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# Teaching CSD Graduate Students to Think Critically, Apply Evidence, and Write Professionally

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Teaching CSD Graduate Students to Think Critically, Apply Evidence,  
and Write Professionally

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**Abstract**

The purpose of this study was to assess the effectiveness of teaching modules designed to enhance the use of critical thinking (CT), evidence-based practice (EBP), and professional writing (PW) skills by graduate students in communication sciences and disorders. Three single-session teaching modules were developed to highlight key features of CT, EBP, and PW. Participants were presented with one module per week during the first month of their two-year graduate program. Each participant's performance was assessed four times by analyzing his or her written responses to clinical scenarios during the first fall semester and the last spring semester of the program. Results demonstrated that the EBP teaching module was effective in improving the participants' application of EBP principles. The CT and PW teaching modules were not as effective, suggesting that instruction in these areas requires more than a single-session teaching module.

*Keywords:* critical thinking, evidence-based practice, professional writing, professional policy, speech-language pathologists, scholarship of teaching

## **Introduction**

The Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association (ASHA) establishes and monitors graduate programs' maintenance of accreditation standards in communication sciences and disorders (CAA, 2013 a). Specifically, there are standards requiring an expert faculty base of teacher-scholars who perform regular and ongoing assessments of program effectiveness (e.g., standards 2.0, faculty and 5.0, assessment; CAA, 2013 b). The model teacher-scholar empowers students to seek, understand, and interpret scholarly products and to contribute or produce their own scholarly work. They integrate scholarship into the framework of a course and enter into a collaborative relationship with students. In addition, teacher-scholars adapt teaching methods and program requirements based, in part, on the results of student assessments.

As faculty members within a CAA-accredited graduate program in speech-language pathology, the authors function as teacher-scholars performing ongoing assessments of student learning (e.g., standards 2.0 and 5.0; CAA 2013 b) and using the results of assessments to design instructional modules that facilitate student success. For example, by evaluating the outcomes of graduate level written, case-based, narrative comprehensive examinations, the authors found that graduate students demonstrated deficiencies in three areas related to academic and clinical success: critical thinking (CT), application of evidence-based practice (EBP), and professional writing (PW). The importance of these skills is also reflected in standards defined by the CAA and the Council for Clinical Certification in audiology and speech-language pathology to practice as a speech-language pathologist (SLP) (e.g., Knowledge and Skills Acquisition and the Certificate of Clinical Competence Standards for Speech-Language Pathology; ASHA 2014).

As teacher-scholars, the authors designed individual teaching modules to address each deficient area in an effort to improve student success. This paper describes the impact of these modules on our students' performance. In the larger context, our work reflects the faculty (i.e., standard 2.0) and assessment (i.e., standard 5.0) accreditation standards (CAA, 2013 b) by evaluating student outcomes on our comprehensive examinations, by developing ways of improving student success through new teaching modules, and by collaborating with students to enhance their academic and clinical success. The following paragraphs summarize key features of CT, application of EBP, and PW.

### **Critical Thinking (CT)**

Paul and Elder (2001) defined CT as “a process of continuous improvement in one’s quality of thinking about problems” (p. 4). To delineate the parameters of critical thinking, Crist (2001) noted that a critical thinker will (a) raise relevant, precise questions, demonstrating the use of past experience blended with knowledge, (b) analyze and interpret experiences from the assessment of relevant information, (c) provide reasoned conclusions and recommendations based on frames of reference and standards for professional performance, (d) modify thinking based on practical implications that demonstrate self-correction of thinking in atypical or unique situations, and (e) communicate effectively with others in negotiating complex problems.

Facione and Facione (1994) further noted that

a good critical thinker accurately interprets evidence, statements, graphics, questions, etc.; identifies the salient arguments (reasons and claims) pro and con; thoughtfully analyzes and evaluates major alternative points of view; draws warranted, judicious, non-fallacious conclusions; justifies key results and procedures; explains assumptions and reasons; and fair-mindedly follows where evidence and reasons lead (p. 2).

They included systematicity, reasoning, self-confidence, cognitive maturity, analyticity, and inquisitiveness as other critical thinking skills.

SLPs must be flexible thinkers and apply their knowledge to novel clinical situations; accordingly, the education of SLPs should involve enhancing CT. It is not the accredited graduate program's responsibility to provide as many facts as possible about every communication and swallowing disorder that may be seen in the population from birth to the end of life. Rather, it is the program's responsibility to enhance each student's ability to learn how to learn and to become a self-directed learner and critical thinker about discipline-specific content. These skills are essential for monitoring advances in the field through research and applying such advances clinically.

