# An Evidence-Based Guide to Clinical Instruction in Audiology

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**Abstract**

**Background:** A significant portion of the AuD curriculum occurs in clinical settings outside the classroom. Expert clinicians, employed within and outside of the university, are called upon to provide this clinical education. Most have had little or no formal training in clinical teaching yet face pedagogical and logistical challenges when simultaneously providing clinical service and teaching. Training to provide optimal methods and approaches to clinical instruction should be based on research evidence; however, there is a paucity of research in this area within the audiology discipline.

**Purpose:** This article provides a review of literature supplying evidence for important concepts, elements, and approaches to the clinical instruction process. Additionally, we provide readers with some practical tools with which to facilitate application of optimal clinical teaching principles.

**Research Design:** We conducted a systematic review of literature on clinical education in audiology and across a wide array of health professions. Through the use of content analysis we identified four elements of the clinical teaching process most critical in examining optimal practices.

**Results:** The elements identified as critical to positive clinical learning outcomes include the establishment of mutual expectations and goals; structured content and delivery of feedback; establishment of a positive instructor/student relationship; and questioning strategies that lead to the development of critical thinking skills.

**Conclusions:** Many disciplines outside of audiology demonstrate robust research activity related to understanding and optimizing the clinical education process. The application of a number of evidence-based clinical teaching principles should allow us to improve student outcomes in audiology. Researchers in our field might consider if and how we should develop our own research literature in clinical education.

**Key Words:** Critical thinking, education, expectations, feedback, relationship

A significant proportion of AuD curriculum content takes place in university and/or community clinic settings. Experienced clinicians are asked to provide clinical education to Audiology graduate students, though many have little or no formal training as educators. Clinical instructors face a number of logistical and pedagogical challenges when simultaneously working with students and servicing patients. Clinical disciplines such as medicine, physical therapy, nursing, and occupational therapy have a considerable body of peer-reviewed literature focused on the methodology of clinical education. Given the relative paucity of such literature in the audiology field it is helpful to look toward other professions to investigate optimal approaches to clinical instruction. This article was motivated by the desire to identify and promote application of best practices in clinical instruction of graduate students across all four years of an AuD program. In order to identify best practices, we conducted a systematic review of the literature on clinical education, across a breadth of clinical professions. The results of this systematic review revealed a collection of evidence-based clinical teaching

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practices, which we thematically categorized and summarized. In order to promote application of these practices, we created and/or adapted tools that readers will be able to use with students in clinical education activities. The review of this literature illuminated a number of challenges inherent in clinical education research.

An array of terminology has been used when discussing the roles and activities associated with clinical education. In this article, the term *clinical education* refers to any and all teaching and learning that occurs in a clinical setting, under the direction of a fully credentialed clinician. A number of titles are used to refer to the credentialed clinician supervising students. These might include clinical supervisor, clinical educator, or preceptor. In this article we use the term *clinical instructor* to refer to this role. The experience we address in this article is not limited to fourth-year clinical externships, or to those clinical experiences occurring in the first three years of an AuD program. Similarly, we address clinical education settings in general, regardless of whether they occur in an in-house setting or in an off-campus placement.

## RATING LEVELS OF EVIDENCE

One goal of this review was to explore the extent and type of published resources available to address the effectiveness of clinical teaching strategies. Specifically, we were interested in the extent to which data-based research studies on this topic have been conducted. We wished to identify such studies, evaluate the strength of demonstrated evidence, and summarize conclusions. Toward that goal, a rating of strength of evidence was applied to the body of research reviewed. The rating system used was based on Cox's (2005) description of levels of evidence, as shown below in Table 1. Note that the highest level of evidence is yielded from systematic reviews and meta-analyses of randomized controlled trials or other high-quality studies. Evidence rated as Level 2 comes from randomized controlled trials such as those more commonly seen in drug or other treatment efficacy studies. Level 3 studies involve intervention, but the methods used to assign subjects to treatment groups are not random. Level 4 studies do not include a treatment or intervention. These studies involve the observation of a group or groups of subjects with a given condition or treatment over time. Level 5 evidence comes from reports of individual cases with given conditions or treatments. Lastly, Level 6 evidence comes from expert opinion based on experience and/or knowledge of the subject. These levels have typically been applied to rate the strength of evidence for health-related treatments or practices. For the purposes of this investigation, the term *treatment* could be thought of as a given clinical education practice, applied in an AuD clinical learning activity. Our goal, a priori, was to identify research evidence at or above Level 4 from which we could summarize best practices.

**Table 1. Levels of Evidence from Highest to Lowest**

| Levels of Evidence |
|---|
| 1. Systematic reviews of meta-analyses of randomized controlled trials |
| 2. Randomized controlled trials |
| 3. Nonrandomized intervention studies |
| 4. Descriptive studies (cross-sectional surveys, cohort studies, case-control designs) |
| 5. Case studies |
| 6. Expert opinion |

Adapted from Cox (2005).

