

The Effect of Training in Gifted Education on Elementary Classroom Teachers' Theory-Based Reasoning About the Concept of Giftedness

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Classroom teachers play an important role in the identification of gifted students through teacher recommendations and referrals. This study is an investigation of teachers' theories of giftedness using methods adapted from those used to study theory-based reasoning in categorization research. In general, the teachers in this study focused on traditional characteristics of giftedness and did not tend to include characteristics associated with diverse gifted students in their theories. Comparisons of teachers with greater and fewer hours of training in gifted education showed no significant differences between the groups. However, there was also little consistency among the teachers in their graphic representations of their theories, suggesting that not all elementary classroom teachers define common characteristics of giftedness in the same way.

The current education system in the United States often fails to identify academically gifted students who are not of the majority culture, including culturally diverse students, economically disadvantaged children, the differently abled, English as a Second Language/Limited English Proficient (ESL/LEP) students and racial minorities (Baldwin, 2002; Ford, 1998; Ford, Harris, Tyson, & Trotman, 2002; Stormont, Stebbins, & Holliday, 2001). The issues facing the field of gifted education regarding identification of underserved populations persist, even though the vast majority of states have developed written policies that call for recognition, identification, and service for all students, including underrepresented gifted students (Coleman & Gallagher, 1995). Teacher nomination issues, potential standardized test bias, lack of research on how to recognize talented students from diverse

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cultures, lack of follow-through concerning initiatives to increase the representation of diverse students in gifted programming, and a simple lack of understanding between the culture of the majority and that of the minority has stymied the progress of the field (Bernal, 2000; Esquivel & Nahari, 2000; Ford, 1998; Kozol, 1991; Patton, 1992; Renzulli, 1999; Tallent-Runnels & Sigler, 1995).

Standardized tests and teacher nominations remain the most frequently implemented identification tools in American school systems (Coleman & Gallagher, 1995). Teachers' nominations are frequently the first step in gifted identification and often determine which students will be considered for individual testing and subsequent inclusion in a program for the gifted (Adderholdt-Elliott, Algozzine, Algozzine, & Haney, 1991; Coleman & Gallagher, 1995). However, these nominations may not be valid if the teacher does not recognize gifted students who do not fit traditional or stereotypical notions of giftedness or if the teacher has low expectations toward minorities and ESL students (Bernal, 2000; Ford, 1998; Ford et al., 2002; Hardaway & Marek-Schroer, 1992; Weber, 1999). Past research has indicated that teachers hold very traditional beliefs about giftedness that is based on high performance on aptitude and achievement tests and do not tend to include more diverse and inclusive characteristics of giftedness when describing their beliefs (Campbell & Verna, 1998; Copenhaver & McIntyre, 1992; Frasier et al., 1995; Guskin, Peng, & Simon, 1992; Hunsaker, 1994; Hunsaker, Finley, & Frank, 1997; Peterson & Margolin, 1997; Rohrer, 1995; Speirs Neumeister, Adams, Pierce, Cassady, & Dixon, 2007).

There are several factors that may have an effect on teachers' perceptions of giftedness. The two factors that arose most prominently in the literature are the effects of teacher expertise and the effect of cultural differences among gifted students. Teachers with more training and expertise in gifted education tend to value creativity and have more inclusive conceptions of giftedness (Copenhaver & McIntyre, 1992; Goodnough, 2000; Siegle & Powell, 2004). However, teacher training in gifted education does not ensure that teachers will hold inclusive conceptions of giftedness (McCoach & Siegle, 2007).

Teachers' beliefs about giftedness are also colored by cultural perceptions (Elhoweris, Mutua, Alsheikh, & Holloway, 2005; Fernández, Gay, Lucky, & Gavilán, 1998; Masten & Plata, 2000; Peterson &

Margolin, 1997; Rohrer, 1995). For example, in a study by Peterson and Margolin, teachers identified characteristics such as good behavior, high academic achievement, being a hard worker, competitiveness, being well rounded, and having verbal strengths as the basis for nominating students for gifted programs. The teachers also focused on consistently achieved goals such as high grades and academic awards. A middle or upper class home environment was mentioned by some of the teachers as support for a child's nomination as gifted. Masten and Plata found that teachers rated Hispanic students who were considered to be highly acculturated higher on the learning characteristics, motivational characteristics, creativity characteristics, and leadership characteristics scales of the teacher rating form Scales for Rating the Behavior Characteristics of Superior Students (Renzulli et al., 1971) than students who were not considered to be highly acculturated. The results of the studies seem to indicate a bias toward students with the characteristics of the majority Anglo culture that was not deliberate but instead was a function of teachers' internal unexamined conceptions of what it means to be gifted. It is these internal conceptions of giftedness that will be examined in this study.

Although not universal, the current direction of most researchers and theorists working in the field of gifted education is toward more inclusive/broadened theories of giftedness (i.e., Callahan & Miller, 2005; Gagné, 2005; Plucker & Barab, 2005; Reis, 2005; Renzulli, 2005). It is the position of this author that this is a productive trend that should be translated into practice in the U.S. school system. In order to facilitate broadened inclusive beliefs about manifestations of giftedness, it seems necessary to understand the current beliefs that teachers hold. Many researchers in gifted education recognize the importance of people's attitudes, theories, and beliefs in the endeavor to change identification procedures (Callahan, Tomlinson, Moon, Tomchin, & Plucker, 1995; Ford et al., 2002; Grantham, 2002). Individuals' thoughts and judgments tend to be based on their personal conceptions of these constructs (Argyris & Schön, 1974; Bluer, 1972; Lim, Plucker, & Im, 2002) rather than specific published theories.

Researchers have described a relationship between teachers' theories about their students and their classroom practices (Dirkx & Spurgin, 1992; Lynott & Woolfolk, 1994; McCarty, Abbott-Shim, & Lambert, 2001; Rando & Mendes, 1991; Richardson, Anders, Tidwell,

& Lloyd, 1991). Teachers' general attitudes and beliefs about students seem to influence how they relate to students and the expectations that they have for students' intellectual growth (Goodman, 1985; Rosenthal, 2002). Therefore, it is reasonable to assume that teachers' theories of giftedness would influence their nomination patterns, and subsequently, the identification of students for gifted programs.

Research focusing on teachers' beliefs about giftedness is not new. Several researchers have and are currently conducting research in this area. A variety of methodologies have been used to study teachers' beliefs. Approaches include content analysis of teachers' responses to situations that allow them to discuss and describe giftedness, analysis of responses to researcher-created profiles, and in-depth case studies. Many researchers examining teachers' beliefs have used qualitative methods (i.e., Campbell & Verna, 1998; Copenhaver & McIntyre, 1992; Hunsaker, 1994; Peterson & Margolin, 1997; Rohrer, 1995). Several of these studies have resulted in lists of characteristics that teachers mention when discussing their beliefs and reactions. A study that presents teachers' conceptions of giftedness as lists of characteristics, without also including an analysis of the relationships among the characteristics, possibly neglects information that is essential to understanding the structure of teachers' theories (Miller, 2005). There is little information available regarding how students may vary in their manifestation of the characteristics and the possible correlations among these characteristics.

