

AN EXAMINATION OF MIDDLE SCHOOL MATHEMATICS
TEACHERS' BELIEFS AND KNOWLEDGE ABOUT
INCLUSION OF STUDENTS WITH LEARNING DISABILITIES

by Janet R. DeSimone

Introduction

The *Education for All Handicapped Children Act of 1975*, now known as the *Individuals with Disabilities Education Act (IDEA)* (renamed in 1990; amended and reauthorized in 1997 as PL 105-17), established procedures to ensure that

children with disabilities . . . are educated with children who are not disabled, and special classes, separate schooling or other removal of children with disabilities from the regular educational environment occurs only when the nature or severity of the disability is such that education in regular classes . . . cannot be achieved satisfactorily. (IDEA Section 612a, 5, A)

According to the above provision, *IDEA* has mandated that schools have an obligation to provide a free and appropriate education, in the least restrictive environment, to all individuals with disabilities, which forms the basis of the principles of inclusion. Inclusion is considered to be an instructional arrangement where students with disabilities are educated in general education settings, with support services provided to the general education teacher and the students with disabilities, as necessary.

Mathematics has always proved to be a challenging subject, even for general education students, in the United States. When examining the performance of students with disabilities on standardized mathematics assessments, the situation becomes even

bleaker. On the National Assessment of Educational Progress only six percent of the students with disabilities who participated in the mathematics component of NAEP scored at or above the proficiency level (National Center for Education Statistics, 2004). Considering that the No Child Left Behind (NCLB) Act of 2001 mandates that all students, with only a few exceptions, master the general education curriculum, participate in standardized assessments, and achieve passing levels of performance, it becomes even more imperative to study the effectiveness of inclusion programs from a variety of perspectives. Further, proportionately, students with LD are the largest special education group to be included in general education classes. Forty-nine percent of students classified with specific learning disabilities spent 80 percent or more of each school day in a general education classroom. These students are not among the groups exempt from state and national standardized tests (US Department of Education, 2003).

It seems obvious to say that effective classroom instructional strategies are at the core of getting *all* students to learn. However, instructional practices are not implemented in a vacuum. Past research has linked teachers' instructional practices, as well as their attitudes toward students and student learning, with student achievement and performance, especially in relation to inclusive education (Larrivee & Cook, 1979; Garvar-Pinhas & Schmelkin, 1989). Instructional practices are also connected to beliefs about learning, beliefs about disability, and perception of available resources and time (Scruggs & Mastropieri, 1996). Other contextual variables include school and district policies about curriculum and assessment, State mandates for academic standards, and Federal mandates on appropriate education for students with disabilities. Therefore, although teacher attitude is not the sole influence of student achievement, it appears to

play an important role in the classroom experiences of students with disabilities in inclusive settings.

The above research leads to significant issues that are worthy of examination—relationship of general educators’ beliefs to actual practice of inclusion in content area classes; the congruence between general educators’ beliefs about inclusive instructional strategies and existing research; and the preservice preparation of general educators for teaching students with disabilities in the content areas.

Rationale

Researchers have studied teachers’ attitudes toward inclusion since its inception (Larrivee & Cook, 1979; Garvar-Pinhas & Schmelkin, 1989; Janney, Snell, Beers & Raynes, 1995; Brantlinger, 1996; Scruggs & Mastropieri, 1996; to name just a few). Based on her experiences as a special education teacher, as well as a teacher educator, Brantlinger (1996) categorized teachers’ attitudes and beliefs toward inclusion as “inclusive beliefs,” which facilitate and maximize inclusive environments and “anti-inclusion beliefs,” which hinder or weaken the implementation of inclusive instructional strategies in schools (p. 19). Research on general educators and inclusion has concentrated on general educators’ overall attitudes toward inclusion. To date, as far as this investigator is aware of, no research has specifically considered teachers’ perspectives and attitudes when actually working with students with disabilities included in mathematics classes. Further, a majority of the existing research studies focus on teachers in elementary schools.

Research on Overall Attitudes Toward Inclusion

The effects of variables such as grade level, classroom and school size, school setting and administrators' support, on teacher attitudes toward inclusion have been studied by Larrivee and Cook (1979). These researchers found that junior high school teachers had the most negative attitudes toward mainstreaming.

In their investigation of 28 survey reports of general educators' perceptions of inclusion, Scruggs and Mastropieri (1996) discovered that two thirds of general educators supported the idea of inclusion, and half of general educators believed that inclusion is indeed beneficial for students with disabilities. However, less than one third of the general educators thought they had adequate resources, training and time required to successfully implement inclusive practices.

Janney et al. (1995) concluded that the more experience general educators had with integrating students with disabilities into the classroom, the more positive were their attitudes. The researchers attributed the general educators' original negative perceptions to the "confusion and uncertainty" (p. 111) that arise when objectives, policies, functions, and responsibilities are altered, sometimes drastically. In their comparison of teachers who worked in inclusion programs and teachers who had not yet started to teach in inclusive settings, McLeskey, Waldron, So, Swanson and Loveland (2001) found that the teachers with no experience in inclusive settings demonstrated more negative attitudes on school readiness, adequacy of resources, academic benefits for students with disabilities, and willingness to collaborate with special education teachers than the group of inclusion teachers. McLeskey et al. (2001), who supported the findings of Janney et al. (1995),

concluded that teachers' negative attitudes toward inclusion derive from a lack of experience with well-designed inclusion programs.

Teachers' beliefs, attitudes, and knowledge have also been found to impact decisions about inclusive instructional strategies. The relationship between general educators' attitudes toward mainstreaming and the instructional methods used has been studied by Bender, Vail, and Scott (1995), and their data indicated that teachers who viewed mainstreaming positively were more consistent in employing effective mainstreaming strategies than those teachers with less favorable attitudes. deBettencourt (1999) also investigated general educators' perspectives toward mainstreaming, as well as general educators' knowledge and use of instructional strategies. She surveyed middle school teachers and found that general educators did not use many of the instructional methods that researchers have proposed to be effective in contributing to the academic success of students with mild disabilities.

Research on Beliefs About Mathematics Teaching

Much of the existing literature on teachers' beliefs about the subject of mathematics and mathematics instruction has focused on three issues: the relationship between teachers' beliefs and knowledge; the influence of teachers' beliefs on instruction; and the role teacher education programs play in both altering teachers' beliefs and fostering an awareness of the importance beliefs play in instruction.

Many researchers have investigated the relationship between mathematics teachers' knowledge and beliefs (Nespor, 1987; Borko, Eisenhart, Brown, Underhill, Jones & Agard, 1992; Pajares, 1992) and have proposed that both concepts have different definitions, motivations, and correlations with instruction. In their study, Peterson,

Fennema, Carpenter and Loef (1989) found that mathematics teachers' pedagogical content beliefs and knowledge seemed to be interrelated and potentially connected to instructional practice, as well as students' understanding of mathematics. Borko et al. (1992) also found mathematics knowledge and beliefs to be related.

Past research has found correlations between teachers' beliefs and instruction (Mewborn, 2002; Stipek, Givvin, Salmon & MacGyvers, 2001; Wilson & Goldenberg, 1998; Kagan, 1992; Thompson, 1992; Thompson, 1984). In an investigation (Stipek et al., 2001) of the mathematics beliefs and practices of fourth- through sixth-grade teachers, the researchers concluded that teachers with traditional beliefs seemed to rely more on traditional practices, emphasizing "performance" (high grades, correct answers) and "speed" rather than comprehension (p. 223); hence, the researchers surmised that beliefs do influence instructional practice. In their case studies of elementary and middle school mathematics teachers, Mewborn (2002) and Wilson and Goldenberg (1998) arrived at similar conclusions—to some degree, beliefs definitely influence instruction.

If beliefs do, indeed, appear to influence practice, teachers need to shift their beliefs to align more with the standards put forth by the National Council of Teachers of Mathematics (NCTM) (Stipek et al., 2001), which advocates an "inquiry-oriented" or "constructivist" (Stipek et al., 2001, p. 214) approach to mathematics instruction.