## PRELIMINARY SEARCH FOR EVIDENCE

We began our search for evidence by identifying articles related to clinical education, specifically in audiology publications. The objective of this literature search was not to conduct an exhaustive review of all possible articles on the topic. The goal was to generally identify the types of articles in our literature and the strength of evidence demonstrated within. We limited the initial search to those articles indexed in the library database known as CINAHL. CINAHL is an acronym for the Cumulative Index to Nursing and Allied Health Literature, a widely used database of health-related publications. The CINAHL index includes a variety of document types such as journals, books, newsletters, and dissertations. This database was chosen as it contains a majority of the professional and scientific journals having relevance to audiology. As noted above, we were interested in finding recommended practices based on evidence at Level 4 or higher.

## SEARCH STRATEGY

To begin this exploration, we entered the search term *audiology education* into the CINAHL database. The time span addressed in the search covered 1997 to 2010. This initial search yielded 388 documents. To narrow the focus of these results, we entered the term *clinical* and executed a combined search with *audiology education*. This search yielded 75 articles. These articles were examined with the goal of identifying those that met both of the following criteria:

1. Focus on principles and practices in general clinical education
2. Research results based on evidence Level 4 or higher

Of note, we excluded studies that addressed specific skill development that might occur outside of the clinical setting (e.g., learning pure tone test techniques or use of specific counseling tools). As described earlier,

our focus was on learning that occurs while patients receive services in the clinical environment.

## AUDIOLOGY SEARCH RESULTS

Review of the 75 articles identified in the initial search revealed that none met the above described criteria. The documents identified did contain an array of formats offering commentary, guidelines, summaries, and descriptions related to audiology student education. Some of the articles offered a robust level of evidence, but the focus was specific to the teaching of a specific clinical skill outside of the clinic setting. Many articles focused on recommended practices in audiology clinical education, but the recommendations were based on expert opinion versus data-based experimentation. The collection of documents, however, offers a window into the current art and science of clinical education in audiology. In order to assess the breadth of topics and approaches covered in the current literature, we organized these documents into categories.

The first category could be described as containing commentaries, summaries, or guidelines relating to audiology education in general. For example, this group included a document by Valente (2010) suggesting areas within audiology education that could be standardized across programs. Another document within this category was an article by McCarthy (2006) describing the challenges of adapting teaching strategies to the learning styles of the current generation. Of the 75 documents identified in the CINAHL search, 23 fell into this category. The next topic category included articles featuring detailed descriptions of individual AuD programs. Thirteen of these articles were included in the 75 CINAHL articles. The third category of articles included descriptions of specific innovations or features applied in a given AuD program (e.g., the implementation of a private practice model in an on-campus clinic; Bray and Dabrowski, 2010). Two such articles were noted in this group. The last group of documents was categorized as articles dealing with specific skill training in audiology. For example, English et al (2007) described the development of an instrument to evaluate audiological counseling skills in students. Three such articles were identified. These articles, though informative, did not meet criterion 1 above. The remaining 34 documents identified in the CINAHL search consisted of general news items, committee reports, position statements, or other articles of low relevance to our specific area of interest.

In summary, the search for Level 4 or better evidence-based approaches to general clinical education practices in audiology was not fruitful. This was not an unexpected finding, as our field is relatively young compared to many other clinical professions. Having confirmed that this literature is in short supply in audiology publications, we expanded our search to include literature from a number of other clinically based professions.

## SEARCHING BEYOND AUDIOLOGY

Our expanded search strategy began with a CINAHL search using the term *clinical education*. This search yielded over 5,000 documents. We initially scanned these citations for the purpose of identifying the professions most prevalent in this literature. The results are shown in Table 2. A number of the professions listed demonstrated a well-developed literature on the strategies for clinical instruction. Not surprisingly, the fields of medical and nursing education were well represented. Additionally, literature related to education of physical therapists and athletic trainers proved to be a rich resource. Though not directly focused on instruction practices in audiology, this body of literature offers a wide array of evidence-based recommendations that can be applied to our professional preparation.

## RECURRING THEMATIC CONTENT

In order to organize this vast collection of documents, the citations were inspected, and key words were noted across professions. In order to explore the evidence for any given topic it is first necessary to narrowly define a question or focus. Toward that end, we analyzed the key words so that we could categorize the articles by thematic content. It was clear that the literature clustered around four predominant themes. These themes included (1) role of expectations, (2) feedback, (3) clinical instructor/student relationship, and (4) questioning for critical thinking. All of these themes overlap to some degree. The use of search terms in each category enabled us to organize and execute a manageable approach to the review of this large body of literature.

The next step in our review entailed specific searching in each of the thematic areas. We chose to use four different library databases to explore the research within each theme. The databases we chose included CINAHL, PsychINFO, MEDLINE, and the Physical Education Index. We included the Physical Education Index based on its inclusion of literature from the sports medicine/athletic training field, as mentioned earlier. Each of the databases was searched using the search term *clinical*

**Table 2. Professions Most Prevalent in the Literature Surrounding Clinical Instruction Research**

| Psychology/ Counseling | Physical Therapy | Occupational Therapy |
|---|---|---|
| Social work | Education | Medicine |
| Nursing | Athletic training | Respiratory care |

*education* combined with one of the four identified themes. Articles that were descriptive in nature were omitted, as were skill-specific training articles (e.g., techniques for training specific counseling skills or techniques for occupational therapy splinting education). Articles that were retained were those that reported on research results from Level 4 or higher studies. Recall that Level 4 studies include nonintervention studies, cohort studies, case-control studies, and cross-sectional surveys. The last criterion for inclusion in this review was that the findings offered evidence that could be reasonably applied to clinical education in typical audiology practice. In other words, strategies to enhance learning in a context that had no parallel in audiology were omitted (e.g., minimizing student pressures in the face of critical care emergencies). What follows is a summary of the well-supported principles and practices that emerged from this search, categorized by the identified aforementioned themes. The coverage of each theme begins with a definition. We then provide examples of studies implemented in order to reach the suggested approach or conclusion. Finally, we provide descriptions of tools, focused on each thematic area that will be useful for implementation of the research findings.