The literature in the field of communication sciences and disorders (CSD) includes two articles related to enhancing the CT skills of graduate students (Hadley & Fulcomer, 2010; Mok, Whitehall, & Dodd, 2008). One of the articles suggested that problem-based learning (PBL) opportunities may facilitate CT skills in graduate clinicians (Mok et al., 2008). PBL is designed to enable students to be active independent learners and thinkers who develop "professional wisdom" (Biggs, 1999, p. 207). In PBL, students are divided into groups, and a group leader or mentor is usually assigned to each group. The students encounter simulated real-life problem cases, exercise self-directed learning and thinking, engage in small group discussion, and evaluate their own learning progress. The second article surveyed the types of teaching strategies used in graduate programs (Hadley & Fulcomer, 2010). The authors reported that PBL was used frequently, even more than direct instruction. The high frequency of PBL use in graduate programs is an interesting finding and supports Mok's et al. (2008) suggestion that PBL may facilitate CT through better integration between theory and clinical practice.

### **Application of Evidence-based Practice (EBP)**

EBP, as defined by ASHA, involves the dynamic integration of three elements: 1) an SLP's clinical expertise, 2) patient values, and 3) current best research evidence (ASHA, 2005). In other words, an SLP who applies EBP considers his or her own level of expertise for managing a patient with a communication and/or swallowing disorder, the needs and wants of the patient, and best available research evidence to guide all aspects of clinical practice. SLPs are first exposed to the concept of EBP as students in undergraduate- and graduate-level CSD programs. Student SLPs learn that EBP is the standard for conducting their clinical practice regardless of the setting in which they are employed. Opportunities to apply EBP occur in simulated case studies during didactic courses and in actual experiences during clinical practicum courses.

Wolter, Corbin-Lewis, Self, and Elswailer (2011) proposed a model for teaching EBP to undergraduate and graduate students. In this model, the definition of EBP is first introduced at the undergraduate level with emphasis on building the students' understanding of research processes (e.g., forming a research question with hypotheses, outcome measures, differences between treatment and control groups, etc.). Later, undergraduates are engaged in class discussions involving the application of EBP to clinically based topics. Then, they are asked to complete written assignments summarizing and examining applied research in consideration of EBP. At the graduate level, each feature of EBP is targeted in every course (didactic and clinical). For example, integration of research is studied in the didactic research design course, and it is emphasized again in clinical practica by using PICO (Problem, Intervention, Comparison, Outcome; Richardson, Wilson, Nishikawa, & Hayward, 1995) or PESICO (Person, Environment, Stakeholders' perspective, Intervention, Comparison, Outcome; Schlosser, Koul, & Costello, 2007) to define a research question related to a client's intervention needs. After the

question is defined, the student identifies the current best research, evaluates the literature, integrates the findings from the literature with clinical expertise and patient values, and makes the clinical decision. Wolter et al. (2011) did not formally evaluate their model's effectiveness. However, mastery of the model's academic components could be assessed by a comprehensive examination or writing assignment and mastery of its clinical components could be assessed through a clinical case presentation of a patient whom the student assessed and/or treated during a clinical practica.

### **Professional Writing (PW)**

PW involves the organization of ideas; clarity of expression; technical accuracy in spelling, grammar, and punctuation; and the use of a conventional system to format extended discourse. Within the field of CSD, the style of written discourse is known to vary somewhat across clinical and academic contexts (e.g., APA, 2001, 2009; Burrus & Haynes, 2008). The current study focused on the style of writing required of students to succeed in academic contexts. This is the same style required of professional SLPs for the submission of papers to ASHA journals. Guidelines for this style are described in the *Publication Manual of the American Psychological Association, Fifth and Sixth Editions* (APA, 2001, 2009). The fifth and sixth editions of the APA manual served as the central reference for the PW teaching module.

Literature addressing strategies for teaching PW skills to SLP students is limited. To date, one study suggested a template for a clinical writing course offered across one semester of a graduate program in CSD (Packer, 1995). Packer (1995) developed a course format that included lecture, discussion, review of sample reports, critique of clinical writing, microtheme writing, and journal writing. Microtheme topics were presented by the instructor. For example, "a clinical report is similar to a research article in a number of ways. Briefly describe why this is



true and justify your response” (Packer, 1995, p. 54). Students were expected to write on one side of a small five-by-eight inch index card, which challenged them to write logically and succinctly. Journal writing was addressed as a more open-ended writing exercise, encouraging students to write down their thoughts for the day. Results demonstrated that the number of clinical report rewrites and the number of editorial comments from supervisors decreased after students participated in the clinical writing course (Packer, 1995).

