

The Development and Effectiveness of an Online Phonetics Refresher Module
for Incoming Speech-Language Pathology Students

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ABSTRACT

This project involved the development and evaluation of an online phonetics refresher module for incoming speech-language pathology (SLP) students at the University of Alberta, class of 2018. The module was intended to provide new students with the opportunity to review phonetics concepts and practice skills in phonetic transcription to ensure that they had a shared baseline of knowledge and skills prior to undertaking coursework in phonological development and disorders at the graduate level. Of the 58 students who were recruited to participate in the project, 35 students completed the entire module, which consisted of 3 units. A comparison of pre- and post-unit quizzes showed that participants received significantly higher quiz scores after completing each unit ($p < 0.001$). Pre-module and post-module surveys found that participants rated their knowledge and confidence in phonetic concepts significantly higher after completing the module ($p < 0.001$). On a follow-up survey midway through the completion of the graduate course in phonological disorders, all of the students that completed the module reported that the online refresher module was helpful in preparation for the course. Additionally, all students reported that they would recommend the refresher to future SLP students. Many students also indicated an interest in refresher modules for other courses, specifically in the areas of anatomy and statistics. These results indicate that there was a need for some review of linguistic concepts learned in prerequisite phonetics classes, and that the online review was effective.

INTRODUCTION

Phonetics is an essential area of study for university students who hope to pursue careers as speech-language pathologists (SLPs). Phonetics is the branch of linguistics that deals

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with the sounds of speech and their production, combination, description, and representation using written symbols. Speech sounds are divided into two general categories, consonants and vowels. English consonants are described in terms of place of articulation, manner of articulation, and voicing. Place of articulation refers to the parts of the speech mechanism that are being used to shape the sound (e.g., lips, tongue, soft palate, etc.), manner of articulation refers to how the airstream is modified (e.g., continuous airflow, nasal airflow, etc.), and voicing refers to the position of the vocal folds when a sound is produced (i.e., sounds are voiced when the folds are closed and voiceless when they are open). In contrast, vowels are described in terms of the position of the tongue (i.e., height and frontness/backness), tongue tenseness (i.e., tense vs. lax), and whether production is accompanied by rounding of the lips (i.e., rounded vs. unrounded). Additionally, vowels are categorized as either monophthongs (i.e., vowels that contain only one vowel sound) or diphthongs (i.e., vowels that contain two distinct vowel sounds). Using these different methods of speech sound categorization, SLPs are able to analyze and discuss speech in terms of natural classes. Natural classes are groupings of speech sounds that share at least one phonetic feature in common (e.g., nasals are sounds that are produced with nasal airflow, obstruents are sounds produced with an obstruction of airflow, etc.).

Knowledge of these speech components are essential for SLPs to properly assess and treat individuals within many areas of speech and language therapy, including articulation, phonology, fluency, and other speech disorders. This knowledge is also necessary for phonetic transcription, a key clinical skill for all SLPs. This is because SLPs need to be able to transcribe speech into phonetic symbols using the International Phonetic Alphabet (IPA) (International

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Phonetic Association, 2005). Knowledge of IPA is essential for SLPs (Singh & Singh, 2006).

Without the ability to phonetically transcribe speech, SLPs would not be able to complete many important clinical tasks, including analyzing speech production, diagnosing speech disorders, and planning/implementing intervention focused on speech production. Other basic tasks within SLPs scope of practice, such as scoring articulation and phonological tests and tracking treatment progress, would not be possible without the use of phonetic transcription (Robinson, Mahurin, & Justus, 2011). It is also important for SLPs to be familiar with diacritics, symbols that are added to transcribed speech sounds to denote modifications in their output (e.g., a typically non-nasal sound was produced with a nasal quality). Use of diacritics is particularly useful when transcribing atypical or disordered speech.

Given the importance of phonetic knowledge and transcription within the field of speech-language pathology, it is important for students to be confident in their knowledge and skills before beginning a professional SLP program so that they can successfully complete the required coursework. Students applying to many Canadian SLP programs are required to complete a prerequisite course in phonetics prior to being admitted into the program. However, students applying to these programs have completed their phonetics courses at different universities and with different instructors. As a result, students begin their programs with a variety of different phonetics and transcription experiences. Furthermore, some incoming SLP students have not recently taken their phonetics course(s) and may have forgotten some key concepts. Due to the importance of the skill of phonetic transcription, it would be beneficial for all incoming students to have a strong knowledge of phonetics and the ability to accurately transcribe speech. Providing these students with a review of phonetics and

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transcription practice activities to be completed prior to starting their professional program may help them become more confident in their ability to phonetically transcribe speech. One way of providing this practice is to provide incoming SLP students with online material that reviews or refreshes phonetics and transcription skills.

Research has shown that there are many benefits to online learning (Kyei-Blankson, Blankson, Ntuli, & Agyeman 2016). For one, online courses allow students to control the pace of their learning (Kyei-Blankson et al., 2016). Having control over the pace of one's own learning gives students the time they need to understand a given concept. Additionally, online learning provides flexibility. By allowing the learner to access material anywhere, anytime, it enables those with a busy schedule to learn at a time that is most convenient for them. This flexibility allows the learner to "collapse time and space" (Cole, 2000). Thus, the nature of online learning is both flexible and accessible. As a result, online courses can reach a wider range of individuals as they are not bound by time or space. Many studies have also analyzed the effectiveness of different teaching methods used within online courses. For instance, it is most effective when students are presented with a variety of learning activities such as reading text, listening to audio, and watching videos as it supports different learning styles (Ally, 2004). This way, students are more engaged with the material and are likely to find a style of learning that works best for them. Students benefited most when material was presented in an organized manner, contained clear lesson headings, and highlighted important information (Ally, 2004). Presenting information in an organized format allows students to process material in an informed and thoughtful manner (Ally, 2004). Organizing the material also allows the instructor to present the online information in such a way that mirrors the organization of in-class instruction.

