UNDERGRADUATES' KNOWLEDGE AND INTEREST IN THE DOCTORATE OF PHILOSOPHY
DEGREE FOR COMMUNICATION SCIENCES AND DISORDERS

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A Thesis

Submitted to the Graduate College of Bowling Green
State University in partial fulfillment of
the requirements for the degree of

MASTER OF SCIENCE

December 2011

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ABSTRACT

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The American Speech-Language and Hearing Association has projected a shortage of professionals in Communication Sciences and Disorders (CSD) who hold a doctorate of philosophy degree. These professionals have expertise in the field and contribute to its development through research and the education of future clinicians. Efforts have been made to remediate this problem through increasing awareness of the shortage and promoting the doctorate degree to students. However, the knowledge and interests that students have about the doctoral degree are not known. To evaluate this, 985 undergraduate CSD students from across the nation participated in a survey inquiring about their perceptions, knowledge, and interests in the doctorate degree in CSD. Results of the survey indicated that the educational backgrounds and experiences undergraduates have relate to their level of knowledge of the doctorate degree. Undergraduate students' level of interest in achieving a doctorate related to their perceived knowledge of the degree, but not their demonstrated knowledge. Overall, opportunities that relate to the doctoral careers should be promoted to undergraduate students in order to increase knowledge and interest in the degree.

This study is dedicated to my grandmother, Lillian Witter.

ACKNOWLEDGEMENTS

I would like to thank my advisor, Tim Brackenbury, for his guidance throughout this process. He has provided me with support and encouragement that will never be forgotten. I would also like to thank my committee members, Lauren Katz, Alexander Goberman, and Larry Small for their advice and suggestions about the study.

I would also like to thank my family for their encouragement. My mom and dad, my brother Matt, and my grandmother have supported me during every step of this journey.

I want to thank my entire CDIS master's and doctoral classmates. I would especially like to thank Scott Palasik for allowing me to create a CSD undergraduate program database based on his CSD master's program database.

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CHAPTER I: INTRODUCTION

The discipline of Communication Science and Disorders' (CSD) governing body, the American Speech-Language and Hearing Association (ASHA), has projected a shortage of professionals in the field who hold a doctorate of philosophy degree. In 2002, a joint ad hoc committee between ASHA and the Council of Academic Programs in Communication Sciences and Disorders (CAPCSD) predicted that the doctoral shortage would become severe within the next 15 years, (Ingham, Oller, & Wilcox, 2002). Evidence for this shortage has come primarily from data comparing the number of doctoral students in training with the number of faculty positions concurrently available in CSD academic programs. Oller, Scott, and Goldstin (2002) presented the results of demographic survey of 56 CSD doctoral programs. The programs reported enrollments between 6 and 16 doctoral students. The CSD departments also indicated the number of open doctoral student slots in their programs. Within these 56 universities, there was an average of 2.9 available in speech-language pathology, 2.0 in audiology, and 1.9 in communication sciences. Overall, the Oller et al. survey results showed there were 333 unfilled student positions. In 2009, Small et al. reported survey results from 267 current doctoral students in CSD program across 71 U.S. universities. Their results indicated that there were approximately 443 individuals enrolled in CSD doctoral program. In terms of faculty positions, Hull and Coufal (2009) reported that 90% of the programs that responded to their national survey were unable to fill open faculty positions with qualified candidates. These results may suggest that there still may be not enough new doctoral faculty to meet programs' needs.

There are a number of negative consequences that may occur if this projected shortage is not resolved. Bernthal (2001) described problems for academic programs, clinical training, client services, and the field in general. Without enough doctoral faculty, programs may not be

accredited by ASHA, which can lead to future clinicians not being certified. Departments might also downsize in the number of students accepted into their graduate programs because they do not have enough faculty to teach and supervise. This could result in decreases in university funding towards programs and fewer clinicians working in the field. If there are fewer doctoral students in CSD programs, audiology and speech-language pathology related research would likely decline. Ultimately, clients would not be provided with services that they require (Bernthal, 2001). Oller et al. (2002) warned that if measures to resolve the issue of the projected shortage in faculty are not taken, then immense restructuring of the CSD discipline will be required.

A number of proposals have been made to address the projected doctoral shortage. They have primarily focused on increasing students' and clinicians' knowledge about the doctorate degree and increasing student experiences in research and teaching. Undergraduates in CSD programs are a prime constituency for these proposals because they represent the future of the professions. There is currently no information available about these students' knowledge and perceptions about the doctorate degree or how this knowledge has been shaped by their experiences. The current study examined these issues through a survey of over 900 undergraduate students in CSD programs. The study was developed from the past proposals and current progress towards reducing the impact of the projected shortage.

Past Proposals to Address the Projected Doctoral Shortage

Ingham et al. (2002) presented six recommendations to address the projected doctoral shortage. These targeted undergraduates, master's students, and practicing speech-language pathologists. The recommendations were to 1) create a structure to continue the momentum in addressing the projected shortage, 2) increase the visibility of the discipline, research

opportunities, and promote higher education as a career, 3) target and coordinate data collection and dissemination, 4) develop a centralized mechanism for information exchange, 5) enhance research training experience, and 6) support a doctoral leadership program. The majority of the suggestions that targeted undergraduates were made within the second and fifth recommendations. The specific actions that were suggested included developing a video about research and academic careers in CSD, including an academic career options in materials to recruit future professionals, showcasing student research and success in academia, and developing a career development program for undergraduates who excel and show interest in academic careers.

Ingham et al. (2002) also suggested the development of curricular models that foster and enhance students' progress from the bachelor's to the doctoral degrees. Generally, most natural science programs use a direct bachelor's to doctoral curricular model that shape their students into future faculty members. Oller et al. suggested that CSD programs create a more direct way into doctoral education, starting at the undergraduate level. This was different than the traditional model of acquiring a doctorate in CSD, in which students acquire their master's degree, work for several years as a clinician, and then return to a doctoral graduate program. The committee recommended creating a curricular model in which undergraduates who had completed their bachelor's degrees could progress seamlessly into a doctoral program. Others also have discussed the importance of direct forms of bachelor's to doctoral training. In 2002, Scott and Wilcox summarized discussions by faculty members and administrators from CSD programs attending a session during the CAPCSD convention about doctoral education. The attendees expressed that they believed pre-doctoral education should be initiated during a CSD student's undergraduate career. Ingham (2003) expressed a similar sentiment stating that the

expansion of the bachelor's to doctorate model would be a more natural means of progression to doctoral education. Ingham considered the bachelor's to doctorate model to be especially powerful for undergraduates interested in research because it would allow them to sustain their interest.

While interest in research can be an important tool for motivating undergraduates to earn a doctorate, just talking about research may not be enough (Scott & Wilcox, 2002). Direct research experiences can offer students the opportunity to experience the research aspect of an academic career in CSD (Busacco, 2002). In 2003, Mueller and Lisko reported survey results from 80 CSD programs about the benefits of undergraduate research and how this could be a step to solving the projected doctoral shortage. They found that 67% of the responding programs offered undergraduate research experience. The CSD programs viewed these opportunities as motivation for undergraduates to pursue a doctorate of philosophy. Mueller and Lisko discussed how having an undergraduate research opportunity can make the student interested and enthusiastic about pursuing a career in academia.

Current Progress

It is reasonable to examine the progress made towards addressing the projected doctoral shortage, given that it has been nearly a decade since the shortage was formally identified and seven or more years since the above recommendations were made. A number of advances have been made in regards to providing undergraduate students with more information about doctoral training. The ASHA website, for example, now includes written material and an informative video about academic career options in the field (ASHA, 2006). ASHA conventions since 1999 have included at least one informative session for students and practitioners who are considering doctoral training (see McCrea, 2008 for an update on these and other recommendations). ASHA

has also implemented the Research in Higher Education Mentoring Program. This program is designed to allow undergraduate and master's students the chance to become exposed to an academic work setting. To do so, selected students are given a stipend for a week-long learning experience about research and academia while being guided by a mentor. This opportunity also gives students the ability to view what an SLP, audiologist, or speech/language/hearing scientist's career could be when a doctorate of philosophy is achieved (Busacco, 2002).

Advances have also been made in directly involving undergraduates in research and connecting undergraduate to doctoral training. In 2004, ASHA established the Student's Preparing for Academic and Research Careers (SPARC), which focused on constructing a mentoring program that would facilitate knowledge of the academic careers in response to the projected doctoral shortage (Patel, 2010). As of 2009, 71 students have received a SPARC award. According to the manager of ASHA's Academic Affairs Program, 13 of these 71 recipients were undergraduates (juniors and seniors) (S. Burger, personal communications, February 16, 2010). In terms of curricular change, a number of CSD programs have implemented training models that facilitate the acquisition of doctoral degrees for interested undergraduate students. Bowling Green State University's Doctoral Bridge Program is one such example. In this program, highly qualified undergraduates can apply to work simultaneously toward their master's and doctorate degrees. Master's and doctorate classes, as well as direct research experiences, are built into the program, and once accepted, students do not have to reapply for the doctoral degree. Although other programs like this exist around the country, it is unclear how many of them are currently being offered.

Present Study

The proposals and current progress towards addressing the projected doctoral shortage have focused on increasing students' knowledge and experience within the research and academic branches of the CSD. They are predicated on the idea that more knowledge and experience will lead to a greater interest in doctoral level training. Yet, there is currently no published information on what undergraduates know about doctorate degrees in CSD. Do they truly not have enough knowledge about doctoral careers in the disciplines? If so, are they uninformed across all areas and/or do they have false beliefs about doctorate degrees and research careers? How closely does their knowledge match their interest in pursuing a doctorate degree? The closest data that could be found was from a study presented at the 2009 ASHA convention (Witter, Pray, & Woods). This survey of 90 undergraduate students from the state of Michigan examined student knowledge about the master's and doctorate degrees in speech-language pathology. The results from this survey revealed that a large majority of students perceived themselves to be very knowledgeable about the master's degree but to have little or no knowledge about the doctorate degree. Without information about what students currently know about the doctorate (and what shaped that knowledge), it is difficult to develop proposals that directly target the areas of need. Furthermore, this lack of information makes it difficult to determine if the actions that are currently taking place are reaching or not reaching students. The number of new doctoral candidates is one potential measure, but there are too many variables that may affect this outcome. These include financial needs, familial requirements, weariness with schooling, or a lack of interest in the doctorate professions (despite increases in knowledge and experiences).

