能力認知：未來教師教學資格標準認識多維層次分析

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摘要

背景：目前美國的教育改革要求師範教育必須根據各州頒佈的教師資格標準培養未來教師。儘管前人對標準，教學和師範教育等方面進行了大量探索，但直接調查學生對於自身能力是否達到標準的認識的實驗研究並不多見。

目的：本文的目的旨在以研究心理認識的方法來考察參與者對自身能力相對于十項資格標的認識。

研究物件：117 名在 2002 和 2003 年間學習社會科學研究方法課程的預備教師參與了此項研究。其中 40 人參加 2002 年秋季課程，32 人參加 2003 年春季課程，45 人參加 2003 年秋季課程。

方法：採用“多維層次模式”分析研究物件對問卷的回答。

結果：研究結果表明預備教師對師範教育的其中三個方面具備信心，而對另外兩個方面最缺乏信心。至於其他方面，他們對於自己的能力認識並不明確。

結論：研究結果爲重新評價師範教育課程提供了參考。尤其是本文中所研究的這部分師範教育課程需要修正和完善，並著重于教師在計畫安排，多種教學手段，積極性與課堂管理，交流溝通，職業發展和評估等方面表現的綜合考察。儘管上述結果是針對當前研究的學校，但此研究方法可爲其他致力於類似研究以完善師範教育培訓的機構參考和應用。

關鍵字： 資格標準，認知，多維層次分析

Perception of Competence: Multidimensional Scaling Profile Analysis of Certification Standards Perceived by Teacher candidates

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Abstract：

Background: Current education reform in the U.S. requires teacher preparation programs to educate the ‘teachers-to-be’ according to the certification standards set forth by the state. So far, there are few empirical studies that directly investigate whether students perceive themselves to be well prepared with respect to the standards, although considerable research has been conducted with respect to the issues of standards, teaching, and teacher preparation.

Aims: The goal of this study is to investigate the participants’ perception about their preparedness with respect to the ten-certification standards using a methodology that is suitable for examining psychological perceptions.

Sample: The participants were 117 teacher candidates enrolled in social studies methods courses in Fall 2002, Spring 2003, and Fall 2003. Among the participants, 40 were from Fall 2002; 32 from Spring 2003; and 45 from Fall 2003.

Method: Participants’ responses to questionnaire items were analyzed using multidimensional scale model.

Results: The results found that teacher candidates felt competent in three areas of teaching preparation and felt least competent in two areas. Their perceived competence in other areas was ambiguous.

Conclusion: The findings of this study may help our teacher education program re-evaluate its curriculum in the future. Particularly, the teacher education program in which this study was conducted needs to revise its curriculum to emphasize more on performance-based portfolios with respect to planning, multiple instructional strategies, motivation and classroom management, communication, profession growth, and assessment. Although the findings were unique to the institution under inquiry, the process used can be applied to other institutions that wish to conduct similar investigation for improvement of their teacher education program.
Key words: certification standards, perception, profile analysis

Across the United States, teacher education programs are being expected to meet higher requirements for accountability than ever before. In response to the call from The National Commission on Teaching and America's Future, states in the U.S. were asked to set high standards for meeting the challenge for beginning teacher (Hoestetler, 2002). Teacher education programs in the U.S. were faced with the need for credible, reliable, and valid measures or standards to document candidate knowledge, skills, and dispositions. Those standards are presumed to correspond to a core set of competencies identified by teacher education programs regarding what is known about effective teaching (Ingersoll & Kinman, 2002). Chief among the resources used to establish performance-based outcomes in teacher education have been the principles delineated by the U.S. Interstate New Teacher Assessment and Support Consortium (INTASC). The ten INTASC principles are an attempt to create a coherent set of standards through which new teachers might be judged (INTASC, 1992; Darling-Hammond, Wise, & Klein, 1999; Foster, Wilke, & Song, 2006).