Purpose and Research Questions

Professors within the Department of Communication Sciences and Disorders (formerly Speech Language Pathology and Audiology) at the University of Alberta have shared feedback from past clinical educators responsible for the supervision of practicum students, indicating that SLP students sometimes struggle in the areas of phonetic transcription and phonetic discrimination (i.e., the ability to tell phonetically different sounds apart). They have suggested that students would benefit from additional transcription practice prior to beginning their clinical placements. Additionally, the ability to phonetically transcribe speech is a skill that is necessary for courses within the program, and without this skill, students may struggle throughout the remainder of the program (Robinson, Mahurin, & Justus, 2011). Having a strong knowledge of phonetics upon entering the SLP program will allow professors to focus on new content rather than reviewing basic concepts.

In an effort to improve students' knowledge and skills related to phonetics and transcription, the main objective of this project was to give students who had been admitted to the MSc-SLP (Communication Sciences and Disorders) program at the University of Alberta an opportunity to refresh their knowledge and practice their transcription skills prior to beginning graduate coursework in phonological development and disorders. The goal of this study was to answer the following research questions: Will students' self-rated scores of knowledge and confidence related to phonetics and transcription improve following completion of an online phonetics refresher module? Will students find the online phonetics refresher course to be effective in preparing them for their course in phonological development and disorders? In pursuit of these research questions, an online module was created and subsequently delivered

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through the University of Alberta's eClass, an online learning platform that allows course moderators to share materials with their students. Students entering the program in Fall 2016 had the option to complete this online module. The module incorporated a variety of teaching strategies such as text, audio, video, images, and external resources to support different learning styles (Ally, 2004). The flexibility that the online module provided was beneficial for the incoming SLP students as many of them relocated from across the country and completed it before the start of the program. Students were given access to the module from August to mid-October, prior to beginning the graduate course in phonological disorders.

The independent variable of this study was the students' completion of the online module. The dependent variables included: pre and post-test scores within the online module, and the students' self-rated scores of knowledge and confidence obtained before and after completion of the module. The researchers determined whether the online phonetics refresher module was effective in increasing students' knowledge of phonetics concepts by comparing students' scores on tests written before and after module units. The effectiveness of the refresher module was also measured by assessing students' perceptions of their knowledge in phonetics and their confidence in their ability to apply this knowledge through the completion of self-rating scales before and after completion of the module.

METHODS

This project was approved by the Research Ethics Board at the University of Alberta.

Pre-Module Development

Prior to the development of the online refresher module, a survey was created and distributed to students in their first semester of the SLP program (class of 2017) at the

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University of Alberta. These students were nearing the end of their graduate course in phonological disorders (CSD 507 - Phonological Disorders) and had completed sections that addressed the fundamentals of phonetics and transcription. The intention of the survey was to gather information on how long it had been since students had completed their pre-requisite phonetics class, how said class had been delivered, and what the primary areas of focus were. The survey also asked about levels of preparedness for a phonetics course at the graduate level and content areas that were initially or continued to be problematic. Lastly, the survey inquired about interest in enrolling in a phonetics refresher module had it been available, the amount of time willing to devote to said module, and content that should be addressed. Please see Appendix A for the full survey.

Of the 54 paper surveys that were distributed, 52 were completed during class time and returned to the examiners. The most significant results from these surveys are reported as follow: Only 33% of students had completed their prerequisite phonetics course within the previous two years, and 14% of students had completed their prerequisite course more than four years prior. Most of the students (96%) completed their course via face-to-face instruction, while 4% completed their courses online. Students identified that learning the IPA, practicing transcription, and the acoustics of speech were the primary areas of focus. Thirty-five percent of students reported that they felt inadequately or only somewhat prepared to complete a course in phonological disorders at the graduate level. Students reported that the concept that was the most challenging for them both prior to and after completing a large portion of the graduate level phonetics course was live transcription (i.e., writing a person's speech sound by sound in IPA as the individual is talking).

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In regards to interest in a phonetics refresher, 50% of students indicated that they would have taken the opportunity to review content had it been available to them prior to beginning classes. In terms of the amount of time students were willing to spend on a refresher module, a large amount of variability was reported; the responses ranged from 0 to 40 hours with the majority (25%) suggesting that 5-6 hours would be a reasonable timeframe. The results of this survey provided a basis on which to develop the refresher module for incoming students, helping to determine what content areas to focus on and an appropriate amount of information to include.

Participants

The online refresher module was offered to all 58 students enrolled in the Communication Sciences and Disorders program, class of 2018, at the University of Alberta who were beginning in Fall 2016. Students were contacted by the department in August 2016 via a departmental email. The email informed the students of the purpose of the study and invited them to participate. All 58 students were enrolled in the online module through eClass. The module became available to students in August and online materials were available until mid-October, giving students two and a half months to complete all components. Prior to beginning the module, students were presented with an informed consent that required agreement on their part to be a participant in the research study before module materials could be viewed.

Module Content

As previously mentioned, the online module was offered through eClass, University of Alberta's online learning portal. The module consisted of three units that focused on the primary areas covered in most prerequisite phonetics courses. These units included: Basic

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Concepts, International Phonetic Alphabet (IPA), and Transcription. These units were developed using published linguistic resources as well as materials from the University of Alberta's Communication Sciences and Disorders courses (see references). The module content was based on review topics typically covered in the first week(s) of CSD 507: Phonological Disorders. This information is assumed to have been covered in most comprehensive undergraduate phonetics courses. The module also included a pre-module survey, a post-module survey, and a follow-up survey upon completion of the first half of CSD 507. See Appendices B and C for the full pre-module and post-module surveys. The purpose of administering these surveys was to obtain self-ratings in both knowledge of phonetics and other core linguistic concepts, as well as ratings of confidence in applying said knowledge.