The present study focused on students' demonstrated and perceived knowledge about the doctorate degree in CSD. This was examined by surveying undergraduate freshman,

sophomores, junior, seniors, and post-baccalaureate students in CSD programs across the country. The following research questions were examined: What demonstrated and perceived knowledge do undergraduate students have about the doctorate of philosophy degree in CSD? How do their general educational backgrounds relate to their demonstrated and perceived knowledge? How do prior experiences with the doctorate degree and its common professional duties relate to their demonstrated and perceived knowledge of the doctorate of philosophy degree in CSD? How does knowledge of the undergraduates relate to their level of interest in pursuing a doctorate of philosophy degree in CSD?

CHAPTER II: METHODOLOGY

Participants

The survey participants were undergraduate students throughout the United States. The targeted populations of undergraduates were freshman, sophomores, juniors, seniors, and post-baccalaureate students, within a CSD program, considering a career in speech-language pathology, speech language hearing sciences, and/or audiology. Only individuals who were 18 years of age or older were allowed to contribute to the survey. No identifying information (e.g., name or email address) was taken that could link survey responses to a particular participant. Thus, participants were able to remain completely anonymous throughout the entirety of the survey.

Following the procedures outlined below, a total of 985 students fully participated in the survey. The participants consisted of 65 freshman (6.38%), 137 sophomores (12.7%), 313 juniors (33.2%), 397 seniors (45.1%), and 70 post-baccalaureate (6.2%) CSD students. Most of the participants attended CSD programs that were described as clinically and research based ($n=446$, 45.4%), while other participants were enrolled in programs that were clinic- ($n=279$, 28.4%) or research- ($n=14$, 1.42%) centered. A majority of the CSD departments offered at least a master's level degree ($n=803$, 81.6%). The participants attended universities in 39 states across the U.S. The mean self-reported grade point average (GPA) of the participants was 3.54. They reported entering college with mean ACT and SAT scores of 25 and 1039, respectively. The participants also stated the career they were interested in and 853 of them planned on becoming a speech-language pathologist (87%), 60 planned on becoming an audiologist (6.12%), 18 planned on being a speech-language-hearing scientist (1.84%), and 49 of the participants were still

undecided (5%). Additionally, 97.7% of the participants stated they would want to work clinically as part of their career duties.

Materials

An internet-based questionnaire that consisted of 52 survey questions was developed. Although information about current undergraduate knowledge and interest in the doctorate of philosophy degree in CSD could have been obtained by other formats, such as by a phone interview, an online survey design allowed us to efficiently reach a large number of participants. The survey was divided into five sections: Background Information, Ph.D. Knowledge and Methods, Encouragement and Qualities, Research and Teaching, and Future of CSD. The questions in each section were guided by recent efforts to increase undergraduate students' interest and potential acquisition of the doctorate degree. A variety of question styles was used. Students answered open-ended questions, partially open-ended questions, closed-ended multiple-choice questions, yes/no questions, and Likert-scale questions. A complete copy of the survey and the participants' responses to the numerically-based questions are contained in Appendix A (Note that the survey contained some questions that were not directly relevant to the present study. As a result, some of the survey items will not be analyzed or discussed in this investigation.).

The Background Information section required the students to report their own personal histories. Questions in this portion of the survey asked for information regarding age (whether 18 years or older), current academic year, CSD program (in terms of degree types offered), ACT and/or SAT scores, family members highest level of education achieved, professional plans (including degrees), and professional interests (e.g., clinician, instructor, researcher, and/or an administrator).

The second portion of this questionnaire, Doctoral Degree Knowledge and Methods, contained a series of questions that defined a doctorate of philosophy degree. These included describing: the differences between a doctorate of philosophy and a medical degree, why people choose to pursue a doctorate, the job duties of doctoral-level professionals in CSD, and questions the students might have about the CSD doctorate. The students were also asked about their prior knowledge about the doctorate of philosophy degree in the field of CSD, how many years they believe it takes to acquire the degree, and if they had actively searched for information about the doctorate. Participants who had searched for CSD doctorate of philosophy related information were asked follow-up questions related to the methods that were used and which of those methods they felt provided the best information.

The third part of this survey included questions about Encouragement and Qualities. In terms of encouragement, the students were asked to: reveal who had spoken to them about pursuing a doctorate of philosophy in CSD, how much support they had received to pursue a doctorate, if they considered attaining a doctorate degree, and if they planned on enrolling into a doctoral program (including a time frame they plan on for registering). The qualities portion of the questionnaire, students were asked to consider the traits that doctorate of philosophy degree holders possess.

The next portion of the questionnaire involved questions regarding Research and Teaching. For the Research portion the students were asked to report their interest in conducting research, history of seeking out research opportunities, prior research experiences, the availability of an undergraduate research class in their CSD programs, and the extent to which they enjoyed conducting research. The teaching part of this survey contained questions in which students gave information on their interest in teaching, if they were directed to or personally

sought out teaching opportunities, teaching experiences in their CSD program and across their university, if they had been a teaching assistant, and if they like teaching.

The final section of this survey was concerned with the Future of CSD. In this section students reported if they knew about the projected shortage of individuals holding a Ph.D. in CSD prior to taking the survey, and if they did know about it, how they discovered this information, if availability of jobs for a doctorate of philosophy professionals in the field of CSD would be altered as a result, and if they believed there would be a shortage of individuals possessing a doctorate of philosophy in CSD and consequences if doctoral shortage occurs. These questions were based on a previous survey given to undergraduate students about the projected doctorate shortage in CSD (Witter, Pray, & Woods, 2009).

Procedures

Recruitment and data collection.

The following methods for recruiting participants were approved by the Human Subjects Review Board at Bowling Green State University on 02/11/2011 (See Appendix B.). SurveyMonkey.com, a web-based survey service, was used to present the survey and collect the participants' responses.

Undergraduate students in CSD were contacted through emails sent to the department chairs and undergraduate coordinators of 257 CSD programs throughout the United States. The chairs and coordinators were given a brief description of the research study and asked to forward the emailed description to their undergraduate students. The email included a link to the survey, which directed the students to the survey's introduction page. There, potential participants were provided with information about intention of the study, confidentiality and anonymity protections, potential impacts, risks and benefits, and contact information (see Appendix A).

Once the students read through the information and agreed to participate, they could then begin the survey. They were instructed to complete the survey in its entirety, but were also directed discontinue participation if they felt uncomfortable at any time. There were no anticipated risks to participants completing the survey, but an indirect benefit was included. A list of website links that directed the students to information about the doctorate of philosophy degree in CSD was presented at the end of the survey.

Analysis

A grand total of 1,663 people responded to the survey in at least some form. These responses were initially filtered using the analysis program on surveymonkey.com. Respondents who did not at least view the survey in its entirety were filtered out from the sample population. As a result, the data from 1044 remained in the response pool and were placed into an Excel spreadsheet.

The respondents were then manually filtered within the Excel spreadsheet. Respondents and their data were deleted from the spreadsheet if they answered questions in a manner that did not fit the study's parameters (such as selecting, "I do not attend a CSD program." for item #3) and/or viewed all survey pages but did not answer beyond the first few background information questions. After filtering through all of the respondents, 985 participants were included in the final analysis. It is noted, however, that not all of these participants completed all of the survey questions. As a result, the number of individuals who responded to each survey item varied from 685 to 981. After narrowing down the respondents, some of the survey responses were transformed into numerical values within the Excel spreadsheet (see below). Once this was completed, the final data were statistically analyzed using the Statistical Package for Social Sciences (SPSS) program version 11.0.4.

Statistics

The data used for statistical analysis included numeric values that were from nominal, ordinal, and intervals scales. As a result, four different parametric procedures were conducted, depending on the scales of the data being compared. The Chi-square procedure was applied to analyses that included two nominal variables. An Independent-Samples *t*-test was utilized for comparisons that included one ordinal and one nominal variable (with two levels). The Pearson Product Moment Correlation was used for analyses with two ordinal/interval variables. Finally, a one-way analysis of variance (ANOVA) was applied to comparisons that included one ordinal/interval and one nominal variable (with more than 2 levels). In cases where the results of the ANOVA were statistically significant, post-hoc *t*-tests (with Bonferroni adjustment) were administered to determine the source(s) of the differences.

Research question 1: Demonstrated and perceived knowledge.

The first research question asked about undergraduate students' demonstrated and perceived knowledge of the doctorate of philosophy degree in CSD. In order to determine the students' demonstrated knowledge, four open-ended survey questions from Section II – Ph.D. Knowledge and Method (questions 12-15) were examined. The questions required the participants to: define the doctorate of philosophy, describe the differences between a medical degree and a doctorate of philosophy, explain why people choose to pursue a doctorate, and list the job duties of doctoral-level professionals in CSD. The participants' responses for each question were then compared to 5 defining features of the doctorate of philosophy. These features were identified by the researchers, based on definitions of a doctorate of philosophy and its uses. According to Dictionary.com Unabridged (2011), a Doctor of Philosophy is “also called doctorate. The highest degree awarded by a graduate school, usually to a person who has

completed at least three years of graduate study and a dissertation approved by a board of professors.” ASHA (2011) stated that,

A Ph.D. is the terminal degree in many fields, and completion of the Ph.D. prepares individuals for careers as researchers, scholars, and teachers. Persons with a Ph.D. in communication sciences and disorders can pursue academic/research careers in colleges and universities or in other facilities where research is a component of their responsibilities. Thus, when a person chooses to pursue a Ph.D., he or she is typically choosing to pursue a career in teaching, research, and other scholarly activities.

Based primarily on these sources, the 5 features identified as relevant to the composition of a doctorate of philosophy in CSD were: highest degree, research, teaching, service, and dissertation. Each individual participant’s responses to questions 12 – 15 were scored based on the occurrence of these features. For example, if a student stated that the doctorate of philosophy is the highest degree obtainable then they would receive one demonstrated knowledge point. The occurrence of each feature was allowed to only count for one point (no matter how many times an individual listed a feature), resulting in demonstrated knowledge scores that ranged from 0 to 5.

