Is Virtual the Same as Real?
Medical Students’ Experiences of a Virtual Patient

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ABSTRACT

Purpose. Narrative and problem-solving versions of the same virtual patient’s case were created for teaching communication skills to medical students. This qualitative study explored how students experienced the virtual patient.

Method. In 1998–1999 in-depth, free-form interviews and follow-ups were conducted with 12 third-year medical students at Monash University in Australia. Students were asked about their experiences with the virtual patient. The interviews were qualitatively analyzed using psychological phenomenology.

Results. Results were in the form of a description of the students’ lived experiences with the virtual patient. Findings indicated that students responded to the virtual patient as if she were real but they felt a simultaneous sense of prefabrication, which often led to frustration. Students’ experiences of both versions were similar, but the narrative version permitted better rapport with the virtual patient.

Conclusion. This phenomenological study indicated that a constructed, computer-based virtual patient can have substantial emotional effects on medical students. Acad. Med. 2003;78:538–545.

It is increasingly common in medical education to find a medical student role-playing a doctor with a computer-based, simulated patient. However, such a “virtual patient” is often represented as a case rather than as a person. The human or psychosocial aspect of the patient simulation has been referred to as an “unanswered question,” but has been rarely researched.1 While the literature reveals descriptions and evaluations of virtual patients, including those used to teach psychosocial skills, there is not much information about how medical students respond to these patients on a psychosocial level. What has been reported can be disturbing. For example, in a study of one computer-based patient simulation, a minority of students regarded the virtual patient as a test case for “do[ing] absolutely anything to a patient that you wanted . . . .”2 This finding raises interesting questions: How do students experience the virtual patient? Do they respond emotionally to these patients? Are virtual patients an adequate substitute for human face-to-face learning? Should virtual patients be used to teach psychosocial skills? Moreover, virtual patients are a heterogeneous collection of teaching tools that raise the additional question: Does the design of the virtual patient influence the student’s experience?

As discussed elsewhere in the literature, virtual patients can be put into two broad categories: problem-solving and narrative.3,4 These categories are not exclusive or comprehensive, but represent the most frequent design choices used in developing virtual patients. The problem-solving approach teaches clinical reasoning or diagnosis. Problem-based learning or exploratory learning often underpins this design choice. The student gathers information, usually from menus of possible history questions, lab tests, and physical examinations, and subsequently diagnoses and/or manages the patient. The information is not “cued,” that is, there is no direction from the program format as to what the student’s next course of action should be. Templates are easily created with this type of design, which reduces the costs of multiple simulations. One of the best known Web examples is the Interactive Patient.5 Another instance
is DxR, a case-based, problem-oriented diagnostic reasoning package that is available commercially both as a template and as individual cases. A 1998 evaluation of DxR indicated that the program was valued by the students and formed an effective educational tool when used appropriately.²

The narrative approach is often found in virtual patient encounters that are concerned with cause and effect and that have a time element. In general, narrative designs are more expensive to produce because the narrative has to be individually crafted—a time-consuming process—rather than relying on a template.⁶ Pedagogic rationales are diverse but narrative designs often have a personal story line. For example, the simulation portion of the Virtual Practicuum traces the progression of a woman with HIV over five years through a series of virtual consultations.⁷ Well-known, Web-based examples of narrative design, for example (www.trauma.org), provide the user with an opportunity to treat a range of trauma patients in moulage scenarios.⁸

METHOD

The Virtual Patient Tutorial

As computer-based patient simulations vary enormously in quality, purpose, presentation, and usability, I felt that a single, purpose-built case with two design variations would provide the best opportunity for in-depth analysis of how medical students experience the virtual patient. I chose the domain of communication skills because it offered a good opportunity to study students’ psychosocial responses. I developed an interactive, multimedia virtual patient, Heart of the Problem. Previous papers have described quantitative³ and pragmatic⁴ evaluations of this virtual patient.

Heart of the Problem was provided to students in 1998 and 1999 as an hour-long tutorial that was part of an overall clinical and communication skills program for third-year, preclinical medical students at Monash University in Australia. I created two CDs based on the same case but using the two different design approaches. The case I chose was that of a middle-aged woman who presented to a general practitioner with chest pains that appeared to be stress-related. However, Mrs. Cohen—the virtual patient’s name—was a somewhat aggressive woman who was not interested in the general practitioner’s assistance or opinion. She believed firmly in the physical nature of her physical illness and wished only for a referral to a specialist.

