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Using Simulation and Critical Thinking in Speech-Language Pathology: A University Case Study

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Abstract

Education is changing. Virtual learning is now a common occurrence. Along with this change, more and more virtual learning tools are being used in the educational setting. The American Speech-Language-Hearing Association (ASHA) has recognized this change and has modified certification standards to include clinical simulation experiences in graduate speech-language training programs. Along with this modification, critical thinking skills are an expected goal, not only in face-to-face experiences, but also in simulation experiences. Educators need to meet this expectation to ensure that future speech-language pathologists are fully prepared to make sound decisions within the clinical setting. Educators may benefit from the following suggestions in regards to the use of critical thinking skills within a clinical simulation experience.

Keywords: clinical simulation, clinical hours, critical thinking skills, de-briefing, ASHA Standards, certification process, evidence-based practice

Revision of 2014 Standards for Certificate of Clinical Competence

It is well known within the speech-language pathology profession that Communication Sciences and Disorders programs across the United States often struggle with providing their graduate students with the required clinical hours needed for ASHA certification (Sheepway, Lincoln, & Togher, 2011). In fact, Mancinelli and Amster (2015) have stated that the one-to-one supervision model is impractical. Because of this national problem, the Council for Clinical Certification in Audiology and Speech-Language Pathology (CFCC) has revised the 2014 Standards for the Certificate of Clinical Competence in Speech-Language Pathology. This revision, adopted in 2016, now includes the use of clinical simulation (CS) as part of Standard V-B. This standard requires students to demonstrate competency in three clinical skill areas including evaluation, intervention, and interaction/personal qualities, and these skills need to be applicable across nine major communication areas. In the past, the skills could be developed and demonstrated primarily through direct clinician/client contact; however, now, students can obtain up to 75 hours of direct clinical contact through the use of CS (ASHA, 2017). The CFCC has stated that CS would be an additional tool available to students to further develop their clinical knowledge and skills by allowing them to obtain a greater variety of supervised clinical experiences with different populations regardless of the students' physical location.

ASHA has stated that these clinical simulations can include a great variety of acceptable CS forms. For example, the CFCC has specifically identified that the CS experiences can include standardized patients, virtual patients, digitized mannequins, immersive reality, task trainers, computer-based interactive experiences, and other simulation technologies (ASHA, 2017). One type of CS experience, using standardized patients, involves using actors and actresses who are trained to act like real patients with various symptoms (Williams, Dudding, & Ondo, 2013). These

patients follow specific scripts and graduate speech-language pathology students are expected to complete evaluations on the patients to identify their difficulties. Zraick (2012) has reported that the use of standardized patients in speech-language pathology is limited. He recommended that speech-language-hearing professionals expand their use of this modality. Some studies have now begun in this area (Hill, Davidson, & Theodoras, 2013). CS can also include virtual patients, who are digital/animated figures that an individual can create within a virtual environment. This puppet-like figure can be used by students to target specific learning objectives by manipulating and interacting with the figure (i.e., Second Life patients). James Madison University is one example of higher education that has embraced Second Life to help speech-language pathology students learn about inter-professional collaboration (Vieth, 2015). Digitized mannequins are another option (Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005; Savoldelli, Naik, Park, Joo, Chow, & Hamstra, 2006). These mannequins are real physical simulators that can be programed to exhibit many clinical symptoms, and faculty are able to control the outcomes of these devices from a lab computer in another location. Also, immersive reality simulations, which involve creating actual environments by using projectors and other objects, can be used to simulate a specific environment and specific situation (Williams, 2006). In addition, many other types of simulation experiences can be utilized such as developing a variety of computer-based patients for students to learn from in a virtual "clinical" situation (i.e., SimuCase).

The overall purpose of clinical simulations is to provide learners with an avenue to discover specific processes or principles through an actual experiential learning environment. The possible goals of CS in learning various clinical skills in speech-language pathology are numerous including (a) learning about interviewing skills, (b) assessment skills, (c) clinical decision-making skills, and (d) intervention skills (Williams et al., 2013). Based on evidence-based practice

principles and critical thinking skills, this article will discuss the essential components of CS, ASHA's clinical learning goals for CS, and information will be shared about how a Kansas university has integrated these principles and skills into a CS experience to support the student goals proposed by ASHA.