INTASC as a Framework for Effective Teaching Performance

The ten Interstate New Teacher Assessment and Support Consortium (INTASC) standards are consistent with Shulman's (1987) four major sources of teaching knowledge (content, instruction, research, and wisdom) and can be summarized into two components that underlie effective teaching quality: one is content knowledge (INTASC 1), and the other is pedagogical knowledge (INTASC 2 through 10) (Kolis & Dunlap, 2004) (see Table 1 for 10 standards of INTASC).

Table 1. INTASC Standard Descriptions and their Means and Standard Deviations

INTASC	Standard Description	Mean	(Std.)
INTASC 1	Content Pedagogy	3.41	(0.87)
INTASC 2	Student Development	3.52	(0.79)
INTASC 3	Diverse Learners	3.32	(0.90)
INTASC 4	Multiple Instructional Strategies	3.51	(0.93)
INTASC 5	Motivation and Classroom Management	3.43	(0.92)
INTASC 6	Communication	3.63	(0.87)
INTASC 7	Planning and Curriculum Development	3.46	(0.92)
INTASC 8	Assessment	3.37	(0.96)
INTASC 9	Reflective Practice and Professional Growth	3.54	(0.97)
INTASC 10	School and Community Involvement	3.66	(1.03)

Note. Numbers in parenthesis are standard deviations.

Teachers' competency in content knowledge (INTASC 1), according to researches, helps enhance effective teaching and provide appropriate instruction that avoids students' misunderstanding of content (Berg & Brouwer,1991; Hashweh, 1987; Tobin, Tippins, & Gallard, 1994). The pedagogical knowledge process, which is the other side of effective teaching competence, helps teachers transform their content knowledge into forms that are powerful and adaptive when presented to the K-12 students (Hutchings & Shulman, 1999; Kolis & Dunlap, 2004). For example, teachers may be very knowledgeable in their subjects, but may encounter difficulty in teaching content (Hope & Townsend, 1983; Jong, 1992).

Thus, standards-based teaching should conform to the foundational effective teaching pedagogy that contains content knowledge and teaching strategies (Reeves, 2002). The INTASC standards provided a framework in which what teachers are expected to know and be able to do (INTASC, 1992; Foster, Wilke, & Song, 2006). Within this framework, the teacher candidates should perceive all of the standards as important or salient guidelines for their teaching practice (Darling-Hammond, Wise, & Klein, 1999).

Challenges of Teacher Preparation

Developing a set of viable certification standards is a significant step forward for teacher education and the INTASC standards provide a framework for what teachers are expected to know and be able to do (INTASC, 1992). Considerable research has been conducted with respect to the issues of standards, teaching, and teacher preparation (e.g., Darling-Hammond & Youngs, 2002; Thirunarayanan, 2004; Wilson, Floden, & Ferrini-Mundy, 2001). However, there continues to be great concern about the quality of teachers that teacher education programs in the U.S. have prepared (Darling-Hammond & Youngs, 2002). According to the report of the U.S. Department of Education in July 2002, teachers who have completed teacher education programs are academically weak and are under-prepared for their jobs (U.S. Department of Education, 2002). One assumption of this assertion is that students are lack of understanding of certification standards. But there has not been much empirical research conducted regarding this issue. For example, do students have difficulty in understanding some of the standards? If they do, can we do something in preparation that results in teacher candidates perceiving themselves to be more competent? Or is there a relation between the course work teacher candidates receive and their perception of being prepared in these standard areas? Thus, the purpose of this study examines teacher candidates' understanding of the certification standards from their perspective.