Perceived knowledge was also examined specifically, on question 18, students rated their “current level of knowledge” about the doctoral of philosophy degree in the field of CSD. If a participant selected an answer of “Very Knowledgeable” at the top of the scale, they received a score of 5, while a participant that selected “No Knowledge” at the bottom of the scale would receive a score of a 1. This gave the participants their perceived knowledge score.

The participants' demonstrated knowledge score was analyzed in relation to their perceived knowledge scores. In this case, the demonstrated knowledge score served as the dependent variable.

Research question 2: Educational Background

It is quite possible that the participants' demonstrated and perceived knowledge was related to their educational background. To investigate this, separate analyses were conducted in which the participant's demonstrated knowledge score served as the dependent variable and the following educational aspects as independent variables: current enrollment level (i.e., year in school), types of degree their university offered, and GPA. Similar analyses were also conducted with perceived knowledge as the dependent variable.

Research question 3: Experiences.

The third research question asked how demonstrated and perceived knowledge related to the participants' current and past experiences related to the doctorate degree. Experiences that might be related to the participants' level of knowledge were Question 19 (which asked students to state whether or not they searched for information about the doctorate), Question 23 (which required participants to select all of the different people that had spoken to them about pursuing the doctorate of philosophy degree in CSD), and Questions 33, 35, 44, and 45 (which examined the participants' involvement in direct experiences of job duties professionals with a doctorate of philosophy would perform, such as teaching or conducting research).

The direct experience score was comprised of participants' involvement in conducting research, taking a research class, being a peer tutor, and being a teaching assistant. These activities were categorized into two groups: teaching and research. Nominal number values were used to code each participant's experiences. Participants who reported no involvement in either

research or teaching experience received a score of 0. If a participant only participated in research, he/she obtained a value of one. Those who only participated in a teaching activity, received a value of 2. Finally, a score of 3 was given to participants who reported being engaged in both research and teaching activities.

A similar process of transforming response data into numerical values was done for the questions about who had spoken to the participants about pursuing a doctorate of philosophy degree. In the survey, the participants were free to select up to 7 groups of people that had spoken with them about pursuing the doctorate of philosophy degree in CSD (e.g., CSD advisor, CSD faculty, and parents). Another nominal scale was developed to code these responses. Participants who did not speaking with anyone, were categorized with a score of 0. Those who stated a CSD department member spoke to them received a score of 1. A score of 2 was given to participants who responded that only individuals outside of the CSD department spoke to them. Finally, if a CSD department member and a person outside of the department spoke with the student about pursuing a doctorate in CSD, the participant was given a score of 3.

Research question 4: Interest.

The final research question asked if the undergraduate students' level of interest in pursuing a doctorate of philosophy was examined relative to their level of demonstrated and perceived knowledge of the degree. On question 25, students rated how interested they were in pursuing a doctorate of philosophy in CSD, with the highest value of five suggesting high interest and the lowest value of one suggesting low interest.

CHAPTER III: RESULTS

The test results reported in this chapter were created from the specific survey items that were connected to the study's research questions. Descriptive results for each of these items can be found in Appendix A. Tables and figures demonstrating the inferential analysis results are in Appendix C. All of survey items analyzed using inferential statistics were tested at $\alpha = .05$ in order to prevent the possibility of making a Type II error. The Bonferroni correction for the alpha level was applied during post-hoc testing, to avoid a Type 1 error. According to the SPSS software, Bonferroni corrections were made within the program's analyses and, as a result, $\alpha = .05$ remain in effect for the post-hoc analyses (SPSS, 2005).

Demonstrated and Perceived Knowledge

There were two types of knowledge analyzed in this study: demonstrated and perceived. A total of 770 participants responded to each of these knowledge-based questions. The overall mean demonstrated knowledge score on a scale from 0 to 5 (where 0 represents no identified features of a doctorate and 5 represents all defined features of a doctorate were identified) was 1.66 ($SD = 1.08$). The mean demonstrated knowledge score for each of the 5 levels of perceived knowledge were: no knowledge = .98 ($SD = 1.06$), almost no knowledge = 1.42, ($SD = 1.02$), limited in knowledge = 1.80 ($SD = 1.0$), somewhat knowledgeable = 2.14 ($SD = 1.14$), and very knowledgeable = 1.89 ($SD = 1.36$) as shown in Figure 1. In order to identify if a relationship between demonstrated and perceived knowledge existed, an ANOVA was conducted (Table 1). The result of this ANOVA indicated that there were significant differences between demonstrated knowledge for the different levels of perceived knowledge ($F(4, 765) = 18.01, p < .001$). Post-hoc t -tests (see Table 2) revealed that participants who rated themselves as having no knowledge of the doctorate degree had significantly lower demonstrated knowledge scores than

those who rated themselves with almost no knowledge, limited in knowledge, or somewhat knowledgeable ($p = .033$, $p < .001$, $p < .001$, respectively). Other significantly different demonstrated knowledge scores were found between having almost no knowledge and limited in knowledge ($p < .001$), almost no knowledge and somewhat knowledgeable ($p < .001$), and limited in knowledge and somewhat knowledgeable responses ($p = .028$). None of the other post-hoc comparisons reached significance.

General Education Background and Knowledge

Demonstrated knowledge and perceived knowledge were compared to general education background information provided by the participants. The general education background information analyzed included current year enrolled, type of degrees offered by their programs, and GPA. Results from one-way ANOVAs comparing each of these variables with demonstrated knowledge are described below and presented in Table 1. Likewise, results from Chi-Square comparisons of these variables with perceived knowledge are described below and presented in Table 4.

Year enrolled.

The first general education background analyses compared each knowledge level with the participants' current year enrolled. The mean demonstrated knowledge scores for each of the current years enrolled were as follows (see Figure 2): freshman = .91 ($SD = .88$), sophomores = 1.30 ($SD = 1.03$), juniors = 1.53 ($SD = 1.04$), seniors = 1.89 ($SD = 1.05$), and post-baccalaureates = 2.18 ($SD = 1.06$). The result of the one-way ANOVA, years enrolled (5-levels) by demonstrated knowledge score, for 786 participants was significant ($F(4, 763) = 17.80$, $p < .001$). Post-hoc t -testing, as shown in Table 3, revealed that freshmen had significantly lower demonstrated knowledge scores than juniors ($p = .002$), seniors ($p < .001$), and post-

baccalaureates ($p < .001$); sophomores had significantly lower demonstrated knowledge scores than seniors ($p < .001$) and post-baccalaureates ($p < .001$); and juniors had lower demonstrated knowledge scores than seniors ($p < .001$) and post-baccalaureates ($p < .001$). Demonstrated knowledge score comparisons between all other current years enrolled levels were not significantly different from each other.

The relationship between the participants' current year enrolled and their perceived knowledge of the doctoral degree was also analyzed. Visual inspection of this data (see Table 5) suggested that the participants who were further along in their education felt like they knew more about the doctoral degree. This was confirmed by the significant results of a Chi-Square analysis, of 978 participants, comparing current year of enrollment and perceived knowledge ($\chi^2 (16, N=978) = 43.60, p < .001$).

Types of program degrees offered.

The second component of background information analyzed with both knowledge levels was the types of degrees offered at a program. The following mean scores were found for demonstrated knowledge of the 685 participants by the different program types (see Figure 3): bachelor's = 1.50 ($SD = 1.04$); bachelor's and master's = 1.63 ($SD = 1.02$); and bachelor's, master's and doctoral 1.82 ($SD = 1.12$). The participants' demonstrated knowledge was found to significantly differ depending on the types of degrees their CSD program offered, according to ANOVA results ($F (2, 682) = 4.72, p = .017$). Post-hoc t -tests (Table 6) revealed that the demonstrated knowledge of students in bachelors only programs was significantly lower than those of students in programs that offer bachelor's, master's, and doctoral degrees ($p = .020$). All other types of degrees that programs offered were found not to be significantly different ($p = .121, p = .745$).

Table 7 visually represents the number of participants (861) who perceived themselves at a certain level of knowledge and the degrees their CSD program offered. A Chi-Square test was performed to determine the relationship mentioned above. These variables were found to be significantly different ($\chi^2 (8, N= 861) = 29.36, p < .001$). Just like demonstrated knowledge, participants' perceived knowledge level differed based on the number of degrees offered within their program.

GPA

GPA was the final area of background information evaluated with both knowledge levels. A Pearson Correlation, as shown in Figure 4, indicated that self-reported GPA ($M = 3.56, SD = .36$) showed a statistically significant positive correlation to demonstrated knowledge for 750 participants ($r (750) = 0.201, p < .001$) (see Table 8). This result shows that the higher the GPA a participant had, the higher the demonstrated knowledge score the participant received.

GPA was also compared to perceived knowledge (see Figure 5). The mean for GPA for each perceived knowledge level was as follows: no knowledge = 3.48 ($SD = 0.40$), almost no knowledge = 3.56 ($SD = 0.37$), limited in knowledge = 3.55 ($SD = 0.35$), somewhat knowledgeable = 3.56 ($SD = 0.38$), and very knowledgeable = 3.36 ($SD = 0.41$). For the 943 participants, as shown in Table 9, an ANOVA revealed that perceived knowledge and GPA did not differ significantly ($F (4, 938) = 1.67, p = .155$).

Experiences and Knowledge

Demonstrated knowledge and perceived knowledge were compared to the participants' various experiences related to the doctorate degree and its common professional duties. These experiences included if the participant had actively searched for information about the doctorate degree, the people whom discussed about the doctoral degree, and direct experiences participants

had with teaching and/or research. See Tables 1 and 4, respectively, for results from one-way ANOVAs comparing each of these variables with demonstrated knowledge and Chi-Square comparisons of these variables with perceived knowledge.

Actively searching for information.

The first experience factor analyzed in relation to both knowledge levels was if the participant actively searched for information about the doctorate degree. The mean demonstrated knowledge score for the 770 participants analyzed (Figure 6) was as follows: those who did search for information = 2.02 ($SD= 1.15$) and those who did not search for information = 1.60 ($SD= 1.06$). According to the results of an Independent Samples t -test, the demonstrated knowledge of participants who had actively searched for information was significantly higher than participants who had not actively searched for information ($t(768) = 12.19, p < .001$) (Table 10).