Plante (2010) proposed a model for teaching writing skills to CSD students. It is based on a consideration of the writing goals typically embedded in CSD programs and on the writing errors Plante had observed as a professor over the years. Plante’s (2010) model recommends a department-wide effort through writing assignments and feedback in all CSD courses. In courses at the 200 level, all professors communicate the program’s seriousness of intent regarding writing. Students receive explicit instruction on writing, examples of well-written papers and small writing assignments on discipline-specific topics. Their products are graded based on a rubric that only addresses the written form and not the content. At the 300-level, writing assignments continue to be short, but emphasis now expands to include content (i.e., supporting positions with evidence) as well as form (i.e., professional tone, mastery of professional writing style). At the 400-level, students receive a mixture of long and short writing assignments. Emphasis is placed on the student’s abilities to adapt writing to different professional needs. Again, grading is based on both form and content. At the graduate level, writing assignments become extensive. Greater emphasis is placed on 1) planning (i.e., idea generation, goal setting) and literature review (organizing ideas); 2) translating plans into written form; and 3) reviewing (i.e., making substantive modifications, clarifying ideas, selecting precise vocabulary, and making supervision modifications).

The literature outside of CSD has suggested various models for teaching writing skills to graduate students (Harvey, 2008; Mullen, 2001; Plakhotnik & Rocco, 2012; Sallee, Hallett, & Tierney, 2011). Harvey (2008) proposed a four-stage model: 1) instructor presents a clear description of writing skills, 2) students assess a published article and provide revision to the article, 3) students assess and revise one of their own papers, and 4) instructor presents how a paper can be written in stages (i.e., thinking, brainstorming, serious thinking, planning the paper, writing the draft, and revising the draft a number of times). Mullen (2001) recommended the Writing Process Feedback model. This model includes nine tasks that increase in complexity: 1) paragraph writing (write three sentences for your intended topic or an introductory paragraph), (2) paragraph sharing (share it with a colleague for feedback), 3) phase one writing (extend upon your three topics previously presented), 4) phase one sharing (share with a colleague for feedback), 5) subsequent phase writings (submit three or four more drafts of the entire paper), 6) continued sharing, 7) finalization of paper (learn the publishing style that is required), 8) writing refinements, and 9) a new writing cycle (start a new paper). Sallee et al. (2011) described five strategies for an instructor to implement within courses: 1) make research and writing more manageable through shorter assignments with detailed instructions focused on developing writing skills, 2) encourage students to support each other through peer review, 3) focus on developing form, content, and writing style, 4) apply a role model to the writing process, and 5) invest in the students by providing substantive qualitative feedback. Plakhotnik and Rocco (2012) implemented Writing Support Circles for Latina students which involved facilitator-guided workshops that enhanced academic writing skills. The concept of sharing and collaboration in the writing process, which emphasized that feedback is an important aspect in

the writing process, is consistent across Mullen's (2001) and Plakhotnik and Rocco's (2012) work.

### **Statement of Purpose**

The literature does make suggestions for enhancing the skills of CT through PBL (Mok, et al., 2008), applying EBP in undergraduate and graduate curricula (Wolter et al., 2011), and facilitating PW skills (Harvey, 2008; Mullen, 2001; Packer, 1995; Plakhotnik & Rocco, 2012; Sallee et al., 2011); however, no studies have evaluated the effectiveness of such suggestions for enhancing CT, applying EBP, and facilitating PW in CSD. The current study seeks to advance the discipline by assessing the effectiveness of teaching models to improve CT, application of EBP skills, and PW of CSD graduate students. This work is an initial step toward developing standardized teaching practices across instructors for CT, EBP, and PW. We hypothesized that entry-level graduate students would demonstrate improved CT, EBP, and PW throughout the first semester of the graduate program and would continue to demonstrate improved CT, EBP, and PW skills in a written paper assigned in the last spring semester of the graduate program. Prior to the teaching modules, individual instructors determined the teaching method for CT, EBP, and PW in each graduate course. There was no standardized method and no guarantee that each would be taught. Future goals of such work will develop standardized teaching strategies of CT, EBP, and PW that can be implemented in all academic and clinical graduate courses.

### **Method**

A longitudinal pre- and post-test design was used to assess the effectiveness of teaching modules targeting CT, EBP, and PW. The study extended over a two-year period involving an entire cohort of CSD graduate students over the course of their graduate program. A timeline

showing the distribution of teaching modules and performance assessments is provided in Appendix A.

### **Participants**

Twenty-four graduate students served as participants during their first fall semester of an SLP graduate program at a comprehensive public university in the northeastern United States. During their first fall semester, all participants were enrolled in the program's Research Design and Methods course (SPP 501) and were exposed to the three teaching modules targeting CT, EBP, and PW. The performance of the 24 participants, in their first fall semester, was measured during written responses to a pre-test and two post-tests. Twenty of the 24 participants completed a third post-test during the second year of the graduate program in their last spring semester. The four participants not included in the third post-test were part-time students completing the program in three rather than two years and were not enrolled in Medical Speech-Language Pathology (SPP 575) spring semester 2011, the course in which this third assessment was administered.

