ABSTRACT:

Purpose: An increasingly important aspect of university programs in communication sciences and disorders is making students aware of evidence-based practice (EBP). One of the components of EBP is information literacy, or the ability to conduct effective information searches and examine quality indicators of the information found. The information literacy skills of communication sciences and disorders students at 3 academic levels in 1 training program were measured to determine the nature and extent of any differences in the skills across academic levels.

Method: The communication sciences and disorders version of the Research Readiness Self-Assessment (RRSA; Ivanitskaya, O'Boyle, & Casey, 2006) was administered to 150 students enrolled in sophomore-, senior-, and graduate-level courses in a communication sciences and disorders program.

Results: There were significant differences among student groups in the objectively measured skills related to searching for and evaluating information. For the most part, graduate-level students demonstrated the highest skills, followed by senior- and sophomore-level students.

Conclusion: Implications for communication sciences and disorders training programs are discussed, as are ways to facilitate students’ information literacy skills.

KEY WORDS: evidence-based practice, information literacy, academic levels
include suggestions for evaluating the quality of the information provided (Ivanitskaya, O’Boyle, & Casey, 2006).

In an effort to emphasize the importance of information literacy in speech-language pathology, Nail-Chiwetalu and Bernstein Ratner (2006) identified five standards of information literacy competency for higher education developed by the American Library Association in 2006 that should guide individuals in expeditiously managing a plethora of available information. These standards are:

- Determine the nature and extent of information needed. This involves knowing why information is needed, the potential sources for obtaining it, and the costs and benefits of acquiring it.
- Access needed information effectively and efficiently. This entails being able to use key words and search parameters to find information as well as being knowledgeable about a variety of databases.
- Evaluate information and its sources critically and incorporate selected information into the knowledge base and value system.
- Use information effectively to accomplish a specific purpose by comparing it with prior knowledge.
- Understand the economic, legal, and social issues surrounding the use of information and access and use information ethically and legally (e.g., understand what plagiarism is and the ramifications of it; Nail-Chiwetalu, 2005).

By its nature, information literacy implies more advanced competencies than simply being able to gather information (Ivanitskaya et al., 2006). Nail-Chiwetalu and Bernstein Ratner (2006) and Bernstein Ratner (2006) reported that the second standard (i.e., accessing needed information effectively and efficiently) is the weakest link in the information literacy construct. There is an assumption that practitioners and even preprofessional students know how to search for literature primarily because it is so conveniently available. Furthermore, institutions of higher education provide access to a prodigious amount of information via online archives, proprietary library databases, and public access Internet. However, availability does not imply competent use, and information itself is not necessarily knowledge (Bernstein Ratner, 2011).

Individuals who use e-mail and access websites may lack skills essential for EBP, as illustrated in a survey of practicing speech-language pathologists (SLPs) and audiologists in Idaho (Guo, Bain, & Wiler, 2008). In this study, 87% of the respondents reported insufficient knowledge and skills to use the PubMed online database, and almost half of the respondents indicated limited knowledge of EBP concepts (Guo et al., 2008). This was true despite other results of the same survey that showed that professionals who graduated within the past 10 years were more likely to respond to online correspondence than those who graduated >10 years ago.

Students in training programs today are already consumers of electronic information in personal and academic areas. Moreover, clients are often educated consumers, bringing information to the clinic from a large variety of sources, primarily the Internet. The rich but unregulated worldwide web makes discrimination of what is relevant from what is irrelevant an important skill for both clinicians and consumers. Furthermore, the amount of information available through traditional library and online sources can be overwhelming.

Searching and sorting through this wealth of information and determining its quality in order to answer a specific clinical question can be so burdensome as to interfere with and even prevent the effective use of evidence in one’s clinical practice (Bernstein Ratner, 2006). Moreover, research has documented that Internet users tend to focus their searches on finding information quickly rather than taking time to evaluate its quality (Ivanitskaya et al., 2006). Searchers typically explore only the first few links obtained from an online search. In addition, they rarely read the “About us” information or the disclaimers/disclosure statements on websites of interest (Ivanitskaya et al., 2006).