Perceived knowledge was then compared to actively searching for information. Table 11 shows the number of participants' ($n= 979$) perceived knowledge levels with their actively searched for information report. A Chi-Square test indicated that perceived knowledge differed significantly based on the students' levels of actively searching for information on the doctorate ($\chi^2(4, N= 979) = 140.26, p < .001$).

Types of individuals discussing the doctorate.

The next feature examined in relation to the two knowledge levels was the types of individuals who discussed the doctorate degree with the participant (e.g., CSD Personnel or Non-CSD Personnel). The mean demonstrated knowledge score for the reported types of individuals who discussed the doctorate degree with the participants were: no one = 1.49, ($SD= 1.08$), CSD personnel = 1.95, ($SD= 1.01$), Non-CSD personnel = 1.52, ($SD= 1.03$), and CSD personnel and

Non-CSD personnel = 1.83, $SD= 1.10$) (see Figure 7). The results of an ANOVA indicated that the type of individuals who discussed the degree significantly related to demonstrated knowledge of the participants ($F(3, 766) = 9.37, p < .001$). Post-hoc t -tests indicated participants that had not had conversations about the doctorate degree scored significantly lower than participants who had spoken to either CSD department personnel ($p < .001$) or CSD department personnel plus non-CSD individuals ($p = .010$) (Table 12). Demonstrated knowledge scores also differed significantly between individuals reporting conversing with someone from the CSD department and when non-CSD personnel offered information to them about the doctorate degree ($p = .034$). No significant differences in demonstrated knowledge were found between any other levels.

The type of individuals who spoke to the participants and perceived knowledge were then compared. Table 13 shows for 980 participants the number of individuals who selected a type of individual that discussed the doctorate with them by their perceived knowledge level. The type of individuals who discussed the doctorate with participants had a significant impact on the participants selected level of perceived knowledge ($\chi^2(12, N= 980) = 172.34, p < .001$).

Direct experiences.

The last experience component assessed within both levels of knowledge was direct experiences with teaching and/or research. The mean demonstrated knowledge score for each type of experience are as follows: no direct experience = 1.56 ($SD= 1.07$), research experience only = 1.93, ($SD= 1.09$), teaching experience only = 1.53, ($SD= 1.08$), and research and teaching experience = 1.90 ($SD= 1.05$) (see Figure 8). Results from an ANOVA of 770 participant responses showed that demonstrated knowledge of the doctorate degree significantly differed by participants' direct experiences in research and/or teaching ($F(3, 766) = 6.41, p < .001$). Post-hoc t -testing, as shown in Table 14, showed that participants who had no direct experience had lower

demonstrated knowledge from those who had only research experience ($p = .002$), as well as those who had research and teaching experience ($p = .026$). Participants who only had a teaching experience had lower demonstrated knowledge scores than those who only had research experience ($p = .021$). No significant differences were found in demonstrated knowledge within other experience comparisons.

Direct experiences were then compared to perceived knowledge level for 979 participants (see Table 15). A Chi-Square test, indicated that direct experiences also significantly affected perceived knowledge ($\chi^2 (12, N = 979) = 61.67, p < .001$).

Interest and Knowledge

The final variable analyzed in relation to demonstrated knowledge and perceived knowledge was level of interest the participant had in the doctorate degree. The mean demonstrated knowledge score by level of interest are as follows: strongly disinterested = 1.75 ($SD = 0.97$), disinterested = 1.68 ($SD = 1.03$), neither interested nor disinterested = 1.57 ($SD = 1.05$), interested = 1.71 ($SD = 1.25$), strongly interested = 1.76 ($SD = 1.17$) (Figure 9). Level of interest in relation to demonstrated knowledge was measured using an ANOVA. No significant difference was found between level of interest and demonstrated knowledge ($F (4, 766) = .88, p = .475$) for 771 participants.

Level of interest was then compared to perceived knowledge level for 981 participants (see Table 16). Unlike the level of interest and demonstrated knowledge analysis results, perceived knowledge was found to differ significantly based on level of interest ($\chi^2 (16, N = 981) = 94.05, p < .001$).

CHAPTER IV: DISCUSSION

The purpose of this research was to determine undergraduates' knowledge and interest in the doctorate of philosophy degree in CSD. It was encouraging to see the large amount of responses (over 1000) to the questionnaire. This suggests that the topic of undergraduates' knowledge and interest in the doctorate degree in the CSD field is viewed as possibly being of high interest to departmental chairs (who forwarded the survey) and undergraduate students. The responses the students provided revealed interesting results on the main research topics of their knowledge of the doctorate of philosophy, the influences of background information and educational experiences on this knowledge, and their level of interest in degree. They also have some potential implications for the ongoing attempts to decrease the potential doctoral shortage and undergraduate training.

Undergraduate Students' Knowledge and Interests in the Doctorate of Philosophy

Knowledge of the doctorate of philosophy.

Two types of knowledge were compared: demonstrated and perceived. The overall mean demonstrated knowledge score on a scale from 0 to 5 (where 0 represents no identified features of a doctorate and 5 represents all defined features of a doctorate were identified) was low ($M = 1.66$) and the mean demonstrated knowledge score was low for all five levels of perceived knowledge ($M < 2$). This indicates that the students neither had strong knowledge about the doctorate degree nor felt confident in their knowledge. Differences in perceived knowledge were found, especially when no knowledge was compared to other knowledge levels (e.g. almost no knowledge through somewhat knowledgeable). These results suggest that students who identified themselves as having more knowledge did achieve higher demonstrated knowledge scores. It appears that CSD students are able to accurately convey their true level of knowledge

about the doctorate. Given that the overall average knowledge score was relatively low and that this knowledge score was found to be an accurate interpretation of student's knowledge, CSD programs might consider facilitating more education about the doctorate degree.

General education background related to knowledge.

The next analysis conducted compared demonstrated knowledge scores and perceived level of knowledge with general educational background information of the students. The analyses results indicate that background information such as the year in which students are currently enrolled, the type of degrees their programs offered, and their GPAs were significant in relation to their demonstrated knowledge scores and/or perceived knowledge levels.

A steady progression of demonstrated knowledge about the doctoral degree was observed across the five levels of education. Freshmen scored lower than juniors, seniors, and post-baccalaureates, and sophomores and juniors scored lower than seniors, and post-baccalaureates. While this suggests that students are learning more about the doctoral degree as they progress through undergraduate programs, their general low levels of demonstrated knowledge are of concern. In addition, there was a lack of a significant difference found between the seniors and post-baccalaureates. This raises a question of the relevance if being in CSD program increases knowledge of the doctorate degree as opposed to students in other majors. Perceived knowledge levels were also found to differ between years of enrollment. These results, along with the low overall knowledge scores, suggests that CSD programs are not being very successful in educating undergraduates about the doctorate degree, let alone promoting the degree to students as a career option. One suggestion to improve this situation is for information about the doctorate degree to be presented to CSD students early and throughout their academic career. Promoting

the degree and relaying the benefits of acquiring it to students throughout their academic career might increase the number of undergraduates knowing information about the degree.

The next items explored were types of knowledge and the types of degrees offered in a CSD program. Demonstrated and perceived knowledge differed by the types of degrees offered in a CSD program. Students in bachelors only programs displayed less demonstrated and perceived knowledge than those in programs that offered bachelor's, master's, and doctorate degrees. It appears that the experiences and exposures offered by multiple degree programs are helpful to learning about the doctorate degree. This idea resonates with a recommendation made by attendees at the CAPCSD convention in 2002; doctorate programs might need to assist non-doctoral bachelor's and master's programs in terms of talking to students about academic careers (Scott & Wilcox, 2002). Given the low mean demonstrated knowledge scores of current undergraduate students, perhaps the discussions currently being conducted relative to doctorate level professionals at programs that offer bachelor's only degrees are not enough to impact undergraduates' knowledge positively. More active promotion of doctorate level learning opportunities and easily accessible sources of doctorate information, such as websites, could assist undergraduates in gaining more knowledge about the degree.

GPA was the final general educational background factor investigated. GPA did have a significant positive correlation with demonstrated knowledge. Even though the relationship was found to be significant, this relationship was weak in terms of how well GPA related to demonstrated knowledge scores (i.e., $R^2 = .04$, indicating that these variables accounted for only 4% of the variations within each other's scores). In terms of perceived knowledge, GPA was shown not to have a strong relationship. Students with higher GPAs were no more prone to perceiving themselves at a certain level of knowledge than students with lower GPAs. In other

words, GPA does not appear to have an influence on self-perception of knowledge of the doctorate. In many undergraduate programs, discussions between students and faculty members concerning the doctorate degree tend to occur more frequently with students who have higher GPAs. The results here suggest that these efforts are not having a meaningful impact on high achieving students' knowledge about the degree. As a result, efforts to improve their knowledge should be increased and enhanced.

Experiences related to knowledge.

Both demonstrated and perceived knowledge differed by the experiences of undergraduate students with the doctorate degree and its typical professional duties. More precisely, searching for information about the doctorate, discussing the doctorate degree, and participation in direct experiences involving teaching and/or research were found to be significantly related to demonstrated and perceived knowledge levels.

Students who had actively searched for information about the doctorate degree scored higher on demonstrated knowledge than those who had not searched. This result suggests that there is information available to students and they are learning from it. The relatively low knowledge scores of those who did search, however, suggest that they are either not fully accessing or retaining much information about the degree. It might be important for individuals in the field of CSD to show students how to search and find accurate information on the doctorate. When students are taught how to properly perform these activities, their knowledge of the doctorate may increase.

The types of individuals (i.e., CSD personnel and non-CSD personnel) discussing the doctorate degree were found to have impacted both types of knowledge. Students who were not exposed to discussions about the doctorate had less knowledge than students who had

discussions with CSD personnel or CSD personnel and another adult. Knowledge scores were also different between undergraduates who only had discussions with CSD personnel and those who only conversed with non-CSD personnel. These results indicate that even though knowledge about the doctorate is low amongst these students, CSD personnel who discuss the doctorate degree with them did impact the students' knowledge. These results suggest that CSD personnel need to pass on their knowledge of the doctorate with students. Scott and Wilcox (2002), however, warned that discussing the doctorate degree with undergraduates "...who profess an interest in and aptitude for research, while helpful, has not been sufficient in the past and will not be in the future" for resolving this projected shortage (p. 10). In other words, CSD professionals should not rely on discussing the doctorate degree with students as their sole method to solve the projected doctoral shortage.

