The Development of Accepted Performance Items to Demonstrate Braille Competence in the Nemeth Code for Mathematics and Science Notation

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Structured abstract: *Introduction:* The purpose of the study presented here was the initial validation of a comprehensive set of competencies focused solely on the Nemeth code. *Methods:* Using the Delphi method, 20 expert panelists were recruited to participate in the study on the basis of their past experience in teaching a university-level course in the Nemeth code. The Delphi method uses multiple iterations or "rounds" to develop a consensus. The panelists were given the list of competencies developed by a focus group and were asked to rank their importance and the level of resources they would expect a beginning teacher of students with visual impairments to use. With each round, the panelists were provided with the statistical results and comments on the previous round, so they could make an informed decision on their next rating. *Results:* Only three rounds were necessary for the panelists to reach a consensus. For writing, the panelists reached a consensus on 12 (41%) statements for importance and 17 (59%) for reference. For reading, they reached a consensus on 19 statements (66%) for importance and 23 (79%) for references. Comments from the panelists focused primarily on the fact that teachers of students with visual impairments need to use resources more often for writing to ensure the quality of their transcriptions, but that they should be able to read without resources. This difference may be due to the panelists' perception that teachers of students with visual impairments need to be more equipped to back-translate from the Nemeth code into print than to transcribe from print into the Nemeth code. *Discussion:* On the basis of the scoring and the comments, the panelists had different expectations for their students. These differences may have been due to their own level of understanding of the Nemeth code or mathematics in general. *Implications for practitioners:* This study is the first step in developing a comprehensive set of Nemeth code competencies for the field of special education for students with visual impairments. These competencies will become the benchmark for all university programs as they develop their courses on the Nemeth code. They may also be used for the framework for professional development for in-service teachers of students with visual impairments.

The purpose of standards and competencies in personnel preparation is to ensure that educators from different institutions are given approximately the same training. Although the early standards and competencies focused primarily on general education, there was a movement in the 1950s, spearheaded by the Council for Exceptional Children (CEC, 1966), to develop professional standards in special education. The American Foundation for the Blind led the efforts to establish more specialized competencies for teachers of students with visual impairments, and Spungin's work (1977) became the framework of competencies used by teacher preparation programs. Since the 1970s, CEC has redeveloped its standards to include sets of knowledge and skills for each exceptionality (CEC, 2003). The CEC Division on Visual Impairments, with the support of the Association for Education and Rehabilitation of the Blind and Visually Impaired (AER), was responsible for developing the statements on knowledge and skills that are currently used in the preparation of teachers of students with visual impairments (Hatlen, 2000).

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Within the field of special education for students with visual impairments, there has been a recent movement to standardize the preparation of students with visual impairments by developing "microstandards" that focus on the minute knowledge and skills that are needed by teachers of students with visual impairments. For example, Smith, Kelley, Maushak, Griffin-Shirley, and Lan (2009) developed an exhaustive set of competencies in assistive technology (along with levels of proficiency) for teachers of students with visual impairments. Fueled by the findings by Amato (2002) and Rosenblum, Lewis, and D'Andrea (2010) of the lack of consistency in preparation in literacy braille, Lewis, D'Andrea, and Rosenblum (2012) recommended literary braille competencies. It remains to be seen whether these competencies will be enacted by AER's Personnel Preparation Division as standards that personnel preparation programs will use in designing their courses for preservice teachers of students with visual impairments and certified vision rehabilitation therapists.

A review of the literature found that teachers of students with visual impairments are concerned about their training and level of proficiency in the Nemeth Code for Mathematics and Science Notation (hereafter, Nemeth code). In a Delphi study, Koenig and Holbrook (2000) found that skills in the area of the Nemeth code were rated as important. Kapperman and Sticken (2003), however, stated that most teachers of students with visual impairments often do not have the skills to teach the Nemeth code. A survey of 135 teachers of students with visual impairments, by Rosenblum and Amato (2004), found that only 28.9% of the respondents

believed that their university preparation programs provided almost all the information they needed to do their jobs. Conversely, 34.4% stated that their preservice training in the Nemeth code was rudimentary and that they had to learn most of what they needed in order to perform their job themselves.

