A Comparative Analysis of Case Presentation Modalities Used in Clinical Reasoning Coursework in Occupational Therapy

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This study used mixed methods to compare four different styles of case presentation in a course designed to develop the clinical reasoning skills of master's level occupational therapy students. Modalities used to present cases were printed text, videotape, live interview, and CD-ROM movies delivered on an Internet platform. The researchers sought to determine the relative merits and limitations of each modality from both pedagogical and practical standpoints. Results indicate that the choice of modality does not compromise the ability of students to meet learning objectives related to clinical reasoning; however, several advantages and disadvantages with respect to practical aspects of presentation and learning were identified from instructor and student perspectives. The strength of the overall instructional format, and decisions concerning the amount and type of information provided in the cases were found to be more relevant to the quality of the learning experience than the modality of presentation. Recommendations are provided for structuring clinical reasoning learning experiences that combine the best features from the case modalities examined in this study.


Faculty in professional programs are faced with the challenge of not only educating students in theories underlying professional practice, but also assisting them to acquire entry-level competence in applying these theories to practice (Bailey & Cohn, 2001; Schön, 1987; Thomas, O’Connor, Albert, Bourain, & Brant, 2001). Rather than following prescribed algorithms, professional students must be able to interpret the complexity and context of individual cases, and successively consider the viability, advantages, and risks of potential interventions. The process of moving students from basic levels of interpretation to higher-level problem solving requires graded instruction and feedback, and selection of appropriate media and learning opportunities to encourage sound independent decision making (Gagne, Briggs, & Wagner, 1992).

In health sciences, the process of developing clinical reasoning requires that students gain skills in critically evaluating the presenting problems of clients, and planning and executing interventions (Fleming, 1991b). A variety of educational methods have been used to help build clinical reasoning skills; however, few studies have compared the efficacy of different case presentation modalities, or determined whether the success of an instructional framework in clinical reasoning is impacted by the presentation modality used. This study was based on a single instructional approach to developing clinical reasoning skills in entry-level occupational therapy students, and examined the relative advantages and challenges of four different modalities of case presentation used within the assignment structure.

Review of Literature

Clinical reasoning is the embodiment of higher level, competent functioning that is seen in experienced clinicians who are able to integrate explicit professional
knowledge with implicit, acquired knowledge of practice to produce skilled responses to a complex and varied range of presenting problems (Mattingly, 1991). Although it is acknowledged that practitioners in training will require several months or even years in practice before they attain even proficient levels of clinical reasoning (Dreyfus & Dreyfus, 1986), educators have sought to initiate this process and help students to acquire the analytical and reasoning skills necessary for knowledge application while they are still in the academic setting.

The nature of clinical reasoning has been studied in occupational therapy, and contrasted with clinical reasoning in medical practitioners (Fleming, 1991a). Despite many similarities, Fleming noted that the reasoning process in medicine was frequently directed towards reductionistic diagnostic interpretations and hypothesis formation, whereas clinical reasoning observed in occupational therapy was continuous and evolving, focusing more on individual client and contextual factors that could influence outcomes. Three primary types of reasoning have been identified in occupational therapy (Fleming, 1991b) that may also be of relevance to other health professions. **Procedural or scientific reasoning** involves identifying the specific nature of a presenting disability or disease, and theories and procedures that are relevant to therapeutic intervention. **Interactive reasoning** is the ability to effectively gather information directly from a client in order to fully understand the subjective meaning of the disability experience. **Conditional reasoning** involves consideration of the whole individual in context, and envisioning a potential future state toward which therapy can be guided. Other aspects of clinical reasoning have since been discussed by various authors. **Narrative reasoning** is an approach that explicitly focuses on the client’s “story” or personal meaning and daily experience, rather than focusing on the disability itself (Mattingly, 1991). **Pragmatic reasoning** requires consideration of constraints and facilitators to actually implementing optimal treatments, including financial resources, available facilities and tools, and the skills and knowledge of the practitioner (Schell & Cervero, 1993). **Ethical reasoning** has also been identified as a key element of professional reasoning and decision making, and involves weighing risks and benefits when establishing priorities, and determining a course of action that honors the client’s wishes while also being clinically sound (Rogers, 1983). The challenge for educators is to identify meaningful ways to foster clinical reasoning ability in student practitioners (Schuwirth, 2002).