The final experience evaluated by both types of knowledge was direct experience students had in teaching and research. Both demonstrated and perceived knowledge were found to differ with students' direct experiences. A common factor is revealed regarding direct experience. If an individual was involved in research activities, they were more aware of the components of a doctorate degree. Demonstrated knowledge scores did differ between those who had teaching experiences and those who had research experience. These results imply that being involved in the process and/or learning about research seems to lead students to greater understanding of what a doctorate of philosophy degree entails. According to Patel (2010), "SPARC (Student's Preparing for Academic and Research Careers) is a unique program that facilitates the spread of the passion, knowledge, and experience of mentors for teaching, research, and scholarship." Perhaps, promoting programs such as the Research in Higher Education Mentoring Program and SPARC awards more would encourage more knowledge

growth for the doctorate. There was a lack of a relationship found between teaching experience and students' knowledge of the doctorate. A relationship may emerge if undergraduates become more involved with a teaching experience, such as a teaching practicum.

Interest related to knowledge.

Demonstrated knowledge scores were found not to be significantly different with the level of interest undergraduates had in pursuing a doctorate degree. This result shows that interest in the doctorate degree was not an important factor in how much a student actually knew about the degree. One would think that if an undergraduate had ample knowledge of the doctorate in CSD, they would be more interested in obtaining this degree (unless, of course, they knew enough about it to make an informed decision to not pursue one). This was not the case. However, perceived level of knowledge was different from the undergraduates' level of interest. This implies that the belief of knowing a great deal about the doctorate generates more interest in obtaining the degree in the future. Perhaps if CSD professionals foster knowledge of the doctorate beliefs of undergraduate students, then maybe these students will become more apt to applying and achieving a doctorate.

Implications for Attempts to Reduce the Impact of the Projected Doctoral Shortage

Oller et al. (2002), identified ASHA and CAPCSD as the main organizations in charge of addressing the projected doctoral shortage. The recommendations created by these organizations also recognized CSD programs as important partners in this process. The McCrea (2008) review of the progress and outcomes of the 2002 recommendations indicated that ASHA and CAPCSD have implemented numerous programs aiming to reduce the doctoral shortage. Actions taken by individual CSD programs to increase awareness, interest, and knowledge of the doctorate were unclear. Overall, the results of the present research suggest that more emphasis needs to be

placed at the individual CSD academic program level.

Overall undergraduate knowledge, perceived and demonstrated, was relatively low. Students also were indifferent about the possibility of acquiring the degree. Educational background and experiences undergraduate students acquired seemed to influence their level of perceived and demonstrated knowledge. These results all suggest more of an effort has to be made to increase undergraduate knowledge of the doctorate. Perhaps when undergraduates understand more about the doctorate degree, their knowledge might positively impact their level of interest of acquisition. The projected doctoral shortage is rapidly approaching the anticipated date of severity. For this reason, it is essential that current actions to reduce the potential shortage are increased or improved. As previously stated, promoting the doctorate earlier in an undergraduate's career, spreading information about the doctorate to programs that offer only bachelor's degrees, urging undergraduates to search for information about the degree, and advising undergraduates to become involved with doctoral related activities might decrease the chances of the projected doctoral shortage reaching a severe level.

Undergraduates had been a targeted population in which the doctorate should be promoted as per the Oller et al. (2002) recommendations. The results indicated that perhaps more education concerning the doctorate in CSD could happen at the undergraduate level. Students apparently are not learning important information that defines what a doctorate is in the field of CSD. It may be that the best ways to help these students learn and increase their knowledge would be to hold informational sessions at universities during class or club meetings or making information more accessible on CSD related websites.

Another model that could increase undergraduates' knowledge and interest in the doctorate degree would be to create an introductory course that discusses career possibilities in

CSD. This would be a mandatory course for all CSD majors. This course could be divided into program degree sections. The first section of the class could discuss career possibilities with a bachelor's degree only, such as being a speech-language pathology assistant. Another section for master's degree and clinical doctorate careers could clarify speech-language pathologists in schools or hospitals or audiologists. The final section of the curriculum could include information about the doctorate. The students could spend some time in exploring different doctorate occupational duties: service activities, teaching, and research. If creating a new course is not a possibility for some programs, this concept of discussing careers of CSD professionals could be incorporated as a supplement to an existing introduction to CSD class.

Limitations

This survey was presented to the participants as a way for students to identify if they had knowledge and/or interest in pursuing a doctorate of philosophy. This information, the method of delivery, and survey title ("Doctoral Education in Communication Sciences and Disorders: Could it be Right for You?") may have influenced potential respondents' decisions about whether to participate or not. These issues make it difficult to clearly determine how representative the respondents to this survey were of the general population of undergraduates majoring in CSD. Given that close to 1000 students completed the survey, however, the potential for generalizability of these results is great.

This survey was sent to over 250 programs across the United States. Emails about the survey were sent to undergraduate CSD program directors and CSD department chairs. Unfortunately, because these individuals were not asked to report if they sent out the survey to their students, it is not possible to report return rates.

Conclusion

This survey was created in response to the predicted potential shortage of professionals acquiring a doctorate in the field of CSD. The undergraduates who participated demonstrated mediocre knowledge about the doctoral degree. Their general education backgrounds and prior experiences related to the degree influenced their knowledge of the doctorate of philosophy degree. However, interest in the doctorate did not appear to relate to actual knowledge undergraduate students had on the degree. Perceived level of knowledge did relate to how interested undergraduates were in the degree. Bringing awareness of doctoral opportunities to undergraduate students is important for continuing efforts to decrease the impact of the potential Ph.D. shortage in the field of CSD. Since CSD programs have the closest contact with these students, they should be aiming to foster interest and implement student involvement in doctoral career activities. Given the results of this study, it is important to make these opportunities known to undergraduates earlier than their senior year and to CSD programs that only offer a bachelor's degree. Promotion of these doctoral opportunities seems to lead to undergraduates having more knowledge about the degree. Taking these actions may start undergraduates pondering the appropriateness a doctoral degree has with their career goals.

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APPENDIX A: SURVEY QUESTIONS

Section I – Background Information

1. I am 18 years old or older. (N= 983)
(Y/N) (If Y= continue to #2, No= skip to pg. Thank You)
 (Yes) (100%)
 (No) (0 %)
2. I attend a university in the state of... (N= 973)
(This will be a drop down list of all states, Select One)
Alabama	(1.44%)	Alaska	(0%)	Arizona	(0%)
Arkansas	(1.54%)	California	(1.44%)	Colorado	(2.06%)
Connecticut	(0.05%)	D.C.	(0%)	Delaware	(0%)
Florida	(4.73%)	Georgia	(1.03%)	Hawaii	(0%)
Idaho	(0.31%)	Illinois	(7.1%)	Indiana	(1.54%)
Iowa	(0%)	Kansas	(0.21%)	Kentucky	(1.44%)
Louisiana	(0.92%)	Maine	(0.21%)	Maryland	(3.8%)
Massachusetts	(0%)	Michigan	(7.4%)	Minnesota	(0.72%)
Mississippi	(1.03%)	Missouri	(1.95%)	Montana	(2.06%)
Nebraska	(0.31%)	Nevada	(0.41%)	New Hampshire	(0%)
New Jersey	(2.57%)	New Mexico	(0.41%)	New York	(5.45%)
North Carolina	(2.36%)	North Dakota	(0.51%)	Ohio	(12.33%)
Oklahoma	(3.19%)	Oregon	(1.03%)	Pennsylvania	(7.91%)
Rhode Island	(0%)	South Carolina	(0.72%)	South Dakota	(1.44%)
Tennessee	(0.82%)	Texas	(4.52%)	Utah	(7.4%)
Vermont	(0%)	Virginia	(0.72%)	Washington	(0.21%)

- West Virginia (0%) Wisconsin (6.27%) Wyoming (0%)
3. I attend a Communication Sciences and Disorders (CSD) Program that is...
(Select One) (N= 983)
- ☐ Clinically Based (28.38%)
 - ☐ Research Based (1.42%)
 - ☐ Clinic and Research Based (45.37%)
 - ☐ Don't Know (24.82%)
 - ☐ I do not attend a CSD program (0%)
- (If selected skip to pg. Thank You)*
4. I attend a Communication Sciences and Disorders Program that offers...
(Select all that apply) (N= 865)
- ☐ Bachelor's Degree (N= 865, 87.7%)
 - ☐ Master's Degree (N= 803, 81.6%)
 - ☐ Doctoral Degree (Research – e.g., Ph.D.) (N= 235, 23.9%)
 - ☐ Doctoral Degree (Clinical - e.g., Au.D.) (N= 229, 23.2%)
5. I am currently enrolled as a... *(Select One)* (N= 982)
- ☐ Freshman (N= 65, 6.6%)
 - ☐ Sophomore (N= 137, 14%)
 - ☐ Junior (N= 313, 31.9%)
 - ☐ Senior (N= 397, 40.4%)
 - ☐ Post-baccalaureate (Bachelor's degree in another field) (N= 70, 7.1%)
 - ☐ None of the Above *(If selected, skip to pg. Thank You)* (N= 0, 0%)
6. I scored the following on my university entrance examination(s)...
(Select and List) (N=956)
- ☐ ACT (Written Responses=515) (N= 535, 55.96%)

Score: 15: N=2, 0.39%	23: N=41, 7.96%	30: N=28, 5.44%
17: N=2, 0.39%	24: N=62, 12.04%	31: N=24, 4.66%
18: N=8, 1.55%	25: N=45, 8.74%	32: N=11, 2.14%
19: N=18, 3.5%	26: N=49, 9.51%	33: N=6, 1.17%
20: N=11, 2.14%	27: N=43, 8.35%	34: N=4, 0.78%
21: N=48, 9.32%	28: N=41, 7.96%	35: N=1, 0.19%
22: N=28, 5.44%	29: N=42, 8.16%	36: N=1, 0.19%

- ☐ SAT (Written Responses=112) (N= 217, 22.7%)