The potential effect of considering and discussing the relationships among characteristics can be seen in the following analysis of a study completed by Hunsaker (1994). Hunsaker conducted a qualitative analysis of perceptions of giftedness using a sample of teachers purposely selected from three school districts. The teachers were asked to state their conception of giftedness and to discuss the traits they looked for when nominating students for placement in gifted programs. The traits most often mentioned by teachers as part of their personal conception of giftedness were creativity/divergent thinking, convergent thinking, curiosity, advanced academic ability, and task commitment. The traits most often mentioned as the basis for nominating students for gifted programming were outstanding academic achievement, good work habits, effortless learning, higher order thinking, creativity/divergent thinking, high test scores, and leadership. Hunsaker

interpreted these findings to indicate that teachers do *not* use their personal conceptions when nominating students for placement in gifted programs. However, an alternate interpretation outlined below suggests that this might not be the case.

Several of the characteristics that were mentioned by teachers as the basis for making nominations are possibly caused by traits that are part of the teachers' conceptions of giftedness. For example, high test scores and outstanding academic achievement could be the result of convergent thinking and advanced academic ability. Good work habits could arise from task commitment. Hunsaker (1994) does not present an analysis of the relationships among the traits mentioned by teachers as part of their personal conception and the traits mentioned as the basis for nominating students. Thus, it is possible that the teachers used their personal conceptions when nominating students. Information about student variability and the relationships among characteristics contributes to the coherence of a theory (Murphy & Medin, 1985). Information about the reasoning behind the characteristics that teachers believe to be important would help to clarify the nature of teachers' theories of giftedness.

One way to study thinking and reasoning is to take advantage of methods developed by cognitive psychologists as they seek to model these phenomena. Giftedness can be thought of as an educational and social category. By studying how categorization occurs on a cognitive level, we may find better ways of understanding what the category *gifted* means to others and how to operationalize it for research purposes. In cognitive psychology research, concepts are thought of as mental representations that form groups of equivalent things to create categories. Researchers have sought to understand how people form these concepts and the structure and mechanisms that determine categories (e.g., Ahn, 1998; Kruschke, 1992; Murphy & Medin, 1985; Nosofsky, 1989; Rosch, 1978).

Theories of categorization and concept acquisition have evolved over time from the classical view to similarity-based views to theory-based approaches. It is the theory-based approach that is taken in this study because this method allows for a consideration of more complex interactions among the characteristics that make up an individual's theory.

According to the theory-based view, people's intuitive theories tend to activate the abstract features used to describe a category

(Wisniewski & Medin, 1994). Different people consider different characteristics to be important or central to determining category membership. One way to study individuals' intuitive theories about categories is to examine which characteristics are more important to their theory of the category (Medin, 1989). Researchers in cognitive psychology use the term *centrality* to describe this idea of *importance*. There are many different aspects to the idea of importance or centrality and thus this idea can be studied in several ways.

One method of studying centrality is to look at the relationships among the characteristics that individuals include in their theories of category membership. Some properties may be more central than others due to the role they play in the conceptual structure. For example, *roundness* may be treated as more central to the categorization of basketballs than to the categorization of cantaloupes because roundness is more central to the physics underlying the use of the basketball than to the underlying biology of cantaloupes (Kim & Ahn, 2002). The characteristic of roundness can be thought to cause essential features of basketballs, such as bouncing, rolling, going through a hoop, and so forth. As such, roundness can be thought of as being *causally central* to basketballs. Causal centrality is when the importance of a feature or characteristic is determined by whether or not it plays a causal role in the structure of the individual's conception. Causal centrality leads to the *causal status effect* (Ahn, 1998). The causal status effect is when the features that are causally central to an individual's theory of that category are treated as more important than less causally central features (Ahn, Kim, Lassaline, & Dennis, 2000; Kim & Ahn, 2002).

Another way to study centrality is to look at the mutability or changeability of the characteristic. If a characteristic was very important to a person's belief about a category, then a change in that characteristic would have a relatively large effect on that person's conception. On the other hand, if the characteristic was not as important, then modifying it would not have a significant effect. Extending the basketball and cantaloupe example, *taste* is a relatively important aspect of fruit, but not of basketballs. Changing the taste would have a large effect on what it means to be a cantaloupe but little to no effect on what it means to be a basketball.

This study adapts the methods used by Kim and Ahn (2002) in their study of psychologists' theories of mental illness to the study of

teachers' beliefs about giftedness. Kim and Ahn examined the mutability and causal centrality of features in order to measure psychologists' conceptions. This study will examine these same constructs in order to address the following research questions:

- What is the structure and content of teachers' theories/beliefs about giftedness?
- What is the relationship between the structure and content of theories/beliefs about giftedness of teachers with greater amounts of training and the structure and content of theories/beliefs about giftedness of teachers with less training in gifted education?
- Is there consistency in the theories/beliefs about giftedness among teachers with different levels of training in gifted education?
- What differences exist, if any, between the groups in the inclusion of culturally diverse characteristics of giftedness in their theories of giftedness?

The first research question involves a descriptive overview of the overall patterns in the structures and content of the participants' theories of giftedness. The concepts of structure and content are intertwined in the theory-based reasoning explanation of categorization, such that the two constructs form a conceptual whole. The second and third questions are designed to investigate a possible effect of gifted education courses on theories of giftedness. These questions were posed because differences in the beliefs of teachers with differing levels of experience and education were discussed in previous research (Copenhaver & McIntyre, 1992; Goodnough, 2000; Guskin et al., 1992; Siegle & Powell, 2004). It is predicted that there will be consistency in the theories/beliefs about giftedness among teachers in each training level group (greater and fewer hours of completed gifted education coursework). However, it is predicted that there will not be consistency among the entire sample (because of differences between the two training level groups). It is predicted that teachers with more training in gifted education will show a greater breadth and flexibility in their beliefs about gifted students. It is also predicted that teachers with more training will produce more complicated models of giftedness.

The fourth question is a description of the nature of the theories with regard to culturally diverse conceptions of giftedness. It is

predicted that teachers with more training will be more likely to include characteristics of giftedness associated with underrepresented groups of students as a result of their experiences in gifted education courses.

Research Methods

Participants

Sixty classroom teachers teaching in grades 2 through 5 participated in the full study. Participants were drawn from five school districts in both urban and suburban areas of the Mid-Atlantic region of the United States. The teachers in the study had taught for an average of 12 years (range 1–34 years). Nearly all of the participating teachers identified themselves as White females. Thirty-two percent of participating teachers indicated that they taught in diverse schools in which less than 50% of the students would identify themselves as White. There was a split in the affluence levels of the different school districts represented. Approximately 50% of participants taught in relatively affluent communities in which less than 10% of students received free or reduced lunch. Thirty-one percent of teachers indicated that the majority of their students received free or reduced lunch.

Expertise in gifted education is a major concept in the present study. Expertise has been defined in various ways by different researchers, including completion of postbaccalaureate study, serving as a gifted resource teacher, or having taught for a greater number of years (Copenhaver & McIntyre, 1992; Goodnough, 2000; Guskin et al., 1992; Siegle & Powell, 2004). In the current study, expertise is defined as having an endorsement or certification in gifted education from the teachers' respective states or reporting 12 or more hours of completed coursework in gifted education. Thirty-nine (65%) of the participants were labeled as having less training in gifted education and 21 (35%) were labeled as being highly trained in gifted education.

Teachers with more training in gifted education tended to have taught for a greater number of years. This finding is understandable, as teachers who have taught longer have had more time to complete gifted education courses. There were no other significant differences in

demographic characteristics between the two groups. The definitions of giftedness used in the school districts were similar and focused on intellectual ability and creativity.