**Case-Based Learning**

The case method of instruction is one approach to teaching applied clinical reasoning. Hunt (1951), one of the pioneers of the case method, in his seminal piece introducing the method called it “the use of problems to train the student to discover and then to fix in his mind ways of thinking that are productive in the chosen field” (p. 175). In health sciences, this approach attempts to simulate the experience of meeting a real client in the clinical setting by presenting a clinical case in a controlled learning venue. As opposed to problem-based learning, where learners seek out information relative to the presenting problems of a case and receive tutorial support to determine the relevance and adequacy of the material gathered, case-based learning generally involves initial instruction. Learners are then responsible for interpretation of the problems presented in the case, and applying knowledge to the unique features of the situation at hand. Hunt recommends use of authentic issues and problems from real life scenarios and the use of a series of cases over time to progressively advance learning in terms of conceptual and intellectual challenge. Other authors since have recognized the contributions of the case method to “deep learning” (Lockyer, Gondocz, & Thivierge, 2004) and building reflective reasoning skills in developing practitioners (Schön, 1992).

In occupational therapy Neistadt, Wight, and Mulligan (1998) have described a method they used for the development of clinical reasoning skills called the “clinical reasoning case study.” This method involves explicitly presenting information relative to each type of clinical reasoning in order to provide the student with a comprehensive image of the client’s situation. In a qualitative study designed to compare the effectiveness of this more comprehensive clinical reasoning case approach with traditional case studies, which typically include only information found in a health record, such as a client’s age, diagnosis, medical history, and social history, Neistadt and colleagues found that students receiving the more comprehensive case study developed better treatment plans, and had more confidence in their clinical decision-making abilities.

**Methods of Case Presentation**

A variety of approaches to presenting case information have been described in the literature. Text-based cases may be presented on paper or electronically and are used in both instruction and testing situations (Haywood & Cairns, 2001; Neistadt, Wight, & Mulligan, 1998; Thomas et al., 2001). Live cases involve a real individual (either a true or proxy client who has been coached to present certain conditions) meeting with a small or large group of students (Bailey & Cohn, 2001; Liu, Schneider, & Miyazaki, 1997; Thomas et al.). The client can be interviewed by a single person, such as the instructor, or students can meet with the client and conduct the interview themselves. Cases have
also been presented by videotaping a client and showing the taped version of the client to an assembled group (Liu et al., 1997; Neistadt & Smith, 1997). A variation of the videotaped case presentation is the “virtual client,” in which a client has been videotaped (typically an interview, but may also include views of the client performing certain tasks) and the video converted to a digital movie format that can be played on a computer. VanLeit’s (1995) experiences with various case presentation methods suggested that paper cases are best suited to developing scientific and procedural reasoning, but may evoke narrative and pragmatic reasoning if the scope of information presented promotes these. Videotaped cases are best suited to narrative or conditional reasoning due to the ability to actually see the client and how he or she interacts and performs. Live simulated clients provide the opportunity to develop interactive and narrative reasoning whereas real clients offer the potential for all types of reasoning (VanLeit).

A limited number of studies have compared the effectiveness of more than one of these methods in achieving learning goals relative to problem identification and treatment planning. One such study used an alternating conditions approach, where two groups of students from a single cohort were exposed to the same simulated clients, but either in live or videotaped format (Liu et al., 1997). Results were mixed, with students exhibiting significantly better problem identification with the live simulated case, but better treatment plans with the videotaped format. Another study compared use of online digital video cases and on-campus paper and videotaped cases in problem-based medical education learning groups (Kamin, Deterding, & Lowry, 2002). Focus group follow-up indicated that students had more difficulty recognizing abnormal findings in the paper cases than the video and preferred the live video learning group to the online group. They also reported that the virtual group assignments took up to three times longer than those in live groups. All methods reportedly improved clinical reasoning skills. Another qualitative study (Thomas et al., 2001) conducted in a mental health course for nurse practitioners compared paper, simulated patient, and Web-based textual cases. Students were better able to organize information when the case details were provided in written format (paper or Web-based) but were successful in all formats. In all studies reviewed, students preferred the live cases to paper or videotape.