## STUDENT/CLINICAL INSTRUCTOR RELATIONSHIP

An interpersonal relationship is an association between two or more people that may range from fleeting to enduring. In audiology education we deal with dyads and triads in terms of relationships. There is the obvious relationship between the student and the clinical instructor, which is an unequal relationship in terms of power with the clinical instructor assigning grades and providing recommendations. The triad relationship consists of the student, clinical instructor, and the faculty who may oversee clinical rotations. These relationships for both the student and clinical instructor may differ from other relationships in that these are generally relationships that are not chosen (students are assigned to clinical rotations) and have unequal power distribution. In addition, many of these relationships are immediate, intense, and fleeting (one semester).

Kilminster and Jolly (2000, p. 827) report that "The supervision relationship is probably the single most important factor for the effectiveness of supervision, more important than the supervisory methods used." Eight studies were identified that provide data related to the importance of relationships in the clinical learning experience (CLE). Each of these studies was designed in a manner that would allow the researchers to identify factors that influence the students' perception of the CLE.

The studies indicate that the student's perception of the environment is what is critical to determining the success of the clinical instructor/student relationship as opposed to an objective measurement of what is happening during supervisory interactions. In addition, the willingness on the part of the clinical educator to perform the duties of clinical education impacts the relationship significantly with willingness being related to successful relationships (Fretwell, 1980; Barnum, 2005). Relationships appear to form the underpinning for every clinical educational environment (Henzi et al, 2006). In reviews of broad research into clinical education and learning environments, relationships are always identified as a critical factor in a successful clinical learning experience (Dunn and Hansford, 1997; Linden and Bertero, 1999; Aagaard and Hauer, 2003). The studies also promoted the concept that relationships should change, suggesting that clinical educators and students should engage in an intentional, structured process of changing roles (Papastavrou et al, 2010). One study suggested the use of stories to build relationships (Cernohous, 2005). These were generally clinical experiences that the clinical instructor was sharing with the student to illustrate clinical decision making and various clinical challenges. Inclusion of the student as "part of the team" also was attributed to building a positive relationship. This avoided the student feeling as though he or she were in the way during clinical activities.

## A RELEVANT TOOL

The Supervisory Relationship Questionnaire (SRQ) was identified as a tool that might assist students and faculty overseeing clinical rotations in assessing the student/clinical instructor relationship. Table 3 provides a modified version of the questionnaire to provide examples of the questions. This questionnaire can be found in its entirety at www.midss.ie/content/supervisory-relationship-questionnaire-srq. With the evidence pointing the importance of the student/clinical instructor relationship it is well worth considering quantifying how the relationship is progressing early on in the process.

## THE ROLE OF EXPECTATIONS

Both the student and the clinical supervisor will have expectations about the student's experience at the clinical placement, based on a number of factors. Expectations are different from goals. Whereas goals are generally task specific (e.g., "By the end of the semester, I will be able to effectively mask for speech audiometry"), expectations focus around the way a task is accomplished (e.g., "I expect a 3rd year AuD student will be able to independently complete real ear aided response measurements"). This section will focus on establishing expectations, not establishing goals. Supervision lacks

**Table 3. Examples from the Supervisory Relationship Questionnaire**

| |
|---|
| Safe Base Subscale |
| 1. My supervisor was respectful of my views and ideas. |
| 2. My supervisor and I were equal partners in supervision. |
| Structure Subscale |
| 16. My supervision sessions took place regularly. |
| 17. Supervision sessions were structured. |
| Commitment Subscale |
| 24. My supervisor was enthusiastic about supervising me. |
| 25. My supervisor appeared interested in supervising me. |
| Reflective Education Subscale |
| 34. My supervisor drew from a number of theoretical models |
| 35. My supervisor drew from a number of theoretical models flexibly |
| Role Model Subscale |
| 45. My supervisor was knowledgeable. |
| 46. My supervisor was an experienced clinician. |
| Formative Feedback Subscale |
| 57. My supervisor gave me helpful negative feedback on my performance. |
| 58. My supervisor was able to balance negative feedback on my performance with praise. |

clarity and purpose without set expectations. As supervisees' expectations for advice and feedback from a positive and directive supervisor are often largely unmet (Sweeney et al, 2001), the goal of this section is to show evidence that discussing the expectations of both the student and the clinical instructor will foster a more positive clinical experience.