We hope that by providing more discrete competencies and levels of proficiency for the Nemeth code, as developed in the study presented here, university personnel preparation programs will have a direct guide to develop courses in which their students will proficiently learn to read and write the Nemeth code. For the purposes of the study, standards and competencies had to be defined. Klein and Richey (2007) defined *standards* as the combination of current practice, shared ethics and values, and the profession's vision for the future. Standards are the basis for the knowledge, skills, and attitudes needed within a specific profession. *Competencies* are defined as "a knowledge, skill, or attitude that enables one to effectively perform the activities of a given occupation or function to the standards expected in employment" (Houston, 1975, p. 7).

The process of developing competencies is cyclical, beginning with an expert focus group reviewing the current practice and literature to determine a set of proposed competencies. Next, the competencies are formally validated through the consensual agreement of diverse experts in the field, typically using the Delphi method. During the process, the competencies are refined before moving to the next phase, which is full-field validation through a large-scale survey. Over time, the competencies are reviewed for relevance, and the process begins again.

As was the case with literary braille (Lewis et al., 2012), a full description of the specific knowledge and skills required for instruction in the Nemeth code has not been developed or delineated to the universities that prepare teachers of students with visual impairments. Therefore, the purpose of the study presented here was to develop such a list of competencies focused solely on the Nemeth code. The study presented here is the initial validation of competencies in the Nemeth code for professionals who serve students with visual impairments. This project was initiated and endorsed by the Personnel Preparation Division of AER. Many members of the Personnel Preparation Division of AER were members of the initial expert focus group and are listed with appreciation in the authors' note.

Method

To develop a valid set of competencies for the Nemeth code, a two-part process was implemented. The first step was to have a focus group develop a set of proposed competencies. On the basis of their work, the second step was to validate the proposed competencies through the Delphi method.

Development of the Proposed Statements on Competence

A focus group, composed of the Nemeth Code Committee of the AER Personnel Preparation Division, developed the set of proposed competencies on the basis of their experience and knowledge of the code. The focus group members were researchers and educators with expertise in the Nemeth code and mathematics

education, along with special education for students with visual impairments. They reviewed the current literature and professional practice and developed a proposed set of competencies in the Nemeth code. The set was separated into two domains: 29 reading and 29 writing statements, for a total of 58 statements.

A modified Delphi method was used to develop a consensual validation of the proposed set of competencies. In a true Delphi method, the expert panel develops the proposed competencies as part of the first iteration or round. However, the use of the modified Delphi method that has an external focus group develop the initial set of information has been found to be more efficient and valid (Turoff & Linstone, 2002). Thus, the focus group creates the competencies, but the Delphi method is used for the first phase of validation of the competencies because it is based on the professional consensus model (Imig & Imig, 2007). With any Delphi method, however, expert panelists are allowed to add competencies if needed.

Participants

The expert panelists were required to meet the following criteria: (1) they had taught at least one university course on how to read and write the Nemeth code within the previous three years, (2) they had taught the course in which future teachers of students with visual impairments learn the Nemeth code during at least three semesters or quarters at a university, (3) they had taught the Nemeth braille course for three or more years, (4) they had taught the course at at least one university in the United States or Canada, and (5) they provided students in the course with skills to produce and read the Nemeth code (as defined and approved by the Braille Authority of North America).

Turoff and Linstone (2002) explained that in a Delphi study, the level of reliability is the strongest with more than 13 participants; however, the reliability is not significantly affected with more than 30 participants. Therefore, the study set out to recruit a total of 20 participants. The expert panelists were recruited through an identification process used in the study by Rosenblum and Smith (2012), in which the participants identified qualified participants for the current study. Twenty-one individuals nominated potential expert panelists, and these individuals were contacted by the researchers (the authors of this article) via e-mail. Twenty qualified, expert panelists participated in Round 1, and 18 of these individuals completed Rounds 2 and 3. As is shown in Table 1, the expert panelists varied in their faculty positions, years of teaching the Nemeth code, and how they structured the courses.

Instruments

A focus group composed of 13 members, including the authors, of the AER Personnel Preparation Division developed a proposed set of 29 competencies in the Nemeth code, along with mathematical examples for each. We determined that for each competence, a reading and a writing competence should be used, for a total of 58 competencies. For each proposed competence, the expert panelists were asked to rate the competence for the minimal level of importance that beginning teachers of students with visual impairments should have by the completion of their degrees or certification courses. A

Table 1
Demographic data on the 20 participants.