Each of the three units contained a pre-unit quiz, a PDF slideshow of the unit content, additional practice materials, and a post-unit quiz. All quizzes consisted of twenty questions delivered in a multiple-choice format. Students who received a score of 90% or higher on the pre-test could move ahead to the next unit, without completing the activities or post-unit quiz. Those who received a pre-unit quiz score of less than 90% were required to complete the unit activities and obtain a post-test score of 90% or higher to continue to the next unit. They could repeat the post-test as many times as needed to pass and continue. Completion of each unit was self-directed. Where necessary, instructional videos and online links were provided as additional resources. Because unit 3 focused on IPA transcription, audio files were included to help students practice their transcription skills. A glossary of key terms used throughout the module was also provided so that students could lookup definitions and clarify understanding. A bibliography containing all relevant material was also provided on eClass for students to

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reference. Lastly, a forum for feedback and questions was also created so that students could anonymously provide feedback or ask questions about the module whenever they liked.

Unit 1 outlined basic concepts in phonetics, including the difference between phonetics and phonology, and definitions of key concepts such as phone, allophone, and allophonic variation. Unit 1 also contained an overview of speech anatomy, place and manner of articulation, sound categories (i.e., consonants and vowels), and developmental norms of speech sound acquisition. Unit 2 provided an overview of the IPA and outlined topics such as diacritics, segmental/prosodic features, allophonic rules, and use of diacritics in the field of Speech-Language Pathology. Lastly, unit 3 focused on transcription. This unit covered topics such as phonemic vs. phonetic transcription, systematic vs. impressionistic transcription, different strategies and conventions for transcription, and dialectal differences. Unit 3 also provided students with both orthographic and audio transcription practice to improve their transcription skills. Students were encouraged to complete the transcription practice questions, however, it was not required to complete the unit. Due to the many acceptable variations of the transcriptions, the accuracy of students' transcriptions was not determined. Instead, students had access to online documents that outlined possible answers, thus allowing them to score their transcriptions themselves.

Module Surveys

A pre-module survey was developed for students to complete prior to beginning the refresher. The survey was used to determine when students completed their prerequisite course in phonetics, how it was taught (e.g., in-class vs. online), and in what department the prerequisite course was offered (e.g., linguistics, communication sciences and disorders, etc.).

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The pre-module survey also asked students to rate their level of knowledge and confidence in various areas of phonetics (see Appendix B for pre-module survey questions). To rate their level of knowledge, students were provided with the following Likert scale: 1 representing 'poor', 2 representing 'fair', 3 representing 'average', 4 representing 'good', and 5 representing 'excellent'. To rate their level of confidence, the following Likert scale was used: 1 representing 'not at all', 2 representing 'not very', 3 representing 'neutral', 4 representing 'somewhat', and 5 representing 'very'. A post-module survey was also made available to students once they had completed the refresher. The post-module survey asked students to rate their level of knowledge and confidence in the same areas of phonetics as listed in the pre-module survey (see Appendix C for post-module survey questions). Students were asked to rate their levels of knowledge and confidence in the same areas both prior to and after completion of the refresher, in order to assess whether or not their self-ratings would improve significantly.

A follow-up survey was given to the students three weeks into the start of their graduate level phonology course. This was six weeks after the online module was no longer available to students. The purpose of the follow-up survey was to get feedback from students who did not complete the module, and to see if the students who did complete it felt it prepared them for their graduate level phonology course.

Data Analysis

Data from participants who completed all components of the refresher module, including the post-module survey (n=35), were analyzed using IBM SPSS Statistics 24. To compare potential gains in phonetic knowledge, the means from pre and post-unit quiz scores for each unit were compared using paired samples t-tests. The scores for the post-unit quizzes

were those from the students' first attempts only. These calculations excluded participants who were not required to complete the post-unit quiz due to having met criterion (90%+) on the corresponding pre-unit quiz. Self-report measures of both knowledge of module content and confidence in application of said knowledge were obtained through pre and post-module surveys. Mean pre and post module levels of knowledge and confidence were also compared using paired samples t-tests.

RESULTS

Unit Completion

The online phonetics refresher class was offered to 58 first-year speech-language pathology students at the University of Alberta. Of these students, 35 (60%) completed the entire module, including the post-module survey. Figure 1 shows the percentage of students who completed each of the 3 units and the pre- and post-module surveys.