Students in university courses today have been described as having extensive experience with technology yet not necessarily exercising the critical thinking or questioning that is important in discerning appropriate information (Nail-Chiwetalu, 2005; Stuart & Ritthaler, 2008). For example, Nail-Chiwetalu and Bernstein Ratner (2006) discussed a study that examined student term papers and reports from 1996 to 2000 and found that the bibliographies of these papers grew incrementally but contained progressively fewer sources of scholarly information. These issues present challenges to educating practitioners and students alike about locating relevant information and discerning whether it has relative quality as evidence on which to base clinical practice.

Information seeking and evaluation have been an issue for health care disciplines other than speech-language pathology (Ivanitskaya et al., 2006; Nail-Chiwetalu & Bernstein Ratner, 2007). Results of studies involving physical therapists, occupational therapists, physicians, and nurses indicate that these professionals are most likely to seek professional information from a colleague, followed by information from textbooks, continuing education workshops, and the Internet (Bernstein Ratner, 2006; Guo et al., 2008). Many health care professionals also tend to underestimate the effort and time required to competently search for valid information, which can put consumers at risk (Ivanitskaya et al., 2006).

Nail-Chiwetalu and Bernstein Ratner (2007) surveyed certified SLPs regarding their information-seeking behaviors. Results of their study indicated that SLPs are no different from other health professionals in that they too seek information primarily from colleagues, followed by continuing education activities and the Internet. Most of the respondents reported that they did not often take advantage of library or database resources or the online ASHA journals. Findings such as these are an impetus to include EBP concepts, particularly information literacy activities, in the curricula and course activities in speech-language pathology training programs.

In summary, information literacy is an integral part of EBP, and EBP is increasingly recognized as best practice in service delivery in speech-language pathology. Therefore, we
decided to investigate the information literacy abilities of students in a preprofessional training program in communication sciences and disorders (CSD). We also investigated whether there are differences among students at different levels in their training. It is often assumed that higher education builds information literacy skills; however, this assumption needs to be verified. The information skills we targeted were the ability to find specific information from a variety of media and the ability to accurately judge its quality. Thus, we asked the following research questions:

- Are there significant differences in the information literacy skills of speech-language pathology students enrolled in courses at the sophomore, senior, and graduate levels?
- Do students at more advanced academic levels have better information literacy skills than students at lower levels?

**METHOD**

**Participants**

Study participants included 178 students who were enrolled in CSD courses at the introductory, mid, and advanced levels of their preprofessional training programs. The first (introductory) group consisted of 75 students who were enrolled in an introductory course in phonetic transcription. In the curriculum of their institution, this course is taken primarily during the students’ sophomore year. The second (mid-level) group consisted of 62 students who were enrolled in an assessment/diagnostic course that is typically taken during the students’ senior year. Finally, the third (advanced) group consisted of 41 graduate students who were enrolled in a research design course that was part of graduate study in audiology and speech-language pathology. Table 1 provides the participants’ pertinent demographic data. As an incentive to participate, the students were awarded extra credit in their respective courses. Participation was also promoted as a means for the students to learn more about their individual research skills.

**Evaluation Instrument**

The original Research Readiness Self-Assessment (RRSA; Ivanitskaya et al., 2006) was developed to assess electronic health information competence in university students. With this instrument, Ivanitskaya and her colleagues were able to report results on health information research and evaluation proficiencies such as differentiating between scholarship and marketing, recognizing plagiarism, and self-awareness of competencies in regard to finding and using health information. Their sample of 400 college-age students was divided into three groups based on academic level in the health professions—introductory, mid, and advanced.

The RRSA was designed to be used by multiple institutions and to be adaptable to different disciplines (Ivanitskaya et al., 2006). For the purposes of our study, we modified a health version of the RRSA, which is applicable to college students from a variety of health disciplines, for use with students who were majoring or anticipating to major in CSD. The CSD-RRSA measures student proficiency in searching for and evaluating information provided by websites and articles. Thirty-one items measure students’ objective skills and knowledge related to finding specific information (e.g., ability to conduct basic and advanced information searches), and 17 items measure students’ ability to evaluate information.

The assessment contains a variety of question types. Some questions are multiple-choice, with one correct answer; other questions are composed of a common stem followed by multiple true/false items and the direction to “check all that apply.” Thus, if there were five foils following a common stem that could be checked or not checked, each was treated as a separate true/false item for data analysis purposes. In addition, interactive problem-solving exercises require the participants to demonstrate skills, such as evaluating specific journal articles and websites.