Teachers need to adopt beliefs that inspire them to "give up some of their control over mathematical activity and allow students to initiate their own strategies to solve problems and grapple with contradictions" (Stipek et al., 2001, p. 215).

The Role of School Administrators

Faced with unfamiliar and demanding responsibilities, general education teachers struggle to adapt to inclusive environments. They cannot accomplish what many general educators perceive to be a daunting challenge, without support and direction from school administrators. Since effective principals also fill the roles of instructional leaders, principals must confront this new challenge along with their teachers. Principals, as well as district administrators, must provide general educators with sufficient professional development opportunities, adequate resources, and additional time for instructional preparation.

If principals are to be a major force in the implementation of inclusion programs, it is beneficial to understand their attitudes toward and knowledge of inclusion. Barnett and Monda-Amaya (1998) surveyed principals of Illinois schools on their definitions of inclusion, their leadership styles, and their perceptions of effective inclusive practices and implementation. There was a low level of consensus on one of the survey's items, which stated that 'all children should be educated in the regular classroom.' Furthermore, only 30% of the principals described themselves as visionary leaders, which is the leadership style promoted by experts in the implementation of inclusive schools. Barnett and Monda-Amaya's (1998) findings supported the view that principals lacked an explicit, consistent definition, comprehension and knowledge of inclusion, and inclusive strategies. Principals' inabilities to express an exact understanding of inclusion and students with disabilities may stem from the fact that most educational administration programs do not emphasize special education in the coursework (Brownell & Pajares, 1999).

In their research on general education teachers' efficacy beliefs on teaching students with disabilities, Brownell and Pajares (1999) determined that both teachers' perceptions of collegiality (with both general and special educators) and their perceptions of the quality of inservice programs directly impacted teachers' perceptions of their competence teaching students with disabilities. Larrivee and Cook (1979) suggested that teacher perception of successful instruction of students with disabilities is the most important variable affecting general educators' attitudes toward inclusion.

In addition, Brownell and Pajares' (1999) findings suggested that strong administrative support for inclusion directly influenced collegiality (again, with both general and special educators). Collegiality is a necessary component in the successful implementation of inclusion programs and is at the root of collaboration. McLeskey and Waldron (2002) found that teacher cooperation, sharing ideas, and pooling resources proved to be the foundation of inclusive elementary school programs. It is the responsibility of administrators to foster teacher collaboration and cooperation in schools with inclusive settings through designating more time for general educators to interact with special educators outside of the classroom.

Finally, for the design and implementation of inclusive programs to be successful, administrators must commit themselves to planning professional development and building support groups that increase the efficacy of general educators, thus enhancing teachers' perceptions of competence in teaching students with disabilities. Valuable inservice training should include information on the diverse needs of students with disabilities, curricular and instructional modifications for these students, as well as strategies on behavior management (Brownell & Pajares, 1999). Furthermore, prior

research has shown that teachers who played a role in the design of inclusive programs demonstrated significantly more constructive and confident attitudes about inclusion. Therefore, administrators must involve general education teachers in the design and implementation phases of inclusion. If general education teachers are responsible for teaching students with disabilities, they should be encouraged to team with special educators in deciding ways to create the most conducive environment for this diverse population of students.

The Role of Teacher Education Programs

With the increase in the number of students being served through inclusion, coupled with the emphasis on standards and accountability, teacher education is also an important component in this mix and must be carefully examined, especially in relation to the emphasis placed on content areas, pedagogical strategies, and theoretical knowledge versus practical application.

As a rule, students studying to be general education teachers have not been adequately exposed to the field of special education. General education preservice teachers have not been required to take a sufficient number of special education courses or given the dual certification options in general/special education. In addition, general education preservice teachers have not been assigned student teaching duties in inclusive environments. In their study of 58 postsecondary education departments in the state of New York, Kearney and Durand (1992) found that over two thirds of the programs were not accredited by the National Council for Accreditation of Teacher Education (NCATE). Furthermore, more than half of teacher education programs required less than one class in

special education or child psychopathology, and more than two thirds of these programs expected students to spend less than 16 hours in an inclusive classroom.

Reed and Monda-Amaya (1995) surveyed undergraduate instructors who taught courses in exceptional children to general education majors and found that 62% of the instructors had structured their courses as special education survey courses, whereas only 35% of the instructors combined both survey and methods components. Further, only one of the institutions involved in the investigation employed a text that highlighted instructional methods for students with disabilities in inclusive classrooms. Most of the instructors chose materials that concentrated on the traits of students with disabilities.

Researchers suggest that teacher preparation programs are not addressing the instructional needs of general educators, and teacher educators are not fostering a cohesive bond between general and special education teachers. In their qualitative study, Hasazi, Johnston, Liggett and Schattman (1994) found that higher education might actually be creating more of a chasm between general and special education, especially through instruction and curriculum. Since inclusive environments require a commitment on the part of both general and special educators to work together for one common goal, educating *all* students, the coursework of teacher preparation programs should emphasize collaborative strategies such as team and cooperative teaching methods (deBettencourt, 1999; McLeskey & Waldron, 2002).

In addition, teacher education programs have been criticized for their failure to provide opportunities for preservice teachers to examine their philosophies, beliefs, and attitudes on instruction. Teacher education programs should be responsible, in part, for fostering in teachers an understanding and awareness of their beliefs. By not encouraging

reflection on instructional beliefs and philosophies, teacher educators are ignoring the existing research (Mewborn, 2002; Stipek et al., 2001; Wilson & Goldenberg, 1998; Raymond & Santos, 1995; Borko et al., 1992; to name just a few) that has supported a relationship between teachers' beliefs, attitudes, and actual instruction, particularly with mathematics teachers. General educators should be required to participate in effective inclusive programs and afforded time during methods classes to engage in conversation and reflection on inclusive strategies (Reed & Monda-Amaya, 1995).

For example, it has been recommended that mathematics methods courses provide opportunities for preservice teachers to reflect on and examine their philosophies about instruction and learning. Since demands (e.g., student teaching, coursework, etc.) on preservice teachers can be daunting, they do not have the time to ponder their beliefs about mathematics (Borko et al., 1992). It has also been suggested that methods courses incorporate strategies such as cooperative learning and reflective journals. These instructional tools, combined with mathematics problem solving, encourage mathematics teachers to explore their current beliefs systems (Raymond & Santos, 1995). Also, teacher educators must strive to challenge, alter, and shape mathematics teachers' fundamental beliefs about learning, teaching, and learning to teach (Borko et al., 1992; Nespor, 1987). In addition to including reflective opportunities for mathematics teachers, teacher educators must shift from a strict emphasis on theoretical knowledge to an emphasis on practical knowledge (Borko et al., 1992; Ernest, 1989; Fang, 1996). Instead of providing more theories for preservice teachers to memorize, teacher educators must aid teachers in comprehending "the complexities of classroom life and how to apply theory within the constraints imposed by those realities" (Fang, 1996, p. 59).

Finally, the instructional methods of teacher educators need to be closely examined. It is not enough to support mathematics general educators in their quest to understand their beliefs, in hopes of increasing the consistency between beliefs and instruction. Teacher education programs must also encourage their faculty to adopt a “practice-what-you-preach” mentality. After all, teacher educators must not forget that their beliefs also influence current and prospective teachers through the instructional practice teacher educators demonstrate in their own university classes (Thompson, 1992). Institutions of higher education should strive to be prototypes for collaboration, modeling collaborative strategies, which have proven to be effective in the design and implementation of inclusive programs, in individual methods classes (deBettencourt, 1999; Lesar, Benner, Habel & Coleman, 1997). Mathematics teachers should be exposed, first-hand, to unique and innovative pedagogy (Raymond & Santos, 1995). Teacher education programs should offer preservice mathematics general educators such an experience.