This study builds on the existing knowledge base reported here. Review of the existing literature revealed no previous research that has compared a full range of presentation modalities over time within a single instructional format.

Methods

The study was designed to answer two research questions: How does the modality used to present a case study affect the learning process when teaching clinical reasoning skills to occupational therapy students? What are the benefits and drawbacks of selected case presentation methods?

Participants and Procedures

Approval was granted by the instructional program's institutional review board and all participants completed a consent form prior to taking part in the study. Three cohorts of master's level students attending an entry-level occupational therapy program in the United States participated in the study over a 3-year period. Each cohort consisted of second-year students taking classes (one course each in theory, evaluation, and intervention) relative to adult populations during the fifth semester of the program. A total of 39 students took part in the study, including 15 students in the year 1 cohort, 13 students in year 2, and 11 students in year 3. One student declined to take part in the study but did attend all related classes and completed the associated assignments. During the last class of the theory course each week in the semester, the students were presented with a clinical reasoning case study assignment. Four different presentation modalities were used to present the case studies: printed text (paper case), video, live, and CD-ROM/Internet. The sequence of case modalities employed was randomized across the semester (see Table 1), with two examples of each case modality used with each cohort. In addition, the instructor commenced each semester with a printed text case followed by a video case to enable the students to become familiar with the clinical reasoning assignment process. In both initial cases, the students received instructor guidance. Neither of these cases was included in the data collection for the study.

The clinical reasoning assignment framework remained constant for each case presented throughout the semester. The assignment framework (see Appendix) was based on Neistadt et al.'s work (1998) with terminology incorporated from the Occupational Therapy Practice Framework: Domain and Process (2002).

Presentation Modalities

The cases presented to the students all provided comprehensive information using the clinical reasoning format, but were presented through distinctly different media.

Text-Based Cases: Printed case studies consisted of a written description of the client's presenting disorder, information about the context of the client's social and family situation, copies of evaluation results, and therapist's notes.
Table 1. Format and Sequence of Cases Employed Across Cohorts

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort 1</td>
<td>15</td>
<td>Text</td>
<td>Video</td>
<td>Text</td>
<td>CD-ROM</td>
<td>Video</td>
<td>Live</td>
<td>Text</td>
<td>CD-ROM</td>
<td>Live</td>
</tr>
<tr>
<td>Cohort 2</td>
<td>13</td>
<td>Text</td>
<td>Video</td>
<td>Video</td>
<td>Live</td>
<td>CD-ROM</td>
<td>Text</td>
<td>Video</td>
<td>Live</td>
<td>Video</td>
</tr>
<tr>
<td>Cohort 3</td>
<td>11</td>
<td>Text</td>
<td>Video</td>
<td>Live</td>
<td>Text</td>
<td>Video</td>
<td>CD-ROM</td>
<td>Live</td>
<td>CD-ROM</td>
<td>Video</td>
</tr>
</tbody>
</table>

Note: Shaded area indicates that these cases were not included in data collection or analysis for the study.

Videotape: Videotaped case studies were composed of three distinct phases: an interview with the client describing the impact of their presenting disorder; some video clips providing an overview of their contextual environment (e.g., home, community, and/or work place setting); and examples of the person performing some of their daily living tasks (e.g., preparing lunch, dressing, transferring in and out of their car).

Live: Live cases were individuals with disabilities who had previously, or were currently, receiving therapy services at local clinics. Each came into the classroom setting to be interviewed by the instructor and students of the class. In addition, subjects were asked to carry out a limited range of functional activities in order to demonstrate their current skill level (e.g., ambulation, fine-motor ability, range of motion).