Research Questions

Teacher education programs preparing teachers have developed and implemented an assessment system that is expected to yield possible defensible evidence regarding their graduates' knowledge, skills and disposition for beginning a career in teaching (Darling-Hammond & Snyder, 2000). The main research question addressed in this study is: can teacher candidates coming out from the teacher education program perceive themselves to be competent with respect to certification standards? The theoretical framework of the study is based on the psychological principles of self-efficacy. The principles of teaching self-efficacy purports that the facilitation of

meaningful change in curriculum and instruction in teaching would be affected by teacher beliefs (Dembo & Gibson, 1985; Guskey, 1988; Henson, Kogan, & Vacha-Haase, 2001; Ling & Gorrell, 1998). Hence, the standards in which teacher candidates think they are well prepared are the ones they may incorporate into their teaching practice. If they do not feel they are well prepared in certain standards, the teacher candidates may be less likely to incorporate them into their future teaching activities. Thus, it is important to study the degree to which teacher candidates feel competent with respect to the standards as they are trained in teacher education programs. In a sense, we investigated the relation between the course work teacher candidates have received during their training and their perception of being prepared in these areas. Such an investigation is based on the assumption that without a high degree of perceived preparedness teacher candidates may fail to transfer the standards into future teaching actions. The findings may help teacher education programs identify the areas that need greater emphasis in teacher preparation in the future. Another significance of the study is that it may help to establish a methodology framework in which the similar issues can be investigated.

Methods

The data were gathered from students in a teacher preparation program at a Midwest metropolitan university in the U.S. The teacher candidates were at the end of their teacher education program and had completed most of all the required courses except for student teaching.

Participants

The participants were 117 teacher candidates enrolled in social studies methods courses in Fall 2002, Spring 2003, and Fall 2003. Among the participants, 40 were from Fall 2002; 32 from Spring 2003; and 45 from Fall 2003. Of the 117 subjects, 6 (5%) were male and 111 (95%) were female. There were 110 (94%) seniors and 7 (6%) juniors. Ninety four (80.3%) participants were in their 20's, 18 (15.3%) were in their 30's, and 5 (4.2%) were 40 years or older. With respect to ethnicity, 7 (6%) were African American, one (1%) was Native American and 109 (93%) were European American. Among all the participants, 106 (90.6%) were elementary education majors; 10 (8.5%) were special education majors; and 1 (.9%) was a middle school major. Although these students were from different majors, the structure of the teacher education program at the university under study was similar. In other words, all the students in the teacher education program were trained based on the same standards with respect to content knowledge and pedagogical knowledge.

Instrument

A questionnaire that assessed perceived competence was used for the study. The INTASC certification standards served as the basis for the questionnaire items. For this study, 36 items were developed based on 36 performance indicators of the INTASC standards (Foster, Wilke, & Song, 2006). These items were grouped into 10 scales, with one scale corresponding to each of the 10 INTASC standards (see Table 2). These scales were then used to measure students' perception of competence about their knowledge, skills, and dispositions in each of the standards.

For example, the participants responded to the question, "Overall, how well prepared are you in the following area?"

For a given standard performance indicator (e.g., INTASC 1---engage students in the methods of inquiry used in the subjects, see Table 2), the participants chose a Likert-type scale ranging from 0 to 5, with 0 for "*not sure*," 1 for "*not very well*," 2 for "*somewhat*," 3 for "*adequately*," 4 for "*well*," and 5 for "*very well*." Each scale included three to five performance indicators. The reliability (Alpha) for these scales ranged from .76 to .92, with median reliability being .80.

Table 2. The Sample Performance Indicators of the INTASC Standards Adopted for the Survey Items