Addressing and establishing expectations before or at the beginning of the clinical rotation is essential. This activity provides the foundation for learning for the student. By setting expectations, trust and confidence in the relationship between the student and the clinical supervisor is fostered (Danielsson et al, 2009). Setting expectations allows the student to have a better understanding of his or her role in the clinical placement. This allows students to believe that they belong in the clinical setting and are not 'in the way' (Klein and Weaver, 2000). It promotes self-confidence, which allows students to have a more positive learning experience. For example, Foley (2007) reported that students who had clear objectives and defined expectations reported decreased stress and encountered fewer obstacles to learning. Furthermore, by allowing students to discuss what they expect from clinical placements and allowing them to guide their learning experience, students feel appreciated (Papp et al, 2003). As the students develop skills and independence, they require less clearly defined expectations along with less direct supervision. In a study on medical training, Paukert and Richards (2000) found that medical residents are more independent, and medical school students need more clearly defined expectations. Wooliscroft et al (1993) reported that medical residents are fairly accurate in judging their own abilities. However, they tend to rate themselves higher at the beginning than toward the end of their training. Wooliscroft et al (1993) suggested that this was related to the residents developing improved understanding of their knowledge. Similarly, it is likely that AuD students in their first few years rely heavily on structured expectations but students in their later years benefit from having input into defining the clinical learning environment. The level of independence can only be established when the expectations are discussed at the beginning of and across clinical learning experiences.

## EXPECTATION TOOLS

Discussing expectations establishes a framework of learning, which allows students to feel comfortable in the clinical environment. Each clinical instructor has different ideas about what is important (Elcigil and Yildirim Sari, 2007). Many types of expectations exist within student and clinical supervisor dyads. We have created a tool called the *Placement Expectation Worksheet* (adapted from Watson and Kiger, 1994; Klein and Weaver, 2000; Paukert and Richards, 2000). Clinical instructors are able to use this form, which allows students to have a better understanding of the office processes. Information, such as the way that the student should address the supervisor in front of patients and what happens if they are ill, allows the student to feel more comfortable in the clinic. This tool is shown in Table 4.

This type of expectation information allows students to feel like they are a part of, and not ancillary to, the clinic operations. When students believe they are integrated into the work environment, they learn more effectively (Klein and Weaver, 2000; Foley, 2007). Solomon (1992) demonstrated that a learning contract allows for negotiation between the student and the clinical instructor. It provides a flexible learning environment and promotes acquisition of self-directed learning skills. Using a learning contract fosters the student's autonomy and motivation (Rye, 2008). We have adapted a learning contract tool from Rye's (2008) work for use with audiology students. This learning contract can be used to clarify expectations and to promote productive communication between the clinical instructor and student (Appendix A).

Some research on student expectations has likened students to consumers of education. Just like any product consumer, the expectations of the consumer heavily influence their satisfaction with the product. By managing students' expectations via discussion at the beginning of the semester, clinical instructors increase satisfaction with the overall experience (Appleton-Knapp and

**Table 4. Placement Expectation Worksheet**

| | |
|---|---|
| Supervisor(s) | |
| | Names |
| | Staff names |
| Attendance | |
| | Days/times |
| Attire | |
| | Appropriate |
| | Not appropriate |
| Supplies | |
| | What to bring |
| What to expect from supervisor | |
| | During appointment |
| | After appointment |
| | At end of day |
| Addressing Supervisor/Self | |
| | Supervisor |
| | Supervisor in front of patient |
| | Self |
| Appointments | |
| | Types of appt. in clinic |
| | Where to get the schedule |
| | How to know appt. type |
| | If running behind? |
| Role in seeing patients | |
| | Weeks 1–2 |
| | Weeks 3–5 |
| | Weeks 6–10 |
| | Weeks 11–16 |
| Questions | |
| | Who to ask? |
| | When to ask? |
| Breaks/location of rooms | |
| | Lunch |
| | Restroom |
| What happens if….. | |
| | I am ill? |
| | Ill during work? |
| | Weather is bad? |
| | Transportation problems? |

Krentler, 2006). If the clinical instructor does not provide students with the support needed for the planning and fulfillment of expectations, the clinical learning period may be ineffective (Papp et al, 2003). By allowing the student and the clinical supervisor to create collaborative expectations, the clinical

learning environment will be positive, and the student will have a better learning experience (Danielsson et al, 2009).

## QUESTIONING FOR CRITICAL THINKING

Critical thinking emerges as an essential activity in both the learning of new skills and knowledge and as a requisite skill in all clinical service. The definition of critical thinking is complex. Indeed, the official definition was formulated based on the consensus of an expert panel convened for that purpose in the late 1980s. The short definition resulting from that panel includes the following: "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference" (Facione 1990, p. 2). Critical thinking in a clinical area can be thought of as clinical judgment (Alfaro-LeFevre, 1995). The ability to make clinical judgments is germane to the goals of clinical instruction.

The dominant approach to the development of critical thinking involves the generation of questions to the student, by the clinical instructor. In the Socratic approach, the instructor skillfully crafts questions that probe various areas of the student's thought process (Myrick and Yonge, 2002). Another widely accepted framework for student questioning comes from Bloom (1956). Bloom provides instructors with a taxonomy of terms used to phrase questions targeting a continuum of increasingly complex levels of cognitive processing. These levels, from simplest to most complex, include knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom 1956). Table 5 shows Bloom's taxonomy and examples of audiology-related questions targeting each level.