Because we were interested in information literacy in the area of speech-language pathology, we edited the RRSA items to emphasize speech-language and hearing disorders. For example, an original interactive problem-solving exercise that measured students’ ability to conduct restricted searches had these instructions, “You are interested in gathering information about work stress, but are not interested in its medical side effects. Set up a document search in a separate window using the following keywords: stress, medical.” This item was adapted as follows: “You are interested in gathering information about stuttering, but are not interested in the genetic causes. Set up a document search in a separate window using the following keywords: stuttering, genetic.”

We adapted other items to measure students’ ability to evaluate scholarly documents. For example, an original item was, “You found three articles on learning disabilities. Click on the links below to examine each article and evaluate its content. Which article is most likely to serve commercial purposes?” The revised item read, “You found three articles on augmentative communication. Click on the links below to examine each article and evaluate its

| Table 1. Study participants’ gender, age, and credit hours earned toward their next degree (N = 150). |
|--------------------------------------------------|----------|----------|----------|
| Gender                                           | Age      | Credit hours earned toward next degree |
|        | Male     | Female   | ≤21      | 22–24    | ≥25      | ≤24      | 25–70    | ≥71      |
| Sophomore | 2.8%     | 97.2%    | 90.3%    | 6.9%     | 2.8%     | 33.3%    | 40.2%    | 26.4%    |
| Senior   | 5.7%     | 94.3%    | 52.8%    | 39.6%    | 7.6%     | 7.6%     | 1.9%     | 90.5%    |
| Graduate | 8.0%     | 92.0%    | 4.0%     | 88.0%    | 8.0%     | 92.0%    | 0.0%     | 8.0%     |

| Ratcliff et al.: Information Literacy Skills | 33   |
content. Which article is most likely to serve commercial purposes?” The poorest of the three articles was created specifically for our study. It represented an advertisement for an augmentative and alternative communication product posing as a serious informational piece. It did not have a publication date, author qualifications, or references. The better article created for this study contained dates of publication and suggested readings but still lacked appropriate references. An article with the greatest scientific rigor was an actual research report that passed a peer review. To make its length comparable with the other articles, we reduced the size of the report but retained numerous in-text citations and end references.

The CSD-RRSA also contained questions about evaluating websites. The students compared three websites on stuttering. Two of the three websites were created for this study. The poorest of the three sites was an unsubstantiated product promotion. A fictitious certification of the product was its only attempt at legitimacy. The better site was also a commercial effort but promoted the product in a more educational manner and contained addresses and phone numbers. The best site reproduced, with permission, web pages by the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health (NIH). No products were advertised on this website, and the information was unbiased. In addition, contact information for additional sources was provided.

The respondents completed the CSD-RRSA online. Personal identification numbers were required to access the questions, to keep track of individual results, and to produce automatic e-mails requested by those who completed the instrument. The CSD-RRSA administrators were given a general, group-based report that tracked the average time to complete the assessment and summarized group performance. If a participant wanted to complete part of the assessment, pause, and return to it later, that was allowed.

**Personalized Participant Feedback**

When each participant had completed the survey, his or her responses were saved in the survey database, which was programmed to automatically calculate and display numeric and narrative feedback about each participant’s personal research skills. Upon completing the survey, each participant received a feedback report that showed a quantitative summary of his or her strengths and weaknesses, a narrative that explained low or high scores, and strategies for building information literacy skills. The feedback web page showed a student’s scores for finding information and for evaluating information, as well as an overall score, which is the sum of the first two scores. Narrative feedback was based on three levels of performance on each scale. Specifically, congratulatory messages were displayed for high performance (top 30%), suggestions for further skill development were given to students whose skills were in the middle 30%, and corrective feedback with encouragement and remedial resources was provided to students whose performance was low (bottom 30%). The cutoff scores were estimated based on past performance on similar questions in the original version of the assessment survey that was constructed for use in general health professions.

Before the survey was administered, a pilot administration was given to 20 students who were enrolled in a course that was offered early in the sequence of courses required for the CSD undergraduate major. Feedback from the initial respondents was used to further modify the instrument for use in the present study.