CD-ROM on Internet Platform: A videotape of the client was captured as a QuickTime movie and transferred to a CD-ROM. Movies included short video clips of interviews with the client, therapist, and family or caregiver. In addition, the movies included examples of the individual carrying out some of his or her daily occupations (e.g., sorting laundry, grooming, and preparing a beverage). The clinical reasoning assignment framework was then incorporated into an Internet platform (Acropolis) that had active links to the QuickTime movies, interspersed with the questions from the clinical reasoning assignment. Students could then type their responses directly into the assignment framework, and the rater could print off their responses for grading purposes.

Data Collection and Analysis

The class instructor kept a reflective diary throughout the study. In the diary, the instructor recorded observations of advantages and disadvantages of using each of the four case modalities in terms of preparation, administration, and implementation phases of the assignment. Student impressions were captured through use of feedback forms completed after each exercise. The feedback form included five Likert-scaled questions and invited comments concerning the learning experience. The five questions (scaled from 5 “High” to 1 “Low”) addressed these issues:

- Level of reflection and independent processing required
- Contributions of the exercise re: ability to make clinical decisions
- Relative merits/negatives of presentation method compared to others used across the semester
- Student numeric ratings were summarized for each case, resulting in a mean score for each of the five questions, and an overall mean rating for the case. The numeric ratings for each method were then combined to allow comparison of the answers to each questions by modality, as well as comparison of the overall favorability of each method.

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Entries from the instructor’s reflective diary and students’ responses to open-ended questions on the feedback forms were analyzed using “open” and “axial” coding as described by Strauss & Corbin (1998). Open coding involves examining events, observations, and transactions as discrete entities, considering their meaning, and possible connections to other discrete data units. The process commenced in this instance with both researchers independently examining diary entries and student feedback forms line by line, identifying phenomena of interest and relevance, and assigning preliminary open codes relative to their apparent meaning. Preliminary hypotheses about how the data related to one another were built through the “constant comparison” process, whereby initial ideas are continuously tested and refined as new data are considered. Axial coding is a process whereby subthemes within categories and their inter-relationships are identified, as well as explanations and meaning that lie beneath the surface interpretation. Key themes identified in the texts were reexamined by each researcher, and further refined, to create a more cohesive set of themes and subthemes. The process enabled the researchers to develop new interpretations as similarities and differences became clear, with less important information taking more minor roles in the interpretation. They reviewed preliminary, separately identified themes together, and further refined the themes and their relationships within the larger categories of “instructor experience” and “student experience.” These perspectives were determined early in the process to be unique, and presenting different interpretations, even when similar themes were identified.
Finally, the researchers agreed on the overall messages or lessons to be derived from the two separate perspectives: student and instructor. T ermed “selective coding” by Strauss and Corbin (1998), this final stage involves integration of the thematic analysis and answers to central questions concerning the phenomenon under examination into refined, cogent theory. The tentative conclusions drawn were considered in light of the results of the numeric ratings for the methods and their pedagogical elements as a means of verifying findings. The results of both analyses were combined into a general rating for each of the predominant themes that had been identified for instructor and students, whereby the relative importance of the theme for each group was rated from “low” to “very high.” The accuracy of these ratings was further tested by reexamination of the numeric and qualitative data to determine if the conclusions were supported.

All assignments were graded by an independent rater (not the instructor) who used a scoring key provided by the instructor that identified key points that should be identified in each section of the assignment. The researchers analyzed the graded assignments in order to audit student attainment of the basic competency levels in clinical reasoning that had been identified for the session.

Results

Instructor Experience

Figure 1 presents the five primary themes that were ultimately generated concerning the instructor’s experience of using the four case methods. As indicated previously, the “strength” of each theme relative to the presentation methods was derived in a qualitative sense, rather than through scaled ratings. These ratings were tested through reflexive review of the original data sources.