Operationalization of Major Constructs

The procedure for this study is based on methods used in the study of theory-based reasoning in categorization (Kim & Ahn, 2002; Sloman, Love, & Ahn, 1998). In this study, the concept of giftedness is operationalized as an educational category that is constructed through theory-based reasoning. Cognitive psychologists who subscribe to the theory-based reasoning orientation of categorization propose that a person's individual theory about a category determines which characteristics describe that category for that individual (Ahn, 1999; Ahn et al., 2000; Kim & Ahn, 2002; Medin, 1989; Sloman et al., 1998). Specifically, researchers such as Kim and Ahn (2002) and Sloman et al. (1998) proposed that the characteristics that are part of an individual's theories of a category differ in the centrality of their positions in the structure of the individual's theories. In other words, characteristics that are more central are more important to the individual's theory.

In this study, centrality is operationalized in two ways: through an analysis of characteristics' mutability and through an analysis of characteristics' causal centrality. Mutability indicates how easily a characteristic can be changed without disrupting the structure of the individual's theory. The more central a characteristic, the more its change disrupts the structure of the theory and thus the greater its mutability. The second way that centrality is operationalized is through an analysis of the characteristic's causal centrality as theorized by Ahn (1998). Ahn (1998) has proposed that characteristics are more central because of their causal position in the structure of individuals' theories of a category. Characteristics that cause other characteristics are more central because they are the heads of causal chains. Their absence would disrupt the structure of an individual's theory, as there would be a breakdown in the causal chain. Ahn (1998) has labeled this theorized phenomenon the causal status effect. The theory-based view is operationalized as a systemic effect of the pattern of relationships on conceptual representation.

Instrumentation

Theory-Drawing Task. The theory-drawing task was designed to measure the causal centrality of the characteristics that make up the different teachers' beliefs about giftedness. During the task, the participants created a graphic representation or cognitive map of their theory of giftedness. The list of behaviors used in the centrality task was compiled deductively by the researcher according to a review of the literature on conceptions of giftedness. In order to improve the content validity of conclusions to be made using this task, the list went through an expert review by researchers in gifted education. Each of the experts was chosen based on demonstrated expertise in gifted education (i.e., record of publication and scholarship), conceptions of giftedness, and/or culturally diverse gifted students. These experts were asked to determine thoroughness and representativeness of the list of behaviors in relation to characteristics of giftedness, including those considered important by various cultural and social groups. The resulting list of 83 characteristics was then reviewed by practicing elementary education teachers to ensure ease of understanding and to assess practicing teachers' reactions to the list (see Miller, 2006, for a detailed report of this procedure.)

The causal centrality/theory-drawing task allows one to assess the structure and composition of the participants' individual theories as well as the relationships among the characteristics included in the theories. One can determine the relative importance of the different characteristics in the models as well as the complexity of participants' beliefs about giftedness through an analysis of the theory-drawing task. The procedure for the theory-drawing task follows.

Using the characteristics, participants formed a graphic organization of the perceived relationships among the characteristics that they considered to be the features of giftedness. Specifically, they were told that the characteristics are characteristics of children. They were instructed to first sort the characteristics into two piles: characteristics they think particularly describe gifted children and characteristics that they do not think particularly describe gifted children. They then drew single-headed arrows between characteristics indicating possible causal relationships among the characteristics, thus forming causal chains. They were directed to consider using, but not to limit

themselves to, the following relations: “causes,” “jointly causes,” “is an example of,” “co-occurs with,” “is a result of,” “affects,” “is a precondition for,” “is shown by,” “increases,” “decreases,” “is a requirement for,” and “is a subset of.” Each relation was considered as indicating a causal relationship for the purpose of calculations. Participants did not have to use all characteristics in their stack; however they could not add characteristics. The participants are asked to rate the strength of the relationships on a scale from 1–5 (*very weak, weak, moderate, strong, very strong*).

Equation 1, developed by Sloman et al. (1998), is used to mathematically determine causal centrality.

$$c_{i,t+1} = \sum_j d_{ij} c_{j,t} \quad (1)$$

In Equation 1, d_{ij} is a positive number that represents how strongly characteristic j depends on characteristic i (rated by the participants on a scale from 1–5) and $c_{i,t}$ is the conceptual centrality of characteristic j , at time t (initially set to the value .5). The centrality of feature i is determined at each time step by summing across the centrality of every other feature multiplied by that feature’s degree of dependence upon feature i . The equation described above produced a rank ordered list of characteristics for each participating teacher’s model of giftedness. Specifically, the ratings of the causal links were entered into a pairwise dependency matrix. Links between items that are grouped together were entered as each characteristic in the causal group as causing each characteristic in the effect group. Equation 1 is run repeatedly until the order of the rankings (not the numerical scores) stabilized. Equation 1 does not distinguish between terminal effects (the ends of causal chains) and isolated items, thus conceptual maps were inspected to determine isolated items. (See Figure 1 for a simplified example of a conceptual map.)

Mutability Survey. The mutability survey was designed to measure conceptual centrality. Conceptual centrality was operationalized as the degree of mutability of the teachers’ beliefs as measured through an ease-of-imagining task (Sloman et al., 1998). The conceptual centrality of each characteristic was measured by asking participants to rate “How easily can you imagine a gifted child who (opposite of characteristic used in the theory-drawing task)?” using a Likert-type scale. The