**RESULTS**

Participation rates varied by students’ academic level: 61% of the graduate-level learners completed the CSD-RRSA, as compared to 86% of the senior-level students and 96% of the sophomore-level students. Questions that made up the CSD-RRSA were examined for their reliability. Estimates of internal consistency were computed for two scales—the ability to find information and the ability to evaluate information. The first scale, the Finding Information scale, initially consisted of 31 items that measured respondents’ ability to find information from a variety of sources. Cronbach’s alpha was .69, which increased to .72 after three items with negative item-total correlations were removed, reducing the scale to 28 items. The second scale, the Evaluating Information scale, consisted of 17 items that measured respondents’ ability to evaluate information. Cronbach’s alpha was .67, which increased to .70 after four items with negative item-total correlations were removed, reducing the scale to 13 items. Both internal consistency reliability estimates were considered to be underestimates due to the dichotomous (0 = incorrect and 1 = correct) nature of the test items. When the two scales were combined (a total of 41 items), Cronbach’s alpha reliability was .79, which is an acceptable internal consistency estimate (George & Mallery, 2003).

In order to rule out whether time may have influenced the results, we examined how long it took participants to complete the survey. First, in order to compare mean CSD-RRSA completion times by academic level, any outliers of ≥60 min were removed because they were likely due to the fact that a student saved responses and returned to the assessment at a later time. After removing the outliers, the mean completion time ranged between 28 and 33 min (M = 32.88, SD = 11.09 for sophomore-level students, M = 27.59, SD = 11.36 for senior-level students, and M = 31.06, SD = 11.60 for graduate students). The times did not differ significantly across academic levels, F(2, 131) = 2.80, p > .05. Therefore, time to complete the survey did not appear to influence the results.

Results of a one-way analysis of variance (ANOVA) indicated significant skill differences among the students at the three academic levels. Scores for the Finding Information scale, F(2, 147) = 9.18, p < .001, and scores for the Evaluating Information scale, F(2, 147) = 3.47, p < .05, as well as overall information literacy scores, F(2, 147) = 9.43, p < .001, differed significantly among the three groups. Table 2 shows the mean scores earned on each scale by students at each level. Bonferroni tests indicated that graduate-level students’ scores differed significantly from scores earned by the sophomore-level students. Further statistical tests of academic-level group differences could not be performed due to small cell counts. Therefore, we examined the
percentages of correct responses in each scale to identify strong and weak skills demonstrated by CSD students at different academic levels.

Finding Information Scale

The Finding Information scale included measures of basic and advanced search skills as well as knowledge of sources. Specifically, some items measured the ability to conduct document searches using key words and Boolean operators. For example, students were asked to find a publication in their library catalog when given only the author and title. In addition, students were asked to indicate whether a citation in American Psychological Association (APA) format was complete or not, and to specify what type of publication was being referenced—a book chapter, a scholarly journal, or a book. Other items measured students’ knowledge of scholarly publication types in the CSD field and their ability to differentiate primary and secondary sources of information.

The percentage of students who correctly responded to items in the Finding Information scale varied widely. Table 3 contains data for the Finding Information scale for each specific question at the three academic levels. Examination of these data indicate a number of patterns. First, the issues appearing most difficult for the graduate-level students were using advanced searches and recognizing whether a source was primary or secondary. The graduate-level students did particularly poorly on a question that required them to use Boolean operators. The senior-level students performed poorly on these same questions. The sophomore-level students also found the question requiring the use of Boolean operators difficult; however, they also performed poorly on questions dealing with recognizing authoritative as opposed to non-authoritative sources of information, and recognizing when a citation lacks key information such as page numbers.

On the other hand, the graduate-level students did well on the majority of questions. As a matter of fact, all of the graduate students who participated in the study answered five of the 28 questions correctly. Specifically, the graduate-level students were able to recognize complete APA style citations in CSD articles and books. They were also able to recognize whether a specific publication was a scholarly or academic publication, as well as differences in the APA reference for a book versus a journal article. The graduate-level students also demonstrated knowledge of the terms abstract and bibliography and the ability to set up a document search using specific key words. Senior-level students performed well on questions that pertained to (a) recognizing whether a given citation was not a scholarly journal and (b) finding a call number from an online library catalog when given an author and title. Sophomore-level students performed at their highest level on questions concerned with (a) recognizing journal citations as opposed to book citations, (b) realizing that a well-known professional journal was a source of scholarly information and that a well-known daily newspaper was not, (c) knowing the definition of a journal abstract, and (d) finding a library call number by using only title and author information (see Table 3 for specific data).