There has been extensive research on general education teachers' attitudes toward inclusion overall and the role that beliefs play in mathematics pedagogy. However, no research exists to date that links the two areas in a way that reveals how students with disabilities experience learning in the content area while in inclusive placements. Since inclusive practices are rapidly growing, Cochran (1998) is correct in his assessment of the current state of education—“all teachers [have] become teachers of special education students” (p. 4). Nowadays, given the expansion of inclusion, an individual is not required to have a certification or a degree in special education to be assigned the responsibility of teaching students with disabilities. Teacher education programs, as well

as school administrators, are now faced with the urgent task of preparing general education majors to succeed in getting *all* students to achieve in inclusive classrooms.

The purpose of the current study was to examine middle school general education mathematics teachers' beliefs about and knowledge of inclusive instruction and to assess whether or not teachers' classroom practices reflected their beliefs and knowledge.

This study investigated the following four questions:

- 1) What are the beliefs of general education middle school mathematics teachers about inclusion of students with learning disabilities, and how are these beliefs reflected in their instructional practices?
- 2) What is the knowledge-base of general education middle school mathematics teachers regarding inclusive practices for students with learning disabilities, and how is this knowledge-base reflected in their instructional methods?
- 3) What support mechanisms and resources are middle school administrators providing for general education mathematics teachers to help them succeed in teaching mathematics in inclusive settings?
- 4) What strategies are higher education teacher preparation programs using to prepare general educators to teach in inclusive middle school mathematics classrooms?

Methods

Quantitative Component

Initial Questionnaire

Since the main purpose of the study was to investigate middle school general education inclusive mathematics teachers' pedagogical beliefs and knowledge and to

determine whether their classroom practices reflected these beliefs and knowledge, first it was critical to design an instrument that would adequately assess the beliefs and knowledge of the sample, prior to observing a portion of the sample's instructional behavior.

The *Survey on Teaching Mathematics to Students With Learning Disabilities in Middle School* (DeSimone & Parmar, 2004; see Appendix I) was designed as a three-part questionnaire: Part I, which contained 12 items, focused on obtaining descriptive data of both the participant (e.g., gender, educational history, number of years teaching) and the school where the participant taught (e.g., type of school—urban, public, etc., size of school, number of students in the inclusive classes). Part I was also used to collect data on participants' perceptions of the level of administrative support and available resources for inclusive teaching (e.g., choices ranged from *extremely low* to *extremely high*). Part II, which was comprised of 16 items, used a five-point (rated from *strongly agree* to *strongly disagree*) Likert scale to measure participants' beliefs toward inclusive mathematics classes, students with LD, and teacher education programs in the preparation of general educators to teach in inclusive classrooms.

The items from Parts I and II were adapted from existing research (Larrivee & Cook, 1979; Coates, 1989; Chow & Winzer, 1992; McLeskey et al., 2001) on teachers' beliefs and inclusion. Part III of the questionnaire (contained 28 items) had two dimensions and used a four-point (rated from *very comfortable* to *not comfortable*) Likert scale to assess participants' level of comfort in their abilities to both 1) adapt their mathematics instruction for students with various LD learning characteristics, and

2) adapt their instruction for students with LD in specific topics within the middle school mathematics curriculum (topics were taken from the New York State Core Curriculum for grades seven and eight). The greater understanding a teacher has of the learning characteristics of students with LD, as well as knowledge of various mathematics instructional strategies for students with LD, the more likely a teacher will feel comfortable using such strategies in his/her inclusive mathematics classes. This was the logic for measuring teachers' levels of comfort for instructional adaptations.

To determine the validity of the survey instrument, a pilot study was conducted. However, prior to piloting the questionnaire, several individuals who had experience with teaching mathematics to students with LD were asked to review the survey and provide their comments. Minor changes in relation to certain word choices were made based on the reviewers' comments. Over a span of two months, the pilot study was conducted with a purposive sample of 27 middle school mathematics general educators who had been teaching in an inclusive classroom for at least one year. The participants all taught at public middle schools, both urban and suburban, in New York State; close to 82% taught in schools with 800 or more students. Sixty-three percent of the participants had a master's degree or higher, with close to 52% having certification in mathematics secondary education.

All data were analyzed using SPSS. A simple frequency analysis was performed for the items in Part I, to provide descriptive statistics on the participants and the schools where they taught. Separate reliability analyses were conducted for the three types of items: general beliefs; the adaptation of instruction to fit the learning characteristics of students with LD (abbreviated as *characteristics*); and the adaptation of instruction to

effectively teach middle school mathematics topics to students with LD (abbreviated as *topics*). The Cronbach's alpha coefficients, for the three subscales, were somewhat high for *characteristics* (.92) and *topics* (.90), but low for *general beliefs* (.71). The Cronbach's alpha for all of the items together was .89.

After calculating the alpha coefficients, an item analysis (Walsh & Betz, 1990; Rust & Golombok, 1989; Anastasi, 1976) was undertaken to examine ways to increase the reliability and validity of the instrument, especially the *general beliefs* subscale. After an examination of the facility index and discrimination (Walsh & Betz, 1990; Rust & Golombok, 1989) of all the items, it was found that four items in the *general beliefs* subscale had rather low correlation coefficients. For two of the four items, many of the participants who completed the pilot survey seemed to respond with similar responses; therefore, an adequate judgment of the validity of the actual questions could not be made, so it was decided to leave these two items in the final version of the questionnaire. (These items read as follows: *In inclusive mathematics classrooms, general education teachers often are the primary ones responsible for modifying instruction for students with LD* and *In inclusive mathematics classrooms, general education teachers have the major responsibility of ensuring that the students with LD succeed academically.*) However, after looking at the individual responses to the other two items (items five and nine in the *beliefs* subscale), it was decided to omit the items from the final version of the questionnaire. (The items that were omitted read as follows: *When students with LD are taught mathematics in general education classes, significant changes in instruction are required* and *General education teachers prefer sending students with LD to resource*

rooms, rather than having resource teachers provide mathematics support in the inclusive classrooms.)

After the omission of the two items discussed, Cronbach's alpha coefficients were again performed for the beliefs subscale (.75) and for the total number of items (.90) on the questionnaire. These new alphas were deemed acceptable for the research objectives.

Final Questionnaire

The final version of the questionnaire was now ready to distribute widely. In summary, after the weaknesses that were revealed from the pilot study, the final version of the *Survey on Teaching Mathematics to Students With Learning Disabilities in Middle School* (DeSimone & Parmar, 2004) contained three parts: 1) background information (12 items); 2) general beliefs subscale (14 items); and 3) characteristics (11 items) and topics (17 items) subscales.

The final questionnaire that resulted from the pilot process required 54 responses of various kinds. Part I contained 12 questions that collected descriptive data (e.g., gender, educational level, certifications held, number of years teaching, etc.) of the respondents. Part II was comprised of 14 items using a five-point (rated from *strongly agree* to *strongly disagree*) Likert scale. Part III contained 28 items that requested respondents to categorize their level of comfort (rated from *very comfortable* to *not comfortable*) in making specific instructional adaptations for students with LD. Finally, Part IV, which was an optional section, asked respondents to list their name and telephone number if they were willing to volunteer for a phone interview.

In an attempt to avoid regional biases, a sample of teachers was recruited from across the United States. Initial contact, via telephone, letter, or e-mail correspondence,

was made with university professors who taught graduate mathematics methods courses in hopes of having them distribute surveys to any inservice inclusive mathematics middle school teachers currently enrolled in the professors' graduate courses. However, this method did not prove to be as successful as originally thought. Although many of the professors who were originally contacted could not aid in the distribution of surveys, they did refer the researcher to various organizations, listservs, and specific individuals who proved to be helpful with the data collection phase. Through such contacts, the researcher was able to secure surveys from a variety of states across the nation.

If a response was not received within a three to four-week period, a follow-up phone call was made or an e-mail was sent. A total of 356 surveys were mailed to teachers who fit the appropriate criteria, and 223 surveys were received, resulting in a 62.6% return rate.