Instructor Control. The course instructor reflected positively on her comfort level in maintaining control over the design and implementation of the case materials when using printed text, video, and CD-ROM formats. It seemed these formats enabled the instructor to plan the case study well in advance of the class session and to ensure that key elements such as information about environmental context, past medical history, and funding issues were included in the case study. However, the instructor recorded that she was not able to retain such levels of control when using the live-case study format. In her diary, she talked about the difficulties she experienced trying to identify a person with an illness or disability presenting with relevant occupational performance deficits and who was also willing, or well enough, to attend class and take part in the assignment. Due to this difficulty, she reported that both of the live cases used in the 3rd year of the study presented with fewer performance deficits than those used in the previous years. She questioned the learning value of providing live cases who offered fewer challenges than more complex cases presented through other modalities. In addition, the instructor wrote about how the unpredictable nature of the live cases caused her to experience high levels of anxiety at times. In particular she recorded how “out of control and anxious” she had
felt when several live-case participants had failed to show up for the class assignment resulting in her having to hastily locate a back-up videotaped case to use instead.

Preparation. The paper case studies were reported by the instructor to be the easiest to prepare. She noted that she was able to write the cases based on past clinical experience and from cases provided by local therapists, and to include chart notes and materials about the environmental context without having to do additional research or rely on locating an available client who demonstrated the required performance problems. Her diary revealed the high level of preparation in using both the video and CD-ROM formats. She described how this involved locating an individual with the disability willing to be videotaped, finding time to videotape the individual within their home and community environments, and editing the tape for use into the two formats. However, the live method was reported by the instructor to take the highest level of preparation, as this involved identifying a willing participant, spending time with the individual explaining the format of the session, and conducting a trial preclass interview to coach the participant for the classroom presentation.

Context. Both the video and CD-ROM formats were felt by the instructor to provide the best methods for illustrating the context of the individual’s ability to perform their daily occupations. Using these formats, the instructor described how she was able to capture the case participants performing activities within familiar environments, and how this had helped students to observe performance deficits to help guide their clinical reasoning decisions. The instructor noted that it was possible to include contextual information in paper cases, but that it was difficult to convey this information in writing without providing too many clues as to why the person was experiencing performance problems. She reported that the live format was the most difficult method in which to provide contextual information since students were not able to see the individual performing daily occupations within their usual living environments. In her diary she stated that at times, the live-case participants were able to describe problems they were experiencing at home, but she reflected that this method did not allow students to observe specific aspects of the individual’s home environment that might be affecting the individual’s performance.

Portability and Review of Materials. The instructor commented that paper and CD-ROM formats enabled students to revisit the case studies to review specific information while completing their clinical reasoning assignments. In addition, she recognized that these methods were portable, starting that some students chose to complete the CD-ROM or paper exercises at home on their own time. In addition, she reflected that the videotaped cases offered an opportunity for students missing a session to do the case at a later time. The instructor pointed out that the live-case study, by virtue of the fact that it was a single interview conducted in the classroom setting, did not enable students to review materials once the case participant had left the room, or to do the case later. This was noted as a disadvantage by the instructor in terms of supporting student learning.

Need for Technology Experience. The instructor reported that no technology experience was required to construct the printed text and live-case formats. She acknowledged that the video format required a moderate degree of technology experience in terms of operating the video camera and editing the tape. The instructor reported that the CD-ROM format required a very high level of technology experience to prepare. In her diary she explained the experience she needed to gain in order to prepare a case for CD-ROM format. This involved filming the interview with the client including taking some contextual clips, learning how to use the Internet platform, writing and input of the clinical reasoning questions into the software, selecting pertinent video clips to be edited, and incorporating these into the CD-ROM.

Student Experience

Results of the analysis of student comments are shown in Figure 2. Again, the graph provides visual representation of student perspectives about each of the presentation modalities as identified through qualitative analysis of their comments, and supported through numeric ratings.

Student Control. Students reported the highest level of control relative to use of the CD-ROMs due to the ability to play and replay segments of the client interview or demonstration. In addition, since their responses were typed, they reported that they were able to return to previous questions and add to or change their responses after reflecting on later questions. The paper cases were identified by the students as providing a degree of control, because the client’s background information and evaluation results could be noted and reviewed as the student desired. Although the live cases provided opportunity to ask questions of the client, control over information was viewed as lower by the students, since any information that was missed could not be reviewed. Some students reported that due to this issue they lacked comprehensiveness in their notes relative to the case questions. The video format was described by the students
as providing the least amount of student control. Some students complained that since the video was played only once, it sometimes resulted in them missing key data.