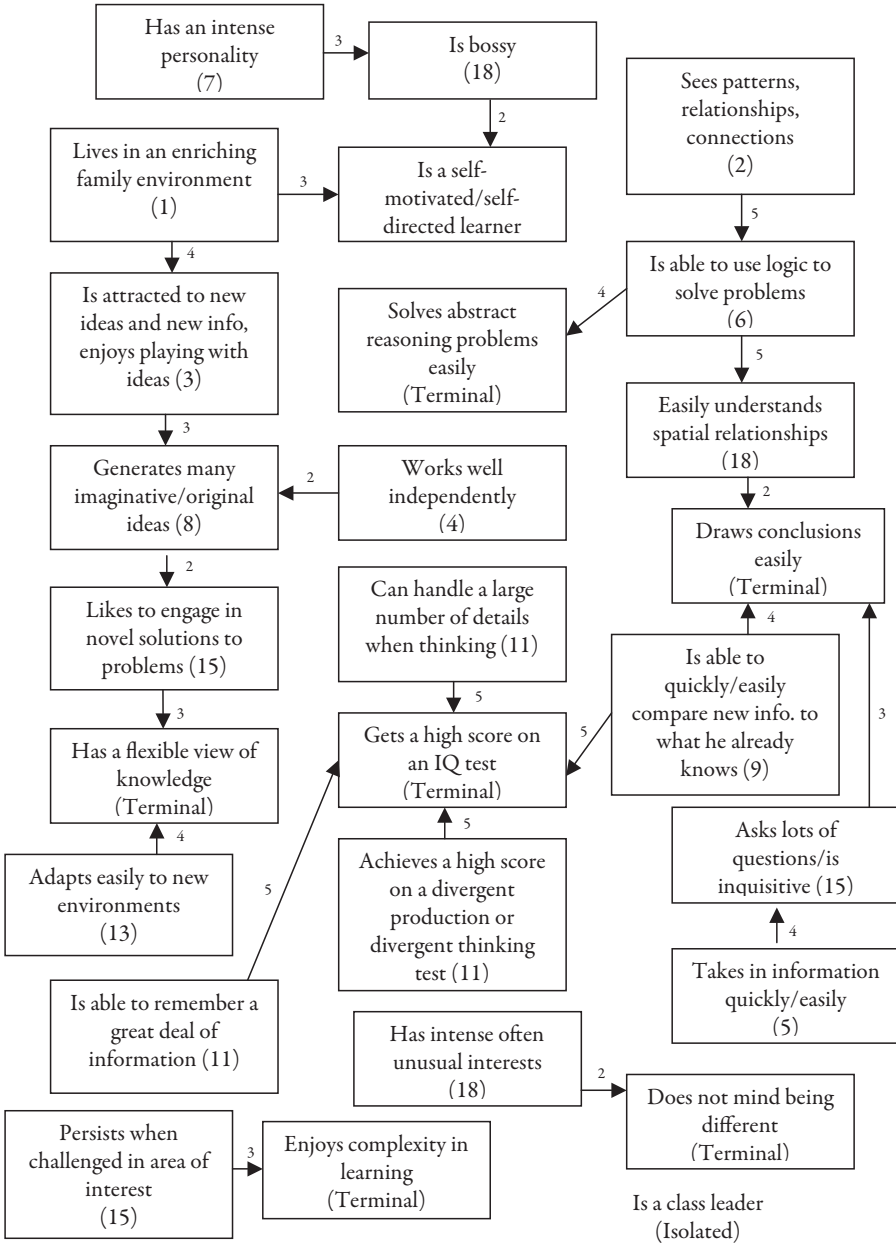


Figure 1. Example of a simplified conceptual map with causal centrality ranking in parentheses.

response options were (4) *Very Easy to Imagine*, (3) *Easy to Imagine*, (2) *Difficult to Imagine*, and (1) *Cannot Imagine*. The characteristics used in the mutability survey were written to express the opposite of the 83 characteristics of gifted students compiled for use in the centrality/theory-drawing task. As the idea of mutability is to study the effect of change, transforming a characteristic to its opposite accomplishes a major alteration. For example, the characteristic "Has a broad range of knowledge" was rewritten to be "Has a limited range of knowledge" and "Has an outgoing/adventurous spirit" was rewritten to be "Is shy." Some characteristics were rewritten by inserting "not" into the phrase.

An inductive approach was used to construct five scales that were labeled by the researcher (Academic–Productive, Abstract–Intellectual, Intrapersonal, Interpersonal, and Creative) from the items in the mutability survey. The researcher and a peer reviewer independently sorted the items into as many self-created categories as we each determined were necessary. The researcher then reconciled the two sorts in order to create the final set of scales.

The Academic–Productive scale consists of 10 items describing characteristics associated with school success, such as reading, math, and science achievement; grades; and homework completion. The Abstract–Intellectual scale contains 16 items describing more conceptual and intangible cognitive characteristics that provide the basis for achievement, such as range of knowledge, vocabulary, and problem-solving ability. Items related to personality differences, such as motivation level and learning style, were included in the Intrapersonal scale. This scale consists of 22 items. The Interpersonal scale is made up of 20 items describing social interaction characteristics and styles such as respect for others, helpfulness, and charisma. The Creative scale contains 13 items associated with creativity, such as improvisation skill, imagination, and mental flexibility.

Differences in the sum scores of the different scales would indicate differences in the inclusiveness of a participant's theory of giftedness. The greater the sum scores, the more mutable the conception of giftedness because this indicates that the respondent is able to more easily imagine a wider array of possible manifestations of giftedness. A more mutable conception of giftedness is synonymous with a broader conception in which students with a wide variety of characteristics have the possibility of being identified as gifted.

To assess the reliability of each scale, Cronbach's alphas were obtained using the responses from the total sample of 60 teachers who participated in the present study. The internal consistency estimates were 0.92 for the Academic–Productive scale, 0.92 for the Abstract–Intellectual scale, 0.87 for the Intrapersonal scale, 0.89 for the Interpersonal scale, and 0.88 for the Creative scale.

Data Collection

The majority of data collection took place as part of in-service opportunities for elementary teachers. The teachers could choose to participate in the study as part of their in-service workdays. Participants completed the mutability survey and theory-drawing task. The order of the two tasks was counterbalanced. Upon completion of the theory-drawing task, participants were asked to rate their confidence that their model represents their conception of giftedness on a 4-point scale using the question, "How confident are you that this diagram represents your beliefs and knowledge about giftedness?" (*completely confident, confident with few (1–2) reservations, marginally confident (3–4) reservations, not confident*). Participants also filled out a survey consisting of demographic questions, requests for contact information, and questions regarding professional experience.

All 60 participants completed the mutability survey. However, only 46 of the teachers created analyzable conceptual centrality maps. This lesser number of participants is due to several factors. Six participants withdrew before beginning the causal centrality task. Eight participants produced causal centrality maps that were not analyzable (two withdrew before completion of their map, two used double headed arrows, one used only one characteristic in her map, one created arrows that were unclear as to their endpoints, one did not rate the arrows, and one did not draw any arrows.)

Data Analysis and Results

This study addressed four questions regarding the structure, content, and application of teachers' theories of giftedness. A combination of

inferential statistical analyses and descriptive statistics was employed to answer the questions.

Research Question 1

Research Question 1, "What is the structure and content of teachers' theories/beliefs about giftedness?", was addressed using descriptive statistics drawn from both the mutability survey and theory-drawing tasks. Because all of the participants were given the same set of characteristics, it was possible to analyze theories across participants. Analysis of the theory-drawing task focused on the following qualities: complexity, the types of characteristics included in the models, and the mean ranked characteristics across participants.

Theory-Drawing Task Results

In order to establish that teachers believed they were adequately representing their beliefs in the theory-drawing task, they were asked to provide their mean confidence in their maps (1 = *completely confident* to 4 = *not confident*). Mean confidence level was 2.29 ($SD = 0.73$), a majority (73%, $n = 33$) of teachers indicated that they were completely confident or confident with few (1–2) reservations that the diagram represented their beliefs. The analysis of the theory-drawing task included an evaluation of the complexity of the models, the types of characteristics used in the models, and the mean ranked characteristics across participants.

Complexity of the Models. Two factors (the total number of characteristics used and the number of relational arrows) can be used to indicate the complexity of the models. One participant used all 83 characteristics in her map and one participant used only one characteristic (Gets a high score on an IQ test). The participant who used only one characteristic was identified as an extreme outlier and was not included in further analyses. Of the remaining participants, the number of characteristics used in the maps ranged from 21 to 83 (mode = 39, $M = 43.45$, $SD = 16.71$). Analysis of the number of relational arrows can also be used to evaluate the complexity of the models (Kim & Ahn, 2002). Participants used an average of 96.11 relational arrows (range

13–551, $SD = 120.55$) in their theory-drawing maps. The extreme range of links is a result of participants aggregating characteristics in their causal centrality maps. According to the causal centrality method, a link between two aggregated groups of characteristics is considered as indicating a link between each characteristic in Group 1 to each characteristic in Group 2. Participants who viewed the characteristics of giftedness as large conceptual groups rather than as individual characteristics had large link totals. When considered separately, the 11 participants in the total sample who tended to aggregate characteristics had an average of 262.91 links (range 70–551, $SD = 160.50$) and the 35 participants who did not tend to aggregate characteristics had an average of 45.14 links (range 13–80, $SD = 17.97$.)

Theory-Drawing Task Descriptive Data. Descriptive statistics were compiled regarding the characteristics used in the individual maps. The percent of participants who included the characteristic was computed for each of the 83 characteristics provided in the original sort. The majority of the most often used characteristics described abstract intellectual traits and creativity. The most often used characteristics for the total sample are presented in Table 1. The majority of the least often used characteristics were social and personality traits. The least often used characteristics for the total sample are presented in Table 2.