Evidence Supporting Clinical Simulations

"Evidence-based practice" (EBP) is an essential component in the field of speech-language pathology/audiology. It can be promoted through different clinical avenues such as a traditional clinic model or using case studies (McCabe, Purcell, Baker, Madill, & Trembath, 2009). Using EBP is critical since it helps professionals make sound and appropriate decisions for their clients within the clinical realm. With the addition of CS as a clinical learning option, a professional must ask, "What is the evidence for using clinical simulations versus using a traditional classroom teaching model? Does it work?"

In one study by Squire, Barnett, Grant, and Higginbotham (2004), the pedagogical potential of using a 3D simulation game was investigated to see if it helped middle school science students learn about electromagnetic forces. The researchers used pre- and post-testing with control groups and used a combination of both quantitative and qualitative methods to identify patterns of the students' learning. A traditional interactive lecture format including experiments, was used for the control group. The experimental group format consisted primarily of playing the simulation game along with some additional teacher interaction and handing out of supplemental information to students. The results of a two-way ANOVA revealed a significant difference between the experimental and the control groups' performances. Participants in the control group improved their understanding of electromagnetic concepts by 15 percent while those students in the experimental group (who played the simulation game) showed a 28 percent improvement in their

understanding of the concepts. In the same study, Squire et al. (2004) observed that there was a critical need for more studies related to CS to see how they compared to a more traditional model of learning.

Clark Aldrich (2009) (a well-known expert in the field of simulation) reported that "the early evidence, both rigorous and anecdotal, seems to strongly suggest that highly interactive virtual learning is a permanent transformation of the educational landscape, coming out of its somewhat awkward adolescence and entering early maturity" (Aldrich, 2009, p. 4). Aldrich claims that there are at least three strong arguments explaining why highly interactive virtual environments work. The first argument is that virtual games are a more natural way to learn than traditional classrooms so they could easily be used as a learning tool. A second argument is that we have been learning through games since the very beginning of man. He purported that knowledge is only useful in some sort of context, and CS can provide this context in an environment similar to which it may ultimately be used. The third argument he reported is that participation with content is necessary for learning to take place. He added "One can't learn to ride a bicycle… from a great lecture" (p. 6). Aldrich's global message was that the education of "Learning to DO" is just as important as "Learning to KNOW."

A very current study by Hayden, Smiley, Alexander, Kardong-Edgen, and Jeffries (2014) addressed the need expressed earlier by Squire et al. (2004). The study was a randomized, longitudinal study involving 650 nursing students. It compared a traditional clinical training program to a training program which contained simulation experiences. The results of this study indicated that there weren't any significant differences between the knowledge, clinical competency, and critical thinking abilities of the students who participated in a traditional type of

training program vs those students who completed 25% or 50% of their clinical hours using a simulation format.

During the last decade, the exploration of simulation-based education has continued to grow, especially in the medical field (Boese, Borum, Cato, Gonzalez, Jones, Kennedy, & Resse, 2013; Decker, Fey, Sideras, Caballero, Rockstraw, Boese, & Borum, 2013; Hayden et al., 2014; Singh, Kalani, Acosta-Torres, Ahmadieh, Loya, & Ganju, 2013). Although some studies have also been completed in the area of speech-language pathology (Hill, Davidson, McAllister, Wright, & Theodoros, 2014; Hill et al., 2013; Jansen, 2014; Sheepway et al., 2011), currently, clinical activities involving simulation have not been fully integrated into the field of speech-language pathology and audiology (Jansen, 2014).

Essential Components of Clinical Simulations

In addition to participating in the actual clinical simulation experience, some researchers have reported that the CS experience should also include certain critical components such as a *Pre-Brief Session*, an *Introduction Session*, and a *De-Brief Session* (Williams et al., 2013). According to Williams and colleagues, the *Pre-Brief Session* should include (a) the purpose of the CS, (b) the goals and learning objectives of the experience, (c) background information on the client, (d) a tie to previous clinical experience, (e) an attempt to build student motivation, and (f) a discussion of any ground rules, time frames, and/or expectations. These researchers added that the *Introduction Session* should include (a) technical aspects such as reporting the learning format, (b) the software interface, (c) an explanation of any critical elements of the simulation, and (d) it should prepare students for any frustrating moments they might encounter.