### **Teaching Modules**

Three single-session teaching modules were delivered to the participants by three of the authors on the second, third, and fourth class meetings of the Research Design and Methods (SPP 501) course during the first fall semester of their graduate program. Specifically, the second class meeting addressed CT, the third addressed EBP, and the fourth addressed PW. Each module was delivered in two hours and 45 minutes, the length of a weekly academic graduate course. The design and content of the modules followed pedagogical strategies used in higher education to promote student learning through teaching, demonstration, and hands-on practice. The rationale for the hands-on practice component is further supported by the literature in CSD

related to PBL, as discussed in the Introduction section (Hadley & Fulcomer, 2010; Mok et al., 2008).

The students participated in a module on CT related to clinical practice. The module started with a series of definitions of CT, followed by examples of the traits common across definitions of this concept. The module continued with a description of levels of CT - basic, intermediate, and advanced. A list of dimensions of CT – knowledge, creativity, analysis, integration, and systematicity – accompanied the description of levels. An overview of how each of these dimensions would increase in sophistication across the levels of CT followed. For experience with application of concepts through demonstration and hands-on practice, the students were provided with a clinician-produced narrative about a clinical problem. The students evaluated the level of CT demonstrated in this sample and formed conclusions about the level for each dimension, as well as the overall level displayed.

For EBP, the teaching component involved a definition of EBP with a foundation from evidence-based medicine, a rationale for using EBP in clinical practice, a description of ASHA's hierarchy of evidence with explanations of each level, and steps for applying EBP using PICO to help form the clinical question. The demonstration component involved several clinical scenarios highlighting the paradigm shift from using only clinician expertise to using clinician expertise, patient wants/needs, and current best research evidence to inform clinical practice. Another demonstration component included an example of using PICO to help answer a clinical question through a single subject design. In the hands-on practice component, students determined PICO for a simulated adult and child client and identified the steps for applying EBP. Class discussion followed the hands-on practice component with problem scenarios that may

arise; for example, how would the SLP deal with an absence of current best research in a clinical area?

The PW module included an introduction to elements of APA style with emphasis on those features relevant to discipline-specific writing across the CSD curriculum. Students were presented with information about general formatting (e.g., margins, fonts, text spacing, page numbering), guidelines for organizing the macrostructure of a paper (title, introduction, levels of heading, summary), elements of microstructure (e.g., spelling, punctuation, hyphenation, quotes, citations, reducing bias in language use), and requirements for constructing a reference list. The demonstration component included samples of written work illustrating correct and incorrect application of the information discussed. The hands-on component provided students with an opportunity to proofread portions of a poorly written paper and to propose recommendations for improvement.

### **Procedure**

Each participant's use of CT, EBP, and PW was assessed four times by analyzing his or her production of written responses to clinical-based scenarios. The pre-test and first two post-test samples were obtained by asking the participants to respond to the following clinical scenarios:

- (1) Pre-test: Assume that you are an SLP and that one of your clinic patients is noncompliant with a treatment recommendation that you have made. Please describe your decision-making process for dealing with this issue.
- (2) Post-test 1: Assume that you and your client disagree with regard to the course of treatment that is appropriate to address the client's clinical problem. Describe the decision-making process that you would employ to address this issue.

- (3) Post-test 2: The scope of practice allows SLPs to diagnose a wide variety of communication disorders, swallowing disorders, and oral-facial structural abnormalities. Your work place prohibits an SLP from the diagnosis of certain specific conditions even though these are allowed within the SLP Scope of Practice. Describe your decision making process in addressing this issue.

The first response served as a pre-test and was collected during the first week of the semester before the three teaching modules were delivered. The second and third responses served as the first and second post-tests during weeks five and 10, respectively. A timeline of the study within the curriculum is provided in Appendix A. Participants typed their responses into an MS Word file during a one-hour time period. Immediately upon completion, they e-mailed their responses to one of the first three authors. Written responses for the third post-test were prompted by a take-home assignment that was completed over a 14-week period. The assignment was given in a didactic course, Medical Speech-Language Pathology (SPP 575), which was completed by the participants during their last spring semester before graduation. To prompt the written sample, each participant was provided with (1) the profile of a patient and (2) instructions to describe evidence-based assessment and intervention protocols appropriate for that patient.