The virtual patient’s narrative design emphasized an experience that unfolded over time. Students selected from three or four options to advance the interview. The virtual patient responded through a video representation (see Figure 1). If students made irrelevant, insensitive, or repetitious choices then the path through the simulation resulted in a clearly unhappy patient. If a student made patient-centered choices that allowed the patient to express her views, then the consultation would be successful. There was a clear story line, no matter which path the student took.

Figure 1. Sample screen from the narrative version of the virtual patient simulation, Heart of the Problem. Students selected from three or four options to advance the interview. The virtual patient responded through a video representation.
The second design stressed the problem-solving aspects of the interview. A student was given the initial scenario and then a range of history questions to be asked in any order. These were drawn from students’ previous studies and were presented alphabetically. After selecting a question—such as “Do you have any pain in your chest, Mrs. Cohen?” from the cardiovascular section—subquestions appeared. The subquestions related to the specific history at hand. Students doing this program had to select suitable lines of questioning. They were then asked to make a preliminary diagnosis before proceeding to a short management section. As with the narrative design, if the students made irrelevant, insensitive, or repetitious choices, Mrs. Cohen’s responses were clearly negative, although in this case, her responses were independent of previous interactions.

In all other respects, the different designs were very similar: the content of what Mrs. Cohen said was the same, and there was equal emphasis on reflective thinking, interaction, and feedback. In both tutorials students reflected on establishing rapport in the consultation and how they could have conducted such an interview better. They also received a question-by-question analysis of their choices. Students were randomly assigned to one of the simulations, although they all later had the opportunity to use both simulations.

### Psychological Phenomenology

Investigating the holistic effect of a virtual patient on medical students required a rigorous qualitative approach. Amadeo Giorgi is the psychological phenomenological authority whose method I selected for this study. This particular qualitative method is often used in situations with a strong emotional element, because it emphasizes experience above thought. In general, the purpose of psychological phenomenology is to describe the essential elements of the lived experience under study. Essential elements are shared by those within the study. This is a method of condensing qualitative data into meaningful form and is not the same as positivist generalizability. The outcome of Giorgi’s method is usually a descriptive statement rather than a list of categories or themes. I considered this narrative outcome appropriate because it underlines the specific nature of the phenomenon under study, the experience of using the virtual patient in Heart of the Problem.

### Participants and the Interviews

Giorgi’s phenomenological method requires that in-depth interviews be collected from individuals who have experienced the phenomenon. I identified 12 participants during the 1998 clinical and communication skills program at Monash University. Twelve is a typical number of subjects for a phenomenological research study, because analysis is time-consuming even with this very small number of interviewees. All the students were third-year, preclinical medical students between 19 and 22 years old. Selective sampling resulted in participants who represented as wide a cross section of the class population as possible. I interviewed six women and six men who had a wide range of apparent attitudes toward the simulation and who were from a variety of ethnic backgrounds. Of the 12 participants, four had completed both versions of Heart of the Problem, four had completed the narrative-based tutorial, and four had completed the problem-based tutorial. While these students were all aware that they were participating in a study, they were not aware of the substance of the investigation. Interviews took place at Monash University up to a week after the student had used the virtual patient tutorial. I audio recorded and transcribed the interviews, which ranged fairly evenly between 20 and 70 minutes long. I used an unstructured, open approach that allowed the interviewees to guide the direction of the conversation around the use of the simulation within the overall context of their education. I prompted as necessary and raised issues of experience and feeling.

### Data Analysis

I conducted data analysis using the phenomenological techniques of bracketing, horizontalization, and imaginative variation. Any variation between the two types of simulation experience was not predicted, but allowed to arise naturally from the data. Analysis consisted of two main phases. In the first phase, I analyzed each interview individually and divided the transcript into units of meaning, each representing a different thought or intention. This ensured that the data were treated evenly. I developed a first-person narrative and regrouped the meaning units according to theme and temporal experience. I discarded repetitious statements, which resulted in a coherent description of the experience from the student’s point of view. Finally, I transformed this text into the essential features of the student’s experience.

The second phase required synthesis of these individual analyses. I developed a systematic, four-step process. First, I extracted 23 themes from the individual descriptions (see List 1). Second, I formed matrices, cross-checking the presence of the theme implicitly or explicitly in each interview. Features that were exclusive to either narrative or problem-solving simulation were noted at this stage. Third, I created a description of the general experience of each theme. Finally, I considered these descriptions at length, with frequent reference to
the original interviews, and compiled the general features of the common experience into a narrative outcome.