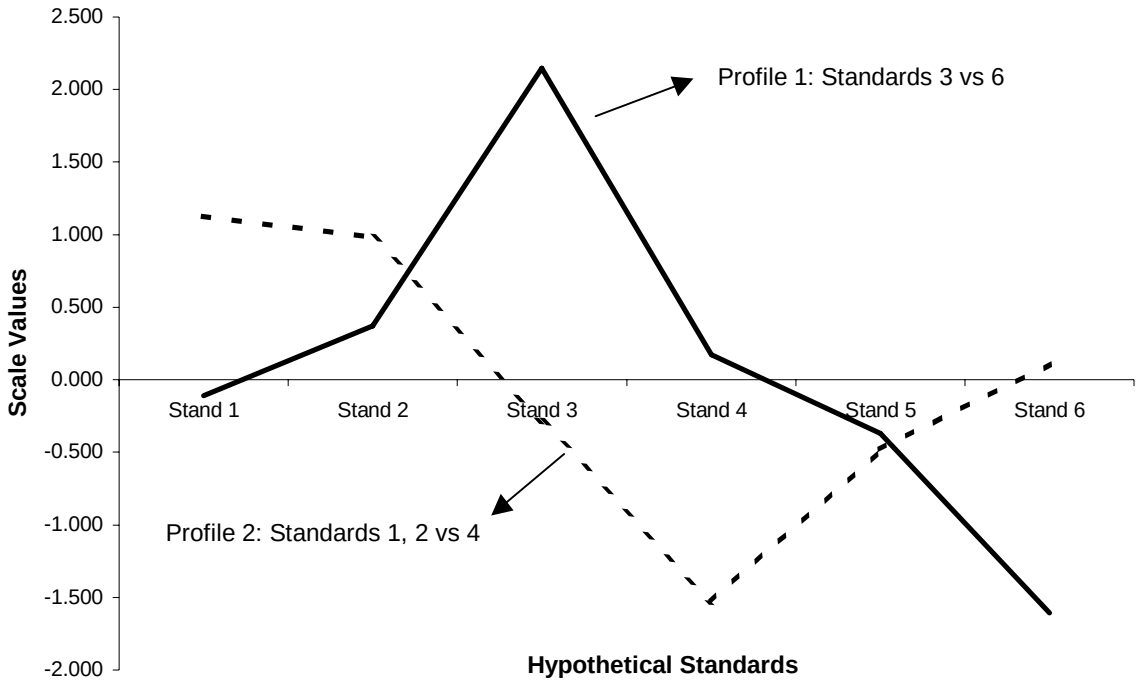
INTASC	Performance Indicators
	The pre-service teacher:
INTASC 1 (Content Pedagogy)	Presents the subject matter in multiple was;
	Uses students' prior knowledge;
	Engages students in the methods of inquiry used in the discipline;
	Creates interdisciplinary learning.
INTASC 4 (Multiple Instructional Strategies)	elects alternative teaching strategies, materials, and technology to achieve multiple instructional purposes and to meet student standards
	Engages students in active learning that promotes the development of critical thinking, problem solving, and performance capabilities.
INTASC 5 (Motivation and Classroom Management)	Knows motivation theories and behavior management strategies and techniques;
	Manages time and space transitions and activities effectively;
	Engages students in decision-making.
INTASC 6 (Communication)	Models effective verbal/non-verbal communication skills;
	Demonstrates sensitivity to cultural, gender, intellectual, and physical ability differences in classroom communication and in responses to students' communication;
	Supports and expands learner expression in speaking, writing, listening, and other media;
	Uses a variety of media communication tools.
INTASC 7 (Planning and Curriculum Development)	Selects and creates learning experiences that are appropriate for curriculum goals, relevant to learners, based upon principles of effective instruction (e.g.) encourages exploration and problem solving, and building new skills from those previously acquired);
	Creates lessons and activities that recognize individual needs of divers learners and variation in learning styles and performance
	Evaluates plans relative to long and short-term goals and adjust them to meet student needs and to enhance learning.
INTASC 8 (Assessment)	Employs a variety of formal and informal assessment techniques (e.g.) observation, portfolios of student work, teacher-made tests, performance tasks, projects, student self-assessments, authentic assessments, and standardized tests) to enhance and monitor her or his knowledge of learning, to evaluate student progress and performances and to modify instructional approaches and learning strategies.
	Uses assessment strategies to involve learners in self-assessment activities, to help them become aware of their learning behaviors, strengths, need and progress and to encourage them to set personal goals for learning;
	Evaluates the effect of class activities on both individuals and the class as a whole, collecting information through observation of classroom interactions, questioning, and analysis of student work;