**Adequacy of Information Provided.** Students commented that paper cases provided a high level of specific information relative to the case. They reported that they appreciated having evaluation and test results to examine and to be able to refer to demographic information about the client. Although personal narrative information was reported to be weak in this method, students commented that they sometimes had the benefit of reviewing self-report measures such as the Canadian Occupational Performance Measure (Law et al., 1994), which provided some insight into perceived occupational limitations and personal goals. One student commented, “It’s great to have a copy of the OT eval and try to make sense out of it, and to have the history in so much detail,” and another said, “It is nice to have the written information to refer back to when writing treatments, and knowing details about insurance, previous treatment, etc.” The live cases were identified by the students as providing the least specific information. The students described the difficulties inherent in the client being the historian. The clients frequently could not remember specifically what their occupational therapy treatment had consisted of, or confused it with other therapies.

**Insights Provided Into Client Perspective.** Many comments were written by students concerning the value in hearing the clients tell their story, and actually seeing performance difficulties first hand. In the case of a live-case study client with multiple sclerosis, one student commented that it “brought home the personal meaning of the disease.” Another reported that the live case, “was a very personal experience that allowed us to ask questions, reason, and take notes.” In contrast, although the videotape allowed direct observation of the client, some students highlighted that at times it was difficult to hear what was being said, especially in the case of a client with schizophrenia who spoke in a very low voice with little inflection. Similar issues were reported by students using the CD-ROM versions of tapes, although they recognized that they could adjust volume and replay the tapes. They recorded that the paper cases provided low personal insight into the client.

**Time Efficiency.** Students acknowledged that cases completed during class time and thus time-limited by the length of the presentation were the most efficient to complete. When large volumes of printed information were provided, as in several paper cases, some students stated they spent considerable time sorting through documentation. Many comments were received about the length of time required to complete the CD-ROM cases. Even the students who indicated that they had no problems with the technology found them to be time-consuming due to the need to obtain an online Internet account, log in, and play the many short movies. Other students complained that due to system crashes or the need to find a computer with sufficient memory to do these exercises, they took several hours to complete.
Technical Ease. As reflected in the students’ comments concerning time efficiency, CD-ROM use was difficult for some of them. The majority of students said that use of paper cases was technically very easy. In contrast, they described problems concerning the use of videotapes including not being able to hear (captioning was not provided) and see client expression adequately, and not being able to get the necessary information in the sometimes quick presentation on screen. One student commented, “taking notes is necessary and may conflict with attending to the video.” The live cases resulted in few comments in this regard, but some indicated that note taking while attending to the client was difficult.

Convenience. Accessibility of the CD-ROM and paper cases was mentioned by many of the students as being the most convenient case modality as they could complete the cases during class time, or at a later time if desired. In addition, several noted that CD-ROM cases could be completed at home as long as they had adequate computer hardware and a high-speed Internet connection. Several students commented that they liked the ability to type the exercise when it was presented online and to make changes in responses as they reflected. It seems the live cases had the drawback of being a one-shot event which, if missed, could not be done later.

Impact on Learning

Review of the graded assignment sheets for each student revealed that specific learning objectives were met for each case, with students who completed the program successfully (n = 1 unsuccessful student) identifying at least 80% of the key elements in the individual cases. The successful grades indicate that students attained a basic level of competency in clinical reasoning. There were no scoring trends observed that could be attributed to the case presentation modality.