Qualitative Component

Interview and observation data were collected during a span of six months. Each teacher was observed for one period, which ranged from 39 to 60 minutes, teaching an inclusive mathematics class. Each teacher was also interviewed, in person (one in-depth interview was conducted over the telephone), using the same interview schedule, for approximately one hour. Narrative, open-ended, scripting of all observed teacher actions at the selected sites, which were pertinent to mathematics instruction for included students, occurred during the observations. Each script was typed within 24 hours of the initial observation. All interviews were tape recorded and were transcribed within 24 hours of conducting the interviews. After the initial transcriptions were finished, each transcription was checked (compared with the original tape cassette) twice for accuracy.

Qualitative data were then analyzed using the constant comparative method (as discussed in Bogdan & Biklen, 1998).

Interview Schedule

The interview questions were based on the main themes found in the *Survey on Teaching Mathematics to Students With Learning Disabilities in Middle School* (DeSimone & Parmar, 2004). The interview schedule (see Appendix II) for the in-depth interviews, comprised of twelve questions (some included multiple layers), followed the general outline of the surveys but in a more open-ended manner (semi-structured). For example, participants were asked to comment on a variety of topics that included, but were not limited to, undergraduate and graduate educational experiences, definitions of students with LD, instructional and curricular adaptations, available resources, and level of administrative support.

Additional interviews, via the telephone, were conducted with survey respondents who had volunteered. Overall, a total of 41 survey respondents had volunteered for follow-up interviews. Although the largest portion of surveys was from the state of New York, since the initial observations and interviews were conducted in New York, this state was omitted from any additional telephone interviews. Eight respondents were chosen from the six states (Massachusetts, Pennsylvania, Rhode Island, New Hampshire, Texas, and Colorado) with the next largest percentage of surveys. These telephone interviews were more directed than the in-depth interviews conducted with New York State middle school teachers and consisted of only eight questions (see Appendix III). These telephone interviews were not audio taped; instead, during the interview, notes were simultaneously entered into a laptop computer.

Results

Demographics of Participants

Survey Respondents

A total of 223 survey responses were obtained from the various methods employed to contact individuals (described in the methods section). The demographic characteristics of the respondents are presented in Table 1, below.

Table 1

Demographic Characteristics of Survey Respondents

Characteristics	No. (%) ^[a]
Gender	
Female	157 (70.4)
Male	59 (26.5)
Educational Level	
Bachelor Degree	23 (10.3)
Master's Degree (completed or pursuing)	179 (80.3)
Professional Diploma (completed or pursuing)	16 (7.2)
Doctoral Degree (completed or pursuing)	5 (2.2)

(table continues)

Table 1 (continued)

Characteristics	No. (%) ^[a]
Years of Experience Teaching	
1-2	40 (17.9)
3-8	65 (29.1)
9-14	48 (21.5)
15 or >	70 (31.4)
Years of Experience Teaching Inclusion	
1-2	66 (29.6)
3-5	66 (29.6)
6-10	41 (18.4)
10 or >	49 (22)

[a]The number of respondents varied because of missing cases.

A total of 223 general education teachers responded to the survey, representing a total of 19 different states from all geographic regions of the United States. Close to 49% of the teachers ($n = 108$) were from suburban school districts, followed by 25.1% urban ($n = 56$) and 14.8% rural ($n = 33$). Approximately 12% of the respondents ($n = 26$) did not classify their school district. The majority of teachers taught in schools that had more than 500 students (77.1%, $n = 172$), with the average inclusion class-size falling between 21 and 30 students. Approximately half the respondents identified themselves as public school teachers (51.6%, $n = 115$), 2% indicated they were private school teachers, and the

remaining teachers did not describe this aspect of their schools. The sample was thus a fair representation of middle schools across the country as described by the National Center For Educational Statistics (NCES, 2003), in their report on Public Elementary and Secondary Schools. According to the NCES data, the average size for middle schools is 612 students, with 57% of schools being located in suburban areas, and 18% in major urban areas.

The majority of respondents were female (70.4%, $n = 157$). Sixty-three percent of these teachers ($n = 141$) possessed a master's degree or higher, and 36.6% ($n = 75$) held two or more teaching certifications (e.g., elementary, secondary, special education, mathematics, administrative, etc.). More than half (52.9%) of the respondents ($n = 118$) had been teaching for longer than eight years. All respondents were currently teaching at least one middle school (sixth-, seventh-, or eighth-grade) mathematics class that contained students classified as learning disabled.

Follow-up telephone interviews were conducted with eight teachers, who had volunteered, via the survey, to participate in such interviews. The purpose of these interviews was to obtain some additional insight into survey responses. Two participants were from Rhode Island (RI); two were from New Hampshire (NH); and one participant each from Massachusetts (MA), Colorado (CO), Texas (TX), and Pennsylvania (PA). It was decided not to conduct telephone interviews with respondents from New York State, since observations and in-depth interviews were being conducted with teachers in New York.

In-depth Interview and Observation Participants

Teachers

A purposive sample of seven teachers (see Table 2) was chosen for the qualitative component of the research study. The teachers were similar to the national population of middle-school mathematics teachers in their age-range, possession of a master's degree, and certification in their subject. The teachers were all females whose ages ranged from 30 years old to 52 years old. All of the participants had master's degrees, and one was currently working on additional certification in administration. The teaching experience of the participants ranged from the first year of teaching to 26 years of teaching. Also, the participants had been teaching some form of mathematics inclusion from one to 13 years. The sample of participants was thus consistent with the national sample of middle school teachers. The sites, however, were not typical in that the schools were larger than the national average, located in small suburban districts bordering a major metropolitan area and were economically in the middle- to upper-middle class range.

Table 2

Demographic Characteristics of In-depth Interview and Observation Participants

Participant[a]	Age	Yrs. Teaching Math	Yrs. Teaching Inclusion	School[a]	Grade
Lauren	31	9	3	Hawthorne	8
Maggie	47	26	13	Hawthorne	8

(table continues)

Table 2 (continued)

Demographic Characteristics of In-depth Interview and Observation Participants

Participant[a]	Age	Yrs. Teaching Math	Yrs. Teaching Inclusion	School[a]	Grade
Kylie	40	12	4	Hawthorne	8
Jess	33	1 st Yr.	1 st Yr.	Hawthorne	7
Sam	52	16	1 st Yr.	Dickinson	6
Aimee	30	4	2	Dickinson	7
Naomi	37	10	3	Blake	8

[a]Pseudonyms were used for both teachers and schools.

The teachers had between two to six students with LD included in their mathematics classes. In six classrooms there was a teacher's aide available to assist in instruction and monitoring. However, classroom observations indicated that the level of participation by the aides varied from being highly involved to being minimally involved in classroom instruction. Four teachers also had a special education teacher come into their classroom during the mathematics lesson to assist students with LD and other students in need of assistance. At each site there was time available during the school day for students who requested extra help in academic subjects, including mathematics. This time was available to all students.

Schools

The teachers taught in three different suburban, public middle schools located within New York State: Hawthorne, Dickinson, and Blake Middle Schools. The majority of the students from these schools were classified as middle- to upper-middle socioeconomic status. Hawthorne Middle School had approximately 900 students (300 per grade). Inclusion began at Hawthorne in 1994, and during the first year only, common planning time was scheduled with the special education teachers. Hawthorne's mathematics department was comprised of 13 teachers: 10 were tenured; three were not tenured. The mathematics department encompassed a range of teaching experience (26 years to first-year of teaching). Every teacher was required to do 20 hours per year of professional development. For untenured teachers, 16 hours were comprised of mandated workshops. In addition to the 20 hours, four school days were devoted solely to professional development activities. In the past, the New York State Math A Regent's exam was administered in the ninth grade, and normally, 82% to 87% of Hawthorne students passed the Regent's. Starting in 2003-2004, the Math A Regent's was administered to the eighth-grade classes. The results were not available at the time this study was conducted.