**RESULTS**

My study had two pertinent descriptive outcomes. The first was a narrative describing the common elements of the students’ lived experiences. The second narrative outlined the differences that arose out of the data with respect to the two different types of simulations.

**Students’ Experiences Using a Virtual Patient to Learn Communication Skills**

The third-year medical students were a very clearly defined group, and they were unambiguous about their identity (“You’re just a medical student . . .”). Their generalized goals were to do well in their study and to become a doctor. The world of the medical student was their familiar, typical world. On the other hand, at this stage in their course, the “real” clinical world was an uncertain place. As one student said, “I absolutely shit myself when I think of going to interview a real patient who it matters if I don’t do it properly.” Experience with real patients reduced this uncertainty and improved the students’ clinical communication skills. Another student commented, “You’re not really going to learn any more until you encounter . . . different sorts of patients.”

From their training, the students brought to the simulation a highly structured approach to history taking and systems review, although they had differing attitudes toward what they had learned. One student remarked:

... it’s good having a very methodical list of things you’ve gotta ask . . . [In previous role-plays] we were looking at these lists of questions . . . and saying this is going to be a race. We rattled off all the questions, trying to get all the information out of a patient without having the time to look at the patient, because a lot of the time we were writing . . .

More generally, the students also brought the sum of their life experiences, as was implied in the following comments:

I work at a hostel for elderly people. And especially through that, I’ve developed my communication skills . . .

I was working at a restaurant and we had, like a massive drama . . . I went in there with this real negotiating attitude . . . I use those skills in a lot of different areas of my life . . . I don’t just see it as part of the medical consultation.

Overall, using a computer to interview a simulated patient was a novel experience, although simulated patients were not. Students found the interface essentially “transparent.” As one student said, “I didn’t notice the simulation after a while. Once I’d got used to using the interface, I felt that I was there.” At the same time, they were simultaneously aware of the medium and its limitations. For example, another student noted, “. . . when Mrs. Cohen is talking there’s a sort of box around her shoulders.”

In both simulations, the students took on the role of the doctor. In this role, they had an implicit additional aim alongside their other goals—information gathering. They conceptualized a consultation where the doctor–expert sought to collect information from a patient. The doctor’s agenda took primacy over the patient’s agenda; the

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**List 1**

| Themes Extracted from Interviews with 12 Medical Students Who Had Used the Virtual Patient Simulation, Heart of the Problem, Monash University, Australia, 1998–99 |
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patient was expected to contribute the required information. This is illustrated by the following students’ comments:

... I’m getting nowhere with this woman, all she wants is a referral ... but I didn’t want to say immediately, “Yes, I’m going to give you a referral.” I wanted to go through different steps and [be] prepared to give her a referral if ... necessary, but she wasn’t letting me ask her the questions that I wanted to.

There’s information you’re gunna have to get and [patients are] not going to like it. And, you know, if they don’t want to be asked certain questions, then they shouldn’t have bothered coming ...

There were issues of control, of wanting to bring the patient around to their ways of thinking. For example, one student felt very strongly that if he were to handle the situation again, he should aim to have the patient admit that her problems were stress-related:

Maybe [I’d] approach it from a different line of questioning that wouldn’t necessarily allude her to the fact you were talking about stress ... maybe [then] she’d use the word “stress” in her own reply.

As the above comments indicated, the students regarded the virtual patient as realistic, although in varying degrees. This variation is illustrated by the following students’ assertions:

She was as a real live patient.

She was OK. Sometimes I was thinking that maybe she might be overreacted ... probably because I’ve never experienced a patient like that ever.

With the earphones and with her—the way she is on the computer—it feels like a real situation. Almost.

The students were also aware that Mrs. Cohen was not real, that she was “as realistic as the people on a computer CD.” As one student said, “Although it seemed so real and everything, I didn’t react as I would as if it was a real patient.”

However, Mrs. Cohen was representative of a “real” type—a difficult and hostile patient, generally a novelty for them. One student remarked:

I’d never had a patient respond like that before. The role-plays we’ve had, they’ve always been very cooperative and they’ve never been offended at all at what we’ve asked them.