Demographic data	*N*	%
Position		
Tenure track	13	60
Nontenure track	2	10
Instructor hired to teach this course	3	15
Doctoral student	1	5
Other, director of certification program (tenure track)	1	5
Years teaching the Nemeth code		
3 to 5 years	8	40
6 to 10 years	7	35
11 to15 years	2	10
16 or more years	3	15
Delivery method[a]		
Online	8	40
Face to face	10	50
Hybrid	11	55

[a] The participants could select more than one option. The percentages are for the total of the 20 participants and do not add up to 100.

4-point Likert scale was used to measure the importance of the competencies (extremely important, important, somewhat important, and not important). The participants were also asked to select their level of agreement with the type of reference material that can be used by a beginning teacher of students with visual impairments who is completing the degree or certification courses. Three choices were provided: "no references," meaning that the beginning teacher should be able to do this skill from memory; "contraction reference," meaning that the beginning teacher may check a reference sheet of braille symbols, but not a book that contains the rules for using the symbol; or "reference book," meaning that the beginning teacher of students with visual impairments may use a reference book that contains the symbol and the rules governing the use of the symbol. The participants were also given the opportunity to provide comments for each competence, which they shared with the other participants during subsequent Delphi rounds.

Procedure

For this study, the Delphi method was used to produce a reliable consensus of opinion through the use of a panel of knowledgeable experts (Turoff & Linstone, 2002). The Delphi method is "a method for structuring a group communication process so that it is effective in allowing a group of individuals, as a whole, to deal with a complex problem" (Turoff & Linstone, 2002, p. 3). It is an iterative process that is generally composed of several "rounds." Expert panelists are asked to rank their level of agreement with the importance of each competence and the level of references to be used for each competence, and to provide comments as appropriate for their rankings. After the first round, the expert panelists are given information on the previous round (descriptive statistics and comments) to inform their decisions in future rounds. The goal is to come to a greater and greater consensus in each round without the negative impact of peer pressure, group dynamics, or even "groupthink" that are found in face-to-face consensus models (Hsu & Sanford, 2007).

Iterations are repeated until a preset level of agreement (or consensus) is achieved or it is clear that a consensus will not occur. For this study, the acceptable level of agreement was established at 85%. If the level of importance or reference level met the 85% threshold in any round, that statement was not included in subsequent rounds, since it met the

consensus. Data were collected in three rounds between October 2011 and May 2012 using an online survey program (Qualtrics). The online survey contained the statements for the expert panelists to rate and math examples for each statement. The statements and math examples were produced in braille and sent to three expert participants who are braille readers, because the examples were not accessible through the survey web site. The research project was reviewed and approved by the University of Alabama in Huntsville Institutional Review Board.

Results

Writing domain

Twenty-nine proposed competencies related to writing the Nemeth code were provided to the expert panel for analysis and rating. The ratings of levels of agreement for importance and the recommended type of references that should be made available when demonstrating proficiency are presented in Table 2.

The expert panelists reached a consensus at the 85% level of agreement for the level of importance for 12 (41%) of the 29 competencies that beginning teachers of students with visual impairments should demonstrate in writing: 7 (24%) competencies in Round 1, which demonstrates that the expert panelists considered these 7 to be the most fundamental skills; 2 (7%) competencies in Round 2; and 3 (10%) in Round 3. For the remaining 17 (59%) competencies, the expert panelists did not reach a consensus. However, many (12, 41%) of those competencies that the expert panelists did not reach a consensus on were within 15 percentage points of the 85% agreement level. Of the 12 competencies that the expert panelists reached a consensus on, 11 competencies were ranked as extremely important and 1 (W22) was ranked as somewhat important.

In regard to the use of references by beginning teachers of students with visual impairments, the expert panelists reached the 85% level of agreement for 17 (59%) of the competencies: 9 (31%) in Round 1, 3 (10%) in Round 2, and 5 (17%) in Round 3. The expert panelists did not reach the 85% level of agreement for 12 (41%) of the competencies. Again, 10 (34%) competencies were rated within 15 percentage points of the preset level of agreement. In reviewing the actual rankings of the 17 for which the expert panelists reached a consensus, only 2 met the level of no references, 4 met the level of contraction reference, and 11 met the level at the reference book level.