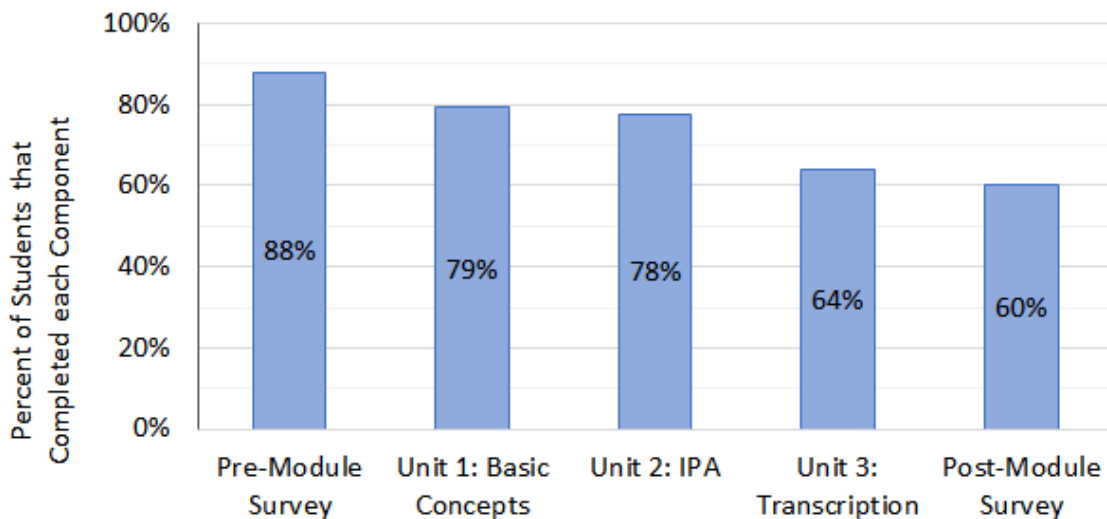


Figure 1. Percent of students that completed each module component out of the 58 students who were offered the module.

Pre-Unit Quiz and Post-Unit Quiz Scores

Table 1 shows (a) the average scores students received on the pre-unit quizzes and post-unit quizzes for each unit, (b) the range of these scores, and (c) the number of people that met criterion for each test. As Table 1 shows, the average post-unit quiz scores (first attempts) were higher than the average pre-unit quiz scores for all three units. The range of scores was broader for all three pre-unit quizzes compared to the post-unit quizzes (table 1).

Table 1.
Pre-Unit Quiz and Post-Unit Quiz Class Results by Unit, based on first attempt scores for all participants.

Unit		Average Score	Range of Scores (First Attempt)	Proportion of Students that Meet Criterion on their First Attempt
Unit 1: Basic Concepts	Pre-Unit Quiz	72.43%	35 - 90%	2/35 (6%)
	Post-Unit Quiz	91.21%***	65 - 100%	26/33 (79%)
Unit 2: IPA	Pre-Unit Quiz	81.43%	50 - 90%	13/35 (37%)
	Post-Unit Quiz	90.00%***	70 - 100%	15/23 (65%)
Unit 3: Transcription	Pre-Unit Quiz	79.57%	50 - 100%	10/35 (29%)
	Post-Unit Quiz	83.27%**	70 - 95%	9/26 (35%)

*Note: ** p<0.01, *** p<0.001*

Paired samples t-tests were conducted to compare students' pre-unit quiz scores and post-unit quiz scores for each unit. These t-tests included only students who completed both the pre-unit quiz and post-unit quiz for the given unit, which resulted in slightly different mean

scores for each pre-unit quiz. There was a significant difference in the scores of the unit 1 pre-unit quiz (M=71.36%, SD=11.61%) and post-unit quiz (91.21%, SD=8.01%); $t(32)=-7.81$, $p < 0.001$ (Figure 2). There was a significant difference in the scores of the unit 2 pre-unit quiz (M=76.09%, SD=10.22%) and post-unit quiz (90.00%, SD=7.07%); $t(22)=-5.72$, $p < 0.001$ (Figure 2). There was also a significant difference in the scores of the unit 3 pre-unit quiz (M=74.62%, SD=9.58%) and post-unit quiz (83.27%, SD=7.20%); $t(25)=-3.59$, $p < 0.001$ (Figure 2).

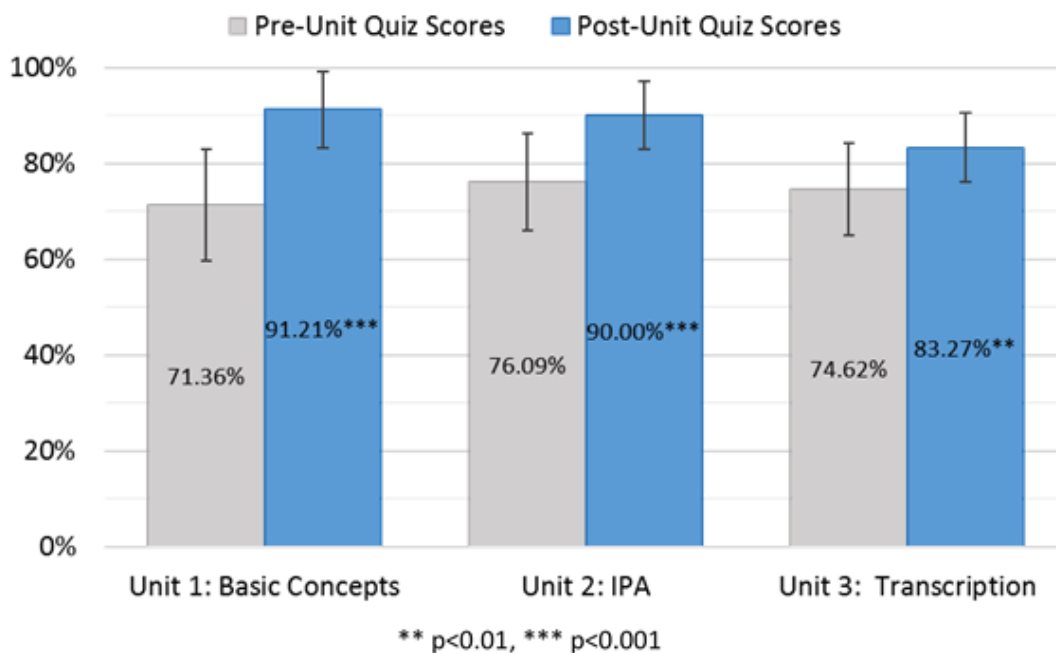


Figure 2. Comparison of average pre-unit quiz score to post-unit quiz score by unit including error bars. Only includes scores from students who did not meet criterion score (90%-100%) on pre-unit quiz. ** $p < 0.001$

Survey Results

In the pre- and post-module surveys, there were 22 questions pertaining to the students' self-rating of their confidence and knowledge in a variety of phonetics concepts.