For a number of questions, the data did not indicate that the students performed particularly well nor particularly poorly. Because results of the ANOVA indicated significant skill differences among the students at the three academic levels, we also examined differences in percentages among the academic levels for a given item in order to indicate whether, for a specific question, the students at higher academic levels performed better than the students at lower levels. There were a number of questions in which the percentage accuracy data of the different academic levels were in the expected direction—that is, the graduate-level students did better than the senior-level students, who did better than the sophomore-level students. The content of questions indicating this expected pattern pertained to a variety of topics, such as (a) recognizing correct APA citation formats, (b) determining whether a specific publication is a scholarly publication or not, and (c) recognizing a peer-reviewed journal as an authoritative source (see Table 3 for these data).
Table 3. Data for all participants by individual item for the Finding Information scale.

<table>
<thead>
<tr>
<th>Item</th>
<th>Sophomore level</th>
<th>Senior level</th>
<th>Graduate level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Boolean operators (and, not, or)</td>
<td>31.9</td>
<td>39.6</td>
<td>28.0</td>
</tr>
<tr>
<td>Ability to perform an advanced Internet search for a health video</td>
<td>40.3</td>
<td>41.5</td>
<td>60.0</td>
</tr>
<tr>
<td>Knowledge of references: a journal citation lacks page numbers</td>
<td>44.4</td>
<td>41.5</td>
<td>80.0</td>
</tr>
<tr>
<td>Identification of a primary/secondary source of information: Mayo Clinic Annual Report</td>
<td>52.8</td>
<td>49.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Demonstration of a skill in setting up and performing a search with Boolean operators</td>
<td>47.2</td>
<td>54.7</td>
<td>52.0</td>
</tr>
<tr>
<td>Knowledge of references: a citation to a book chapter</td>
<td>55.6</td>
<td>64.2</td>
<td>56.0</td>
</tr>
<tr>
<td>Knowledge that a journal is a source of scholarly information on a narrowly specialized topic</td>
<td>44.4</td>
<td>64.2</td>
<td>88.0</td>
</tr>
<tr>
<td>Identification of a secondary source of information: an anatomy textbook</td>
<td>56.9</td>
<td>64.2</td>
<td>68.0</td>
</tr>
<tr>
<td>Knowledge of references: a citation to an article from Audio Quarterly</td>
<td>51.4</td>
<td>73.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Knowledge of scholarly or academic journals: Health Services Research</td>
<td>62.5</td>
<td>75.5</td>
<td>72.0</td>
</tr>
<tr>
<td>Demonstration of a skill in using a library online catalog to find the call number of a book</td>
<td>69.4</td>
<td>73.6</td>
<td>64.0</td>
</tr>
<tr>
<td>Identification of a primary source of information: one’s medical record</td>
<td>66.7</td>
<td>73.6</td>
<td>76.0</td>
</tr>
<tr>
<td>Understanding that a one-key word generic search may return too many documents—an overwhelmingly large number of resources on a variety of topics</td>
<td>63.9</td>
<td>67.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Knowledge of references: a citation to an article from Language, Speech, and Hearing Services in Schools</td>
<td>63.9</td>
<td>77.4</td>
<td>96.0</td>
</tr>
<tr>
<td>Knowledge of references: a citation to an article from Allied Health</td>
<td>65.3</td>
<td>79.2</td>
<td>88.0</td>
</tr>
<tr>
<td>Identification of a secondary source of information: a summary of empirical studies</td>
<td>80.6</td>
<td>77.4</td>
<td>76.0</td>
</tr>
<tr>
<td>Ability to detect a journal citation that is incomplete</td>
<td>81.9</td>
<td>83.0</td>
<td>84.0</td>
</tr>
<tr>
<td>Understanding of the term “bibliography”</td>
<td>80.6</td>
<td>81.1</td>
<td>92.0</td>
</tr>
<tr>
<td>Ability to determine which sources would be best to use in quoting for a specific purpose</td>
<td>76.4</td>
<td>86.8</td>
<td>92.0</td>
</tr>
<tr>
<td>Ability to detect that a journal citation lacks a year of publication</td>
<td>80.6</td>
<td>84.9</td>
<td>96.0</td>
</tr>
<tr>
<td>Knowledge of scholarly or academic journals: U.S. News and World Report (not scholarly)</td>
<td>81.9</td>
<td>86.8</td>
<td>92.0</td>
</tr>
<tr>
<td>Identification of a secondary source of information: a newspaper article about the number of people with hearing loss</td>
<td>79.2</td>
<td>94.3</td>
<td>92.0</td>
</tr>
<tr>
<td>Knowledge of scholarly or academic journals: Time (not scholarly)</td>
<td>86.1</td>
<td>88.7</td>
<td>96.0</td>
</tr>
<tr>
<td>Ability to detect that a journal citation lacks publisher information</td>
<td>88.9</td>
<td>83.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Knowledge of scholarly or academic journals: Wall Street Journal (not scholarly)</td>
<td>93.1</td>
<td>88.7</td>
<td>96.0</td>
</tr>
<tr>
<td>Understanding of the term “journal abstract”</td>
<td>95.8</td>
<td>83.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Demonstration of skill of finding a call number when given an author and title</td>
<td>95.8</td>
<td>96.2</td>
<td>92.0</td>
</tr>
<tr>
<td>Knowledge of scholarly or academic journals: Journal of Speech, Language and Hearing Research</td>
<td>95.8</td>
<td>96.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Evaluating Information Scale