Reading domain

The same 29 competencies were reviewed by the expert panel, but focused on the ability of beginning teachers of students with visual impairments to "read" the Nemeth code instead of writing it. The findings within this domain can be found in Table 3.

Within this domain, the expert panelists reached a consensus on their importance for 19 (65%) of the 29 competencies: 6 (21%) in Round 1, 4 (14%) in Round 2, and 9 (31%) in Round 3. They did not reach a consensus on 10 (34%) competencies. It is interesting that only 3 of those that the expert panelists did not reach a consensus on were within 15 percentage points of the 85% agreement required. For the remaining 7, the expert panelists had much larger dispersions (see Table 3).

Table 2
Consensus on competencies within the writing domain.

	Importance		References	
Statement	Percentage	Round	Percentage	Round
W1: Write in context linear math problems using whole numbers, signs of omission, signs of operation, and signs of comparison.	EI (95%)	1	NR (94%)	3
W2: Write in context punctuation signs and symbols.	EI (100%)	1	NR (39%) CR (61%)	3
W3: Write in context commonly used simple fractions and mixed numbers.	EI (100%)	1	NR (69%) CR (31%)	3
W4: Write in context mathematic expressions requiring computation in a spatial format.	EI (100%)	1	NR (94%)	3
W5: Write in context mathematical expressions containing grouping symbols, including parentheses.	EI (95%)	1	NR (17%) CR (83%)	3
W6: Write in context mathematical expressions containing decimals, percentages, and negative numbers.	EI (100%)	1	NR (24%) CR (76%)	3
W7: Write in context mathematical expressions containing more advanced signs of comparison.	EI (83%) I (17%)	3	CR (94%)	3
W8: Write in context mathematical expressions containing exponents (superscripts).	EI (85%)	1	NR (5%) CR (78%) RB (17%)	3
W9: Write in context mathematical expressions containing subscripts.	EI (83%) I (11%) SI (6%)	3	NR (5%) CR (17%) RB (78%)	3
W10: Write in context mathematical expressions containing radicals (square roots, cube roots, and the like).	EI (83%) I (17%)	3	NR (6%) CR (83%) RB (11%)	3
W11. Write in context mathematical expressions containing complex numbers.	EI (78%) I (17%) SI (5%)	3	RB (89%)	2
W12: Write in context letters representing measurement units related to length, weight, volume, area, and surface area (i.e., inches, feet/ centimeters, meters, cm^2).	EI (94%)	2	CR (89%)	3
W13: Write in context signs of comparison (i.e., ratio, proportion).	EI (83%) I (17%)	3	CR (89%)	2
W14: Write in context signs for rates and derived measurements (e.g., velocity and density—example: ft/sec & lbs./square inch).	EI (78%) I (22%)	3	NR (6%) CR (11%) RB (83%)	3
W15: Write in context formulas for the area, surface area, and volume of geometric figures.	EI (72%) I (17%) SI (11%)	3	RB (90%)	1

(cont.)

Table 2
(cont.)

	Importance		References	
Statement	Percentage	Round	Percentage	Round
W16: Write in context letters used to symbolize variables.	SI (94%)	2	NR (5%) CR (17%) RB (78%)	3
W17: Write in context algebraic equations, including those with polynomials and rational numbers (fractions).	EI (89%)	3	NR (6%) CR (11%) RB (83%)	3
W18: Write in context algebraic equations that use logarithmic numbers.	EI (17%) I (11%) SI (72%)	3	RB (95%)	1
W19: Write in context algebraic equations that use periodic functions.	EI (17%) I (72%) SI (11%)	3	RB (85%)	1
W20: Write in context algebraic equations that use inequalities.	EI (67%) I (33%)	3	NR (5%) CR (17%) RB (78%)	3
W21: Write in context statements that use shape indicators (e.g., circle, square, triangle).	EI (94%)	1	RB (89%)	3
W22: Write in context compass directions using arrow indicators (e.g., compass rose, up arrow, right arrow).	SI (89%)	3	RB (85%)	1
W23: Write in context symbols for congruence, similarity, parallel, and perpendicular.	EI (17%) I (78%) SI (5%)	3	RB (89%)	2
W24: Write in context coordinate indicators.	EI (22%) I (78%)	3	NR (6%) CR (11%) RB (83%)	3
W25: Write in context indicators for angles, lengths, arcs, perimeters, areas, and volume.	EI (22%) I (78%)	3	RB (85%)	1
W26: Write in context trigonometric indicators for lengths and angle measurements.	EI (11%) I (11%) SI (78%)	3	RB (85%)	1
W27: Write in context Cartesian coordinates, navigational, polar, and spherical systems.	EI (11%) I (11%) SI (78%)	3	RB (95%)	1
W28: Write in context indicators for plane, vectors, function notation, and matrices.	EI (11%) I (11%) SI (67%) NI (11%)	3	RB (100%)	1
W29: Write in context using various indicators and equations for statistical data.	EI (5%) I (17%) SI (71%) NI (5%)	3	RB (95%)	1