The mean ranks for each of 83 characteristics across all participants were compiled using the data provided by the pairwise dependency matrix and Equation 1 from the analysis of the theory-drawing task. The pairwise dependency matrix and Equation 1 allow one to analyze the cumulative effect and pattern of the causal links among the characteristics in an individual's map. This procedure produces a ranking of the characteristics used by each participant according to causal centrality. The top 10 mean ranked characteristics are presented in Table 3.

Mutability Survey Results

Participants were asked how easily they could imagine a gifted student with each of the 83 different characteristics. Each of the characteristics was expressed as the opposite of the characteristics of giftedness derived through the literature and expert reviews. The participants had the most difficulty imagining a gifted child who lacked characteristics involving

Table 1
Most Often Used Characteristics to Describe Giftedness

Characteristics	Percent*
Sees patterns, relationships, connections	92
Generates many imaginative/original ideas	90
Asks lots of questions/is inquisitive	88
Is able to use logic to solve problems	88
Enjoys discovery	88
Has a broad range of knowledge	88
Is attracted to new ideas and new information; enjoys playing with ideas	88
Has an extensive and sophisticated vocabulary	87
Takes in information quickly/easily	87
Is able to quickly/easily compare new information to what (s)he already knows	83
Solves abstract reasoning problems easily	83
Is able to remember a great deal of information	81
Is good at finding new uses for things	81
Enjoys experimenting	81
Likes to engage in novel solutions to problems	79
Enjoys complexity in learning	79

Note. * Percent of participating teachers who included the characteristic in their model.

creativity, a broad knowledge base, and vocabulary skill. The participants could most easily imagine a gifted child who lacked more social, intra/interpersonal characteristics. Those characteristics that classroom teacher participants could most easily imagine and those that participants found most difficult to imagine are presented in Tables 4 and 5.

Research Question 2

Research Question 2, "What is the relationship between the structure and content of theories/beliefs about giftedness of teachers with greater amount of training and the structure and content of theories/beliefs about giftedness of teachers with less training in gifted education?", was addressed in two ways.

Two-tailed *t*-tests and correlations using the data from the theory-drawing task were completed. Bonferroni correction was used to adjust

Table 2
Least Often Used Characteristics to Describe Giftedness

Characteristics	Percent*
Is physically coordinated	8
Keeps work and personal belongings organized	12
Prefers the company of adults and/or older students	13
Is good at handiwork/crafts	13
Has a balance between academic and social endeavors	13
Is quiet	13
Makes social bonds easily	15
Respects tradition	17
Makes contributions to his/her neighborhood/community	17
Has nonbook knowledge/is streetwise	19
Behaves well in school	19
Completes homework	21
Respects older adults	21
Has difficulty accepting those of lesser ability	21
Enjoys helping others	23
Communicates easily with others	25
Has an outgoing/adventurous spirit	27
Has knowledge of own cultural heritage	27
Adapts easily to new environments	27
Is able to overcome adversity	27

Note. * Percent of participating teachers who included the characteristic in their model.

for multiple comparisons. Analysis of the theory-drawing task focused on the following qualities: complexity as shown through mean number of characteristics used and mean number of links, the types of characteristics included in the models, and the mean ranked characteristics across participants. A two-tailed *t*-test was completed with the two teacher groups as the independent variable and mean number of characteristics used in the causal centrality maps as the dependent variable. A second two-tailed *t*-test was completed with the mean number of links in the causal centrality maps as the dependent variable.

Two correlations were completed. First, a Pearson product-moment correlation was run comparing the number of participants from each group who included each of the 83 characteristics in

Table 3
Top Mean Centrality Ranked Characteristics of Giftedness
Total Sample and by Training Level

Characteristic	Total Sample (Mean Rank)	Highly Trained Group (Mean Rank)	Less Training Group (Mean Rank)
Is able to quickly/easily compare new information to what he/she already knows	25.10	21.41	27.18
Enjoys discovery	25.14	27.44	23.83
Is attracted to new ideas and new information; enjoys playing with ideas	25.53	35.18	20.07
Has a broad range of knowledge	26.32	24.06	27.60
Takes in information quickly/easily	26.81	22.53	29.23
Sees patterns, relationships, connections	26.99	19.62	31.17
Asks lots of questions/ is inquisitive	27.10	22.71	29.58
Enjoys complexity in learning	28.03	26.21	29.07
Generates many imaginative/original ideas	28.29	31.88	26.25
Enjoys experimenting	28.36	29.82	27.53
Likes to engage in novel solutions to problems	35.11	29.24	38.43

Table 4
Characteristics Teachers Found Most Easy to
Imagine a Gifted Child Possessing

Characteristic	Very Easy/Easy to Imagine (%)
Has disorganized work and personal belongings	90
Is physically uncoordinated	85
Does not have a balance between academic and social endeavors	85
Is shy	85
Is loud	85
Is poor at handiwork/crafts	83
Does not complete homework	82
Behaves poorly in school	80
Writes compositions poorly	79
Finds it difficult to make social bonds	75
Is accepting of others of less ability	73

Table 5
Characteristics Teachers Found Most Difficult to Imagine
a Gifted Child Possessing

Characteristic	Difficult/Cannot Imagine (%)
Dislikes discovery	87
Hates to experiment	82
Has a limited range of knowledge	80
Does not get bored when unchallenged	79
Has difficulty finding new uses for things	77
Has a limited vocabulary	75
Cannot see patterns, relationships, connections	73
Is unable to draw conclusions easily	72
Does not generate many imaginative/original ideas	71

their causal centrality model (i.e., the number from each group who included Characteristic 1, the number who included Characteristic 2, and so on for each of the 83 characteristics). Second, a Spearman rank-order correlation was completed with the mean rankings of each of the 83 characteristics for each group.

Research Question 2 was also addressed through a one-factor, between-subjects multivariate analysis of variance (MANOVA) using data from the mutability survey. The mutability survey was divided into five scales (Academic–Productive, Abstract–Intellectual, Intrapersonal, Interpersonal, and Creative). The sum score for each subscale was calculated for each participant. The mean sum scores for each of the scales of the mutability survey served as the dependent variables in the analyses, and the expertise groups (Highly Trained and Less Training) comprised the independent variable.

Theory-Drawing Task Results

Complexity of the Models. Participants with less training used an average of 43.94 characteristics (range 22–83, $SD = 18.04$). Participants with more training used an average of 39.47 characteristics (range 22–64, $SD = 13.80$). The two-tailed t -test showed no significant difference at the $p < .05$ level in the mean number of characteristics used

between the two groups. The second two-tailed t -test was completed with the mean number of links in the causal centrality maps as the dependent variable. The results indicated no significant difference at the $p < .05$ level in the mean number of links in the models between the highly trained ($M = 128.94$, $SD = 153.26$) and less formal training group ($M = 77.50$, $SD = 95.40$).

There was a significant Pearson's product-moment correlation ($r = .90$, $p < .01$) between the number of participants in the highly trained group who included the characteristic and the number of participants in the less training group who included the characteristic. Overall, there was little difference in the most often used characteristics between the two groups. The second correlation was completed between the mean rankings of each of the 83 characteristics for each group. There was a significant Spearman's rank order correlation ($\rho = .66$, $p < .01$) between the mean rankings of the items by the highly trained group and the mean ranking of the items by the group with less formal training. Top ranked characteristics were similar for the two groups (see Table 3).

Mutability Survey Results

A one-factor, between-subjects multivariate analysis of variance (MANOVA) was conducted using the data from the mutability survey. Evaluation of the homogeneity of variance-covariance matrices (Box's $M = 28.513$, $p > .05$) and normality assumptions of MANOVA did not reveal violations. The *a priori* level of significance was set at .05. The bivariate correlations for the dependent variables are presented in Table 6.