The Evaluating Information scale contained three groups of items. First, the participants were provided with three websites about stuttering and were asked questions relative to the credibility/validation of the sites. Second, the participants evaluated three full-text articles on augmentative and alternative communication. Finally, participants were provided with a description of an SLP and were asked to determine whether the practitioner met particular qualifications. With the exception of the NIH website, the websites, articles, and practitioner descriptions were developed by the investigators specifically for the purpose of this assessment. Table 4 contains data for each academic level for each item for the Evaluating Information scale.

Examination of the data indicate that many of the items appeared fairly easy for the graduate-level students, as evidenced by the “relatively high” percentage accuracy. The items obtaining the highest percentage of correct answers by graduate-level students pertained to (a) judging the websites for clinical validity, (b) determining specific practitioner qualifications, and (c) judging which of the three articles underwent a rigorous review. Likewise, both the senior- and sophomore-level students scored well on items having to do with judging website validity. However, both the senior- and sophomore-level students performed relatively poorly at confirming specific credentials of the practitioner described.

As with the Finding Information scale, there were data indicating neither particularly good nor particularly weak performance for all levels of students on a number of items. Because statistically significant differences among the three student levels were reported, we also examined differences in percentages among the academic levels for a given item in order to indicate whether, for a specific item, the students at higher academic levels performed better than the students at lower levels. Further examination indicated that there were six questions in which the percentage accuracy data of the levels were in the expected direction, with students at the higher levels performing better than students at the lower levels. These questions had to do with (a) judging website validity, (b) recognizing practitioner qualifications, (c) noting which of the three articles had been through a rigorous review, and (d) recognizing the implied purpose of a given article (see Table 4 for the specific data).

DISCUSSION

This survey of information literacy skills of students in a CSD curriculum provided results that indicated differences in performance based on students’ academic level. These results offer some interesting observations, described in the following paragraphs.
We surmised that, compared to students at lower academic levels, students at advanced courses were exposed to more sources and different source types, and they may have become overly critical in their judgments of these sources. In other words, in the process of gaining more exposure to a wider variety of sources, students may have adopted a stricter definition of a primary source of information. For example, the students may have decided that because a peer-reviewed article appeared in an online format, it then became a secondary source simply based on the modality of its acquisition. That is, the students may have come to believe that the web itself turns information into secondary sources.