During the simulated interview, the students in their role as doctors endeavored to create a positive relationship. The students interacted with the virtual patient as if she were a person, assigning her emotions and trying to effect a positive outcome. Likewise, the students responded to the virtual patient emotionally, often negatively. The students experienced cause-and-effect—their choices caused responses in the virtual patient. It was as if the experience were actually happening, as these students’ comments revealed:

It was very engaging ... I was talking about it for days afterwards. Like this woman, she was just awful to me! It was shocking! That really affected me, emotionally.

I definitely responded to her. I found it very frustrating ... She just seemed so negative about everything.

However, the simulation lacked the variability—and hence complexity—of the real world. For example, one student noted, “[A] computer program’s always going to have a problem ... You can only run effectively one interview ... one situation ...”

The students experienced time in the simulation differently than real time, which allowed more contemplation of choice. As one student said, “... this way allows for that extra time to listen and to see the patient and to think about those things that aren’t thought about in standard history-taking.”

However, the act of choosing questions from a list was artificial and interrupted the seamless experience of the tutorial. At times, the students encountered a lack of control, a limitation of self-expression, and found this frustrating. This frustration was often also described as a gap between available prefabricated choices and what the students believed they, as a doctor, should rightly do. The following comments illustrate the students’ experience:

You’d get this moment of frustration, when you’d think, I wouldn’t say any of those or I wouldn’t do any of that. So that’s the only thing that often broke it, when you couldn’t make the response that would come naturally to you.

... It’s just not as spontaneous.

The history taking that I’m used to is a lot more structured ... The fact that ... their own structure was there, you couldn’t contribute that much of your own.

The question-by-question feedback, in association with the overall simulation, enabled the students to learn new skills or reinforce and improve old skills. In general, feedback assisted the students in evaluating their own performances. As one student said, “I could see question by question just how my rapport went from brr to bad . . . .”

While the simulation was cohesive with previous teaching, the students’ overall assessment of the simulation was that it was simultaneously “useful” and “frustrating.” It provided an opportunity to practice clinical communication skills in preparation for actual
difficult patients, as these students commented:

I got a bit frustrated ... but I was glad... the questions were written out... It would have been rather intimidating with her as a patient.

I don't know whether [the simulation] alone would have been, would be better than bedside teaching—that's one of the best things. But as a[n] accompanying thing, it's good.

... It probably didn’t advance me a lot. Whereas, if I wander around hospitals and speak to 20 patients today, that'll probably help me.

... it gave me a chance to think about how to approach and question a patient possibly in the future. ... One thing that was lacking is that [in a] doctor–patient situation, you can pick up a vibe from the patient...

The freedom of time and the freedom of the fact that no one else is watching you relaxes you a bit so that you're more likely to learn.

Students’ Experiences Using Two Different Versions of the Same Virtual Patient

There was variation in the students’ experiences depending on the different versions of the virtual patient they used. As the following student commented, the problem-solving simulation provided more realism through a greater number of options:

You'd ask something [in the problem-solving simulation], and she'd give you a response like, “No of course I don't have swelling in my ankles ... What's that got to do with anything?” And you've got no recourse to prove to her that you're not a complete idiot ...

They developed strongly negative emotional responses to the patient, as these students’ comments indicated:

I really felt ... she was abusing the system.

I felt a crushing feeling coming inside, just from how she was attacking the doctor.

In the narrative-based simulation, the students experienced a sense of being guided through a path. The events flowed from each other. They experienced less frustration with the questions in the narratively based simulation. One student said:

[The narrative-based simulation] flowed much better, which made it easier to build a good rapport and easier for me to follow what was going on in the interview.

In this simulation, students had a stronger sense of understanding about the patient, whom they considered more realistic, and they developed a better rapport, as these students indicated:

There's that sense of satisfaction when you know what's going on. And you've found out what they're really upset about and their background and that.

Somehow we went into real depth about her situation with her family and her husband ... I was identifying with Mrs. Cohen personally.

They believed there was a possibility of pleasing the virtual patient, as these students emphasized

... the path that I took was not at all to dismiss her idea ... but validating her concerns ... also [I] tried to give her a chance to speak. 'Cause as much as she was defensive, if you gave her a chance, she did actually say something.

At the end of it ... I think she felt fairly happy. I think the approach that I took was very much patient dependent... I've never really experienced that before ...