Score: (700-799: N=1, 0.89%) (800-990: N=8, 7.14%)
 (991-1199: N=39, 34.82%) (1200-1399: N=32, 28.57%)
 (1400-1499: N=8, 7.14%) (1500-1599: N=4, 3.57%)
 (1600-1699: N=11, 9.82%) (1700-1769: N=5, 4.46%)
 (1770-1799: N=0, 0%) (1800-1899: N=14, 12.5%)
 (1900-2099: N=9, 8.04%) (2100-2139: N=3, 2.67%)
 (2140-2199: N=0, 0%) (2200-2289: N=1, 0.89%)
 (2290-2399: N=1, 0.89%) (2400: N=0, 0%)

- ☐ I do not remember (N= 313, 32.74%)

7. My current overall GPA is... (*Fill in the blank*) (N= 946)

Minimum: 1.95 Maximum: 4.0 Mean: 3.54

8. My family members have achieved the following levels of education

(*Select One*)

(N= 982)

	<u>High School Degree</u>	<u>Bachelors Degree</u>	<u>Masters Degree</u>	<u>Doctoral Degree</u>	<u>N/A</u>	<u>(N=)</u>
Father-	(37.76%)	(35.82%)	(16.12%)	(6.12%)	(4.18%)	(980)
Mother-	(38.61%)	(38%)	(18.6%)	(1.74%)	(3.86%)	(979)
Sibling-	(29.27%)	(28.25%)	(13.22%)	(4.86%)	(23.5%)	(885)
Guardian-	(3.52%)	(2.46%)	(0.7%)	(0.53%)	(92.78%)	(568)

9. I am interested in becoming a: (*Select One*) (N= 980)

- ☐ Speech-language pathologist (87.04%)
☐ Audiologist (6.12%)
☐ Speech/Language/Hearing Scientist (1.84%)
☐ Undecided (5%)

10. I plan on acquiring the following degrees. (*Select all that apply*) (N= 984)

- ☐ Bachelors Degree (N= 586, 59.0%)
☐ Masters Degree (N= 881, 88.6%)
☐ Research Doctoral Degree (N= 120, 12.1%)
☐ Clinical Doctorate Degree (N= 192, 19.3%)

11. I am interested in becoming a: (*Select all that apply*) (N= 975)

- ☐ Clinician (N= 943, 96.72%)
- ☐ Instructor (N= 279, 28.62%)
- ☐ Researcher (N= 162, 16.62%)
- ☐ Administrator (N= 123, 12.62%)

Section II – Ph.D. Knowledge and Methods

12. I define a doctorate of philosophy degree (Ph.D.) as...
(Fill in the Blank) (N= 985)
- Highest Degree (N= 132, 13.40%)
 - Research (N= 246, 24.97%)
 - Teaching (N= 79, 8.02%)
 - Service (N= 5, 12.62%)
 - Dissertation (N= 44, 4.47%)
13. Difference(s) between a Ph.D. and a medical degree (M.D.) are....
(Fill in the Blank) (N=985)
- Highest Degree (N= 5, 0.51%)
 - Research (N= 216, 21.93%)
 - Teaching (N= 38, 3.86%)
 - Service (N= 8, 0.81%)
 - Dissertation (N= 15, 1.52%)
14. Individuals choose to pursue a Ph.D. because....
(Fill in the Blank) (N=985)
- Highest Degree (N= 16, 1.62%)
 - Research (N= 275, 27.92%)
 - Teaching (N= 174, 17.66%)
 - Service (N= 10, 1.02%)
 - Dissertation (N= 2, 0.20%)
15. The job duties of Ph.D.–level professionals working in CSD include...
(Fill in the Blank) (N=985)
- Highest Degree (N= 1, 0.10%)
 - Research (N= 423, 42.94%)
 - Teaching (N= 294, 29.84%)
 - Service (N= 123, 12.49%)
 - Dissertation (N= 13, 1.32%)
16. On average, it takes this many years from starting a Ph.D. program to acquiring a Ph.D. degree. (Select from drop down list) (N= 856)

- ☐ 1 (0.5%)
- ☐ 2 (19.8%)
- ☐ 3 (21.6%)
- ☐ 4 (35.7%)
- ☐ 5 (8.7%)
- ☐ 6 (6.2%)
- ☐ 7 (2.5%)
- ☐ 8 (5.0%)

17. Questions that I have about the Ph.D. degree in CSD include...
(*Fill in the Blank*) (N=317)

- Benefits (N= 151, 37.1%)
- Requirements (N= 149, 33.6%)
- Job Duties (N=85, 20.9%)
- Specialization (N=10, 2.5%)
- Pre-doctoral Opportunities (N= 4, 1%)
- Funding Available (N= 8, 2%)

18. My current level of knowledge about the Ph.D. in the field of CSD can best be described as... (*Select One*) (N= 981)

- ☐ Very Knowledgeable (1.1%)
- ☐ Somewhat Knowledgeable (14.0%)
- ☐ Limited in Knowledge (41.7%)
- ☐ Almost No Knowledge (32.4%)
- ☐ No Knowledge (10.8%)

19. I have actively searched for information about earning a Ph.D. (N= 981)
(*Y/N*) (*Y= continue to # 20, N= skip to #23*)
(Yes) (14.0%)
(No) (86.0%)

20. I was able to find information regarding: (*Select all that apply*) (N= 112)

- ☐ What a Ph.D. is (N= 112, 27.4%)
- ☐ How to get a Ph.D. (N= 107, 26.2%)
- ☐ Funding available for Ph.D. students (N= 42, 10.3%)
- ☐ How long it takes to get a Ph.D. (N= 88, 21.5%)
- ☐ Why SLPs and Audiologists should or should not get a Ph.D. (N= 60, 14.7%)

21. I used these methods to obtain information about the Ph.D. in CSD.
(*Select all that apply*) (N= 93)

- ☐ General Academic Advisor (N= 14, 3.0%)

- ☐ CSD Advisor (N= 43, 9.3%)
 - ☐ CSD Faculty (i.e. Professors other than advisor) (N= 57, 12.3%)
 - ☐ CSD Staff (*i.e. Clinical Supervisors*) (N= 21, 4.5%)
 - ☐ Parents (N= 21, 4.5%)
 - ☐ ASHA Website (N= 80, 17.2%)
 - ☐ Video about Ph.D. on ASHA Website (N= 7, 1.5%)
 - ☐ University Websites (N= 92, 19.2%)
 - ☐ Career Services/Student Affairs offices (N= 10, 2.2%)
 - ☐ Word of Mouth (N= 56, 12.1%)
 - ☐ U.S. News and World Report (N= 10, 2.2%)
 - ☐ Presentations/Published Articles (N= 10, 2.2%)
 - ☐ Other internet resources (N= 41, 8.8%)
 - ☐ Please list websites
 - ☐ Other print resources (N= 2, 0.43%)
 - ☐ Please list magazines, pamphlets, etc.
22. In obtaining information about the Ph.D. in CSD, I found this (these) method(s) to be the MOST helpful.
(Select all that apply) (N= 60)
- ☐ General Academic Advisor (N= 8, 2.9%)
 - ☐ CSD Advisor (N= 30, 11%)
 - ☐ CSD Faculty (i.e. Professors other than advisor) (N= 49, 18%)
 - ☐ CSD Staff (*i.e. Clinical Supervisors*) (N= 18, 6.6%)
 - ☐ Parents (N= 6, 2.2%)
 - ☐ ASHA Website (N= 59, 21.7%)
 - ☐ Video about Ph.D. on ASHA Website (N= 2, 0.74%)
 - ☐ University Websites (N= 55, 20.2%)
 - ☐ Career Services/Student Affairs offices (N= 7, 2.6%)
 - ☐ Word of Mouth (N= 12, 4.4%)
 - ☐ U.S. News and World Report (N= 2, 0.74%)
 - ☐ Presentations/Published Articles (N= 3, 1.1%)
 - ☐ Other internet resources (N= 16, 5.9%)
 - ☐ Please list websites
 - ☐ Other print resources (N= 2, 0.74%)
 - ☐ Please list magazines, pamphlets, etc.

Section III – Encouragement and Qualities

23. The following people have spoken to me about pursuing a Ph.D. in CSD.

- (Select all that apply) (N= 984)
- ☐ No conversation (N= 516, 52.4%)
 - ☐ CSD Personnel Spoke to Me (N= 225, 22.9%)
 - ☐ Non-CSD Personnel Spoke to Me (N= 81, 8.2%)
 - ☐ CSD and Non-CSD Personnel Spoke to Me (N= 162, 16.5%)

24. Based on their guidance, I feel the following about pursuing a Ph.D. (Select one) (N= 464)

- ☐ Strongly Encouraged (9.7%)
- ☐ Encouraged (30.4%)
- ☐ Neither Encouraged nor Discouraged (54.7%)
- ☐ Discouraged (4.1%)
- ☐ Strongly Discouraged (1.1%)

25. I am interested in getting a Ph.D. in CSD. (Select one) (N= 985)

- ☐ Strongly Agree (13.5%)
- ☐ Agree (24.2%)
- ☐ Neither Agree nor Disagree (37.4%)
- ☐ Disagree (17.7%)
- ☐ Strongly Disagree (7.3%)

26. I chose my answer to the last question because...(Fill in the blank) (N=847)

- Tired of School/Ready to Work (N= 64, 6.3%)
- No Fully Aware of Ph.D. (N= 91, 9%)
- Interested in Job Duties/Benefits (N= 185, 18.2%)
- Undecided/Have Not Thought About It (N= 252, 24.8%)
- Work Clinically (N= 233, 23%)
- No Teaching/Research Interest (N= 93, 9.2%)
- Money/Difficulty/Time (N= 97, 9.6%)

27. I would be interested in entering a Ph.D. program... (Select One) (N= 873)

- ☐ As soon as I complete my bachelors CSD program (6.4%)
- ☐ As soon as I complete my master's CSD program (22.0%)
- ☐ After I work in the field for a few years (1-4) (43.0%)
- ☐ After I work in the field for 5 or more years (28.6%)

28. I think that people who are successful in obtaining a Ph.D. degree have the following qualities (Pick 5) (N= 815)

Devoted	(N= 672, 8.9%)	Wise	(N= 190, 2.5%)
Motivated	(N= 795, 10.5%)	Humorous	(N= 45, 0.6%)
Optimistic	(N= 202, 2.7%)	Intelligent	(N= 719, 9.5%)
Helpful	(N= 135, 1.8%)	Unbaised	(N= 78, 1.0%)
Determined	(N= 663, 8.8%)	Empathic	(N= 61, 0.8%)
Open-minded	(N= 193, 2.6%)	Stubborn	(N= 46, 0.6%)
Hard-working	(N= 815, 10.8%)	Compassionate	(N= 207, 2.7%)
Trustworthy	(N= 105, 1.4%)	Egotistical	(N= 49, 0.6%)
Humble	(N= 49, 0.6%)	Curious	(N= 253, 3.3%)
Forgiving	(N= 28, 0.4%)	Dedicated	(N= 648, 8.6%)
Honest	(N= 118, 1.6%)	Inquisitive	(N= 352, 4.7%)
Cooperative	(N= 184, 2.4%)	Sympathetic	(N= 47, 0.6%)
Independent	(N= 353, 4.7%)	Perseverant	(N= 342, 4.5%)
Up-tight	(N= 48, 0.6%)	Callous	(N= 8, 0.1%)
Judgmental	(N= 25, 0.3%)	Idealistic	(N= 67, 0.8%)
Grouchy	(N= 4, 0.02%)	Argumentative	(N= 59, 0.8%)

Section IV – Research and Teaching

According to dictionary.com, a Doctor of Philosophy degree is “Also called doctorate. The highest degree awarded by a graduate school, usually to a person who has completed at least three years of graduate study and a dissertation approved by a board of professors.” In CSD, individuals who achieve a Ph.D. often take up academic and research careers which involve conducting research, teach, and providing services to the community (Schuele, 2004). Please use this information for the remainder of the survey.