A module-specific coding rubric was developed by the researchers for assessing each variable, including CT, EBP, and PW. Each rubric allowed for 20 total points. The rubrics are provided in Appendix B. The first three authors analyzed the written responses. With the exception of those samples that were used to assess coding reliability, each researcher coded only the specific area (i.e., CT, EBP, PW) targeted by the module that she taught. The sequence in which written responses were coded was randomized for each author. The randomized

sequence of written responses included the total writing samples produced by the participants and additional repeated evaluations for inter- and intra-coder reliability.

Inter- and intra-coder reliability scores were calculated for CT, EBP, and PW based on 10% of the writing samples. For inter-coder reliability of the first three response sets (pre-test, post-test 1, post-test 2), all of the first three authors evaluated CT, EBP, and PW for seven of the writing samples yielding strong correlations ( $>.70$ ), except between two of the authors for EBP ( $r = .46$ ). For intra-coder reliability of the first three response sets, each of the first three authors completed a second evaluation of CT, EBP, PW for seven of the writing samples demonstrating strong correlations ( $>.70$ ) for CT and EBP with intra-coder reliability for PW approaching a strong relationship ( $r = .65$ ). For inter- and intra-coder reliability of the third post-test, all of the first three authors evaluated CT, EBP, and PW for two of the writing samples and each author completed a second evaluation of CT, EBP, and PW for two of the writing samples. All correlations for inter- and intra-coder reliability of the third post-test were strong ( $r = 1.0$ ).

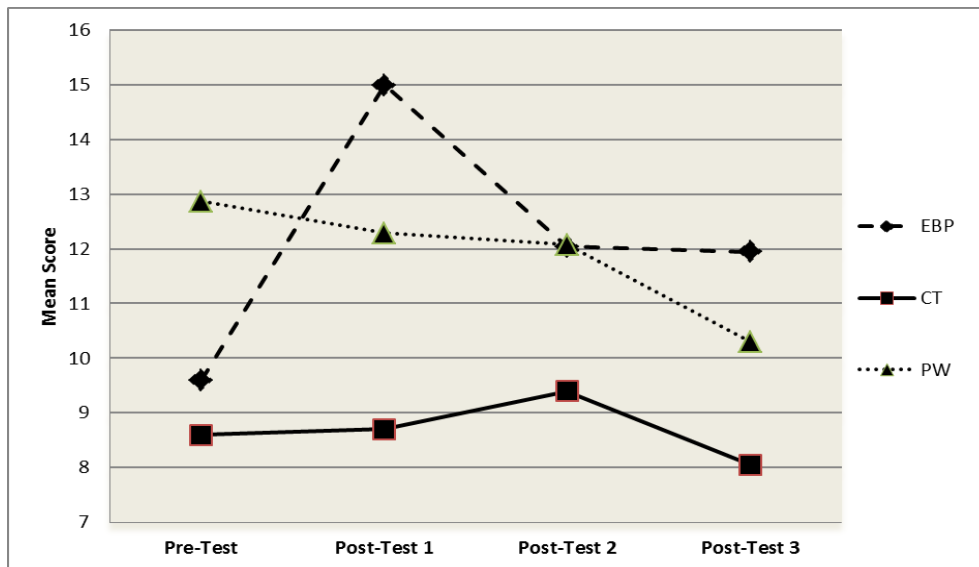
### Results

Twenty-four participants completed the teaching modules and produced written responses to the first three assessments (i.e., pre-test, post-test 1, post-test 2), yielding a total of 72 written samples during the first fall semester of the participants' graduate studies. Twenty participants completed post-test 3, yielding a total of 20 written samples during the students' last spring semester before graduation. A repeated measures ANOVA revealed significant main effects for EBP,  $F(2.57, 48.79) = 13.44, p < .000, \text{Eta}^2 = 0.414$  (effect size) and PW,  $F(2.78, 52.77) = 7.04, p = .001, \text{Eta}^2 = 0.270$  (effect size). Results for CT were not significant  $F(2.14, 40.62) = 1.41, p = .257, \text{Eta}^2 = 0.069$  (effect size) (see Figure 1). The significant main effects of EBP and PW allowed for further post hoc analysis using pairwise comparisons between the pre and three post-



tests. Six total pairings were tested (i.e., pre to post-test one, pre to post-test two, pre to post-test three, post-test one to post-test two, post-test one to post-test three, and post-test two to post-test three). For EBP, significant differences were found from pre- to post-test one ( $p < .000$ ), pre- to post-test two ( $p = .031$ ), pre- to post-test three ( $p = .006$ ), post-test one to post-test two ( $p = .004$ ), and post-test one to post-test three ( $p < .000$ ). From post-test two to post-test three, results were not significant ( $p = .925$ ). For PW, significant differences were found from pre to post-test three ( $p < .000$ ), post-test one to post-test three ( $p = .006$ ), and post-test two to post-test three ( $p = .011$ ). Significant differences were not found for pre to post-test one ( $p = .095$ ), pre to post-test two ( $p = .200$ ), and post-test one to post-test two ( $p = .790$ ).