Credibility (Qualitative Issues of Validity)

Validity and reliability are concepts grounded in positivist tradition, which do not translate well to a qualitative paradigm. There is a diversity of opinion as how best to deal with these issues within phenomenological studies. Giorgi believes the reportage of the method provides credibility, as each reader of the study can critically evaluate the worth of the analysis and the findings, and that other methods, such as use of judges or participants as co-researchers, change the subjective viewpoint rather than verify the results. While his arguments have merit, I felt that some basic checks of external process for assessing credibility were necessary to ensure that gross falsifications or omissions had not occurred. First, an independent check was made on the transcription of the tapes. Second, I sought comment on the results by post from the 12 students who had participated in the initial interviews and from six additional students who had completed both simulations in 1999. One student returned the questionnaire, providing an indication of the broad veracity of the findings. While the student wrote that the results provided “an accurate description of my own experience with the simulations,” she had limited interest in the wider research findings, vindicating Giorgi’s recommendation to limit the use of participants’ input into the research process.
DISCUSSION

The interviews captured the students’ individual narratives of their interactions with the virtual patient. The results of my study encapsulated this variation within the framework of the common lived experience. While, like in most qualitative studies, I drew the outcomes from a specific context, the much-needed empirical data provided insight into how students related to virtual patients, and how this experience might have affected their developing perception of the doctor–patient relationship.

The results indicated that the students’ relationships to this virtual patient—and possibly to patients in general—were highly dependent on their current educational contexts and general life experiences. As they stepped into the role of the general practitioner, the students made assumptions about doctors and patients (“If they don’t want to be asked certain questions, then they shouldn’t have bothered coming. . .”). This finding has implications for future teaching programs because it would be possible to integrate an open discussion of these implicit belief systems into a tutorial. It is also worth considering whether the format of the virtual patient naturally reinforced the students’ preconceptions by inviting the student to role-play the doctor. A more radical possibility might be where the students assume the role of the patient and must contend with a doctor’s agenda.

The simulation challenged some students’ explicit conceptions of a doctor–patient relationship. This was in part through introducing what will become a customary occurrence—a patient who is difficult to treat for psychological rather than physiologic reasons. There were strong parallels between the ways that the students responded to this difficult patient and the ways that doctors describe such patients in a clinical environment. This finding indicates the ability of the virtual patient to initiate students into the complexities of the clinical world, albeit through simulation, and to confront them with some of the personal–professional issues that they will face in this world.

The very elements of the simulation that frustrated the students—the necessary artifice and lack of control—were also the advantages of the virtual patient, in particular more time to contemplate choices and the usefulness of tailored feedback in learning skills. Without prefabricated choices, there would be difficulty in creating tailored, precise feedback. Some students recognized this openly, as the following student indicated:

I understand that you can’t have every response there . . . because you’ve organized it so that you’ve got the feedback . . . Given that you understand that when you undertake to do [the simulation], then it’s fine.

Again, these twin issues of frustration and usefulness were intertwined with the students’ individual situations. Their confidence levels regarding their own communication skills, their need for control, their conception of the doctor–patient relationship, and their growing appetite for “real” clinical contact all influenced how they responded to the virtual patient. Practicing clinicians were not observed to have experienced similar levels of frustration when using the simulations, which adds weight to the argument that response is inseparable from context. Perhaps one of the ways to counter students’ frustration would be to explicitly engage them with the benefits and limitations of the simulation experience in the educational setting.

Disparity in students’ experiences between the two simulations was less than might have been predicted, given that some quantitative differences have been noted. For the students, the simulations had more commonalities than differences, possibly because the selection of the case had such a strong influence. The narrative version did allow students to create a greater sense of empathy and rapport with the virtual patient. Surprisingly, the problem-solving version elicited stronger but markedly more negative emotions—students were angry and frustrated by the patient. In concrete terms, this finding indicates that the design of a simulation may influence the emotional response of the student, and designers and educators must be careful of adverse effects upon students.

In conclusion, the ability of the computer to represent the human has been the assumption of those using virtual patients to teach communication skills, and is also the observation of those using virtual patients to teach diagnostic skills. However, there is little published evidence regarding these aspects of the virtual patient. This phenomenological study indicates clearly that a constructed, computer-based virtual patient can represent the psychosocial dimension of the doctor–patient encounter, albeit with a degree of frustration with the form. The simulation under study provided a representation of the doctor–patient relationship that had limitations but simultaneously offered the student other benefits, including time to contemplate choices and structured feedback. There were distinctive variations between the responses to the problem-solving and narrative versions. Overall, virtual patients have the potential for strong, possibly negative, emotional effect on the students.

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