Note: Importance: EI = extremely important, I = important, SI = somewhat important, and NI = not important. References: NR = no references, CR = contraction reference, and RB = reference book.

Table 3
Consensus on competencies within the reading domain.

Statement	Importance		References	
	Percentage	Round	Percentage	Round
R1: Read in context linear math problems using whole numbers, signs of omission, signs of operation, and signs of comparison.	EI (100%)	1	NR (95%)	2
R2: Read in context punctuation signs and symbols.	EI (100%)	1	NR (95%)	2
R3: Read in context commonly used simple fractions and mixed numbers.	EI (100%)	1	NR (95%)	2
R4: Read in context mathematical expressions requiring computation in spatial format.	EI (100%)	1	NR (95%)	2
R5: Read in context mathematical expressions containing grouping symbols, including parentheses.	EI (95%)	1	NR (95%)	3
R6: Read in context mathematical expressions containing decimals, percentages, and negative numbers.	EI (85%)	1	NR (95%)	3
R7: Read in context mathematical expressions containing more advanced signs of comparison.	EI (95%)	3	CR (88%)	2
R8: Read in context mathematical expressions containing exponents (superscripts).	EI (95%)	3	CR (78%)	3
R9: Read in context mathematical expressions containing subscripts.	EI (88%)	3	NR (11%) CR (83%) RB (6%)	3
R10: Read in context mathematical expressions containing radicals (square roots, cube roots, and the like).	EI (95%)	3	CR (88%)	3
R11. Read in context mathematical expressions containing complex numbers.	EI (17%) I (83%)	3	NR (6%) CR (11%) RB (83%)	3
R12: Read in context letters representing measurement units related to length, weight, volume, area, and surface area (i.e., inches, feet/ centimeters, meters, cm^2).	EI (95%)	2	NR (88%)	3
R13: Read in context signs of comparison (i.e., ratio, proportion).	EI (88%)	3	CR (88%)	3
R14: Read in context signs for rates and derived measurements (e.g., velocity and density—Example: ft/sec & lbs./square inch).	EI (88%)	3	NR (11%) CR (39%) RB (50%)	3
R15: Read in context formulas for the area, surface area, and volume of geometric figures.	EI (16%) I (73%) SI (11%)	3	NR (6%) CR (11%) RB (83%)	1
R16: Read in context letters used to symbolize variables.	EI (95%)	2	NR (95%)	3
R17: Read in context algebraic equations, including those with polynomials and rational numbers (fractions).	EI (95%)	2	CR (88%)	3

(cont.)

Table 3
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Statement	Importance		References	
	Percentage	Round	Percentage	Round
R18: Read in context algebraic equations that use logarithmic numbers.	EI (17%) I (56%) SI (27%)	3	RB (95%)	3
R19: Read in context algebraic equations that use periodic functions.	EI (17%) I (83%)	3	RB (95%)	3
R20: Read in context algebraic equations that use inequalities.	EI (88%)	3	CR (88%)	3
R21: Read in context statements that use shape indicators (e.g., circle, square, triangle).	EI (95%)	3	NR (5%) CR (72%) RB (23%)	3
R22: Read in context compass directions using arrow indicators. (e.g., compass rose, up arrow, right arrow).	EI (11%) I (39%) SI (50%)	3	RB (88%)	3
R23: Read in context symbols for congruence, similarity, parallel, and perpendicular.	I (88%)	3	CR (83%) RB (17%)	3
R24: Read in context coordinate indicators.	EI (88%)	2	CR (83%) RB (17%)	3
R25: Read in context indicators for angles, lengths, arcs, perimeters, areas, and volume.	EI (27%) I (66%) SI (6%)	3	RB (95%)	3
R26: Read in context trigonometric indicators for lengths and angle measurements.	EI (11%) I (17%) SI (72%)	3	RB (95%)	1
R27: Read in context Cartesian coordinates, navigational, polar, and spherical systems.	EI (11%) I (11%) SI (78%)	3	RB (95%)	1
R28: Read in context indicators for plane, vectors, function notation, and matrices.	EI (6%) I (17%) SI (71%) NI (6%)	3	RB (100%)	1
R29: Read in context using various indicators and equations for statistical data.	EI (6%) I (17%) SI (71%) NI (6%)	3	RB (95%)	1