Student numerical ratings were used to summarize their impressions of the modalities as instructional tools, and to elicit feedback in specific areas of interest to the researchers. Overall, ratings showed a “halo” effect, in that the overall mean rating for each method was consistent with the mean responses for the individual questions for that method. Students preferred the live cases, followed by paper, whereas the two recorded client methods, videotape and CD-ROM, received the lowest ratings. All ratings were in the positive range overall with respect to adequacy of information provided, usefulness of the exercise as a learning experience, the degree to which the exercise prompted reflection and independent information processing, and contributions of the exercise to clinical decision making. In terms of their overall rating of the experience (Table 2) and their sense that the modality used had provided unique learning benefits, scores were again in the positive range. The lowest scores overall were related to the CD-ROM cases. The large standard deviation in the responses to questions regarding this method reveals the discrepancy in views among students. The scores given to this modality were generally positive, but very low scores were provided by a few students. Review of the comments on individual rating sheets indicated that those students experienced technical difficulties completing the CD-ROM cases, and were generally unfavorable to all aspects of the method.

Discussion

Results of the present study indicate that a variety of case presentation modalities can be used successfully in courses designed to build clinical reasoning skills. Review of the existing literature revealed that no other studies addressing clinical reasoning from an occupational therapy perspective have captured both instructor and student perspectives with respect to the potential contributions of various case presentation modalities. Qualitative analysis revealed several advantages and disadvantages relative to educational goal achievement and to practical aspects of administration. The modality used appeared to be less influential than the strengths of the overall instructional format, along with the amount and type of information provided.

Differences in the experience of both students and instructor relative to the four presentation methods used here suggest that there are pedagogical factors to consider in choosing case formats. The choice of modality by instructors should be based on several considerations, including the aspects of clinical reasoning that are being targeted through the exercise, the level and specificity of the instructional content, and practical considerations related to case development and presentation. Ease of instructional presentation and control over key learning points are major considerations. Different students may be more comfortable and adept with certain formats than with others.

The success of a live case in this study was highly dependent on the nature of the case presentation, and was unpredictable at best. For example, the instructor noted

### Table 2. Student Mean Ratings for Each Case Modality Based on Combined Responses to Five Scaled Questions (Scale Ranged From 1, “Low” to 5 “High”)

<table>
<thead>
<tr>
<th>Case Presentation Modality</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>4.36</td>
<td>.36</td>
</tr>
<tr>
<td>Paper</td>
<td>4.25</td>
<td>.40</td>
</tr>
<tr>
<td>Videotaped</td>
<td>4.20</td>
<td>.41</td>
</tr>
<tr>
<td>CD-ROM</td>
<td>3.80</td>
<td>.71</td>
</tr>
</tbody>
</table>

that both of the live cases in the 3rd year of the study were subjects who presented with fewer performance problems (despite prior review and coaching), therefore providing fewer challenges than more complex cases presented through other modalities. If live clients are desired for specific curricular goals, simulated patients (either well persons who learn a role, or persons with disabilities who standardize the information they provide) are likely to greatly increase instructor control (Barrows, 1993). Use of recorded (on paper or on video) client information also increases instructor control over the case, with the additional advantage of portability and opportunity for repetition.

Recorded case presentations, whether presented on tape or electronically, include their own set of advantages and drawbacks from a student perspective. Cross (1981) described three categories of barriers to learning for adults, one of which relates to institutional factors such as time and location of learning. Provision of recorded cases helps overcome these barriers by offering flexibility in time and location of viewing. Such cases can be completed individually or in a live or virtual group setting depending on course structure and facilities. As in the Kamin et al. (2002) study, students in this study reported that Web-based cases were more time consuming. Although technical difficulties associated with the CD-ROM version may seem surmountable as more students gain proficiency with computer technology, in our experience, problems persist for a minority of students, sometimes due to the use of old equipment or dial-up Internet connections. This issue needs to be resolved from a learner satisfaction perspective, but electronic presentation was not necessarily a barrier to interpretation of the key elements of the case in either study. Other features, such as the ability to replay segments of the case, may be beneficial to concept formation.

An additional challenge is the design of the cases themselves. Merseth (1991) discusses difficulties inherent in case design, noting that cases can draw on multiple intellectual structures, including conceptual, pedagogical, social, and cognitive. Hunt (1951), in one of his original publications on the case method, warned of the “narrow dividing line” that exists between stating all the facts of a case and providing enough information that learners are required to deduce information, as they would in a true life situation. He states, “The case must be complete enough, and precise enough, to permit learners to think about the problem, and thus to learn to think” (p. 182). Students must have sufficient information, but still have opportunity to make choices and problem solve.