Figure 1. Mean scores of critical thinking (CT), evidenced-based practice (EBP), and professional writing (PW) as a function of test (i.e., pre-test, post-test 1, post-test 2, and post-test 3).



The findings for EBP demonstrate that the pre-test results were significantly different from all of the post-tests, suggesting that the teaching module improved application of EBP as evidenced by an increase in mean scores across all of the post-tests. Another interesting finding of EBP is between post-test two and three. Post-test two was administered during the first semester of a graduate program during the tenth week of instruction in the Research Design and Methods course (SPP 501). Post-test three was administered during the second year of the graduate program while the participants were practicing in a school setting and taking Medical Speech-Language Pathology (SPP 575) at the same time. There was no significant difference in the performance between post-test two and three indicating that the additional coursework and clinical application courses did not change the performance on a written response for application of EBP. The participants applied EBP in the same way, no better or no worse from the first year to the last year of the graduate program. The findings related to PW suggest that performance declined from pre to post-test three, meaning that PW skills were actually better at the pre-test before the teaching module and did not seem to improve across all of the post-tests. Findings related to CT were not significant across all the tests suggesting that CT skills remained the same from the first semester of the graduate program to the last spring semester of the second year.

### **Discussion**

The purpose of this study was to assess the effectiveness of three, single-session teaching modules on the use of CT, EBP, and PW by CSD graduate students. The findings suggest that the teaching module for EBP was effective; however, the teaching modules for CT and PW were not. The participants demonstrated a significant increase in the application of EBP principles (when compared with the pre-test), then maintained an improved level of skill from post-test two to post-test three. For CT, the participants demonstrated relatively stable performance levels

across the pre-test and post-test tasks at a “basic” level, suggesting that the single-session CT teaching module was not enough to improve CT. In the area of PW, the participants demonstrated a decrease in the application of PW skills from the fall semester of their first year to the spring semester of their second year; however, the length and complexity of the third post-test was considerably greater than any of the other tests. Since PW was coded based on the frequency of writing errors, there were more pages of writing for errors to occur.

The interpretation of the results should consider that students may have been exposed to CT, EBP, and PW through other academic courses during the first semester of the graduate program, which also could have influenced their performance. The authors did not account for this additional exposure in the current study. It is important to note that any additional coursework and clinical courses from the first year of the graduate program to the second year did not improve the application of EBP as assessed in this study.

Taken as a whole, these results support the need for continued reflection on the most appropriate methods for teaching EBP, CT, and PW skills in didactic and clinical courses. Considering the results of the current study, a single-session teaching module seemed to be effective for targeting EBP, but not for CT or PW. This is not a surprising result given that EBP involves the integration of three principles, whereas CT and PW have many principles of application that may be communicated more effectively in a multiple-session teaching format rather than in a single-session.

Based on the results of the current study, the authors agree with others (e.g., Plante, 2010; Wolter et al., 2011) that discipline-specific instruction in CT, EBP, and PW for CSD students should begin at the undergraduate level and continue through graduate program. Since there is no published evidence of the performance levels demonstrated by entry-level CSD

undergraduates in these areas, we are conducting a follow-up study to establish baselines that can be used to inform the design of discipline-specific, department-wide instructional modules. We cannot assume that teaching problem solving skills for clinical work, reviewing the current literature base for new evidence, and writing academic papers and clinical reports are enough to address CT, EBP, and PW. Based on our work, targeted instruction is needed in these areas and that instruction must be standardized across the curriculum, so that all instructors are facilitating growth in CT, EBP, and PW in the same way. If the goal is to make our students independent thinkers who can solve clinical scenarios for a diverse patient population at the highest possible level of CT while using EBP and sound PW skills, then we need standardized instruction in these areas.

Several issues should be considered for future work in this area. One is the design of case-based assignments or prompts to invite the application of CT, EBP, and PW skills. Based on the literature and on our experience, a combination of explicit direct instruction including a variety of problem-based scenarios can serve as a starting point. The writing prompts in the present study did not include explicit directions with examples. Second, CT and PW can be evaluated in a number of ways. Future studies could assess variations in performance by the same students across different types of tasks, and perhaps students should be provided with the assessment rubric for each skill prior to receiving the writing prompt. Third, the issue of maintenance of acquired skills in these areas across the MA experience is a concern, particularly for the areas of CT and PW, in which students did not demonstrate the long-term improvement that characterized their use of EBP. Perhaps this can be addressed by infusing the concepts into each CSD course more systematically through tasks that gradually increase in difficulty as students progress from undergraduate to graduate level courses.