A number of the studies regarding critical thinking skills involve the types of questioning techniques used by clinical instructors. For example, Malcomson (1990) noted that untrained clinical instructors mainly use questioning aimed at lower levels of Bloom's taxonomy (i.e., knowledge, comprehension) versus the higher levels called upon during the effective delivery of clinical services (i.e., application, analysis, synthesis, evaluation). She implemented a faculty development program in which clinical nursing instructors were trained to use higher-level questioning to stimulate higher-level cognitive responses from students. This study was successful in demonstrating that trained clinical instructors used a greater number of higher-level questions with their students and that the effect remained for at least several weeks after the training. Additionally, this study showed that students responded to higher-level questioning by demonstrating higher cognitive levels of understanding. It appears that training of clinical instructors is a worthwhile endeavor in our attempt to raise the cognitive level of student's understanding and function. It is possible to train clinical instructors to understand the appropriate use of different types of questions for different levels of learning.

It appears that the type of teaching strategy used by clinical instructors may, in part, be related to self-perception. One study, from the athletic trainer education literature, assessed the impact of the instructors' self-perceived role on the clinical instruction strategies used with students. Clinical instructors were asked to report on the primary role in which they perceived themselves to function. Those who identified themselves as clinical educators tended to use more student-centered teaching strategies. These strategies promoted student exploration and creativity in thinking. Those clinical instructors who primarily considered themselves service providers used more instructor-centered teaching strategies. Those strategies supported students' identification and replication of skills and basic knowledge. Thus, those clinical instructors who think of themselves as educators seem to promote students' higher levels of cognition. This study prompts us to consider whether the culture of the clinical learning environment can allow for creative problem solving and/or offer apprenticeshiplike experiences. It is likely that some combination of the two is necessary at different points in time across the student's clinical education experience. In any case, it seems that promotion of the clinical instructor's self- perception as an educator may promote higher levels of student thinking (Barnum 2005).

Barnum (2008) collected data related to both the types of questioning used by clinical instructors and the reactions of students to the question types. Her data showed that 70% of the questions used were classified as low-level cognitive questions, and 17% of the questions used were classified as high level cognitive questions. The remaining questions were classified as other. Patterns of questioning also were categorized based on the way the clinical instructors incorporated, phrased, and sequenced the questions. Additionally, this categorization scheme considered how clinical instructors stated the intended purpose of the questions. The questioning approaches fell into two categories coded as strategic or nonstrategic. Table 6, adapted from Barnum's data, contrasts the characteristics between these types of questioning approaches. Of interest, this study included analysis of students' reactions to the use of strategic versus nonstrategic questioning approaches. Students consistently reported that strategic questioning assisted them in learning how to think through clinical situations. Students described nonstrategic questioning as "drilling and grilling" (Barnum, 2008, p. 288). The questions were perceived as having low importance and did not seem to stimulate complex cognitive processing. In other words, the use of strategic versus nonstrategic questioning seems more consistent with the development of critical thinking skills.

**Table 5. Classification and Examples of Questions Based on Bloom's Taxonomy**

| Cognition Level (as per Malcomson, 1990) | Category | Question Example |
|---|---|---|
| Low | Knowledge | What is an acoustic neuroma?<br>How could you assess your patient's hearing disability? |
| Low | Comprehension | Why is it important to take a careful case history?<br>Can you explain to me how his complaint of poor speech understanding relates to the audiometric configuration? |
| High | Application | What recommendations will you make to this patient based on your interpretation of the audiometric results?<br>Which behavioral testing technique will most likely be appropriate for a child of this age? |
| High | Analysis | For what reasons may surgical intervention not be indicated in this case?<br>Given all that you know about this case, what is the next step that should be taken? |
| High | Synthesis | Compose an aural rehabilitation treatment plan for this patient.<br>Can you think of a novel way to assess this patient's specific communication challenge? |
| High | Evaluation | What do you consider to be the highest priority in your aural rehabilitation plan for this child?<br>What do you think about the diagnostic report and recommendations previously done on this patient? |

Adapted from Phillips and Duke (2001).=

Hoffman and Elwin (2004) studied the relationship between confidence in clinical decision making and critical thinking ability in newly graduated nurses. Interestingly, they found a negative correlation between these two variables. In other words, new nurses who demonstrated higher critical thinking ability were more hesitant in clinical decision making. Moreover, those new graduates who demonstrated confidence and speed in clinical decision making ability had lower scores on critical thinking ability. This study highlights the concern that overconfidence in clinical decision making can negatively affect clinical evaluation and treatment outcomes (Hoffman and Elwin, 2004). It may be that our impulse to develop student self-confidence is not aligned with improved clinical abilities.

These constructs of student self-perception and self-evaluation are addressed further in research focused on the role of student reflections on critical thinking. Austin et al (2008) studied this relationship in pharmacy students by asking if self-assessment and reflection improved critical thinking skills. Their study was based on the principle that self-assessment and reflection allow an individual to shift from faulty to critical thinking under appropriate circumstances. The act of self-assessment involved asking students to rate their confidence that they had given a correct answer. The act of reflection entailed asking students to describe their rationale for selecting given answers. Two groups of students were administered a test of critical thinking ability. The first group completed the test with no interruptions while the second group was cued toward self-assessment and reflection at two different times during the latter half of the test. The second group performed significantly better than the first on scored items from the latter half of the test. This study supports the notion that simply alerting students to think may improve their performance in the demonstration of clinical abilities. Self-assessment and reflection are activities that can readily be implemented during the process of clinical instruction.