Dickinson Middle School had approximately 1000 students (350 per grade). Inclusive mathematics education began in 2002 at Dickinson and started in the seventh-grade classrooms. In 2003, inclusion expanded to include the sixth- and eighth-grade mathematics classrooms. There were ten mathematics teachers at Dickinson: eight were tenured, and two were untenured. Teaching experience ranged from 32 years of teaching

to two years of teaching. Normally, 79% of Dickinson eighth graders scored above the passing level on the New York State mathematics test.

Approximately 1100 students (350 to 400 per grade) attended Blake Middle School. In 2002-2003, close to 85% of their eighth graders scored above the appropriate level on the New York State mathematics test. Traditionally, Blake had not scored well on the New York State mathematics testing. The 2002-2003 mathematics scores were the best Blake students had achieved in years. According to Blake's mathematics department chair, a great deal of effort (e.g., Saturday classes, after-school review sessions, individualized instruction, etc.) was devoted to raising the eighth-grade mathematics test scores. There were eleven mathematics teachers at Blake: four were tenured, and seven were untenured.

Research Question #1: What are the beliefs of general education middle school mathematics teachers about inclusion of students with learning disabilities, and how are these beliefs reflected in their instructional practices?

Teachers' General Beliefs About Inclusion

Teachers' beliefs concerning characteristics of students with learning disabilities, inclusion, as well as teachers' roles and responsibilities in inclusive classrooms were all examined. There were eleven questions on the survey that assessed teachers' general opinions on inclusion and students with learning disabilities (see Table 3).

Table 3

General Educators' Beliefs Regarding Inclusion and Students with LD

Beliefs Statement	No. (%) ^[a]				
	SA ^[b]	A ^[b]	U ^[b]	D ^[b]	SD ^[b]
Students with LD –					
Should be afforded every opportunity to learn math with general ed students	66 (29.6)	114 (51.1)	24 (10.8)	16 (7.2)	3 (1.3)
Are best taught math in inclusive classrooms	23 (10.3)	70 (31.4)	84 (37.7)	38 (17)	8 (3.6)
Will have a better chance in society learning math in inclusive classrooms than resource rooms	29 (13)	70 (31.4)	68 (30.5)	50 (22.4)	5 (2.2)
In inclusive math classrooms –					
Students with LD cause the most behavioral problems	8 (3.6)	39 (17.5)	29 (13)	101 (45.3)	46 (20.6)
General ed teachers are responsible for modifying instruction for students with LD	61 (27.4)	86 (38.6)	24 (10.8)	42 (18.8)	10 (4.5)

(table continues)

Table 3 (continued)

Beliefs Statement	No. (%) ^[a]				
	SA ^[b]	A ^[b]	U ^[b]	D ^[b]	SD ^[b]
In inclusive math classrooms –					
General ed teachers are responsible for ensuring that students with LD succeed academically	63 (28.3)	92 (41.3)	24 (10.8)	40 (17.9)	4 (1.8)
Student with LD require more time from teachers than general ed students	69 (30.9)	93 (41.7)	24 (10.8)	31 (13.9)	5 (2.2)
General ed teachers –					
Are given sufficient time to prepare for teaching math inclusion	9 (4)	44 (19.7)	42 (18.8)	81 (36.3)	46 (20.6)
Are comfortable team teaching math with special ed teachers	23 (10.3)	81 (36.3)	74 (33.2)	37 (16.6)	7 (3.1)
For the most part, middle schools are effectively implementing inclusive programs	12 (5.4)	53 (23.8)	69 (30.9)	60 (26.9)	28 (12.6)
Resource rooms are effective in meeting the math learning needs of students with LD	17 (7.6)	62 (27.8)	70 (31.4)	57 (25.6)	14 (6.3)

[a]The number of respondents varied because of missing cases.

[b]Abbreviations for *strongly agree*, *agree*, *undecided*, *disagree* and *strongly disagree*, respectively.

During the interviews, participants were asked to share their definition of a student with a learning disability. Participants were also asked to discuss how inclusion was working at their respective schools and whether or not they thought inclusive education was being effectively implemented. Further, participants were asked to list the three most important roles or responsibilities of the general educator in an inclusive classroom.

Beliefs About Students with Learning Disabilities

Approximately four out of five (80.7%) of the survey respondents ($n = 180$) agreed or strongly agreed with the statement that students with LD should be afforded every opportunity to learn mathematics with general education students. However, less than half (41.7%; $n = 93$) believed that students with LD are best taught mathematics in an inclusive classroom, and a large percentage (37.7%) of the respondents ($n = 84$) were still undecided on this issue. The responses indicate a conflict between beliefs about equal opportunity for students with LD when considered broadly and reservations about how this equality could be achieved when making instructional or placement decisions. Since the respondents were currently teaching in inclusive classrooms, their responses appear to indicate that they did not personally find the instructional placement to be best for the students with LD in their classrooms.

Most of the interview participants did not fully agree that mathematics inclusive classrooms provided the most effective learning environment for students with LD. Several of their comments were related to their observation that students with LD cannot cope with the general education curriculum.

Maggie asserted,

I wonder why everyone needs to move on—why they’re as a group . . . it seemed a shame that certain kids were grouped here, and they *all* [emphasis] had to move into math . . . they might have been better off in a math—in a different possible setting because sometimes they, you know, it’s—it’s hard. You look at the group of kids, and I’m never going to get these kids at this level . . . we hear what percentage they’re on, some of them are just bottom—bottom, and you know, trying to teach them Math A is—is not easy.

Further, interview participants did not appear to have high expectations for their included students. For example, Naomi said, “We seek to just get the 70. We’re not seeking the 100 if we can’t get to it . . . we set our expectations that the students can achieve.”

Lauren claimed,

Most of them [included students] fail . . . I can tell you, right now [in September], who’s going to fail . . . I hate it—I hate already knowing . . . but usually it’s the kids who don’t do their homework, and it’s the kids that don’t have support at home . . . it’s the kids who are learning disabled, and some of them have all three of those issues . . . how can you, you know, create an achiever out of that?

The observations in the classrooms further supported the notion that students with LD, for the most part, are not able to meet the curriculum demands of the grade level. In Maggie’s classroom there were three students with LD. Of these, two appeared to be just scribbling in their notebooks rather than taking meaningful notes. The teacher tried to

provide some individual assistance to one of the students but moved on to other students without really remediating the problem. On several occasions, it was observed that the teacher indicated to a student with LD that the student had made an error but did not provide any specific corrective feedback (e.g., Jess, Kylie).

The role of the teaching assistants during the observations was also observed to vary from high involvement to low involvement. For the most part, teaching assistants primarily helped students with LD get back on task when they were distracted (Maggie's class, Naomi's class). Occasionally, teaching assistants were observed moving about and providing some instructional help when students engaged in individual desk work. In two classrooms, the teaching assistants were observed to be almost completely disengaged from any of the instructional activities in the room (Kylie's class, Lauren's class). In only one of the classrooms (Sam's) was the teaching assistant very involved in providing instructional assistance to students with and without LD.

Beliefs About Implementing Inclusion

Survey respondents were largely divided in their beliefs about the effective implementation of inclusion by middle schools. Only 29% of the mathematics teachers ($n = 65$) agreed or strongly agreed that middle schools were successfully executing inclusive practices, whereas 39.5% ($n = 88$) disagreed or strongly disagreed. Thirty-one percent ($n = 69$) were undecided on this issue. (One respondent (.4%) omitted this question.)

The in-depth interviews also reflected a division in beliefs about the effectiveness of middle school inclusion. Three out of the seven interviewees firmly believed that their schools were successfully carrying out inclusive practices.

Sam declared,

We're thrilled with the success that we're meeting with . . . I think that they [included students] came up thinking that—that they were going to meet with tremendous failure, and the fact that we're able to get to them really, really makes us feel very gratified.