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TEACHING GRADUATE STUDENTS

Appendix A

Research Time Line in Relation to the Two-year MA Curriculum

**Fall Semester 2009**

Weeks →	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SPP 501	Foundations of Research													
Testing & Teaching Modules (TM) →	<b>Pre-Test</b>	<b>CT TM</b>	<b>EBP TM</b>	<b>PW TM</b>	<b>Post-Test 1</b>	(No direct instruction on CT, EBP, or PW)				<b>Post-Test 2</b>	(No direct instruction on CT, EBP, or PW)			
Other courses completed SPP 511 - Child Language I (0 to 5) SPP 526 - Clinical Articulation and Phonology SPP 543 - Therapy for the Hearing Impaired														

**Spring Semester 2010** (no research activity)

<u>Courses Completed</u> SPP 512 - Child Language II (School-Age) SPP 516 - Adult Neurogenic Speech-Language Disorders SPP 523 - Voice Disorders SPP 551 - Clinical Practicum 1 in Speech and Language (S/L)
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**Summer Semesters 2010** (no research activity)

<u>Courses completed in 1<sup>st</sup> Summer Session by 1<sup>st</sup> half of the cohort</u> SPP 570 - School Programs Elective	<u>Courses completed in 2<sup>nd</sup> Summer Session by 1<sup>st</sup> half of cohort</u> SPP 551 - Practicum in S/L 2 SPP 551 - Practicum in S/L Diagnostics SPP 551 - Practicum in Hearing
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**Fall Semester 2010** (no research activity)

SPP 551 - Practicum 2 in S/L (for the second half of the cohort) SPP 551 - Practicum in Diagnostics of S/L (for the second half of the cohort) SPP 551 - Practicum in Hearing (for the second half of the cohort) SPP 570 - School Programs (for the second half of the cohort) Elective (For the 2 <sup>nd</sup> half of the cohort) SPP 524 - Fluency Disorders SPP 582 - Dysphagia
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**Spring Semester 2011**

Weeks →	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SPP 575	Medical Speech-Language Pathology													
Testing →													<b>Post-Test 3</b>	
<u>Other course completed</u> - SPP 553 - School-Based Affiliation														

**Summer Semester 2011** (no research activity)

SPP 552- Medically-Based Affiliation
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TEACHING GRADUATE STUDENTS

Appendix B

Evaluation Protocols for CT, EBP, and PW

Evaluation of CT (Adapted from Gunter and LeJeune, 2003)

<b>Participant #</b>		<b>Participant Coding #</b>		<b>Coder:</b>		<b>Date:</b>	
<p><b>Circle the test you are evaluating.</b>  <u>Pre-test</u>  <u>Post-test 1</u>  <u>Post-test 2</u>  <u>Post-test 3: Case Study #</u> _____</p>							

	<b>Categories</b>	<b>Highest Level Possible</b>	<b>Highest Level Dem.</b>
	<b>Knowledge</b> – familiarity with relevant clinical practice standards, professional literature, applicable laws, and other relevant information	4	
	<b>Creativity</b> - Ability to create a broad spectrum of solutions to problems, which include novel solutions that are less obvious than others.	4	
	<b>Analysis</b> - Ability to identify a problem and its implications, as well as to critique the pros and cons of potential solutions.	4	
	<b>Integration</b> - Ability to relate the elements of the problem and the potential solutions, as well as information from multiple sources.	4	
	<b>Systematicity</b> – Ability to present the critical thinking task with an identifiable structure in a systematic fashion.	4	
	<b>Total</b>	20	

**Level 1 (Pre-Critical):** Student attempted to address the problem but demonstrated no systematic critical process.

**Level 2 (Basic):** Student attempted to address the problem and demonstrated elementary critical processes (for instance, student identified the problem or identified a possible solution to the problem).

**Level 3 (Intermediate):** Student demonstrated more specific critical processes (for instance, student identified the problem, identified multiple possible solutions to the problem, or evaluated the value of the solutions).

**Level 4 (Advanced):** Student demonstrated even more specific and sophisticated critical processes (for instance, student identified the problem, identified multiple possible solutions, compared and contrasted the solutions, reviewed evidence, and applied a solution in an appropriate fashion).