## TOOLS TO PROMOTE CRITICAL THINKING

The tools we provide in association with promotion of critical thinking skills are materials that can be used by clinical instructors to implement the strategies described. The first tool was show in Table 5, which included Blooms' classification of questioning with specific examples of audiology-related questions targeting each of the given levels. This tool is adapted from Phillips and Duke (2001). Our suggestion for a second tool is based on Hoffman and Elwin's (2004) and Austin et al's (2008) data supporting the importance of self-assessment

**Table 6. Characteristics of Strategic versus Nonstrategic Questioning Approaches Used by Clinical Instructors**

| Strategic Questioning Approach | Nonstrategic Questioning Approach |
|---|---|
| Has a stated strategy for assisting students in processing information at increasingly complex levels | Does not have a stated strategy for assisting students in processing information at increasingly complex levels |
| Consistently sequences questions in a low-high cognition level pattern that requires students to process information at increasingly complex levels | Questions appear randomly sequenced and primarily target low-level cognitive processes. Most questions posed to elicit patient care updates or to confirm instructions |
| Students describe questioning skills as assisting them in learning how to actively think through situations: a process for thinking | Students describe questioning skills as "drilling and grilling," testing to see if the student knows basic information or understands instructions |

Adapted from Barnum (2008).

and reflection. This tool was created by DePlacido (2010) and was intended in its original form to promote reflective practice for clinicians. It can, however, be adapted for use with clinical students to stimulate critical thinking. Table 7 shows an adapted version of the prompts included in this reflective journal tool. The original tool is available online at the Ida Institute Web site (www.idainstitute.org).

## THE ROLE OF FEEDBACK

A key component of effective clinical teaching is providing feedback to student clinicians to guide learning and promote skill acquisition. As a starting point for examining the evidence on feedback, consider the following operational definition of *clinical feedback*: "Specific information about the comparison between a trainee's observed performance and a standard, given with the intent to improve the trainee's performance" (van de Ridder et al, 2008, p. 193). In clinical teaching, the content of feedback covers a wide range of areas including translating academic content into clinical practice, following professionalism guidelines (i.e., client confidentiality, appropriate dress), acquiring/refining clinical skills, and considering attitudes toward learning. That is, feedback in clinical education addresses all aspects that impact client services or the student-instructor relationship (Hoffman et al, 2005). Feedback is considered effective when it facilitates improved levels of performance by a student. Nicol and Macfarlane-Dick (2006) defined seven principles associated with providing feedback with the goal of promoting self-regulated learning by students. These principles are shown in Table 8. The model is built upon the notion that the long-term goal of feedback is to create students who become effective self-evaluators and transition into professionals who monitor their own performance and actively seek opportunities to learn.

## EFFECTIVE FEEDBACK: WHAT THE RESEARCH TELLS US

The data-based research on feedback has focused on a variety of factors including, for example, timing, modality (written vs. verbal), specificity, and goal development. Smither et al (2005) examined the evidence from 24 data-based studies focusing on multisource feedback from personnel research measuring the longitudinal impact of feedback on improvement in employee performance. The results revealed that changes in behavior were associated with a collection of variables related to employee characteristics as well as employer

**Table 7. Student Reflective Journal Prompts**

| Prompt | Student Response | Instructor Feedback |
|---|---|---|
| What happened in the session? | | |
| Describe one or two things that went well in the session. | | |
| Why do you think they went well? | | |
| How did you feel? | | |
| Why do you think you acted as you did? | | |
| Describe one or two things that went less well in the session. | | |
| Why do you think they did not go well? | | |
| How did you feel? | | |
| Why do you think you acted as you did? | | |
| What can you do differently next time? | | |
| What do you need to *learn or do* to be better equipped for this type of situation? | | |

Adapted from DePlacido (2010) (see www.idainstitute.org).

behaviors. Improvements in performance were more likely to occur when the feedback came from a credible source and was considered valid. Credibility was associated with respect for the evaluator while validity was tied to a notion of fair comments on key behaviors. One of the most interesting findings of the meta-analysis revealed that employee attitudinal reflections prior to receiving feedback played a significant role in likelihood of change. Improvements in performance were associated with employees who displayed open attitudes toward receiving feedback, who judged feedback as useful, and who held a positive view of life-long learning (Smither et al, 2005). That is, improved performance was tied to underlying employee notions that they had the ability to learn and the desire to change.

With regard to employer variables, improvements in employee performance were influenced by characteristics of the employer feedback. Improved performance occurred when feedback was conveyed in a respectful manner and clearly defined deficits that were important to the employee's position. In contrast, negative feedback conveyed in a demeaning manner was associated with lack of change. The meta-analysis also revealed that employers could be trained to talk with employees in a manner that facilitated improvements in job performance.

When employers received persuasion training to help employees "see personal change and performance improvement as not only possible, but also as probable" (Smither et al, 2005, p. 50) performance was enhanced, even in employees who initially judged themselves as being unable to change. While there are inherent differences in the goals and outcomes of employer-employee feedback compared to instructor-student feedback, many of the meta-analysis findings run parallel to those found in studies focused on facilitating student skills.