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These were quantified using a five-point Likert scale. The confidence scale was laid out as 1 being 'not at all', 2 being 'not very', 3 being 'neutral', 4 being 'somewhat', and 5 being 'very'. The knowledge scale was laid out as 1 being 'poor', 2 being 'fair', 3 being 'average', 4 being 'good', and 5 being 'excellent'.

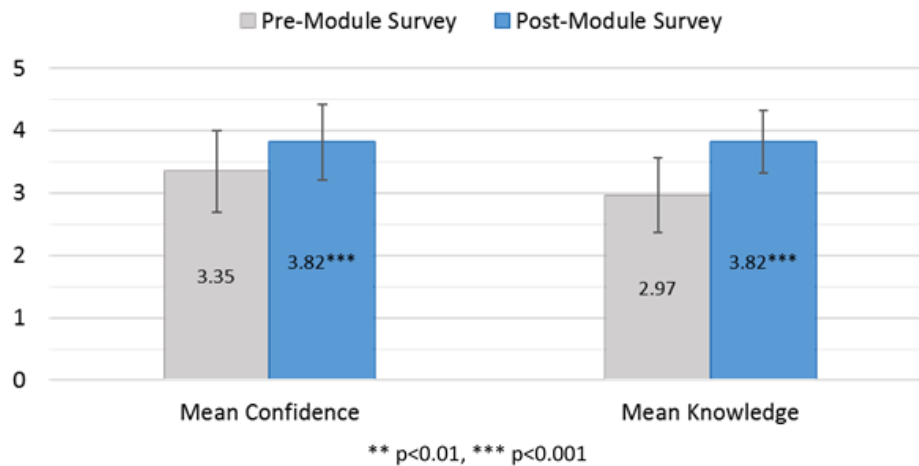


Figure 3. Comparison of pre-module survey averages to post-module survey averages by questions related to confidence and knowledge including standard deviation bars. Only includes scores from students who completed both the pre-module and post-module survey. ** p<0.001

A paired-samples t-test was conducted to compare students' self-reported level of confidence before and after completing the phonetics refresher module. There was a significant difference between the students' confidence levels in the pre-module survey (M=3.35, SD = 0.65) and in the post-module survey (M=3.82, SD=0.61); $t(34) = -5.47$, $p < 0.001$ (figure 3). A paired-samples t-test was also conducted to compare students' self-reported knowledge rating prior to and after completing the phonetics refresher module. There was a significant

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difference between the students' self-reported knowledge rating in the pre-module survey (M=2.97, SD = 0.60) and in the post-module survey (M=3.82, SD=0.49); $t(34) = -12.23$, $p < 0.001$ (figure 3). These results were statistically significant for all components of self-reported confidence and knowledge improvements. See figures 4, 5a, and 5b to see the students' self-reported changes.