29. I am interested in conducting research in CSD. (*Select One*) (N= 985)

☐ Strongly Agree (9.4%)

☐ Agree	(29.7%)
☐ Neither Agree or Disagree	(33.0%)
☐ Disagree	(19.2%)
☐ Strongly Disagree	(8.6%)
30. I have sought out research opportunities. (Y/N)	(N= 983)
(Yes)	(27.0%)
(No)	(73.0%)
31. I have been advised by CSD faculty/staff advised to become involved in research. (Y/N)	(N= 982)
(Yes)	(41.2%)
(No)	(58.8%)
32. I have been directed by CSD faculty/staff to research opportunities. (Y/N)	(N= 980)
(Yes)	(34.0%)
(No)	(66.0%)
33. I have taken an undergraduate CSD research class. (Y/N)	(N= 983)
(Yes)	(19.1%)
(No)	(80.9%)
34. I have been a research assistant. (Y/N)	(N= 980)
(Yes)	(14.7%)
(No)	(85.3%)
35. I have conducted research in CSD at my university. (Y/N)	(N= 983)
(Yes)	(17.3%)
(No)	(82.7%)
36. I enjoy conducting research.	(N= 984)
☐ Strongly Agree	(6.7%)
☐ Agree	(19.1%)

☐ Neither Agree or Disagree	(32.3%)
☐ Disagree	(12.5%)
☐ Strongly Disagree	(6.0%)
☐ N/A	(23.4%)
37. I have presented research. (N= 983)
(Y/N) (If Y- cont. to #38, if N- skip to #39)
(Yes)	(16.6%)
(No)	(83.4%)
38. I have presented research at a(n)... *(Select all that apply)* (N= 92)
☐ Local Conference	(N= 68, 73.9%)
☐ State Conference	(N= 23, 25.0%)
☐ National Conference	(N= 13, 14.1%)
☐ International Conference	(N= 4, 4.3%)
39. I am interested in teaching undergraduates and/or graduate students in the field of CSD. *(Select One)* (N= 987)
☐ Strongly Agree	(8.2%)
☐ Agree	(22.3%)
☐ Neither Agree or Disagree	(35.3%)
☐ Disagree	(24.7%)
☐ Strongly Disagree	(9.5%)
40. I have sought out peer tutoring opportunities at my university. (N= 982)
(Y/N)
(Yes)	(27.3%)
(No)	(72.7%)
41. I have sought out teaching assistant opportunities at my university. (N= 980)
(Y/N)
(Yes)	(16.3%)
(No)	(83.7%)

42. I have been directed to peer tutoring opportunities at my university.

(Y/N) (N= 980)

(Yes) (24.6%)

(No) (75.4%)

43. I have been directed to teaching assistant opportunities at my university.

(Y/N) (N= 981)

(Yes) (15.4%)

(No) (84.6%)

44. I have been a peer tutor. (Y/N) (N= 980)

(Yes) (21.6%)

(No) (78.4%)

45. I have been a teaching assistant. (Y/N) (N= 981)

(Yes) (8.6%)

(No) (91.4%)

Section V – Future of CSD

46. According to the American Speech-Language Hearing Association, there is a potential shortage of professionals in CSD holding a Ph.D. degree. I have heard about the shortage before this survey.

(Y/N) (Y- continue to #47/N- skip to #48) (N= 985)

(Yes) (44.2%)

(No) (55.8%)

47. I found out about the shortage through... (Select One) (N= 362)

☐ Classmates (N= 76, 11%)

☐ Professors (N= 362, 52.3%)

☐ ASHA (N= 110, 15.9%)

☐ Other (Space to list other sources) (N= 73, 10.5%)

48. Based on this shortage, I think the availability of jobs 10 year from now for Ph.D. professionals in CSD will be... *(Select One)* (N= 981)

- ☐ Increased (67.6%)
- ☐ The Same (24.5%)
- ☐ Decreased (8.0%)

49. I think there will be consequences **to me personally** if there are less Ph.D. professionals in CSD. (N= 985)

- ☐ Major consequences (18.6%)
- ☐ Minor consequences (39.9%)
- ☐ No consequences (12.6%)
- ☐ Not sure (28.9%)

(Major/Minor consequences- cont. to #50/No consequences/Not sure- skip to #51)

50. Please check the top 3 potential consequences you see as significantly impacting you personally if there are fewer Ph.D. professionals in CSD. (N= 569)

- ☐ Reduced number of qualified professors (N= 350, 18.6%)
- ☐ Reduced number of qualified clinicians (N= 168, 9%)
- ☐ Reduced amount of quality research (N= 391, 20.8%)
- ☐ Reduced number of field specializations (N= 147, 7.8%)
- ☐ Reduced number of programs (N= 162, 8.6%)
- ☐ Outdated procedures/methods/technology (N= 276, 14.7%)
- ☐ Decline in evidence based practice (N= 190, 10.1%)
- ☐ Reduced admissions into graduate programs (N= 105, 5.6%)
- ☐ Erosion of knowledge base of profession (N= 88, 4.7%)

51. I think there will be consequences **to the field** if there are less Ph.D. professionals in CSD. *(Select One)* (N= 981)

- ☐ Major consequences (47.3%)
- ☐ Minor consequences (35.3%)
- ☐ No consequences (4.4%)
- ☐ Not sure (13.0%)

(Major/Minor consequences- cont. to #52/No consequences/Not sure- skip to pg. Thank You)

52. Please check the top 3 potential consequences you see as significantly impacting CSD if there are less Ph.D. professionals. (N= 563)

- ☐ Reduced number of qualified professors (N= 483, 18.7%)
- ☐ Reduced number of qualified clinicians (N= 241, 9.3%)
- ☐ Reduced amount of quality research (N= 563, 21.8%)
- ☐ Reduced number of field specializations (N= 191, 7.4%)
- ☐ Reduced number of programs (N= 198, 7.7%)
- ☐ Outdated procedures/methods/technology (N= 389, 15%)
- ☐ Decline in evidence based practice (N= 272, 10.5%)
- ☐ Reduced admissions into graduate programs (N= 123, 4.8%)
- ☐ Erosion of knowledge base of profession (N= 127, 4.9%)

Section VI – Thank You

Thank you for participating in this survey!

Here are some helpful links from the 2008 Report by the Joint Ad Hoc committee on PhD Shortages in Communication Sciences and Disorders.

Video about the Ph.D. in CSD

http://asha.http.internapcdn.net/asha_vitalstream_com/www/phd_flash.swf

Considering a Ph.D. in CSD from ASHA-

<http://www.asha.org/students/academic/doctoral/>

Preparing for the Research Doctorate from ASHA-

<http://www.asha.org/students/academic/doctoral/chap2.htm>

Doctoral Program Search from ASHA-

<http://hes.asha.org:8080/EdFind/Doctoral/DoctSearch.aspx>

Ph.D. Faculty Career Profiles-

<http://www.asha.org/careers/professions/profiles/list.htm>

Ph.D. Career Ladder about the Beginning and Advancing in CSD from ASHA-

<http://www.asha.org/academic/career-ladder/>

APPENDIX B: INFORMED CONSENT

Bowling Green State University – Department of Communication Sciences and Disorders

Doctoral Education in Communication Sciences and Disorders: Could it be for You?

Hello! My name is Elizabeth Witter. I am a graduate student at Bowling Green State University. I would deeply appreciate your participation in this study. I am conducting this research to discover the knowledge and interest that undergraduate students have about a doctoral degree in communication sciences and disorders (CSD). In order to find these answers, you are being asked to complete an anonymous online survey questionnaire. This questionnaire should take no more than 15-20 minutes to complete.

While this information could be obtained through a phone or personal interview, using an online survey format is faster and easier method for gathering information about your current knowledge of the doctoral degree and important issues related to the field of CSD. This survey will allow you to share your views while remaining anonymous. To protect your anonymity, you have received this survey via your CSD department chair (who did not share any of your private information with me). I will have no way, therefore, to associate your responses with your name, email address, or any other identifying information. This means that there is no way that any participant's personal information can be revealed (or even suggested) in presentations of the survey's results.

Information gathered from the survey will be stored on a computer in a locked office at Bowling Green State University. Only members of the research team will have access to this computer.

Participation in this study is completely voluntary and will have no impact on you or your program of study. I anticipate no immediate risks to you as a result of participating this survey study. If you feel uncomfortable completing this questionnaire, please do not hesitate to stop at any time.

You may receive multiple requests to complete this survey because I plan on sending one reminder email to all the department chairs of CSD departments a week after the survey opens. The department chairs will then distribute this email to all undergraduate students in their CSD program requesting them to participate in this survey, if they have not yet, and that their responses are valued. Please complete the survey only once.

While there may not be any direct benefits to you for participating in this survey, your participation will benefit the education of CSD students and hopefully give you a voice about your future career. I hope you will take some time and look at the helpful website links found at the end of the survey regarding the doctoral degree in CSD.