Data Analysis

In order to examine perceived competence with respect to certification standards, we translated the responses reported by the participants into the profiles (or dimensions) that represented the perceptual configuration of the ten

standards. To illustrate the concept of profile, let's look at a hypothetical example in Figure 1. It shows an example of six hypothetical standards represented by two different profiles. Profile 1 indicates individuals who had high scores (called scale value) on the diversity standard scale (INTASC 3) and low scores on effective verbal/non-verbal communication standard scale (INTASC 6). Profile 1 reveals one group of teacher candidates who is more cognitively attentive to the diversity standard, but less cognitively attentive to learner expression in speaking, writing, listening, and other media (see Figure 1). On the other hand, Profile 2 indicates individuals had high scores (in absolute values) on the standard scale 1 and 2, and low scores on the standard scale 4. Thus, individuals who manifested this profile were more focused on the content reflected in standards 1 and 2, but less focused on the content reflected in the curriculum and planning standard (see Figure 1).

Figure 1. An Example of Profiles with Hypothetical Standards.



The analytic technique used for this type of student perception data is a multidimensional scaling (MDS) profile analysis (Mark L Davison, 1996; M. L Davison, Gasser, & Ding, 1996). We employed this analytical method because it is a method for providing a "psychological model" of a person's perceptual representation of objects (e.g., standards). In the current study, for example, when a person feels competent and well prepared in a standard, the absolute scale value of that standard will be larger relative to other standards, as shown in Figure 1. The difference in scale value associated with a particular standard indicates that the participants feel more competent in one standard

more than on the other. We call this difference in scale values “perceptual saliency". Information gained from such an analysis may help teacher educators to identify the areas that education programs need to put more emphasis in the future.

Results

The means and standard deviations of variables for 10 INTASC standards are also shown in Table 1. It is interesting to notice that mean ratings of these standard variables were at the middle point of 3 (3 for “*adequately prepared*) and the standard deviations were not very large. We estimated the scale values corresponding to the ten standard variables by performing MDS profile analysis. One of the most important aspects in the MDS profile analysis is the correct selection of the number of profiles (i.e., dimensions) that represent the appropriate number of groups of students who may have different perceptions of competence. In this regard, we used Akaike’s Information Criterion (AIC) (Akaike, 1974) for model selection. In the current paper we performed analyses of one- to four-profile models. The results of analyses indicated that the model with the smallest AIC value was one-profile model (AIC = -87.27) in comparison to other models, suggesting that one-profile model was the best model among the four candidate models.

The resulting scale values from a one-profile solution are shown in Table 3. In Table 3, the *t* values of these scale values were also reported. Any scale value with a *t* value larger than 2.26 (the critical *t* value at $\alpha = .05$) was considered statistically significant. Standards with a significant scale value were used to define a profile. As mentioned previously, a profile reflects groups of students who share similar perceptual characteristics. A standard with a significant scale value may be the one in which the participants have perceived they are either well or less well prepared. The profile of the standard scales is plotted in Figure 2 based on the scale values in Table 3.