Many researchers have investigated the value and importance of the *De-Brief Session* or *"*debriefing*"* as a CS component (Alrich, 2009; Fanning & Gaba, 2007; Issenberg et al., 2005;

Rall, Manser, & Howard, 2000; Savoldelli et al., 2006). Fanning and Gaba (2007) have reported that "debriefing" is a term that has been around for a long time, and its value has been identified since the beginning of its use. For example, these researchers have reported that the process of "debriefing" has historical roots in the military, and it was originally used as a therapeutic approach by individuals returning home from a mission. The individuals from the military described what they had experienced, talked about the actions that took place, and they developed new strategies from their learning experiences. Furthermore, the researchers reported a second origin for "debriefing," which comes from the field of experimental psychology. Participants, who have been deceived in some way (because of their role in a study) were debriefed to eliminate any negative consequences which were acquired from participation in the study. The debriefing process included (a) a discussion of the event, (b) reflection of that event, and (c) assimilation activities to support this elimination process.

Williams et al. (2013) agree that the feedback/debriefing component is very important. These researchers completed a study involving the role of feedback in a CS experience. Two universities participated in this study and a virtual human simulation experience was used to compare the learning that took place in two of their graduate speech-language pathology courses. Students in the graduate course at university "A" worked independently and had limited faculty support during their experience. Students in the graduate course at university "B" had strong faculty support during their experience; the faculty used a variety of facilitation techniques during the experience. Students who received faculty feedback and support performed much higher on the virtual human simulation experience than the other group, revealing the significance of faculty feedback during or after the experience.

Many researchers believe that debriefing is of prime importance to the CS learning process. Issenberg et al. (2005) have stated that it is the MOST important variable of the simulation experience to promote student learning. Fanning and Gaba (2007) conducted a systematic review of the CS literature, and after completing their review, they agreed with Issenberg et al. Moreover, Savoldelli et al. (2006) also investigated the debriefing process. They reported that individuals who do not participate in a debriefing process actually do not show improvements in their performance and do not transfer learning from their experiences. Kelly, Hager, and Gallagher (2014) asked 150 nursing students to rate 11 simulation components in regards to "what matters most" in the effectiveness of simulations for applying clinical judgement, and the highest ranking component was facilitated debriefing followed by post simulation reflection and guidance by the academic. In conclusion, current investigators concur with past researchers about the prime importance of facilitated debriefing to learning (Decker et al., 2013; Lusk & Fater, 2013; Mariani, Cantrell, Meakim, Prieto, & Dreifuerst, 2012).

ASHA Clinical Simulation Supervision

ASHA has stated that CS supervision can take on many forms including the process of debriefing. They have added that debriefing can be "synchronous" (occur during the experience) or "asynchronous" (occur at a different time than the experience). Also, the percentage of CS supervision should include 25% of the total CS patient clock-hour time. It can include face-to-face discussion, self-reflection with feedback, and/or written self-evaluation with feedback (ASHA, 2017).

Goal expectations for CS have also been reported by ASHA. "CS experiences should allow students to (a) interpret, integrate, synthesize core concepts and knowledge; (b) demonstrate appropriate professional and clinical skills; and (c) incorporate critical thinking and decision-

making skills while engaged in identification, evaluation, diagnosis, planning, implementation, and/or intervention" (ASHA, 2017). These goals clearly identify the need to incorporate critical thinking skills into the CS process. This fact logically leads professionals in speech-language pathology to ask which critical thinking skills are essential to the clinical process, and how can I include these skills within the debriefing process of a CS?

Critical Thinking and Evidence-Based Practice

Kamhi (2011), a prominent professional in the field of speech-language pathology, has expressed concerns that speech-language clinicians make clinical decisions at an "individual level" rather than at a scientific "community level" where decisions can undergo scrutiny and be questioned. He believes that we all make mistakes but, without some type of check on our decision-making, clinicians may be more vulnerable to potentially making more unbalanced decisions during the decision-making process. He believes that clinicians' thinking may be more influenced by their personal beliefs and thinking styles rather than in a more objective manner. In addition, he believes that evidenced-based practice (EBP) may help, but, ultimately, critical thinking skills need to be used on a daily basis to complement this evidence. Finn (2011) agrees with Kamhi and believes that the ability to think critically is a core skill that clinicians need to develop early on in their career and to use routinely in decision-making. After reviewing the critical thinking literature, Finn has identified a specific set of skills that he thinks speech-language clinicians need to use in their clinical practice. This list includes the use of interpretative skills, evaluative skills, and metacognitive skills. Within these three areas Finn has also described three steps for each set of skills (Table 1).