Results from the MANOVA were not statistically significant according to Wilks' Λ , multivariate $F(5, 54) = .806$, *ns*. The average mean sum scores for the total sample and each group is presented in Table 7. The mean sum scores for the different scales for the total sample ranged from 2.29 for the Abstract-Intellectual Scale to 2.80 for the Interpersonal Scale. The intercorrelations among the mutability scales were relatively high and significant across the correlation matrix, which suggests that the scales are not independent. Further work is needed to determine whether the separate scales are useful or if a single scale score would be more appropriate.

Table 6
Intercorrelations Among Mutability Scales

Trait	A-P	A-I	IntraP	InterP	C
Academic-Productive	1.00	.71*	.67*	.75*	.64*
Abstract-Intellectual		1.00	.83*	.74*	.86*
Intrapersonal			1.00	.80*	.85*
Interpersonal				1.00	.78*
Creative					1.00

Note. A-P = Academic-Productive; A-I = Abstract-Intellectual; IntraP = Intrapersonal; InterP = Interpersonal; C = Creative. * $p < .01$.

Research Question 3

Research Question 3, “Is there consistency in the theories/beliefs about giftedness among teachers with different levels of training in gifted education?”, was answered by evaluating the consistency of the models for persons of different levels of training using characteristics included in the models that had been rank-ordered by level of causal centrality as the dependent variable. Specifically, a pairwise dependency matrix was created for each participant using the data from the causal centrality maps. Equation 1 was used to determine the order of the rankings. Kendall’s coefficient of concordance was used to determine the consistency of the models within the total sample and within each group.

Kendall’s coefficient of concordance is a nonparametric test measuring the agreement of raters. For each variable, the sum of ranks is computed. Kendall’s W ranges between 0 (*no agreement*) and 1 (*complete agreement*). The null hypothesis for W is that concordance of ranks is not significantly different from 0 (i.e., random). Rejection of the null hypothesis signifies that the concordance is not random; it does not necessarily indicate that there is a stable ranking. In order to determine the level of stability present, one must examine the magnitude of the relationship. If W is high (greater than 0.75) and significant, then one can conclude that the relationship is stable (Grossman, Dowd, & Crawford, 1990). Kendall’s W is also strongly affected by consistently low rankings for rare items. A statistically significant result can be obtained if relatively rare items remain rare while the more

Table 7
Mean Sum Scores for Mutability Scales

Scale	Average Mean Sum Score (<i>SD</i>)				Range		
	Total Sample	Highly Trained	Less Training	Total Sample	Highly Trained	Less Training	
Academic-Productive	2.68 (.56)	2.75 (.65)	2.64 (.50)	1.10-3.90	1.10-3.90	1.70-3.90	
Abstract-Intellectual	2.29 (.48)	2.36 (.46)	2.26 (.49)	1.44-3.81	1.69-3.25	1.44-3.81	
Intrapersonal	2.62 (.40)	2.61 (.38)	2.62 (.41)	1.87-3.91	1.87-3.22	1.87-3.91	
Interpersonal	2.80 (.40)	2.78 (.41)	2.82 (.40)	1.90-3.95	2.05-3.40	1.90-3.95	
Creative	2.41 (.43)	2.44 (.37)	2.39 (.43)	1.45-3.92	1.69-3.08	1.46-3.92	

Note. Scale: 1 = Cannot imagine to 4 = Very easy to imagine

commonly used items fluctuate substantially. To control for this, it is necessary to delete rarely used characteristics from the analysis. Thus, Kendall's coefficient of concordance was calculated using only those characteristics used by 50% or more of the participants.

All comparisons were significant at the $p < .0001$ level. However, Kendall's W for the total sample ($n = 46$) was .11. Kendall's W for the highly trained group ($n = 17$) was .14. Kendall's W for the less trained group ($n = 30$) was .13. These low values for the Kendall's W statistic indicate low levels of agreement despite the significant result. The null hypothesis for W is that concordance of ranks is not significantly different from 0 (i.e., random). Although the concordance of ranks was significantly different from 0, the level of agreement was not high.

Research Question 4

Research Question 4, "What differences exist, if any, between the groups in the inclusion of culturally diverse characteristics of giftedness in their theories of giftedness?" was addressed through qualitative content analysis using the data from the theory-drawing task. Qualitative content analysis focused on the types of characteristics included in the models. Because all of the participants were given the same set of characteristics, it was possible to analyze theories across participants. The characteristics used and the relationships among the characteristics were qualitatively analyzed by the experimenter and a peer reviewer with an emphasis on whether they represented the trend toward expanding the definition of giftedness to be more inclusive as opposed to a narrow, IQ-focused definition (as described by research on theories of giftedness and cultural differences in giftedness). The content of the models were examined looking for themes within each of the two groups (more and fewer hours of formal training in gifted education.) Triangulation of analyses (comparison of the analyses by each of the two reviewers) was used to establish credibility of conclusions (Patton, 1990).

An examination of the content of the maps suggested no difference between the two training level groups in the kinds of characteristics included in the causal centrality maps. Across the maps, participating teachers tended to focus on traditional characteristics (e.g., broad

range of knowledge, enjoys reading, and asks lots of questions) and did not tend to include characteristics associated with diverse gifted students (knowledge of own cultural heritage, is able to overcome adversity, and has nonbook knowledge). Specific details regarding the characteristics teachers included and the implications of these choices are provided in the earlier analysis of Research Questions 3 and 4 and in the Discussion and Recommendations section.

Cross Method Comparisons

Two methods were used to measure centrality, the theory-drawing task and the mutability survey. An additional analysis was completed in order to assess the relationships between these two methods to determine whether they were measuring the same construct. If the two methods were measuring the same construct then it was expected that there would be a positive correlation between the number of participants who chose to include a particular characteristic in their causal centrality map as part of the theory-drawing task and the percent of participants who found it difficult to imagine or could not imagine a gifted child who had the opposite characteristic in the mutability survey. This expectation is based on the premise that if a participant cannot imagine a gifted student who does not have a characteristic then they would be likely to include that characteristic in a model of the belief about giftedness.

A Pearson product-moment correlation was run between the number of participants who used the behavioral characteristic in their causal map and the percent of participants who found it difficult to imagine or could not imagine a gifted child who had the opposite of the characteristic in the mutability survey. A significant positive correlation was expected between the number of participants who used the characteristic in their map and the information from the mutability survey.

There was a significant correlation (.77) at the $p < .01$ level between the number of participants who used the behavioral characteristic in their causal map and the percent of participants who found it difficult to imagine or could not imagine a gifted child who had the opposite of the characteristic in the mutability survey.

Discussion and Recommendations

The objective of the current research was to explore the use of methods originally developed by researchers in cognitive psychology to study categorization phenomena to study the theories and beliefs about giftedness of classroom teachers. The methods transferred from cognitive psychology have the potential to address some of the unanswered questions left by past research on beliefs about giftedness, such as the relationships among characteristics teachers use to describe gifted children. These methods also allow for the contribution of information from a quantitative approach to a body of literature on teachers' beliefs about giftedness that has included more qualitative than quantitative research.