One avenue of considering feedback effectiveness comes from the student perspective. Dowling and Wittkopp (1982) gathered survey data from 191 speech-language pathology student clinicians that included items focusing on "useful" versus "undesirable" supervisory behaviors. The results indicated that useful feedback was conveyed in writing and described both positive and negative student behaviors. Through balanced feedback students obtain a clearer understanding of behaviors they should continue to use and specific actions that need to be modified. In contrast, the primary undesirable behavior identified by students was a failure to provide any feedback. Similar results were reported by 30 nursing students who were interviewed regarding effective clinical teaching techniques (Kelly, 2007). While instructor knowledge was identified as the most important quality of effective clinical teaching, characteristics of feedback were identified as the second most important aspect. Feedback characteristics associated with effective teaching included giving timely feedback (soon after the behaviors occurred) and providing details regarding positive *and* negative behaviors (Kelly, 2007).

**Table 8. Seven Principles Associated with Promoting Feedback**

| Good Feedback … |
|---|
| 1. Helps clarify what good performance is (goals, criteria, expected standards) |
| 2. Facilitates the development of self-assessment (reflection) in learning |
| 3. Delivers high quality information to students about their learning |
| 4. Encourages teacher and peer dialogue around learning |
| 5. Encourages positive motivational beliefs and self-esteem |
| 6. Provides opportunities to close the gap between current and desired performance |
| 7. Provides information to teachers that can be used to help shape teaching |

*Source:* From Nicole and MacFarlane-Dick (2006).

Several studies have supported the value of written goals in promoting improved performance in student clinicians. Gillam et al (1990) used a multiple baseline single-case design with four beginning level SLP student clinicians. Improvements in specific behaviors occurred when a written goal was developed and feedback in the form of data were provided allowing students to monitor changes in their performance. In a controlled study, comparisons were made between immediate verbal feedback given in a group and delayed written feedback given individually (Ho and Whitehill, 2009). Nineteen SLP students were randomly assigned to one of the two groups with outcome measures obtained through comparisons on midterm and end-of-term clinical rating forms. Students who received immediate verbal feedback showed greater gains on clinical ratings by the end of the semester compared to students in the delayed written feedback group. From this study, however, it was not clear whether the immediacy of the feedback (now vs. later) was more influential than the modality of the feedback (verbal vs. written). Shapiro and Anderson (1989) conducted another randomized trial study focused specifically on whether written or verbally defined goals promoted higher skill development. This study included 64 SLP/audiology student clinicians and 32 supervisors from 12 university programs (specifics were not provided regarding the number of audiology or SLP students). The goals were collected from 384 audiorecorded supervisory conferences and examined differences in improvement by beginning level vs. experienced student clinicians (based on having fewer than or greater than 145 hr of clinical experience). Beginning level clinicians showed improvement in performance when written goals were provided to them by the supervisor, while more experienced student clinicians made better progress when the goals were defined only via verbal discussion.

A number of studies have examined the challenges that instructors experience when they need to give negative feedback to students. Hoffman et al (2005) conducted interviews of 15 counseling instructors regarding circumstances when they provided easy, difficult (reluctant), or no feedback to students. In easy situations instructors gave direct feedback resulting in immediate changes in performance. The easy scenarios focused on straightforward clinical issues, and students responded openly to instructor input. The situations identified by instructors as difficult focused on a wider range of topics including clinical, personal, and professional concerns. In these contexts the feedback was conveyed indirectly, was associated with a more defensive response by the student, and was inconsistently effective in changing the behavior. The most challenging feedback situations centered on professional issues and resulted in instructors totally avoiding discussion of their concerns. Not surprisingly, when no feedback was provided, improvements in behavior did not occur (Hoffman et al, 2005). Avoidance of discussion in difficult situations also has been described as a frequently used strategy by supervisors of employees (Steelman and Rutkowski, 2004; Smither et al, 2005). Steelman and Rutkowski (2004) obtained survey data from 405 respondents and found that while employees often reported dissatisfaction after receiving negative feedback, improvements in their performance did occur when the concerns were directly discussed by "credible supervisors who delivered quality feedback in a considerate, meaningful manner" (p. 15).

A single study was found that focused on training instructors to provide more effective feedback. Salerno et al (2002) provided training to physicians working with third-year medical students. A 90 min training program focused on teaching the One-Minute Preceptor technique, which uses a structured approach for eliciting student reflections followed by instructor feedback implemented immediately after seeing a patient. With