Table 1. Essential Critical Thinking Skills For Clinical Decision-Making (Finn, 2011)

Skill Type

INTERPRETATION
Step 1: Identify the argument/problem
Step 2: Identify reasons to support it
Step 3: Assess the information for clarity
EVALUATION
Step 1: How acceptable is the argument
Step 2: Examine quality of evidence
Step 3: Accept overall quality
METACOGNITIVE
Step 1: Do you understand clearly and completely what the issues are
Step 2: Check own biases and assumptions relative to argument
Step 3: Deliberately apply/ monitor thinking strategies for effectiveness

Case Study: A Western Kansas University Explores Clinical Simulation

Since the 2014 Certification Standards were revised last year to include the use of CS for helping students gain clinical hours, one Communications Sciences and Disorders (CSD) Department in Kansas moved forward quickly to explore this new opportunity. The department began exploring this possibility after the revision was adopted in March, 2016, and they immediately began investigating computer-based simulation programs. An appropriate choice fitting the needs of their students was found and grant opportunities were explored. An internal grant was applied for and was awarded by the university to obtain program licenses for all 21 graduate students who were enrolled in the CSD department and for all faculty.

In June, 2016, the CSD department explored the CS format by presenting one of the simulation case studies in a learning mode to graduate students in a summer speech sound disorders (SSD) course. The instructor presented a phonology case to the entire class and, during each step of the

process, thoughts were shared aloud by students. The instructor provided general feedback guidance regarding the case simulation as students discussed their thoughts and made clinical decisions. Upon completion of the CS, students wrote reflection papers about their experiences. The reflection paper comments were then separated into three comment groups including *positive/neutral, reflections,* and *suggestions.* The results included 24 positive/neutral comments, 11 reflective comments, and 14 suggestions with some comments being repeated more than once.

The *positive/neutral* comments included various general comments and references to how the simulation was set up. They included the following paraphrased comments: (a) the program scored student progress through appropriateness of responses and time efficacy; (b) it included extra materials/reports to review; (c) the get-started video was easy to follow; (d) the simulation contained formulated questions; (e) students were able to complete the program more than once; (f) the CS was easy to navigate; (g) the program provided comments so you knew if you were making correct decisions; (h) the CS allowed you to practice your clinical skills in a less stressful environment; (i) it allowed you to work with a variety of disorders; (j) it built confidence in decision-making; (k) it provided practice in planning evaluations, connecting with concepts, principles, and theories of real-life experiences; and (l) the reports reflected how they might be written in a real-life evaluation.

The *reflective* comments primarily referenced items that may be lacking. They included the following paraphrased comments: (a) the observation of lack of a counseling component; (b) the thought that the experience may not have taken into account the amount of experience the clinician had; (c) a comment that real test administration is much longer than it was in the CS; (d) the idea that the case study section lacked more complete information about a client which you would receive with real life cases; (e) the collaborators who were interviewed represented an ideal world,

not a real world; (f) the idea that more overall feedback would have been useful for each section; and (e) the thought that the experience didn't take into account a client's unpredictability.

The majority of the students had two main *suggestion* comments. The most common *suggestion* was that students believed the CS would be most beneficial to undergraduates just learning about clinical skills. The graduate students further explained that the undergraduate students would be able to develop their clinical skills prior to interacting with actual clients. The second most common *suggestion* was concerned with critical thinking skills. Students thought that more intense critical thinking should be necessary when choosing the right answers to the questions. One student thought that *twists* should be thrown into the evaluations, forcing students to think critically and allowing them to prepare to react appropriately in a sometimes non-ideal world. Other comments included suggestions for more detailed scoring and maybe varied levels of scoring and practice.