Teachers' beliefs are important given the potential role they play in determining the kinds of students teachers recommend for participation in programming for the gifted (Adderholdt-Elliot et al., 1991; Bernal, 2000; Coleman & Gallagher, 1995; Ford et al., 2002; Weber, 1999). Past research has indicated training and expertise seems to have an effect on beliefs about giftedness to the extent that teachers with greater expertise tend to espouse more inclusive definitions of giftedness (Copenhaver & McIntyre, 1992; Goodnough, 2000; Guskin et al., 1992; Siegle & Powell, 2004). In these studies, teachers with greater expertise were those who had completed postbaccalaureate study, were gifted resource teachers, and/or were teachers who had taught for a greater number of years. In the current study involving classroom teachers, expertise was based on the number of postbaccalaureate credit hours completed in the area of gifted education.

Influence of Level of Training

It was predicted that classroom teachers with more training in gifted education would show a greater breadth and flexibility in their beliefs about gifted students. It was also hypothesized that they would be more likely to include characteristics of giftedness associated with underrepresented groups of students as a result of completing master's-level courses in gifted education. This was not generally the case for teachers teaching in the regular classroom, as indicated by both the mutability survey and the causal centrality map results. In

general, differences in mutability scores would indicate differences in the flexibility and breadth of different individuals' beliefs. The ability to imagine gifted students with a broad range of characteristics was used in this study to indicate a more inclusive conception of giftedness. No difference was found between classroom teachers with different levels of training in their mutability mean scores. This suggests that there is little difference in the breadth of beliefs as a result of educational experience.

Differences in the number of characteristics used in the maps and the number of links drawn between characteristics or groups of characteristics can be used to gauge the relative complexity of the different models. There were no significant differences between the two training level groups on these measures of model complexity. Classroom teachers with differing levels of training also differed little in the content of their causal centrality maps.

The analysis of the consistency of the ranked lists of characteristics both within each group and within the entire sample indicated a statistically significant degree of consistency in the ranking of characteristics. However, the values of the Kendall's W were of low magnitude. This suggests that there is not a great deal of meaningful consistency in which characteristics are most central in the teachers' models for each training level group and across all participants. There remains a substantial degree of variability in the organizational structure of the individual teachers' causal centrality maps despite a great deal of similarity in the actual characteristics teachers include in their maps. This is intriguing, as it indicates that although there is consensus in which characteristics indicate giftedness, there is a wide range of opinions of the relationships among these characteristics. This raises the question whether all teachers define ideas such as broad range of knowledge, imagination, and leadership in the same way. It may be a fruitful exploration to conduct a qualitative exploration of how different groups of teachers define the characteristics that are most often used in descriptions of gifted students and the checklists and rating scales used in gifted identification procedures.

The absence of significant differences between classroom teachers with and without certification/endorsement in giftedness was unexpected. One possible explanation is that the beliefs that classroom teachers develop over the course of their lives are too resistant to

modification to be influenced by subsequent educational experiences, whether they are through district/state organized teacher training initiatives or university courses in gifted education. Educational beliefs are highly entrenched and basically unchanging (Nespor, 1987; Pajares, 1992). In a review of research on teachers' beliefs, Pajares synthesized several findings that occur across the literature. Key findings include the following six conclusions: (a) beliefs function to help individuals understand the world and themselves; (b) beliefs are created through a process of enculturation and social construction and these processes are not likely to be influenced by subsequent educational experiences; (c) beliefs tend to persist even in the face of concrete evidence that they are not accurate; (d) belief change in adulthood is relatively rare and most likely occurs as a result of a significant gestalt shift; (e) changing beliefs can mean changing personal identity; and (f) teachers develop their educational beliefs structure before even beginning their formal education as teachers (Pajares, 1992). Given the conclusions above, it is perhaps unrealistic to expect that several graduate courses or other professional development experiences in gifted education resulting in an endorsement certificate would culminate in a substantial shift in beliefs. However, why provide postbaccalaureate education or training in gifted education if not to influence and enrich practicing teachers' thinking, reasoning, and classroom practices? A next step is to determine what kinds of experiences are necessary to make professional development in gifted education a powerful agent for change.

In general, little research has been conducted on what strategies result in sustained change in teachers' beliefs and subsequent actions. However, several techniques have been suggested. One strategy that seems to be effective is having students make their attitudes and beliefs explicit so that their assumptions can be analyzed (Correa, Hudson, & Hayes, 2004; Middleton, 2002; Schuck, 1997). Teachers need to engage in critical self-analysis and experience cognitive dissonance in order to change. Activities that have been identified as effective in promoting critical self-analysis include having students complete mock qualitative interviews regarding each other's beliefs, participation in cross-cultural field experiences, and having a panel of diverse students talk to the class about their experiences (Begoray & Slovinsky, 1997; Middleton, 2002; Schuck, 1997; Ukpokodu, 2004; Villegas & Lucas, 2002). In universities where it is difficult to arrange cross-cultural field

experiences or diverse panels of gifted students, popular film clips may be used to promote critical analysis of conceptions of giftedness (Nugent & Shaunessy, 2002). Trent and Dixon (2004) promoted a total course design that focuses on individuals understanding their teaching within the broader context of the multiple perspectives of the involved parties, extended community influences, the various outcomes of their teaching, and the different teaching approaches designed to achieve the outcomes. A meaningful framework is created encompassing the different sociocultural factors affecting education rather than studying each factor in isolation.

Interestingly, concept maps have been utilized in educational research to measure cognitive change (Correa et al., 2004; Trent & Dixon, 2004). The causal centrality mapping method described in the present study has potential for use in teacher education programs or other professional development options for tracing conceptual change. This method has the benefit of including a mechanism for quantitative analysis. Further research is needed regarding the nature of belief change and the socialization of teachers. Continued research with teachers who are working on obtaining their endorsement or certification in gifted education would have the dual benefit of both studying and possibly promoting sustained change.

Description of Classroom Teachers' Beliefs About Giftedness

Two methods were used to evaluate the centrality or importance of various characteristics in teachers' beliefs about giftedness. The mutability survey was a measure of conceptual centrality and the teacher-created maps were measures of causal centrality. These methods provided the following three sources of information about the characteristics making up the teachers' beliefs about giftedness: (a) mean mutability scores, (b) the characteristics that were included in the maps, and (c) a ranking of the causal centrality of the characteristics.

The mutability survey was designed to assess how easily teachers could imagine a gifted student without a particular characteristic. The more difficulty the teacher has imagining such a student, the more important the opposite of that characteristic is in that teacher's belief about giftedness. The concept behind differences in mutability is that people have more difficulty with modifications to the more

fundamental characteristics that constitute their beliefs (Sloman et al., 1998). The results of the mutability survey indicate that across participants the most central characteristics are the following: a broad range of knowledge; the ability to find new uses for things; an extensive vocabulary; enjoying experimenting and discovery; the ability to draw conclusions; the ability to see patterns, relationships, and connections; the ability to generate imaginative and original ideas; and being bored when not challenged. An analysis of the number of participants who used a certain characteristic in their causal centrality maps and the top ranked characteristics yielded a similar set of items. These are valid, yet traditional characteristics of gifted students.

These beliefs have implications for the identification of culturally diverse students. Diverse students are described as having traits, personalities, and experiences that do not always fit with traditional ideas about giftedness (Baldwin, 2002). Students from low socioeconomic backgrounds may not have sufficient background experiences to demonstrate a broad range of knowledge at a young age (Schwartz, 1997). Students from different cultures may not perceive the structure of knowledge in the same way. They may not make the kinds of connections or see the types of patterns that teachers may expect. The vocabulary ability of children who are learning English as a second language may be masked. Students from cultures that emphasize respect for older adults may not express their boredom to the teacher even when they are indeed very bored.