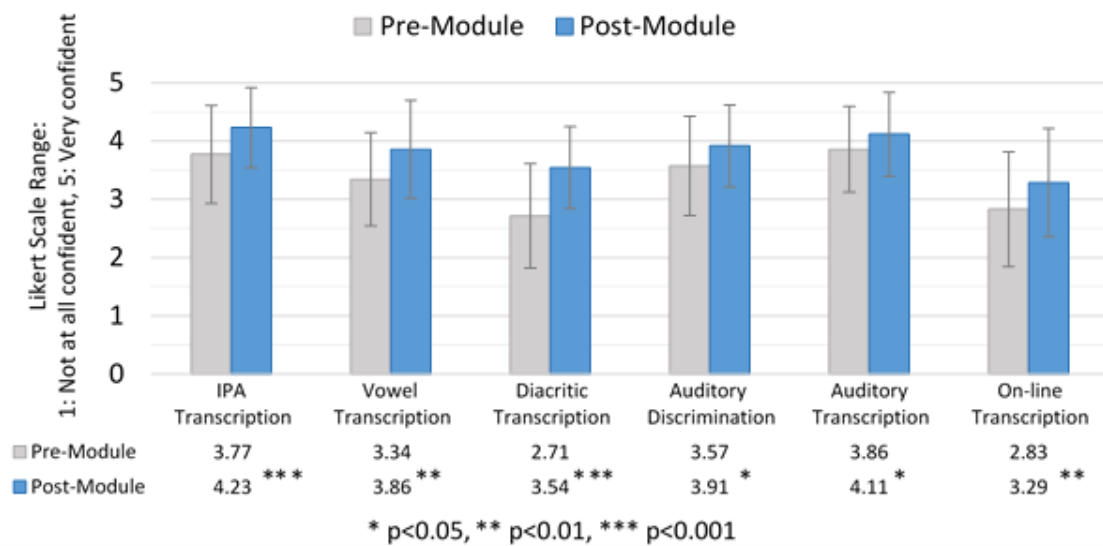
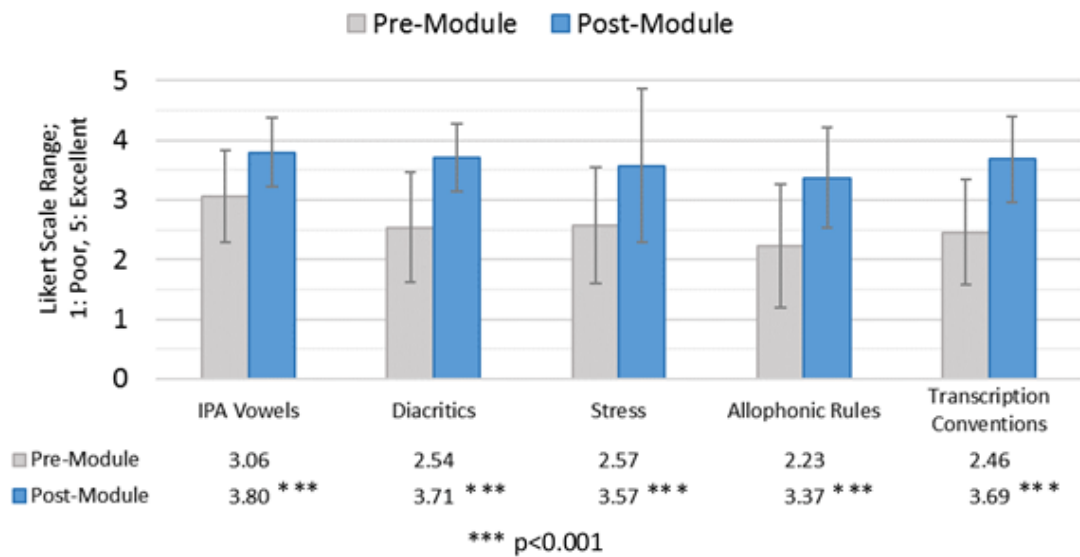
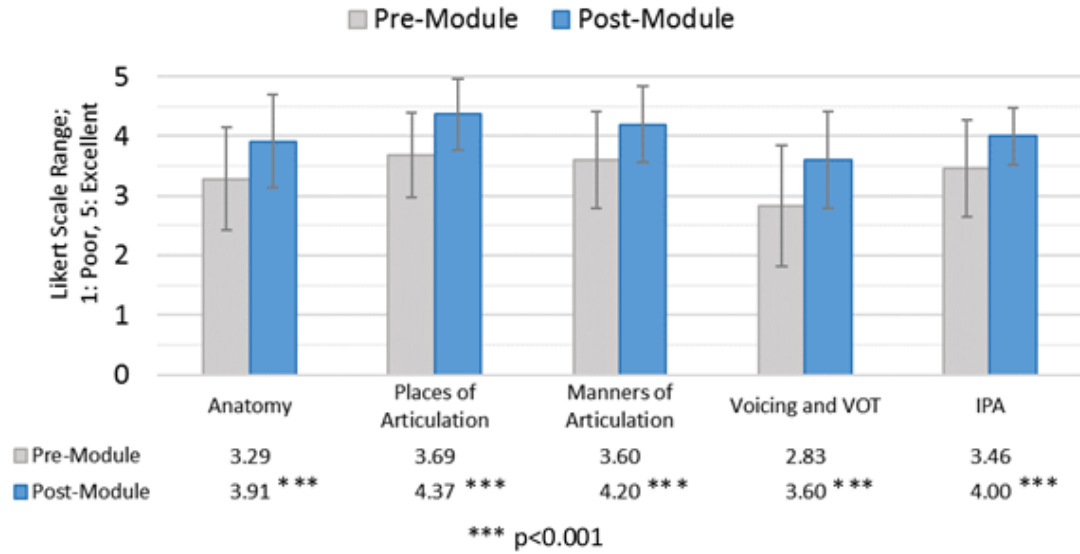


Figure 4. Comparison of self-rated confidence level in different phonetics skills from pre-module to post-module survey. Only includes scores from students who completed both the pre-module and post-module survey.

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Figures 5 a & b. Comparison of self-rated level of knowledge in different phonetics concepts from pre-module to post-module survey. Only includes scores from students who completed both the pre-module and post-module survey.

Follow-Up Survey Results

Thirty-five (60%) out of 58 students completed the follow-up survey. Of the responses, 26 (74%)

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reported that they did the entire module, 6 (17%) reported that they completed a portion of it, and 3 (9%) reported that they did not do any of it. All the students who completed the module reported that the completion of the online phonetics refresher prepared them either somewhat well (18/26; 69%) or very well (8/26; 31%) for CSD 507. All students who completed the course said they would recommend it to future SLP cohorts (26/26; 100%), but the majority said it should be optional (17/26; 65%), not mandatory.

DISCUSSION

The purpose of this project was to develop, implement, and evaluate an online phonetics refresher module for incoming SLP students at the University of Alberta. Three units were created that addressed basic phonetic concepts and phonetic transcription skills. Performance on pre- and post-unit quizzes were compared to evaluate the effectiveness of the content on improving knowledge. Results for each of the comparisons were statistically significant, indicating that, overall, students' content knowledge improved after they had reviewed material covered in each unit. Additionally, self-reported knowledge of phonetic concepts and confidence levels in applying said knowledge practically were also evaluated through pre- and post-module surveys. The results of these comparisons were also statistically significant, indicating that students felt that they had learned from the content and were more confident in their ability to apply their knowledge upon completion of the module. These outcomes are important as they validate the hypothesis that an online refresher module would be effective in preparing students for a course in phonology at the graduate level. Given the survey responses, it was apparent that prior to completing the module, students felt most knowledgeable in the areas of speech anatomy, place and manners of articulation, and basic

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IPA symbols. Though all self-reported gains in knowledge were significant, the areas in which they reported the most growth after completion included: use of diacritics, identifying word stress, allophonic rules, and the different conventions used for transcriptions.