Incorporating Critical Thinking Goals into CS Experiences

Researchers have identified that graduate students in speech-language-hearing programs need to learn to think critically in their clinical programs to support appropriate decision-making when they are in practice (Finn, 2011; Kamhi, 2011). With the addition of the option to obtain CS hours, ASHA has clearly stated that these hours should involve critical thinking skills (ASHA, 2017). Moreover, typical speech and language pathology graduate students at one university also identified a need to use more intense critical thinking skills in conjunction with the completion of a CS experience. Since the debriefing portion of a CS experience is critical to the learning process of this type (Issenberg et al., 2005), it is logical that these skills be incorporated within the de-briefing component. A prebriefing component is also needed to set the stage for the learning experience.

Pre-Brief Session

The CS supervisor in this case study included the use of Finn's critical thinking skills as part of the SSD class and a goal pertaining to these skills was included and reviewed in the pre-briefing process before the case study simulation was begun. In addition to reviewing the major goal, other pre-briefing key points were also addressed during this time such as (a) stating the purpose of the CS, (b) discussing the specific learner objectives, (c) describing learner assessment/evaluations, (d) discussing background information, (e) identifying prior knowledge information, and (f) sharing the expectations of the experience. Examples of this Pre-Brief session are listed below.

Purpose of Simulation Activity. The purpose of the simulation should include the main reason you are completing the CS activity. Example of a purpose: To expose students to the clinical thought process involved in a phonological disorder case study.

Clinical Goal(s). The overall goal is the final target you would like your students to attain. Example of a critical thinking goal: The CSD students will pick an appropriate, evidence-based treatment to fit the needs of a speech-disordered client as demonstrated by a written summarization of the critical thinking process used when walking through the decision-making process of this simulation.

Learning Objective(s). The specific learning objectives lead up to the accomplishment of the main overall goal. Example of learning objectives: **(**a) the CSD student will identify essential case history information needed in a speech sound disorder clinical case, (b) the CSD student will identify key personnel necessary to consult with during a speech sound disorder case, (c) the CSD student will identify formal and informal assessments necessary to gain a complete picture of a client's phonological strengths and weaknesses, and (d) the CSD student will identify beginning treatment(s) that would best support the client's speech disorder.

Learner Assessment/Evaluation(s). Performance for this case study was earning 90% or above on the case study questions to gain clinical hours. Additionally, the students were told that they would complete written self-reflections of Finn's (2011) questions to assess their critical thinking skills. Other evaluations could also be included such as having students specifically report *whether* they have accomplished the various learning objectives, and if they have, they could specify *how* those objectives were attained. Also, the CS supervisor could review and rate the reflections according to how strong the students' reasoning was in regards to the use of those critical thinking skills and give students a rating of: "Not Evident," "Emerging Skills," "Developing Skills," or "Mastery of Skills."

Background Information. Specific information about the client was discussed before completing the simulation. For example, the specific background information included the age of client, why the client was referred and by whom, any detailed information given by caregivers such as specific symptoms/problems, and any effects of their difficulties whether social, academic, personal, etc. The client in this case study was a preschool girl who was difficult to understand and was referred by her teacher. Her peers had difficulty understanding her, and her unintelligibility caused the child to be frustrated.

Prior Clinical Knowledge/Experiences. The students reviewed any prior theoretical or clinical knowledge they had about speech sound disorders. Questions you might ask could include the following choices. Does the student know the difference between an articulation disorder and a phonological disorder? Does the student know the importance of hearing in a speech sound disorders' case? Does the student know how unintelligible speech can affect the evaluation process? Does the student know what to specifically look for in a speech evaluation? Does the student know all the areas of phonology that should be assessed during an evaluation? Can the

student identify specific speech error patterns? What specific patterns might best fit various types of treatments?

Expectations of Experience. The expectations for a particular CS are reviewed for that particular experience. For example, for this case study simulation, the users were expected to ask a patient questions that were not repetitive; but they needed to be strong, in regards to importance of clinical knowledge for the case. Also, the students needed to be efficient during the actual performance of the simulation or points would be subtracted from their score. The expectations of a CS experience are comparable to the rules for participating effectively during the CS. In addition, other expectations might include various motivational factors. For example, students might be motivated by specific game elements in the experience such as seeing a beautiful campus in a virtual world or receiving an actual reward such as obtaining a treasure, etc. (Aldrich, 2009).

De-Brief Session

During the de-briefing process, the CS supervisor and the students participated in a *Global Overview* of the experience as the first step of the debriefing process (Fanning & Gaba, 2007). This was followed by the second step which was a *Critical Thinking Analysis* of student decisions by completing verbal and written "walk-throughs" using the essential critical thinking skills identified by Finn (2011). Specific critical thinking questions and student example answers for each of these questions are included in the critical thinking section.