**Evaluation of EBP**

<b>Participant #</b>		<b>Participant Coding #</b>		<b>Coder:</b>		<b>Date:</b>	
<p><b>Circle the test you are evaluating.</b>  <u>Pre-test</u>  <u>Post-test 1</u>  <u>Post-test 2</u>  <u>Post-test 3: Case Study#</u>_____</p>							

<b>Coding Categories</b>	<b>Pts possible</b>	<b>Pts earned</b>
<p>Definition of EBP (integration of current best research evidence, clinician expertise, and patient wants/needs). Definition must be provided somewhere in the paper.</p> <p>Explanation of points possible:                      5 = Full description of EBP definition                      4 = EBP is stated off and on, but no clear introduction                      3 = Uses EBP framework in paper, but does not explicitly state it                      2 = Two parts of EBP are evident, but one piece is missing                      1 = Says nothing about EBP or it is wrong</p>	5	
<p>Steps for applying EBP (1.Frame the clinical question, 2. Find evidence, 3. Assess evidence, 4. Incorporate clinician expertise, 5. Incorporate patient wants/needs, 6. Make the clinical decision). Give credit for steps if applied anywhere in the paper.</p>	5	
<p>Student makes some reference to source/s (hierarchy)                      5 = Primary source; efficacy and/or effectiveness studies, peer –reviewed, data based, meta-analysis, ASHA cardinal documents                      4 = Secondary source, peer-reviewed book, literature review paper                      3 = Non-peer reviewed newsletter, blog, bulletin board (research articles)                      2 = Expert opinion                      1 = Personal opinion and hearsay</p>	5	
<p>EBP (clinician expertise, patient wants/needs, current best research evidence) was explicitly applied to every dimension of the case (assessment, results, and treatment). Assess content not form.                      5 = all 3 parts of EBP were applied to all 3 aspects of the case                      4 = 2 of the 3 parts of EBP were applied to 2 of the 3 aspects of the case                      3 = 1 part of EBP was applied to 1 aspect of the case                      2 = application of EBP was attempted in the case, but it was wrong.                      1 = EBP was not applied to any aspect of the case</p>	5	
<b>SUM</b>	20	

**Coding system**

- 5 = excellent – no errors (A)
- 4 = very good – 1 or 2 errors of inclusion or omission (B)
- 3 = average – from 3 to 5 errors of inclusion and/or omission (C)
- 2 = poor – from 6 to 8 errors of inclusion and/or omission (D)
- 1 = unacceptable - 9 or more errors of inclusion & omission that challenge a reader’s ability to track and understand the content (F)

Evaluation of PW

Participant #	Participant Coding #	Coder:	Date:	
<p>Circle the test you are evaluating.  <u>Pre-test</u>  <u>Post-test 1</u>  <u>Post-test 2</u>  <u>Post-test 3: Case Study#</u> _____</p>				
Coding Categories			Pts possible	Pts earned
<p><b>Macrostructure</b> – Are these items included?</p> <ol style="list-style-type: none"> <li>1) Title page</li> <li>2) Title is framed at an appropriate level of specificity</li> <li>3) Headings and sub-headings are used throughout the paper</li> <li>4) Appropriate <u>levels</u> are used to format the headings and subheadings</li> <li>5) An integrated summary is provided at the end of the paper</li> <li>6) A Reference list is provided at the end</li> </ol>			5	
<p><b>Transitions</b> – includes</p> <ol style="list-style-type: none"> <li>1) Introduction to the paper</li> <li>2) Introduction includes a road map of what’s to come in the rest of the paper</li> <li>3) Transition statements leading from one section of the paper to another (section = information under a heading or subheading)</li> <li>4) Logical sequencing and segmentation of information within and across sections</li> <li>5) Cohesion within and across paragraphs within a section</li> <li>6) Summaries at the end of each section</li> </ol>			5	
<p><b>Microstructure</b></p> <ol style="list-style-type: none"> <li>1) Correct spelling</li> <li>2) Correct punctuation</li> <li>3) Correct grammar</li> <li>4) Referential clarity</li> <li>5) Use of parallel form</li> <li>6) Other APA style requirements (e.g., correct form of citation in the text; underlining titles of published materials; using numerals for quantities of 10 or more; formatting the reference list correctly; using hyphens correctly, etc.</li> </ol>			5	
<p><b>Overall language style</b></p> <ol style="list-style-type: none"> <li>1) Uses professional vocabulary &amp; expressions rather than colloquial jargon</li> <li>2) Uses professional vocabulary accurately</li> <li>3) Uses either 1<sup>st</sup> person or passive voice consistently</li> <li>4) Uses tense consistently unless there is an obvious reason not to</li> <li>5) Writes succinctly</li> <li>6) Includes citations when making statements that require support</li> </ol>			5	
<b>SUM</b>			20	

**Coding system**

- 5 = excellent – no errors
- 4 = very good - 1 type of error within an evaluation category
- 3 = average – from 2 to 3 different error types within a category
- 2 = poor – from 3 to 4 different error types
- 1 = unacceptable – 5 to 6 or more different error types