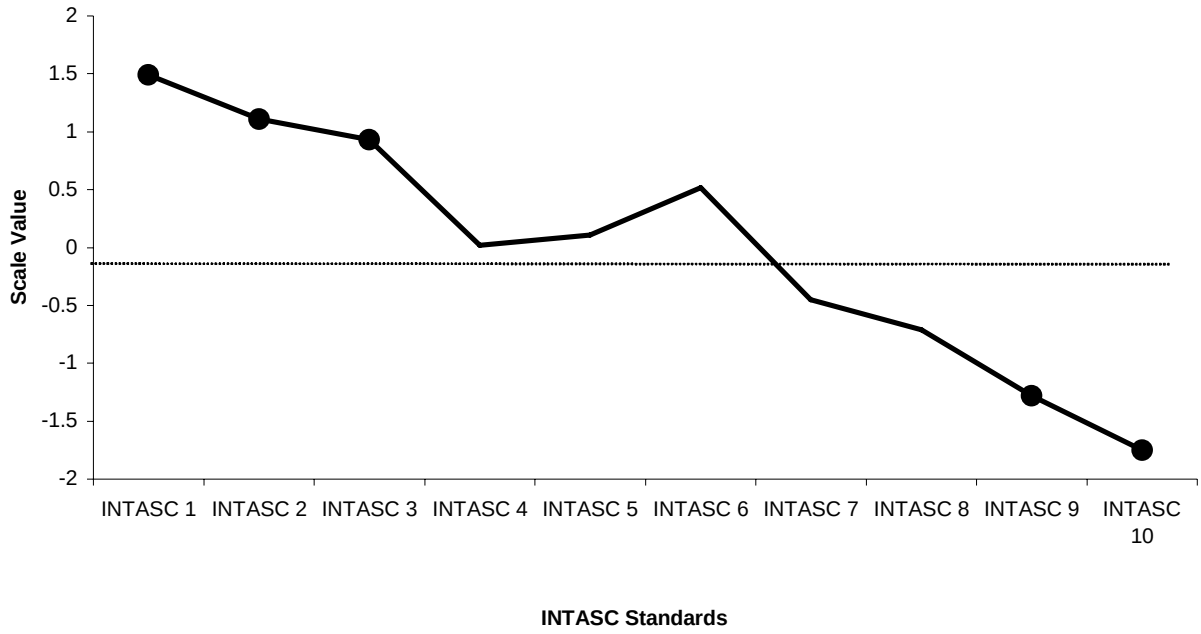
Table 3. Scale Values of INTASC Standards

		Profile 1	
INTASC 1	Content Pedagogy	1.49	(4.47)*
INTASC 2	Student Development	1.11	(3.33)*
INTASC 3	Diverse Learners	0.93	(2.79)*
INTASC 4	Multiple Instructional Strategies	0.11	0.33
INTASC 5	Motivation and Classroom Management	0.52	1.56
INTASC 6	Communication	-0.45	-1.35

INTASC 7	Planning	0.02	0.06
INTASC 8	Assessment	-0.71	-2.13
INTASC 9	Reflective Practice and professional Growth	-1.28	(-3.84)*
INTASC 10	School and Community Involvement	-1.75	(-5.25)*

Note. Numbers in parenthesis are *t*-values. The critical *t* value with 9 degrees of freedom is 2.26 for $\alpha = .05$. * $p < .05$.

Figure 2. A Profile of ten INTASC Standards. The black dots on the line indicate the standards that are perceived as being well prepared.



The current profile was defined by INTASC standards 1 (content pedagogy), 2 (student development), and 3 (diverse learners) at the positive end and by INTASC standards 9 (reflective practice and professional growth and 10 (school and community involvement) at the negative end. What this profile showed was that for the teacher candidates in the sample, they seemed to feel more competent in the standards regarding content knowledge, student development and diverse learners, but they seemed to feel less competent in reflective practice and professional growth and school and community involvement.

Discussion

According to INTASC, all students should feel prepared and competent in all of the certification standards (INTASC, 1992; Shulman, 1987; Kolis & Dunlap, 2004). In our study, the MDS profile analysis revealed one profile. The profile suggested that INTASC standards 1 (content pedagogy), 2 (student development), and 3 (diverse learners) were areas that teacher candidates felt competent, while standards 9 (reflective practice and professional growth) and 10 (school and

community development) were perceived as the areas for which students felt less competent.

One reason for this finding may be that reflective practice, professional growth, and school and community development are important parts of student teaching or competency acquired via working. In other words, competency in these areas may need to be further advanced through actual teaching experience rather than classroom training. Given that the students in the study have not yet completed student teaching, it was possible that they may still feel that they need working experiences to develop these skills. On other hand, it was also possible that the teacher education preparation program at the university did not cover adequately the areas reflected in standards 9 and 10. For example, the course work in the teacher education program described in this study requires the courses on foundation of learning theories and methods. Courses that focused on profession growth and school and community involvement were not required. Thus, our analysis results reflected what has been emphasized in the teacher education program.