The Global Overview section of the De-Brief Session consisted of three major components: description of the experience, reflection of the experience, and comparison of the experience to real-life or generalization. This process was completed to provide a holistic framework to the experience and to increase awareness of how this experience might fit into a students' personal knowledge and professional experiences.

Description of Experience. This specific component directly helps students think about what they have learned and helps them become aware of the impact the CS may have had on their knowledge base. For example, one student from the case study stated that the CS activity and discussion gave them a better understanding of red flags to listen for in a case history, how to choose assessments, and how to prioritize targets. The student also thought that the de-briefing discussion helped to build more bridges from assessment to diagnosis, and from diagnosis to realistic planning. In addition, the student reported that there were multiple times when group discussion helped to sway a decision made during the experience so it was helpful to hear others' opinions.

Reflection of Experience. This component includes sharing personal feelings or different points of view from participants. One particular student commented that she thought the CS was a valuable experience. She added that if she had been asked to do the experience alone, she would have been more confused about the "whys" of the decisions and she would have failed to gain a more holistic view of the case at hand. Furthermore, she added that the discussion during the activity was invaluable, and that she thought the discussion was crucial in order to think critically, and also, to hear not only from classmates, but also from the CS Supervisor. This agrees with past research that the expertise of the instructor is paramount in CS activities (Jansen, 2015).

Comparisons to Real-life and Generalization of Experience. This component was designed to compare the simulation experience to real-life situations to see if the experience had any similarities or differences to actual real clinical situations. Many of the students did see a connection. One student stated that speech sound disorders are a common occurrence in children receiving speech services; so she thought the CS was a realistic lesson of how an evaluation really might look.

The *Critical Thinking Analysis* section of the De-Brief Session (as reported earlier in Table 1 by Finn, 2011) consisted of three main components: Interpretation, Evaluation, and Metacognition. Each of those components have three thinking steps under each of the components. The *interpretation* component was designed to help students to clearly define the issues, to objectively analyze the evidence to support various issues, and to analyze whether the issue(s) is/are clearly understandable. The *evaluation* component was designed to help students decide whether the reasoning is appropriate, examine the quality of the evidence, and to make an appropriate recommendation based on those facts. The *metacognition* component was designed to help students examine their own thinking and decide whether they truly understand the issue. It also helps a student review and consciously evaluate whether they have any biases with an issue or if they have any thinking errors (Kida, 2006) clouding their judgment. In addition, it helps students deliberately put strategies in place to keep thinking errors "in check." Student examples are listed below under each of the components for each of the steps.

Interpretation. The first step was to identify the actual argument or problem. You can prompt this identification by having students identify relevant information and embedded uncertainties while using prompts such as "Explain why _____ can't be known with certainty" (Wolcott & Lynch, 2001, p. 6). One student explained that it was hard to determine the exact cause of the child's phonological disorder in the CS because she felt that there are so many areas of phonology to look at such as the phonetic inventory, the phonotactics of the client, the phonemic contrasts used, the use of phonological processes to avoid certain constraints, and also possible prosody difficulties.

A second step was to determine evidence-based reasons to support an issue. To help with this step you might use a prompt such as "Sort pieces of information to identify reasons and evidence that

support a given solution to_____" (Wolcott & Lynch, 2001, p. 6). One student in this case study reported that it was important to pick a treatment option that has strong evidence. She also added that she originally had wanted to pick a treatment approach just because she was familiar with it and she realized that she wouldn't be making a good decision.

A third step was to assess the clarity of an issue. A prompt that might help support clear thinking would be "Create a list of different points of view related to _____" (Wolcott & Lynch, 2001, p. 6). One student from the SSD class stated that an article she had read about concerning a particular phonological approach was very clearly explained; so she felt she was able to clearly interpret the article from the beginning to the end.

Evaluation. The first step for this component was to check for acceptable reasoning. In other words, really look at the facts, and articulate assumptions and reasoning associated with a researchers' or practioners' point of view. You might prompt this thinking process with "Compare and contrast the arguments related to two or more solutions to _____" (Wolcott & Lynch, 2001, p. 6). One student who had completed the CS experience informed her classmates that when she had looked through the evidence, she thought it was important to only accept information *lightly* in an article, even if the article was written by a prominent person, and to really look through the facts before accepting the information they have concluded.