In contrast, the characteristics that teachers did not tend to use and the characteristics that were easy to imagine also provide information regarding the nature of teachers' beliefs. Among the least central characteristics and lesser used characteristics were keeping work and personal belongings organized; preference for the company of adults and/or older students; ability with handiwork and crafts; a balance between academic and social endeavors; being quiet; making social bonds easily; respect for tradition; making contributions to his or her neighborhood; nonbook knowledge/being streetwise; behaving well in school; completion of homework; respect for older adults; difficulty accepting those of lesser ability; and enjoying helping others.

The lesser importance or value placed on such characteristics such as social skill, enjoying helping others, respect for tradition, contribution to his or her neighborhood, and having nonbook knowledge has

implications for the recognition of students from diverse backgrounds. It is interesting that having a broad range of knowledge was of high importance, but that having nonbook knowledge/being streetwise was not valued as highly. These two characteristics are very similar. One could imagine the possibility that students from an urban or low socioeconomic background might exhibit their gifts through street wisdom and nonbook knowledge while students from a more affluent background may show their gifts in a more traditional, academically oriented manner.

Social skill, enjoying helping others, and contribution to one's neighborhood reflects the more "other-directed" social nature of some groups of African American and Hispanic students (Ford, Grantham, & Milner, 2004; Vásquez, 1990). There are several possible interpretations of this finding. Teachers in this sample simply may not value these characteristics highly. However, an alternate interpretation is that such social factors may be seen as irrelevant to giftedness because they are not included in the school district's definition of giftedness. The majority of the school districts in this study identify students based predominately on intellectual and creative ability. The essential question is whether there is a relationship between social skill or contribution to one's neighborhood and intellectual skill. Sternberg (1985, 1999) and Gardner (1983, 1996) both include practical and interpersonal ability as a form of intelligence; however, this is not generally reflected in identification policies and procedures.

Interestingly, the majority of the less often used and more easily mutable items were included in the list of characteristics based on the results of a study that used qualitative inquiry to study the themes that emerged in the responses of Hispanic American, African American, Native American, immigrant Asian, mainstream American, and low-income Anglo individuals as they nominated individuals for a hypothetical gifted program (Peterson, 1999; Peterson & Margolin, 1997). This study explored the possibility that the various nonmainstream populations would conceptualize giftedness differently from each other and differently from mainstream individuals. Each of the nonmainstream culture groups (Hispanic American, African American, immigrant Asian, and low-income Anglo) emphasized the way one interacted within the family and community as an indicator of giftedness. The value placed on this aspect would be transmitted to children who would also learn to prize community and family connections.

Coleman and Gallagher (1995) included “understanding one’s cultural heritage” as a type of giftedness in their analysis of state policies regarding gifted education because this trait is important to people from cultures that are significantly different from the mainstream American culture, such as Native American cultures. However, it is unlikely that teachers would be able to observe student interaction outside of school in order to place a student’s behavior in cultural context. This is one possible explanation for the lesser importance placed on these factors in the conceptions of the teachers in this study. However, it has been suggested that teachers need to know about their students’ experiences outside of school if they wish to best serve culturally diverse students (Castellano, 2004; Villegas & Lucus, 2002).

Another explanation for the lesser importance placed on these factors involves the teachers’ ethnicities. The majority of teachers in this study identified themselves as being White. It is possible that there could be a conflict between the values of mainstream culture and values of the minority students’ communities that may partially explain why these characteristics were not included as often. The results of this study support previous findings that teachers have difficulty recognizing academic giftedness in students from cultural backgrounds that are different from their own backgrounds (Frazier et al., 1995; Hunsaker et al., 1997).

In general, the elementary school classroom teachers in this study tended to focus on characteristics of giftedness that, although valid, indicate a more traditional conception of giftedness. This result is similar to what has been found in previous research on teachers’ beliefs about giftedness (Campbell & Verna, 1998; Copenhaver & McIntyre, 1992; Frasier et al., 1995; Guskin et al., 1992; Hunsaker, 1994; Hunsaker et al., 1997; Rohrer, 1995; Speirs Neumeister et al., 2007). The classroom teachers’ theories and beliefs reflect a view of giftedness as exemplary performance in school and superior abstract reasoning skills that are shown in a traditional school-oriented manner. Characteristics that are valued by diverse cultures as indicative of giftedness were given less emphasis in the teachers’ theories. Attributes that involved skill in social and community interaction were not generally included in teachers’ representations of their theories nor seen as indicating giftedness by the classroom teachers in this study.

Recommendations and Conclusions

The results of this study suggest several recommendations for further research, as well as possible modification of postbaccalaureate teacher education practices. A subsequent study using the mutability survey and causal centrality map task with a more diverse sample might further explain the findings presented in this manuscript. This follow-up study would allow for a greater understanding of the influence of teachers' own ethnicities on their beliefs about giftedness.

The lack of differences between the classroom teachers with different levels of training in gifted education suggests that programs leading to endorsement or certification in gifted education do not have a great deal of influence on teachers' beliefs about giftedness. This is interesting, in light of the fact that Brown et al. (2005) found in a national survey of educational professionals that teachers of the gifted favor an expanded view of giftedness. Teachers favor an expanded view, but the classroom teachers in this study did not present an expanded view in their personal conceptions of giftedness.

The findings of the present study support assertions that classroom teachers need to receive alternative educational experiences and training in working with culturally diverse students (Ford et al., 2004), particularly those experiences that promote reflection on personal beliefs. As beliefs are not going to be changed unless they are proven to be unsatisfactory by the individual teachers themselves, perhaps part of that training should be a critical exploration and study of the teachers' individual beliefs about giftedness. Teacher educators and professional development programs could explicitly explore teachers' beliefs as part of the first experiences teachers undertake in pursuit of greater expertise in gifted education. One possible mechanism for exploring teachers' beliefs is to use the methods described in the present study as one of the opening activities in programs designed to provide an introduction to gifted education. It is hoped that the results of this study will encourage reflective practice among persons in higher education who are providing endorsement courses as well as those who are providing other forms of professional development activities.

Change is difficult; however, universities, professional development programs, school administrators, and classroom teachers should seek to be agents of change regardless of how difficult this

task may be. This is particularly important in gifted education given the issue of underrepresentation of many culturally diverse students in programs for the gifted. Underrepresentation sends a message of exclusion that can lead to perceptions of racism or elitism. The potential underdevelopment or loss of talent among culturally diverse students as a result of inappropriate educational experiences is troubling. The percent of school-age student from minority cultural/racial backgrounds is projected to continue to increase (U.S. Census Bureau, 2009) with minority students becoming the majority in several states. With the changing demographics of the nation, more states will likely need to place greater focus on the needs of culturally and linguistically diverse students. The difficulties in gifted education in recognizing and serving diverse students is only going to become more significant.

The area of teacher recommendation for gifted programming and the influence of teachers' beliefs on recommendations is one area where action may be taken. This is not to say that issues with teacher nominations are the sole cause for the underrepresentation of culturally diverse student in gifted programs. A myriad of social factors, such as economic deprivation, substandard housing, isolation, discrimination leading to low self-esteem, and unsafe school environments, have a tremendous effect on students' ability to demonstrate their full intellect in the classroom and on standardized tests (Baldwin, 2002; Donovan & Cross, 2002; Gottfredson, 2004; Schwartz, 1997). But these social factors are beyond the realm of influence of public education. Increasing classroom teachers' understanding of giftedness and promoting broad inclusive conceptions of giftedness is not beyond our realm of influence. It is an area in which further effort to create educational experiences that promote growth and change may result in more inclusive gifted education programs.

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