It is interesting to note that INTASC standards 7 (planning), 4 (multiple instructional strategies), 5 (motivation &classroom management), 6 (communication), and 8 (assessment) were not viewed as "salient areas" by the participants. This may mean that the content of these five standards was less tangible, or that the participants did not have enough knowledge about these standards to feel one way or the other.

For example, teacher education program at current teacher education program does not require or offer a technology and communication foundation course that is align with standard 4. Students' level of technology competence varied according to their experience and interests. Some students can make their own web pages and others barely know how to copy and paste a Microsoft Word document. Even with technology competence, incorporating technology into classroom teaching is very new for most of them. In addition, many of the schools in which students were placed for their internship experience did not have technology facilities. Most of the students are aware that technology and communication media can enhance their teaching but are unable to use it appropriately (Doolittle & Hicks, 2003).

Moreover, one of the most important factors for successful classroom teaching is good classroom management or behavior management techniques (Langlois & McAdams, 1992). However, classroom management may be the most problematic for teacher candidates. The participants in this study were not required to take a foundation course in classroom and behavior management. This may result in less attention paid to motivation and classroom management.

Implications of the Study

The findings of this study may help our teacher education program re-evaluate its curriculum in the future. For example, teacher education programs may have to align the certification standards and their performance indicators with their course objectives and activities. Particularly, the teacher education program in which this study was conducted needs to revise its curriculum to emphasize more on performance-based portfolios with respect to planning, multiple instructional strategies, motivation and classroom management, communication, profession growth, and assessment. For example, within teacher education programs, limited attention is given to developing teachers' knowledge and

skills in the areas of assessment (Campbell & Evans, 2000; Stiggins, 2002). More attention in teacher preparation program needs to be given to instructing teacher candidates in assessment through modeling them in teacher education content area methods classes (Allen & Flippo, 2002; Nelson, 1993).

In order to enhance teacher candidates' competence with respect to standards, the teacher education faculty may also have to teach the standards and their performance indicators to teacher candidates. There may be opportunity for teacher education programs to use standards for candidate evaluation, to refine and/or translate them into measurable outcomes that are clear and understandable. As Ingersoll and Kinman (2002) argued, although the certification standards may be a coherent set through which new teachers might be judged, they are also broad statements that individual institutions must translate into measurable benchmarks in a way teacher candidates understand. The importance of this study lies in the fact that it used a specific process to help teacher education programs identify, from the students' perspective, the areas that need greater emphasis in teacher preparation in the future. It provides a methodological framework by which researchers can investigate students' subjective evaluation of academic programs or students' competency.

Unfortunately, the current data would not allow us to examine the variables that might be related to the discrepancy in perceived competence. The data only permitted us to profile students who had different preparedness. Evidently one group feels most prepared in relation to one set of standards and another group feels most prepared in relation to another set of standards. Future studies need to address the difference in the groups that would produce the differences in relation to their preparedness to implement certain standards. However, this limitation did not completely eliminate the potential utility of the study in helping teacher education programs do a better job of preparing high quality teachers in the future. The teacher preparation program is held accountable for quality teachers, and teacher candidates need to be well prepared, regardless of possible differences among students. Although the findings are specific to the current teacher education program, the phenomenon that the teacher candidates did not feel well prepared in all standards can be applicable to other teacher education programs. To ensure teacher candidate competence, teacher education programs may need to improve their teaching practices, especially in areas where students feel least prepared.

Another limitation is that the sample used in this study limits the study's generalizability. We need to be aware of this sampling bias. We did not know why teacher candidates felt less competence in some areas. Although some students feel prepared in relation to specific standards, we cannot assume their perception of competence can be translated into comprehension of the standards or teaching action directly.

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