A second step under evaluation was to examine the quality of evidence. One prompt might be "Interpret and discuss the quality of evidence related to _____" (Wolcott & Lynch, 2001, p. 6). One student reported that one of her articles was a single subject design and there was no control added to it. She also said that she needed to see how each of the variables contributed to the total results in the study and that seeing this was important to determine the overall quality of the article.

A third step was to accept a recommendation or consider any alternative decisions. This step should be completed after thorough analysis of the evidence and after prioritizing the factors to consider. A prompt might be "Explain how you prioritized issues in reaching a solution to ___" (Wolcott & Lynch, 2001, p. 6). In preparation for this decision-making step, one student reported that she analyzed both the strengths and weaknesses of an issue and determined that her article was high quality first before prioritizing and weighing the important factors.

Metacognition. This component was designed to critically analyze your own thinking. The first step in this section involved checking whether you clearly and/or completely understand the issue(s) at hand. A prompt might be "Prepare and defend a solution to _____" (Wolcott & Lynch, 2001, p. 6). Defending a certain solution would help a student determine if they have thoroughly thought through a particular solution. One student who completed the CS clearly understood the issue/goal of the CS; she reported that the issue was determining what treatment approaches are actually working with this type of disorder.

The second step was to check for your own bias/assumptions and thinking errors. Students need to consciously explore thoughts they have in regards to the current issue or problem. A useful prompt to elicit metacognitive thinking might be "Identify and discuss the implications of your own experiences and preferences for how you think about _____" (Wolcott & Lynch, 2001, p. 6). One student admitted that she did not want a particular treatment to be found effective because of her own bias against the use of game-like simulation tools.

The third step of the metacognition component was to deliberately apply thinking strategies in order to support the most effective evaluation of the issue. This involves actually identifying a thinking error and taking steps to actively trying to prevent this error from affecting your decision. A prompt might be "Describe the limitations of your proposed solution to _____" (Wolcott &

Lynch, 2001, p. 6). One student reported that one of her thinking errors was that she tends to put more weight on an author's stories or perceptions than she does on the statistics of an article. So, she decided, in an attempt to avoid this error, that she would spend more time analyzing the results section and the statistics rather than the interpretive sections such as the discussion and conclusion so that she could make a more objective decision about the article.

Summary

The use of virtual classes and distance learning is rapidly on the rise at our universities. More and more universities are looking for alternatives to traditional face-to-face learning. Many professions have recognized this need and are currently using alternative ways of learning in business and in educational settings. ASHA has also recognized the value of graduate students gaining clinical hours in alternative ways rather than exclusively gaining these hours in face-to-face clinical experiences. Recently ASHA has modified the clinical certification requirements so they are more flexible and so students can gain up to 75 hours of CS hours. This helps relieve the burden of CSD programs in obtaining additional face-to-face clinical sites for students and it provides experiences that a student may not have otherwise.

A Kansas CSD department at one university has implemented the use of a computer-based program in their department to expose their graduate students to simulated experiences and to help their students gain valuable clinical experiences with a variety of different cases. The reaction from students in using CS as an alternative learning opportunity has been very positive and it has increased the department's ability to provide more hours for their students. Nationally, this ASHA modification to the Standards will help solve a growing problem within universities in physically providing all the required clinical hours for ASHA certification.

Also, the new ASHA requirements state that critical thinking skills need to be included within the CS activities. Researchers in the field have voiced concerns (Finn, 2011; Kamhi, 2011) that CSD students may not routinely use their critical thinking skills during their decision-making and "checks" on their clinical decisions are not completed at an individual level. Programs in speech-language pathology, therefore, need to deliberately address critical thinking skills not only in face-to-face experiences but also in virtual experiences as well. In an attempt to directly address these skills, a "walk through" was added to the students' De-Brief Session to check the students' thought processes when making decisions. The student comments that were obtained, provided insight into students' individual reasoning processes. In conclusion, simulations activities add a valuable tool to our educational landscape; however, as faculty guide their students through this landscape, educators need to support future critical thinkers to help ensure that clients receive the most appropriate services to best fit their unique speech and language needs.

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