A follow-up survey was provided to students registered in CSD 507, including those who had not participated in the refresher, midway through the course. Those who had completed all module components indicated that they felt the refresher was at least somewhat helpful in preparing them for their phonetics course, suggesting that phonetics is an area that new SLP students may need some additional practice in before starting the program. In addition to the areas of growth reported above, students who completed the follow-up survey expressed that review of the IPA, sound classes, and diacritics were the most helpful in preparing them for CSD 507. These students also reported that they would recommend the refresher module to future students, which further suggests that the students who completed it found it beneficial. In response to what should be added to the refresher, students requested practice with disordered speech, however, as the intention of the project was to act as a refresher of previously learned content, this area was deliberately excluded from the module. For the students that did not attempt the refresher or began and did not complete all components, time constraint was listed as the primary reason.

Of all student respondents, an overwhelming majority expressed interest in additional refresher modules in the areas of statistics, anatomy and physiology, neuroanatomy, and English syntax and grammar. Currently, statistics, neuroanatomy, and introductory linguistics, which covers English syntax, are prerequisite courses for the SLP program at the University of Alberta, but these seem to be areas that students continue to find challenging.

Limitations

Upon review of both the results and the refresher module itself, some limitations were noted. Some of these limitations manifested in the access to information; if a student did not receive 90% or greater on a pre-unit quiz they were required to open all mandatory components of that unit prior to moving on to the post-unit quiz. Despite this effort to ensure students were making use of the available materials, there was no reliable way of ensuring that they reviewed all the module content or completed any of the exercises within a given unit, or the additional practice section, prior to attempting the post-unit quiz. In addition, there were also no restrictions in place to prevent students from reviewing slides while completing post-unit quizzes, which may have influenced scores.

A major focus of the refresher module was on the production of accurate phonetic transcription both from words presented orthographically and speech presented auditorily. Given the online format, time constraints, and variations in responses that could be deemed acceptable, there was no adequate way to verify each participant's transcription accuracy. Because of this, transcription was not as heavily focused on in pre- and post-unit quizzes; thus, the multiple choice format presented in the quizzes may not have been representative of knowledge and skills gained in transcription.

An additional complication with interpreting knowledge gained arises when considering those participants that achieved 90% or greater on the pre-unit quiz who were not required to access the unit content prior to moving on. These individuals were still asked to report on levels of content knowledge and confidence after completing the entire module when the reality is that their scores should not have changed. In conjunction with this issue, all survey scores were

obtained through self-report measures, and while this provides insight into the students' perception of their skills, responses could have been influenced by many outside factors, such as social desirability, and cannot be independently verified.

Future Directions

The online post-module survey and the follow-up survey provided useful feedback on ways in which the module could be improved in the future. Although some students acknowledged that they did not necessarily need to review the basic foundations of phonetics (e.g., IPA, places of articulation, manners of articulation, etc.), many students reported that it was still very useful in preparation for CSD 507 and should not be removed from the module. Thus, although students found some areas more helpful than others, the majority of students indicated that nothing should be removed from the phonetics refresher module. However, many students indicated that they would like more focus on topics including: voice-onset time (VOT), identifying stress, IPA transcription, and child language acquisition norms. Although these topics were covered in the module, it may be beneficial to include more in-depth information and opportunities for practice.

As many students identified acoustic characteristics of the speech signal as an area they would like to learn more about (e.g., VOT and identifying stress), it would be useful to include an additional unit that covered these concepts, as well as other acoustic concepts (e.g., spectrograms, F1 and F2 frequencies, etc.). Offering incoming students with a review of acoustics would not only improve the students' understanding of phonetics more broadly, but it would also better prepare students for other courses within the program (e.g., CSD 505: Speech Sciences) and to use acoustics to support their transcriptions (Shriberg et al., 2010).

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IPA transcription was also reported to be an area of particular concern for many students. Thus, it would be beneficial to include videos that contain more in-depth information about speech discrimination and transcription. It would also be useful to offer students more information about child language acquisition, such as video examples of how a typical two-and-a-half year old sounds versus how a typical three-and-a-half year old sounds. This would give students a more concrete understanding of the stages of language development.

In terms of the format of delivery of the module, many students indicated that it would be helpful to receive more feedback on the quizzes. For instance, many students suggested that it would be useful to see what questions they got wrong and where they could look in the slides to find the answer. This would likely improve their understanding of key concepts and increase students' ability to guide their own learning. A few smaller details regarding the delivery of the module were also noted: One student reported that the video provided in unit 1 did not play on her browser (Firefox) as it was reported to be corrupt. This is an issue that should be looked into further to ensure that all future students are able to access the video on all browsers. Another student indicated that a disclaimer should be added to unit 3 to explain to future students that the examples used reflect standard Canadian English, and that some dialectal variations may not be included and/or represented.

As discussed previously, the majority of students indicated an interest in completing other online refresher modules in preparation for other SLP courses (e.g., statistics, anatomy, etc.). Due to the high level of interest reported by students, the Department of Communication Sciences and Disorders should consider developing online modules for other courses to help better prepare incoming students.

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APPENDIX A

Class of 2017 Phonetics Survey

When did you complete your phonetics pre-req? _____

How was it taught? (Circle one) Classroom Online

Where did you take it? _____

What were the major focuses of your class? (check all that apply)

- Transcription:
 - Live practice (on-the-spot transcription of instructor's speech)
 - Practice from audio/video speech samples (could listen multiple times and have access to IPA)
 - Practice from orthography (transcribing written English words into IPA)
- International Phonetics Alphabet (IPA)
 - base symbols for English only
 - all IPA base symbols
 - diacritics
- Acoustics
- Suprasegmentals (stress, tone, intonation)
- Ear training (identification/discrimination of similar sounds and variations)
- Developmental norms for speech sounds
- Speech mechanism anatomy
- Speech perception
- Other: _____

Did you feel prepared for CSD 507? (if no, please explain)

What areas/concepts in 507 did you have trouble with at the beginning of the semester or are still finding difficult?

