivational interviewing issues over the span of the assignment. In our view though, this was time well spent in providing a high-quality educational experience.

We have found the scriptwriting assignment to be a challenging and active exercise in assimilating the verbal skills necessary for using motivational interviewing in patient counseling. While some students exhibited genuine interest in motivational interviewing, increased knowledge of why motivational interviewing is successful, improved facility with wording motivational-interviewing responses, and greater confidence in their ability to use motivational interviewing in the future, other students had negative reactions to the computer portion of the project and the time involved. In spite of the negative reactions to the computer difficulties, the students did significantly better on all of the motivational interviewing questions (both dialogue-based and theory-based) than on the questions testing other areas of content in the course. This significant difference was the equivalent of a full letter grade! Apparently, the students learned more than they realized about motivational interviewing.

Virtual Patients

The *AUVP* has excellent potential to provide students with their first opportunity to use motivational interviewing in counseling rather realistic virtual patients with various medical conditions. It would appear to be the appropriate next step after completing lectures and readings about the nature and techniques of motivational interviewing. Unsolicited remarks by other students who have seen the *AUVP* in operation indicate that they find the virtual patient realistic and engaging. They react to comments by the virtual patient in a fairly spontaneous fashion and say that the *AUVP* has the feel of normal conversation. Secondly, students seem to appreciate the opportunity to explore how their comments can affect the progression of the counseling session. They like the idea of experimenting with how patients react to the motivational interviewing and biomedical counseling models of counseling. Finally, students seem to like the idea that

they can find ways of wording and implementing motivational interviewing with which they identify. In other words, they are able to find their own motivational interviewing “voice.” We expect that the *AUVP* will become a valuable pedagogical tool in teaching motivational interviewing to first-year students. The natural follow-up to the *AUVP* would be to role play with each other in order to make the transition to using motivational interviewing in their own words in real time. The last step would be to practice with a standardized patient. We believe that students trained in this fashion should have an elementary mastery of motivational interviewing. Such students should be more inclined to improve their counseling as they progress into professional life. Ultimately they should be more able to handle medication management therapy services than pharmacists rooted solely in the biomedical model of patient counseling.

We have identified the need for a coaching function in the *AUVP*. Essentially this would involve freezing the video window showing the virtual patient and opening up a second video window with a motivational interviewing expert analyzing the student’s interaction with the patient and discussing various options for how to proceed. Such a coaching function could be enhanced by background programming to identify patterns in the choices made by the student thus far in the interaction. Ideally, in a series of virtual patients, the coaching function would be maximized for communicating with the first few patients, then decreased when communicating with subsequent patients, and available only as an option when communicating with the final patients in the series.

We are extremely optimistic about the educational opportunities afforded by the *AUVP* itself. As we have shown the program to colleagues from other departments and schools, we have been struck by the creative applications they see for it in the P2, P3, and P4 years. Some of their suggestions include the following:

- (1) Use the *AUVP* to have students practice history taking in their *Physical Assessment* course.
- (2) Use the *AUVP* as the final step in case studies during problem-based modules. After diagnosing a patient’s condition and recommending several possible medication regimens, the students would then monitor and counsel the patient in 1 or more sessions as their prescriptions are refilled. This use would more thoroughly integrate counseling into problem-based learning.
- (3) Use the *AUVP* to practice techniques of communicating with patients having communication disabilities such as varying degrees of hearing loss, or having cognitive impairments such as those caused by Alzheimer’s disease.

- (4) Use the *AUVP* as a refresher for P4 students about to start their rotations in various clinical and community settings.
- (5) Use the *AUVP* to give P4 students on rotations exposure to types of patients or medical conditions that may not be available to them in the region to which they have been assigned.

The *AUVP* can handle any of these uses as long as the interaction can be based on the provision of a restricted set of possible responses from which the user chooses. Because the runtime engine is separate from the authoring system, any professor or researcher interested in creating a virtual patient can do so with simple video production techniques. We envision creating a shared library of virtual patients by requiring anyone using the authoring system to contribute their virtual patient to this library.

The first working version of the *AUVP* will be available to all schools of pharmacy under a grant from Pfizer early in 2006. This CD complements an already available 2-CD set on motivational interviewing.¹³ After reviewing the basic principles of motivational interviewing, the new virtual patient CD will provide a range of virtual patients with which to practice using single READS skills in one response, and then combinations of READS skills in a single response, before engaging in counseling 3 virtual patients (with hypercholesteremia, asthma, and diabetes, respectively) over a series of visits. We hope that the *AUVP* will pave the way to a series of increasingly more sophisticated virtual patients that revolutionize how we train pharmacy students to counsel patients in the next decade.

CONCLUSION

This project has demonstrated the viability and usefulness of assigning student pharmacists to write a virtual patient script in order to learn the verbal skills necessary for using motivational interviewing in patient counseling and to understand why motivational interviewing resolves patient resistance to treatment adherence. Many students exhibited greater interest in motivational interviewing, greater knowledge of why motivational interviewing is successful, greater facility with wording

motivational interviewing responses, and greater confidence in their ability to use motivational interviewing in the future. The project also established that the students were receptive to the use of the *AUVP* in learning how to counsel patients.

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