**Table 9. Feedback Checklist**

| When Providing Feedback to Students in Clinical Practica, Rate How Often You: | KEY: A= Always F = Frequently O = Occasionally N = Never |
|---|---|
| Instructor-to-Student Feedback | |
| 1. Provide orientation information to student regarding the relationship between self-evaluation skills and life-long learning as a professional | A F O N |
| 2. Ask the student to describe his or her feedback preferences (timing, form) | A F O N |
| 3. Clarify the typical format/schedule of providing feedback in the practicum (i.e., during a session when necessary; at the end of the session/day when possible) | A F O N |
| 4. Request student self-evaluation of skills (e.g., create written list strengths/areas to improve based on performance each week) prior to giving instructor feedback | A F O N |
| 5. Use a *respectful and considerate* manner when conveying feedback | A F O N |
| 6. Give *immediate* feedback on performance (minimally by the end of day) | A F O N |
| 7. Present *balanced* feedback with clear description of what has been done *well* and specific *aspects to be improved* | A F O N |
| 8. Provide some feedback in writing to beginning-level student clinicians | A F O N |
| 9. Give *fair* feedback focusing on critical issues related to the student's performance | A F O N |
| 10. Address challenging/difficult issues directly with the student in an open nonjudgmental manner | A F O N |
| 11. When giving negative feedback, facilitate student understanding of why the skill is important and how to implement the behavior effectively | A F O N |
| 12. Help students develop a notion that they do have the ability to modify their performance utilizing the suggested strategies for improvement | A F O N |
| 13. Develop specific goals with the student based on skills to improve | A F O N |
| 14. Provide the student with data on his or her performance of defined goal, allowing him or her to monitor own progress | A F O N |
| 15. As clinical goals are achieved, add new goals, helping the student attain higher levels of competency | A F O N |
| Student-to-Instructor Feedback | |
| 16. Ask student to give feedback on the clinical teaching I provide (i.e., what do I do that facilitates your learning; what could I do/change in order to optimize your skill acquisition?) | A F O N |
| 17. Make modifications in my clinical teaching strategies/procedures based on student input and/or provide a clear rationale for why a change is not optimal | A F O N |
| 18. Serve as a model of a professional who has written professional goals and pursues on-going professional development | A F O N |

this brief amount of training, slight gains were noted in the proportion of physician utterances that provided feedback, and moderate improvements were noted in the percent of those utterances that defined specific behaviors. Menachery et al (2006) examined the feedback skills of physicians categorized as being proficient at providing feedback. Survey data found that those scoring high in feedback skills were physicians who engaged learners in discussions regarding their emotional responses to learning (i.e., in situations when there were struggles in performance). They collaborated with students to create learning plans and to identify teaching strategies deemed useful by the student. These physicians also reported being comfortable in handling conflicts with students. Finally, high feedback scores were associated with doctors who had written professional goals for themselves that were reviewed annually to expand professional growth. Similar to findings of the Smither et al (2005) meta-analysis, an association was made between effectiveness in providing feedback to student learners and an instructor's self-evaluation skills and attitude toward ongoing professional growth.

## IMPLEMENTING FEEDBACK STRATEGIES

Table 9 is a checklist that we created in order for clinical instructors to optimally provide feedback to students. The most important outcome of effective feedback is to engage students in the process of self-evaluation in order to improve clinical skills. The literature suggests that instructors can help students improve their performance by engaging in the feedback Strategies defined above, supplemented by a focus on lifelong learning in their own professional development. Effective instructors are professionals who evaluate their own performance, write goals, and actively engage in learning to improve professional competence. Those interested in applying the research evidence related to feedback will turn the tables directing their students to provide a clear summary of the teaching techniques that are helpful to them and those that need to be modified in order to optimize the student's learning. Based on the feedback received, effective instructors will modify their behaviors, becoming partners in the learning process with their students.

## CONSIDERATIONS FOR FUTURE RESEARCH

As shown by this literature review, researchers across a variety of health professions have used differing approaches in the study of best practices in clinical instruction. This area is open for investigations specific to audiology student learning; however, a number of research challenges will need to be considered.

## CONSIDERATION OF OPTIMUM OUTCOME MEASURES

The formation of a research question must include a specific outcome of interest. As seen in the research reviewed, a variety of outcomes are available when considering optimal clinical learning approaches. The researcher setting out to investigate audiology-specific approaches will need to choose among a variety of such outcomes. These might include outcomes related to the students, patients, and/or clinical instructor. Within each of those groups specific outcomes will need to be identified. For example, should the outcome be a satisfied student, an employed student, or a student who demonstrates good clinical judgments? Once the desired outcome has been identified, we will need to develop a valid means by which it can be measured. Similarly, we will need to consider the salient factors that might differentially impact that outcome.

The literature we have reviewed in this article gives us a head start on these difficult questions. Additionally, these studies have shed light on the types of research approaches and designs most commonly used. For example, a number of these studies have used qualitative methodologies with data obtained from interviews, open-ended self-reports, and/or focus groups. Conclusions have been based on such methods as content analysis and triangulation, approaches that are less common in our mainstream audiology literature. It may be that we will need to embrace such qualitative methods as we move toward developing our own research literature in audiology education.

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## Appendix A. Learning Contract

By the end of the semester working with _____ at _____, I will:

- Demonstrate the knowledge, clinical skills, and attitudes required of a_____-year audiology student in a _____ environment.
- Manage a minimum daily load of _____ _____ _____ _____.
- Increase patient contact hours to further understand patient hearing loss/vestibular disorder/ _____, diagnosis, and treatment regimen. This will be done by _____.
- Gain experience in the _____ environment, including patient and family interactions, and in developing professional rapport with my clinical supervisor and other health-care providers.
- Demonstrate competency in performing_____ _____ _____ _____ _____.

My success in meeting these objectives will be documented by my clinical educator's evaluation of me on the _____ and by my own assessment of my performance. The minimum standard is _____.

Student signature: _____

By signing, I state I will assist the student in attaining the above stated objectives.

Clinical supervisor: _____

Adapted for audiology from Rye (2008).