Ivanitskaya et al. (2006) also found that undergraduate students had difficulty differentiating between primary and secondary sources. These data substantiate the work of Nail-Chiwetu and Bernstein Ratner (2007), who found that practicing SLPs, like other professionals, most often seek professional information from colleagues as opposed to using library resources and/or data-based resources. This, coupled with the finding that Internet users tend to underestimate the effort and skills required to obtain valid information in a given area (Ivanitskaya et al., 2006), helps to explain why the use of valid sources of information may remain at a low level even as the students begin to practice professionally.

### Proficiency in Evaluating Information

The largest differences across academic levels were observed in students’ responses to items in the Evaluating Information scale. For the most part, these differences were in the expected direction: Students at higher academic levels performed better than their less educated peers.

Students’ performance on the items included in the Evaluating Information scale indicated that they were skilled in evaluating website quality. The percentage accuracy was ≥88% for all items. Perhaps the fact that they have been searching for all kinds of information on the web for a number of years is reflected by high skill levels in this area.
Although the students were able to recognize that not all of the websites were of the same quality, the graduate-level students perhaps exhibited more skepticism than the lower level students. Specifically, the graduate-level students appeared to be overly cautious in their evaluation of the material on the NIH site. Many lower level students are so enthusiastic about the value of the Internet as an information source that they tend to use it without critical judgment. In their academic programs, these students get exposed to one-sided, incomplete, or inaccurate online information, which may change their beliefs about some information from the Internet. Does such exposure lead students to believe that they cannot trust most of what they see on the open web, even if it comes from a reputable source? If yes, then it would be valuable to guide these students to develop a more balanced understanding of this information source—a “trust with caution” approach.

Students at all academic levels appeared to be able to recognize the credibility indicators of an SLP. By aspiring to become an SLP and by having credentialed SLPs as their teachers and clinical supervisors, as well as shadowing SLPs in a variety of settings, the students have picked up the meaning of certificate of clinical competence as well as the other academic and clinical designations of professional credibility.

Conclusion

Overall, there were significant differences among students at three academic levels in their ability to find and evaluate information, and the differences primarily indicated that students at higher academic levels were better able to find and evaluate information than students at lower levels. There was evidence that students enrolled in a CSD program systematically have better skills in selected areas of information literacy the longer they are in the program. Data also indicated that students at all levels lacked some competency in certain information literacy areas. For some aspects of information literacy, the differences appeared to reflect more accurate responses from students at lower academic levels compared to those at higher levels. However, these data may not necessarily be an indication of better performance by the students at the lower levels compared to the students at higher levels. In fact, these data may point out that students at higher academic levels have adopted a more critical approach to information analysis.

Despite the significant differences in student levels relative to information literacy in the expected direction, these data substantiate that students at all levels can benefit from further training in information literacy skills. Institutions of higher education are well positioned to be leaders in developing better competencies in information literacy in consumers of information. Methods to improve students’ information literacy have been addressed by Nail-Chiwetalu (2005) and include receiving feedback from information literacy assessments such as the RRSAs, participating in library instruction sessions, and completing research assignments that require an analysis of scholarly sources.

These data have shown a need for instructors across all academic levels to integrate standards of information literacy into activities and assignments for a variety of courses, as well as the curriculum as a whole (Nail-Chiwetalu, 2005). To that end, the faculty and staff at the University of Maryland University College, Information and Library Services, have produced a tutorial for developing and evaluating assignments that capitalize on information literacy (University of Maryland University College, 2005). This tutorial can be found on their website.

Another way to promote competence in information literacy would be to integrate the five standards produced by the American Library Association (2006) and the ASHA standards (ASHA 2005a) into the curriculum of CSD programs while providing students with plentiful opportunities to practice their skills in the areas of obtaining and evaluating documents on speech-language pathology topics.

Future research can be based on longitudinal data sets for a specific CSD training program that track students’ RRSAs performance over time as part of program assessment. The RRSAs could be used to gather data across similar institutions/programs for comparison purposes. Adapted to the discipline of speech-language pathology, the CSD-RRSA has the potential to yield important information for pre-professional training programs at a time when improved information literacy skills are critical for students, educators, clinicians, and the public they serve.

REFERENCES


Nail-Chiwetalu, B. (2005, April 13). *Integrating information literacy into your curriculum* [CAPSCD Short Course]. Scottsdale, AZ.


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