Note: Importance: EI = extremely important, I = important, SI = somewhat important, and NI = not important. References: NR = no references, CR = contraction reference, and RB = reference book.

Of the 19 competencies on which the expert panelists reached a consensus, 18 (95%) achieved a consensus at the extremely important level, and 1 (R23) achieved a consensus at the somewhat important level.

With regard to the level of agreement among the expert panelists on references, 23 (79%) of the 29 competencies reached a consensus: 4 (14%) in Round 1, 5 (17%) in Round 2, and 14 (48%) in Round 3. The expert panelists did not reach a consensus on 6 (21%) of the competencies. Of these 6 competencies, 4 were within 15 percentage points of 85% agreement. Among the 23 on which a consensus was reached, 9 reached a consensus at the no references level, 6 at the contraction reference level, and 8 at the reference book level.

Discussion

The purpose of this project was to establish a consensual agreement on Nemeth code standards for personnel preparation programs for teachers of students with visual impairments and to determine the level of "references" that a new teacher would need. The findings support the following concepts. First, a cursory review of the data immediately shows that high levels of agreement on importance were reached on the more "elementary" concepts of the Nemeth code that would be used more often in a classroom. On the other hand, low levels of agreement were reached on more advanced concepts, such as radicals and algebraic expressions. It would seem that although the expert panelists probably understood the importance of rendering advanced mathematics expressions in the Nemeth code, they did not reach a consensus on the level of importance that should be placed on competently writing such expressions in braille for preservice teachers at the beginning of their careers.

Second, there was more agreement on the importance of reading the Nemeth code than on writing it. This finding was surprising, since it would seem logical that a teacher of students with visual impairments would need to be able to write (or transcribe) the Nemeth code as much as read it. This difference may be due to the perception by the experts that teachers of students with visual impairments need to be more equipped to transcribe the Nemeth code to print than vice versa. Regardless of the reasoning, more emphasis was placed on reading than on writing. The same can also be stated on the level of references being used, since the reading statements had a greater level of agreement than the writing statements. It is interesting to note, however, that the panel expected beginning teachers to be able to read the Nemeth code with fewer references than writing the Nemeth code. This is the logical counter for the level of intensity of the math content.

An interesting point of the research is that even some of the simplest math concepts did not reach the established level of 85% agreement. In reviewing the data, if the level of agreement had been lowered to 80%, the changes in the findings would have been substantial. For writing, the number of items that met the level of agreement would have changed from 12 (41%) to 16 (55%) for importance and 17 (59%) to 22 (76%) for references. The changes for reading would have been similar, but smaller. For importance, the change would have gone from 19 (66%) to 21 (72%). For references, the change would have been more substantial: 23

(79%) to 27 (93%). Therefore, the established level of agreement was a determining factor in the final findings.

The reader may question if the establishment of beginning competencies in the Nemeth code is warranted at this time, because the United States adopted the Unified English Braille (UEB) Code in November 2012. We believe that regardless of which code is used to prepare mathematics materials for individuals who are braille readers, the level of importance and the type of reference materials that are acceptable for beginning teachers to use will not be altered. Thus, the discussion of the establishment of competencies in the Nemeth code or UEB is a critical one for the field to be considering.

Implications

The development of competencies and standards for any field is a complex and long process, with multiple steps and revisions. The Delphi study described in this article is "step 2" in the process of creating a valid and reliable set of standards of practice that personnel preparation programs can use in developing courses and professional development activities. At this point, the set of competencies needs to be sent to in-service teachers of students with visual impairments to determine whether the experts' opinions are correlated with the demands of practicing teachers. Once the competencies have been validated by the larger field, the set of competencies should be ready for use by universities.

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