Once this study is complete, I plan on publishing the results through conference presentations and/or written publication(s). If you have any questions about this survey please contact:

Elizabeth Witter
Principle Investigator
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Bowling Green, OH 43403
(419) 372- 2515
Email: ewitter@bgsu.edu

Dr. Tim Brackenbury
Project Advisor
246 Health Center Building
Bowling Green, OH 43403
(419) 372- 7188
Email: tbrack@bgsu.edu

If you have any questions about participant rights, please contact:

Chair, Human Subjects Review Board
Bowling Green State University
309A University Hall
Bowling Green, OH 43403
(419) 372- 7716
Email: hsrb@bgsu.edu

By clicking next and completing the survey, you are giving your personal consent to participate in this research. Thank you for participating. Please clear your browser cache and page history before beginning the survey.

Link to survey: <https://www.surveymonkey.com/s/VMDG3V3>

This survey was created by a CSD student for CSD students. ☺

BGSU HSRB – Approved for use
ID# H11T137GE7
EFFECTIVE 2/11/11
EXPIRES 1/24/12

Bowling Green State University

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February 11, 2011

TO: Elizabeth Witter
CDIS

FROM: Hillary Harms, Ph.D.
HSRB Administrator

RE: HSRB Project No.: H11T137GE7

TITLE: *Doctoral Education in Communication Sciences and Disorders:
Could it be for You?*

You have met the conditions for approval for your project involving human subjects. **As of February 11, 2011, your project has been granted final approval by the Human Subjects Review Board (HSRB). This approval expires on January 24, 2012.** You may proceed with subject recruitment and data collection.

The final approved version of the consent document(s) is attached. Consistent with federal OHRP guidance to IRBs, **the consent document(s) bearing the HSRB approval/expiration date stamp is the only valid version and you must use copies of the date-stamped document(s) in obtaining consent from research subjects.**

You are responsible to conduct the study as approved by the HSRB and to use only approved forms. If you seek to make any changes in your project activities or procedures, send a request for modifications to the HSRB via this office. Those changes must be approved by the HSRB prior to their implementation.

You have been approved to enroll 600 participants. If you want to enroll additional participants you must seek approval from the HSRB.

Good luck with your work. Let me know if this office or the HSRB can be of assistance as your project proceeds.

Comments/ Modifications:

Please add the text equivalent of the HSRB approval stamp to the "footer" area of the online consent document.

c: Dr. Tim Brackenbury

Research Category: EXPEDITED #7

APPENDIX C: TABLES AND FIGURES

Tables

Table 1

One-Way ANOVA Results for Demonstrated Knowledge

Categorical Variables	Demonstrated Knowledge				
	N	<i>F</i>	<i>df</i>	<i>p</i> -Value	η^2
Perceived Knowledge	770	18.01	(4, 765)	<.001	0.09
Year Enrolled	768	17.80	(4, 763)	<.001	0.09
Type of Program	685	4.10	(2, 682)	.017	0.01
Individuals Discussing the Ph.D.	770	9.37	(3, 766)	<.001	0.04
Direct Experiences	770	6.41	(3, 766)	<.001	0.02
Level of Interest	771	3.37	(4, 766)	.475	0.00

Table 2

Post-Hoc t-Test Multiple Comparison Results for Perceived Knowledge by Demonstrated Knowledge

Perceived Knowledge	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
No Knowledge	X	$p=.033$	$p< .001$	$p< .001$	$p= .145$
Almost No Knowledge	$p= .033$	X	$p< .001$	$p< .001$	$p= 1.0$
Limited in Knowledge	$p< .001$	$p< .001$	X	$p= .028$	$p= 1.0$
Somewhat Knowledgeable	$p< .001$	$p< .001$	$p= .028$	X	$p= 1.0$
Very Knowledgeable	$p= .145$	$p= 1.0$	$p= 1.0$	$p= 1.0$	X

Note X means knowledge levels were not compared. The dependent variable was demonstrated knowledge.

Table 3

Post-Hoc t-Test Multiple Comparison Results for Year Enrolled by Level and Demonstrated Knowledge

Year Enrolled	Year Enrolled				
	Freshman	Sophomores	Juniors	Seniors	Post-Baccalaureate
Freshman	X	$p = .337$	$p = .002$	$p < .001$	$p < .001$
Sophomores	$p = .337$	X	$p = .594$	$p < .001$	$p < .001$
Juniors	$p = .002$	$p = .594$	X	$p = .001$	$p < .001$
Seniors	$p < .001$	$p < .001$	$p = .001$	X	$p = .494$
Post-Baccalaureate	$p < .001$	$p < .001$	$p < .001$	$p = .494$	X

Note X means knowledge levels were not compared. The dependent variable was demonstrated knowledge.

Table 4

Chi-Square Test Results for Perceived Knowledge

Categorical Variables	Perceived Knowledge				
	N	χ^2	df	p-Value	ϕ_c
Year Enrolled	978	43.60	16	<.001	0.62
Type of Program	861	29.36	8	<.001	0.58
Actively Searching for Information	979	140.26	4	<.001	3.17
Individuals Discussing the Ph.D.	980	172.34	12	<.001	2.75
Direct Experiences	979	61.67	12	<.001	0.98
Level of Interest	981	94.05	16	<.001	1.34

Table 5

Year Enrolled by Level and Perceived Knowledge

Year Enrolled	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
Freshman	15	25	21	4	0
Sophomores	18	51	52	14	2
Juniors	39	114	122	35	2
Seniors	29	111	182	66	6
Post-Baccalaureate	4	17	31	17	1

Table 6

Post-Hoc t-Test Multiple Comparison Results for Types of Program Degrees by Demonstrated Knowledge

Types of Program Degrees	Types of Program Degrees		
	Bachelor's Only	Bachelor's and Master's	Bachelor's Master's & Doctorate
Bachelor's Only	X	$p = .745$	$p = .020$
Bachelor's & Master's	$p = .745$	X	$p = .121$
Bachelor's, Master's & Doctorate	$p = .020$	$p = .121$	X

Note X means knowledge levels were not compared. The dependent variable was demonstrated knowledge.

Table 7

Types and Program Degrees and Perceived Knowledge

Types of Program Degrees	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
Bachelor's Only	23	51	79	14	2
Bachelor's and Master's	52	154	161	48	6
Bachelor's, Master's and Doctoral	17	79	116	57	2

Table 8

Pearson Correlation for GPA on Demonstrated Knowledge

	N	<i>r</i>	<i>p</i> -Value	<i>r</i> ²
Demonstrated Knowledge - GPA	750	0.201 ^a	<.001	0.04

^aCorrelation is significant at the 0.01 level (2-tailed)

Table 9

One-Way ANOVA Results for Perceived Knowledge on GPA

Categorical Variable	GPA				
	N	<i>F</i>	<i>df</i>	<i>p</i> -Value	η^2
Perceived Knowledge	943	1.67	(4, 938)	0.155	0.01

Table 10

Independent-Samples T Test of Actively Searching for Information on Demonstrated Knowledge

	Demonstrated Knowledge				
	N	<i>t</i>	<i>df</i>	P-Value	<i>r</i> ²
Actively Searching for Information	770	12.19	768	<.001	0.02

Table 11

Actively Searching for Information and Perceived Knowledge

	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
Actively Searching For Information					
No	100	307	350	80	5
Yes	5	10	59	57	6

Table 12

Post-Hoc t-Test Multiple Comparison Results for Individuals Discussing the Doctorate by Demonstrated Knowledge

Individuals Discussing the Doctorate	Individuals Discussing the Doctorate			
	No One Conversed	CSD Personnel Conversed with Me	Non-CSD Personnel Conversed with Me	Both Individuals Conversed with Me
No One Conversed	X	$p < .001$	$p = 1.0$	$p = .010$
CSD Personnel Conversed with Me	$p < .001$	X	$p = .034$	$p = 1.0$
Non-CSD Personnel Conversed with Me	$p = 1.0$	$p = .034$	X	$p = .356$
Both Individuals Conversed with Me	$p = .010$	$p = 1.0$	$p = .356$	X

Note X means knowledge levels were not compared. The dependent variable was demonstrated knowledge.

Table 13

Individuals Discussing the Ph.D. and Perceived Knowledge

Individuals Discussing The Ph.D.	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
No One Conversed	94	217	161	40	2
CSD Personnel Conversed Me	8	52	121	41	3
Non-CSD Personnel Conversed with Me	2	16	52	9	2
Both Individuals Conversed with Me	2	32	75	47	4

Table 14

Post-Hoc t-Test Multiple Comparison of Direct Experience by Demonstrated Knowledge

<u>Direct Experience</u>	<u>Direct Experience</u>			
	<u>No Direct Experience</u>	<u>Research Experience Only</u>	<u>Teaching Experience Only</u>	<u>Research and Teaching Experience</u>
No Direct Experience	X	$p=.002$	$p= 1.0$	$p= .026$
Research Experience Only	$p= .002$	X	$p= .021$	$p= 1.0$
Teaching Experience Only	$p= 1.0$	$p= .021$	X	$p= .078$
Research and Teaching Experience	$p= .026$	$p= 1.0$	$p= .078$	X

Note X means knowledge levels were not compared. The dependent variable was demonstrated knowledge.

Table 15

Direct Experience and Perceived Knowledge

<u>Direct Experience</u>	<u>Perceived Knowledge</u>				
	<u>No Knowledge</u>	<u>Almost No Knowledge</u>	<u>Limited in Knowledge</u>	<u>Somewhat Knowledgeable</u>	<u>Very Knowledgeable</u>
No Direct Experience	79	201	212	60	3
Research Experience Only	10	35	82	37	2
Teaching Experience Only	14	57	59	18	2
Research and Teaching Experience	3	23	56	22	4

Table 16

Level of Interest and Perceived Knowledge

Level of Interest	Perceived Knowledge				
	No Knowledge	Almost No Knowledge	Limited in Knowledge	Somewhat Knowledgeable	Very Knowledgeable
Strongly Disagree	18	51	79	14	0
Disagree	18	74	117	26	2
Neither Agree nor Disagree	56	128	140	39	3
Agree	9	50	87	26	1
Strongly Agree	5	11	25	1	5

Figures