Cases used in this study were authentic clinical cases representing a wide range of performance area deficits, which presented limitations from a research perspective in that it was difficult to ensure consistency in the level of clinical reasoning required across cases. From an instructional perspective, using authentic cases ensures that students are exposed to experiences they are likely to face in fieldwork and professional practice and adds to the richness of the contextual and intrapersonal details of the case. Practice in developing cases and grading them to be consistent with student levels of learning readiness improves case quality over time and is an issue meriting further investigation.

Lessons learned from this study have suggested a framework for improved clinical reasoning case presentation. Videotaped clients can be presented in such a way that students observe interviews with a client and significant others, therapist interviews, and tasks performed in context (i.e., in the home, nursing home, hospital, or workplace, as appropriate). Health record notes and evaluation data could also be provided to produce a comprehensive case picture. This approach may represent the best of all worlds, combining the best features of each method. Speech interpretation problems with videotapes can be eliminated through use of open captioning. Cases presented on CD-ROM over the Internet, when used on a more regular basis, would likely build a level of expertise with that technology. Indeed, in our experience, student comfort level grew with each exposure to this format. Internet-based cases could be used to expand case assignments in other ways, such as encouraging students to seek additional information about the case via the World Wide Web. Internet-based cases can also be enhanced through the use of either synchronous (e.g., chat room) or asynchronous (e.g., bulletin board) virtual discussion groups when used in distance learning formats.

Overall, it is likely that the case analysis assignment framework employed in this course was the trigger in terms of guiding students through each level of clinical reasoning. The case itself appears to serve as a medium for students to “learn by doing” (Schön, 1987) through provision of a practice-related set of unique problems to be addressed using a structured reasoning process. Although live cases present unquestioned value, instructors must carefully consider the practicalities of this and other methods. If case studies are comprehensive and provide the information necessary to build hypotheses and problem solve, clinical reasoning processes will likely be triggered regardless of the presentation modality in use.

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Appendix

Clinical Reasoning Case Study Assignment Format

Scientific Reasoning
(1) What is the nature of the illness/injury/developmental problem, and what are common disabilities resulting from this condition?
(2) What are the typical performance skills (motor, process, and communication/interaction) and patterns (habits, routines, and roles) likely to be affected by this condition?
(3) What are typical contextual factors and activity demands that may affect performance for the person in this case?
(4) What theories and research are available to guide assessment and intervention for this illness/injury/developmental problem?

Narrative Reasoning
(1) What occupations and roles have been, and are, important to this person?
(2) What occupations are now difficult for this person to complete and why?

Procedural Reasoning—Part A
Provide a brief synopsis of occupational therapy involvement with this person as presented in the case. Describe the problems identified by the therapist, the evaluations used, and the treatments planned.

Procedural Reasoning—Part B
(1) List the occupational therapy problems and their corresponding goals as you would write them (use the occupational therapy practice framework domain and process terminology) and be sure your goals are written as measurable objectives.
(2) List in order of priority the occupational therapy evaluations you believe that you might use with this person if you were his or her occupational therapist. Justify why you would use these evaluations.
(3) Outline in detail the first three treatment sessions you would implement in order to meet the goals listed in (1) above. Identify the frame of reference of practice model that relate to your stated treatment.

Pragmatic Reasoning
Identify constraints, challenges, resources, and strengths that might affect the type of services you are able to provide to this person.

Ethical Reasoning
(1) What are the benefits and risks to the person related to service provision and do the benefits warrant the risks?
(2) In the face of limited time and resources, what is the fairest way to prioritize care?
(3) What factors are important to document in this case in order to secure maximum reimbursement?

References
Neistadt, M. E., & Smith, R. E. (1997). Teaching diagnostic reasoning: Using a classroom-as-clinic methodology with a contribution from a Utah State University project funded through the Fund for the Improvement of Postsecondary Education. Part of this study was previously presented at the 2003 Annual Conference of the American Occupational Therapy Association.