What areas/concepts would you have liked to spend more time reviewing?

Do you remember which textbook you used for your phonetics course? Could we borrow it?

If a phonetics refresher had been available before September, would you have taken it? (circle one)

No Probably Not Maybe/Unsure Probably Yes

If yes, would you be willing to pay a fee to take it? (Circle one)

No Depends on how much the fee is Yes

How many hours would you be willing to put in to an optional phonetics refresher? _____ hours

Would you have been interested in (or do you think future students would benefit from) an online refresher module in any of the following?

- Syntax/Grammar
- Anatomy
- Statistics
- Other : _____

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Appendix B:
Class of 2018 Pre-Module Survey

1) How long ago did you complete your prerequisite course in articulatory phonetics?

1-2 years 3-4 years 5+ years

2) How was your phonetics course taught?

Classroom Online

3) In what type of department was your phonetics course taught?

Linguistics Speech-Language Pathology (or Communication Sciences & Disorders) Other

4) If you answered "other" to the previous question, please specify.

5) Rate your knowledge of: Anatomy (parts of the body) required for speech

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

6) Rate your knowledge of: Places of articulation

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

7) Rate your knowledge of: Manners of articulation

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

8) Rate your knowledge of: Voicing and voice onset time (VOT)

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

9) Rate your knowledge of: The International Phonetic Alphabet

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

10) Rate your knowledge of: Phonetic symbols for vowels

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

11) Rate your knowledge of: Commonly used diacritics (e.g., marking sounds that are voiceless or nasalized)

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

12) Rate your knowledge of: Identifying and marking stress

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

13) Rate your knowledge of: Allophonic rules

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

14) Rate your knowledge of: Conventions used in transcription (e.g., diphthongs, rhotics, syllabics)

1 Poor 2 Fair 3 Average 4 Good 5 Excellent

15) Rate your level of confidence in: Your ability to transcribe written words using the International Phonetic Alphabet (IPA)

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

16) Rate your level of confidence in: Your ability to transcribe vowels

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

17) Rate your level of confidence in: Your ability to include appropriate diacritics in transcriptions

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

18) Rate your level of confidence in: Your ability to discriminate sounds presented auditorily

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

19) Rate your level of confidence in: Your ability to transcribe single words presented auditorily using the IPA

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

20) Rate your level of confidence in: Your ability to phonetically transcribe single words presented auditorily in real time (i.e., without the ability to replay a recording multiple times)

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

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Appendix C

Class of 2018 Post-Module Survey

- 1) Rate your knowledge of: Anatomy (parts of the body) required for speech
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 2) Rate your knowledge of: Places of articulation
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 3) Rate your knowledge of: Manners of articulation
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 4) Rate your knowledge of: Voicing and voice onset time (VOT)
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 5) Rate your knowledge of: The International Phonetic Alphabet
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 6) Rate your knowledge of: Phonetic symbols for vowels
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 7) Rate your knowledge of: Commonly used diacritics (e.g., marking sounds that are voiceless or nasalized)
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 8) Rate your knowledge of: Identifying and marking stress
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 9) Rate your knowledge of: Allophonic rules
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 10) Rate your knowledge of: Conventions used in transcription (e.g., diphthongs, rhotics, syllabics)
 1 Poor 2 Fair 3 Average 4 Good 5 Excellent
- 11) Rate your level of confidence in: Your ability to transcribe written words using the International Phonetic Alphabet (IPA)
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 12) Rate your level of confidence in: Your ability to transcribe vowels
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 13) Rate your level of confidence in: Your ability to include appropriate diacritics in transcriptions
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 14) Rate your level of confidence in: Your ability to discriminate between sounds presented auditorily
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 15) Rate your level of confidence in: Your ability to transcribe single words presented auditorily using the IPA
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 16) Rate your level of confidence in: Your ability to transcribe connected speech (sentences) presented auditorily using the IPA
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 17) Rate your level of confidence in: Your ability to phonetically transcribe single words presented auditorily in real time (i.e., without the ability to replay a recording multiple times)
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very
- 18) Did you complete all three modules of the online Phonetics Refresher?
 Yes
 No
- 19) If you did not complete one or more units, what was the reason?
 Passed the pre-test, skipped ahead to next unit
 Not enough time
 Did not find the information helpful
- 20) Rate the following statement using the scale below: Quiz material was an accurate reflection of the content covered in each unit.
 1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

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21) Rate the following statement using the scale below: The online format was easy to navigate.

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

22) Rate the following statement using the scale below: The practice activities were worthwhile.

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

23) Rate the following statement using the scale below: Feedback on practice activities and quizzes was helpful.

1 Not at all 2 Not very 3 Neutral 4 Somewhat 5 Very

24) What 3 phonetic concepts/areas were most beneficial for you to review?

25) What 3 phonetic concepts/areas were least necessary for you to review?

26) What concepts/content do you think should be added to the Phonetics Refresher?

27) Would you recommend the Refresher to other incoming MScSLP students?

Yes

No

28) Should all incoming MScSLP students be required to complete the Phonetics Refresher?

Yes

No

29) Would you recommend the development of online refreshers on the following topics (check all that apply)?

English grammar/syntax

Basic anatomy/physiology

Neuroanatomy

Statistics

Other

30) If you answered "other" to the previous question, please specify.

31) Any additional comments/feedback?

32) By submitting your responses, you are consenting to participate in the study, "Effectiveness of an Online Phonetics Refresher for SLP Students" and giving the research team permission to analyze your responses to the pre and post-module surveys.