Kylie felt that her middle school inclusion program was “working very well,” and Naomi stressed that her school was “doing wonders as far as inclusion . . . children come away with learning skills that they—they thought they never had in math.”

On the other hand, some of the participants thought that inclusion had tremendous socialization benefits but was lacking in educational benefits. Aimee asserted,

They're [included students] not getting anything out of it. They're just being pushed along . . . I think we should have—or *all* [emphasis] schools should have some sort of a vocational-type thing where they can learn something that they might be able to use. I mean, let's face it, not every kid is college-bound . . . college is not for every single kid . . . I think it's just frustrating them . . . they can't pass a test to save their lives . . . if you ask them a question . . . you ask them what 5×3 is—*they don't know* [emphasis]!

Lauren seemed to be in agreement. She stated,

The math that we're doing is over the heads of many of them . . . and sometimes it's not always the best place for them . . . many of them cannot do it without the help of a teacher next to them . . . I don't know if it's always fair to put this kid in this, you know, supposedly it's fair because

they're getting equal opportunity. But is it fair to put a kid, like some of these . . . who can't even, like, focus on a problem, much less read a word problem and do it on his own . . . but I don't know if there's an answer other than—you know how they have these specialty schools, like trade schools.

Jess felt that inclusion was only working for her students because they were “higher functioning special ed children,” and in general, inclusion would not work for her “lower-end” students. She described inclusion as

a real eye-opening experience—what one teacher can be dealt in one classroom . . . the truth is . . . I walked in here, and if I had a different personality, it could have been disastrous because—it's incredible what they give you.

Jess did believe that there was “tremendous opportunity for children to be included in the classroom,” but she did not think that students should be included for every subject, including mathematics.

Although there was still a large percentage (30.5%) of respondents ($n = 68$) undecided about the benefits of resource rooms in comparison with inclusive classrooms, less than half (44.4%) of the respondents ($n = 99$) agreed or strongly agreed with the following statement: ‘Students with LD in inclusive classrooms have a better chance in society than from resource rooms.’ However, when asked to rate whether resource rooms were more effective in meeting the mathematics learning needs of students with LD, once again, results were closely split; 31.9% ($n = 71$) disagreed or strongly disagreed; 35.4% ($n = 79$) agreed or strongly disagreed; and 31.4% ($n = 70$) remained undecided. (Three,

1.3%, respondents omitted this question.) The varied responses indicated many middle school mathematics teachers were doubtful that the resource room model effectively ensured learning of mathematics; however, they observed that students were not learning very effectively in inclusive placements either. It would appear that, on meeting mathematics learning needs, both placements (resource room or general education setting) would need considerable enhancement.

In the classroom it was observed that students with LD were being presented with the general education curriculum by teachers who were certified to teach mathematics. However, as noted above, many of the students were not able to master the concepts. Even the teachers who thought that inclusion was working in their schools were not observed to provide much individualized attention to the included students. In fact, on many occasions, students with LD were distracted and off-task for long periods of time before they received any attention from either the teacher or teaching assistant.

No evidence of specially designed instruction that met students' individual learning needs was observed. On one occasion, a student tried to copy work from peers, and he was reprimanded (e.g., Lauren's class). In two classrooms all students used colored markers when reading, but students with LD were not given any specific directions or information on how to best use the markers to aid in their learning process. A few of the students were allowed to use calculators to work on individual calculation problems, but there was no real check to see if they understood the concepts being taught. Only two teachers (Jess, Sam) mentioned giving included students notes in advance of the class to ease the note-taking burden.

Beliefs About Roles and Responsibilities of the General Educator

Two-thirds of the survey respondents believed that, as general educators teaching mathematics inclusion, they were the ones who were primarily responsible for modifying instruction (66% agreed or strongly agreed, $n = 147$) and ensuring that their students with LD succeeded academically (69.6% agreed or strongly agreed, $n = 155$).

However, the observations and in-depth interviews suggested something different. For example, during an observation, Aimee could not recall who her included students were and had to ask the special education teacher. Aimee firmly stated, “[Special education students] are under the guidance of the other teacher that’s in here. I mean, I give them a grade just because they’re on my sheet, but their grade is basically calculated by the other teacher.”

Clearly, Aimee was not alone in her beliefs that the major responsibility of the mathematics teacher was to teach the content area, and that it was up to the special education teacher to modify instruction. Maggie explained that it was important “to work cooperatively with that person [special education teacher]—they’re not the expert in math. They’re more the expert on the level of the child.”

Further, when participants were asked, ‘What do you think are the three most important roles/responsibilities of the general educator teaching in an inclusive classroom?’ not one participant raised the issue of modifying instruction. For the most part, participants saw themselves as a “facilitator . . . helper or friend” (Sam), whose role was to “make the child feel like everybody else in the room” (Jess), give “the underdog a chance so to speak,” (Jess), “follow the curriculum” (Aimee), and “teach the content area” (Kylie). Only Naomi appeared to see her role as more encompassing than just teaching straight content. She asserted that part of her responsibility as the general

educator was “to be aware of the student that you have in front of you, how they learn, what their experiences are—give individual attention.”

A large majority (65.9%) of respondents ($n = 147$) disagreed or strongly disagreed with the statement that students with LD cause the most behavioral problems in inclusive classrooms. Yet, still close to one-fourth (21.1%) of the respondents ($n = 47$) agreed or strongly agreed that students with LD do cause the most behavior problems. Students with LD demonstrate a wide variety of learning and behavioral difficulties, and it would be interesting to further explore the specific behaviors that would be considered most problematic for teachers.

During the classroom observations, the inappropriate behaviors most often observed were distractibility and daydreaming. In most cases these were dealt with by a teacher or teacher aide asking the student to get back on task, either verbally or through gestures. The reasons for the distractibility were seldom explored (e.g., not understanding the material, not being able to keep up with note-taking). One student was observed to be overly active (Jess’ class). This student was given tasks to assist the teacher, such as handing out papers, which appeared to be an appropriate channel for his high level of activity. One student who was very withdrawn (Naomi’s class) simply ignored any prompts to get on task and was not engaged for the lesson.

Research Question #2: What is the knowledge-base of general education middle school mathematics teachers regarding inclusive practices for students with learning disabilities, and how is this knowledge-base reflected in their instructional methods?

Knowledge-base of Learning Disabilities

To examine the ways in which general education middle school mathematics teachers' knowledge-base is reflected in their inclusive instructional methods, it was first necessary to assess teachers' understanding of learning disabilities and the different needs of students with LD, as well as teachers' level of comfort adapting instruction to meet the needs of specific learning characteristics of students with LD.

During the in-depth interviews, participants were asked to define "learning disability" and create a profile of this type of student. Participants were also asked to comment on the various types of specialized instruction they thought a student with LD needed to effectively learn mathematics.

With the exception of Aimee who claimed that she did not "know much about learning disabilities," the other seven participants cited difficulty in "understanding" and "processing" as the primary characteristics of a student with LD. For example, Sam identified students with LD as having "difficulty in understanding what you're saying the first time you say it . . . processing is very slow . . . there's a time delay because they're still trying to fathom what it is that you're asking." Lauren also classified students with LD as possessing "reading comprehension problems . . . nowadays, with word problems, the kids who couldn't do language arts now can't do math either."

In the second section of the survey, teachers were provided with a listing of characteristics of students with LD that may impact their effective learning in the mathematics classroom. Teachers were asked whether or not they felt comfortable adapting instruction to meet specific learning needs. Table 4 presents the percentage of middle school mathematics teachers in each category.

Table 4

Level of Comfort Adapting Instruction to Meet the Needs of Students with LD

Learning Difficulties	No. (%) ^[a]			
	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
Attending to tasks	39 (17.5)	88 (39.5)	74 (33.2)	15 (6.7)
Maintaining attention	40 (17.9)	85 (38.1)	70 (31.4)	23 (10.3)
Keeping place on pages	42 (18.8)	81 (36.3)	68 (30.5)	27 (12.1)
Identifying symbols or numerals	35 (15.7)	83 (37.2)	74 (33.2)	27 (12.1)
Using a number line	57 (25.6)	94 (42.2)	58 (26)	10 (4.5)
Recalling math facts	45 (20.2)	85 (38.1)	73 (32.7)	16 (7.2)
Following a sequence of steps to solution	48 (21.5)	93 (41.7)	62 (27.8)	16 (7.2)
Memory of information in word problems	35 (15.7)	78 (35)	86 (38.6)	20 (9.0)
Oral communication	52 (23.3)	87 (39)	71 (31.8)	10 (4.5)
Written communication	42 (18.8)	86 (38.6)	71 (31.8)	20 (9.0)
Interpreting pictures and diagrams	49 (22)	94 (42.2)	62 (27.8)	15 (6.7)

[a]The number of respondents varied because of missing cases.

More than half of the survey respondents described themselves as either *quite comfortable* or *very comfortable* in their abilities to adapt their instruction to meet the special mathematical needs of students with LD (see Table 4). However, more than one-fourth of the participants described themselves as only *somewhat comfortable* addressing the specific learning difficulties of students with LD and modifying instruction to help the students overcome such challenges, and between 5 and 12% indicated they were *not comfortable* in many areas. The areas of “maintaining attention,” “keeping place,” and “identifying symbols,” had the lowest ratings. Adapting instruction to help students understand “number line,” “recall math facts,” and “communication” were rated most highly. In all areas, responses were generally in the mid-range of *somewhat comfortable* and *quite comfortable*.

Specific Instructional Modifications

Maggie said that students with LD needed additional support with “concentration” and “focusing” and required “constant reinforcement.” She thought that effective mathematics instruction was “being able to come up with a variety of strategies [and] being able to explain to a child in 80 different ways, if you have to, how to get through a problem because not everyone can see it the way that you particularly see a problem.” Sam agreed and emphasized that “we all learn differently . . . these children need you to attack more than one method because otherwise they just don’t always get it.” Finally, Jess also thought that effective mathematics teaching involved using multiple modalities, but then she quickly added, “I don’t have the time. I don’t have the room. I teach in four different rooms . . . that’s the reality of the school day . . . [the] ideal world would be, you

know, having tactile things in my room. I can't do that. I have 39 minutes, and every day I teach something new.”

Most of the interviewees mentioned that probably the principal modification for students with LD was reducing the number of examples on the homework they assigned and slowing their teaching pace. Sam said that she has learned to slow down and “really concentrate on not so much what I'm teaching but what they're grasping . . . I'm finding I'm much more in tune to their faces . . . what they're doing and how, if—if at all, they're grasping.” The participants referred to the following as various instructional strategies used in their mathematics inclusion classes: different colored markers, mnemonic devices, charts, typed copies of notes, calculators, modeling, transparencies on overhead projectors, organizational tools (e.g., binders for notes/homework, assignment calendars, etc.), small group work, manipulatives, circulating the room to ensure that students with LD are on-task, and longer response wait-time when a student was asked a question.

Telephone interview participants from various states also named the above strategies. In addition, they mentioned repetitive practice, delivering “small pieces [and] chunking material rather than big groups” (RI) of information and teaching “one concept at a time” (RI). Teachers from NH emphasized the use of instructional methods based on multiple modalities and being “very structured . . . maintain routine for these kids.”

Although these strategies were used in their inclusion classes, the participants also admitted that they also used these same strategies in their general education mathematics classes. Basically, all of the participants made little—or no—distinction between students with LD and very low-end students not classified as special education students. Kylie stated, “If it's good for special ed kids, it's probably good for all kids . . . the more

methods you can bring into your classroom, the more children you're going to reach.”

Further, the modifications were made for all students with LD, not matched to specific learning needs of individual students.

In the classroom observations, four of the lessons dealt with polynomials and monomials (e.g., multiplication of monomials by polynomials), word problems and inequalities; one lesson concentrated on division of decimals; one lesson focused on mathematical terms (e.g., prime, factor, composite, etc.); and one lesson was on factoring. For the most part, the format and organization of all of the seven observed mathematics lessons were extremely similar. All of them started out with a Do Now, which students worked on while the general educator, special educator, and/or aide walked around the room and checked homework. The classroom seating configurations were all the same, with desks lined up in rows. Mainly, the mathematics lessons consisted of whole class instruction. At some point during the lessons, five (Aimee and Kylie did not) out of the seven participants did send students to the board to work on equations.

Again, five (Aimee and Kylie did not) of the participants told the students to partner with someone and work on a few examples, but only Maggie did full group work for part of the class. She had her students rearrange the desks to create groups of four or five students. Maggie was also the only participant who had planned the groups in advance, purposely placing the students with LD in specific groups with higher achieving students. Yet, during the interview, Maggie admitted that her observed lesson “wasn't typical” and that “maybe once every two weeks” they would try something like group work.

In addition, Maggie was the only participant who fully encouraged the students to use calculators. (Actually, some of Naomi students started using calculators, but she told them that they could not use calculators.) Every participant, except for Aimee and Kylie, used an overhead projector for some component (e.g., homework review, class examples, etc.) of the lesson, and basically, all of the participants used different colored markers to highlight certain steps in the equation-solving process. Maggie, Sam, and Jess modeled specific examples for their classes before asking their students to begin working on problems.

Maggie and Sam were the two participants who had the highest level of interaction with their students with LD. They circled the classrooms and walked up and down the rows, individually helping the students with LD and assessing if these students were on-task. In the other participants' classes, there was at least one student with LD who was either daydreaming, taking a test in the hall outside of the classroom and missing most of the new instruction, napping, or otherwise off-task during most of the mathematics lesson. For most of these examples, the participants, as well as the special education teacher and/or aides, were not aware that the students with LD were not paying attention.

Kylie and Jess did not allow for much response wait-time after they asked questions. Much of the time, they ended up answering their own questions. At times, Lauren and Kylie did not analyze the examples the students had difficulty with or incorrectly answered; instead, such examples were quickly skipped over and never discussed in-depth. Naomi, Sam, Maggie, and Aimee attempted to get students involved in their classes by calling on them for answers. However, Aimee tended to call on the

same students, whereas Naomi, Sam and Maggie tried to involve all of their students, including the students with LD.

Curriculum Adaptations

Most of the seven participants were not able to identify any curriculum adaptations made since teaching mathematics inclusion. Kylie, Aimee, and Naomi emphatically stated that they did not adapt the curriculum. Aimee argued, “You can’t because they have to take that assessment test; you can’t change it really. We’re tied on that because of the state assessments.” Naomi added, “They have to learn the curriculum as well as anybody else.” Lauren agreed, “These kids have to pass the Math A Regent’s . . . I can slow down a little . . . re-teach . . . explain a little better. But, we have to get to this level of problem.” Yet, Lauren also pointed out that her district tried to incorporate more reading and writing into the mathematics curriculum and encourage “these kids to reflect on what they’ve done [mathematically] . . . write in words how you would solve this equation.”

The majority of the phone interviewees also said that they have not really altered the curriculum for their included students. A seventh/eighth-grade teacher from NH agreed with the NY teachers; she said, “With all the testing we’re supposed to teach the same content and try to make the kids learn it . . . in the middle schools, there’s a big push to get kids ready for high school.” An eighth-grade teacher from MA agreed; she stated, “[Teachers] can’t change the curriculum. Students have tests to take.” A sixth-grade teacher from TX said, “I do the same curriculum—it just takes longer, and I teach it differently. When I run short on time, I just make the time up in another way.” However, a few of the teachers from outside of NY did identify curriculum adaptations that they

made specifically for their students with LD. A sixth-grade teacher from NH stated, “For fractions, I only make them do a common denominator . . . and for decimals, I only take my special ed students to the hundredth place. The curriculum requires that they go to the place of one thousand.” A seventh-grade teacher from CO replied, “I stay away from dividing three-digit numbers into five-digit ones . . . for the most part, I do try to stay with things that are more relevant to them when they get out into the real world, like money, time, and shopping.”

Mathematics Topics Requiring Instructional Adaptations

The phone interview participants were asked to name specific mathematics topics that they believed required instructional adaptations for students with LD. Participants from NH, TX, and RI all stressed that fractions were very difficult for students with LD to comprehend. A teacher from NH said, “Cognitively they’re [students with LD] not mature enough to understand this.” Other topics identified included word problems; decimals; equations with variables and inequalities; geometric formulas where “understanding dimensions [was] tough” [teacher from PA]; probability; and basic skills such as addition, subtraction, multiplication, and division.

Teaching Specific Mathematics Topics

Survey respondents were asked to describe their level of comfort in adapting instruction for students with LD in relation to 17 mathematical topics (see Table 5).

Table 5

Level of Comfort Adapting Instruction for Specific Mathematics Topics

Topics	No. (%) ^[a]			
	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
Reading/writing integers, rational, irrational numbers	61 (27.4)	86 (38.6)	62 (27.8)	11 (4.9)
Equivalence of fractions, decimals, percents	64 (28.7)	84 (37.7)	56 (25.1)	16 (7.2)
Arithmetic operations – decimals, fractions	68 (30.5)	86 (38.6)	53 (23.8)	12 (5.4)
One- and two-step word problems	62 (27.8)	86 (38.6)	59 (26.5)	13 (5.8)
Inverse relationships between x and $1/x$, roots, exponents	43 (19.3)	71 (31.8)	84 (37.7)	21 (9.4)
Scale drawings	36 (16.1)	89 (39.9)	66 (29.6)	28 (12.6)
Coordinate planes	71 (31.8)	106 (47.5)	35 (15.7)	8 (3.6)

(table continues)

Table 5 (continued)

Topics	No. (%) ^[a]			
	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
Line and bar graphs	86 (38.6)	88 (39.5)	36 (16.1)	8 (3.6)
Compasses, rulers, protractors	63 (28.3)	84 (37.7)	56 (25.1)	16 (7.2)
Square and cubic units	49 (22)	83 (37.2)	70 (31.4)	17 (7.6)
Size, quantity, capacity	54 (24.2)	83 (37.2)	68 (30.5)	14 (6.3)
Graphing calculators	33 (14.8)	48 (21.5)	61 (27.4)	67 (30)
Computer spreadsheets	32 (14.3)	56 (25.1)	67 (30)	57 (25.6)
Estimation as problem-solving	56 (25.1)	85 (38.1)	61 (27.4)	16 (7.2)
Identifying, describing and creating patterns	68 (30.5)	84 (37.7)	55 (24.7)	10 (4.5)
One- and two-step equations	68 (30.5)	85 (38.1)	50 (22.4)	15 (6.7)
Describing functional relationships	43 (19.3)	70 (31.4)	75 (33.6)	28 (12.6)

^[a]The number of respondents varied because of missing cases.

According to survey results (see Table 5), the majority of general educators seemed to be most comfortable when teaching students with LD to locate points on a

coordinate plane and to interpret line and bar graphs. General educators described themselves as either *very comfortable* or *quite comfortable* in their abilities to adapt instruction for students with LD when dealing with coordinate planes (79.3%, $n = 177$) and line and bar graphs (78.1, $n = 174$). General educators seemed to be less comfortable when teaching students with LD to use graphing calculators and computer spreadsheets. General educators described themselves as only *somewhat comfortable* or *not comfortable* in their abilities to modify instruction when working with graphing calculators (57.4%, $n = 128$) and computer spreadsheets (55.6%, $n = 124$).

When exploring general educators' levels of comfort with topics that the interview participants had claimed were most difficult for students with LD, such as fractions, decimals, word problems, variables, basic mathematical functions, and relationships, etc., general educators rated themselves as either *very comfortable* or *quite comfortable* in their abilities to adapt instruction in the following topics: describing equivalence of fractions, decimals and percents (66.4%, $n = 148$); performing arithmetic operations on decimals and fractions (69.1%, $n = 154$); and solving one- and two-step arithmetic word problems (66.4%, $n = 148$). Yet, close to one half (46.2%) of the general education teachers ($n = 103$) surveyed described themselves as only *somewhat comfortable* (33.6%, $n = 75$) or *not comfortable* (12.6%, $n = 28$) in their abilities to modify instruction when describing functional relationships to students with LD. Finally, at least one fourth of the respondents described themselves as only *somewhat comfortable* in adapting their instruction for students with LD in 12 out of the 17 mathematics topics listed on the survey.

The teacher interviews indicated that teachers did not plan specific modifications for particular topics or lessons. The modifications they mentioned (colored markers, overhead, slowing pace, special worksheets, etc.) were generic across topics and also implemented with all students rather than tailored to specific learning needs. Classroom observations supported the above statements. The only exception was the occasional use of calculators when computational tasks were more complex.

Research Question #3: What support mechanisms and resources are middle school administrators providing for general education mathematics teachers to help them succeed in teaching mathematics in inclusive settings?

Survey respondents and interview participants were asked to comment on the level of administrative support and resources available to aid them in teaching students with LD. On the survey component, approximately four questions addressed these issues. During the in-depth interviews, participants were asked two questions that dealt with administrative support and available resources. On the telephone interviews, participants were only asked to comment on current resources for teaching inclusion.

Administrative Support

Sixty-seven percent of survey respondents ($n = 150$) considered the support level of their school's administration to be average or below average. The qualitative data showed that the level of administrative support was higher than average. (However, it must be noted that the administration at Hawthorne Middle School, where four of the participants taught, were former special education teachers and/or chairpersons. In addition, one of the participants, Naomi, also held an administrative position as the

mathematics chairperson, as well as being an inclusion teacher. The socio-economic status of the districts where the observations took place may have been a factor as well.) The provision of teaching assistants and co-teaching by special education teachers were concrete examples of support. Further, some joint-planning time had been provided to teachers initially.

Four of the seven in-depth interview participants viewed administration to be, as Sam stated, “extremely helpful.” Yet, Sam did recall one specific instance when she and her inclusion team were “pushing” for more help in the classroom and were “pretty much told to suck it up as much as we could.”

Naomi stated, “They [administration] know . . . everything that’s going on with inclusion classes. They’re well aware. They support it completely . . . it’s something that’s really supported in the building.”

Maggie commented that administration was “definitely there for supporting, seeing how to work things through . . . they’re very realistic about what expectations and goals you can get to do. They want every kid to try to succeed, but they know this may not be the year.”

Lauren and Aimee sort of gave the impression that administration was doing the best they could under poor circumstances. Lauren stated, “For the model that we use, I think it’s effective in—I think they’re [administration] doing what they can do.” However, she questioned the administration’s choice of Hawthorne’s specific inclusive model. Lauren also seemed a bit frustrated when she said, “And they’re [administration] always pulling the math for trips and assemblies, and this-and-that, and you end up losing.”

The majority of the participants (in-depth interviews only) did not really think that administration greatly assisted them when preparing to teach inclusion their very first year. Only one (Sam) out of the seven participants was encouraged to observe other inclusive classes and visit local schools where inclusion was being implemented. Further, only one participant (Naomi) read any research related to inclusion or teaching mathematics to students with LD when she first started teaching mathematics inclusion. All of the seven participants did attend at least one workshop related to special education or inclusion, but the benefit of the workshop(s) was questionable according to the participants. For example, both Lauren and Jess said that the required workshop(s) focused mainly on Attention Deficit Hyperactivity Disorder (ADHD) and offered not much in the way of instructional strategies.

Aimee maintained that the workshops she attended were “very vague” and were more “geared towards younger kids.” Aimee felt that she was unable to implement the strategies offered through the workshops. She stated, “You know . . . how are you going to send a kid to the back of the room to a nice, quiet, little—there is no back of the room with a little carpet . . . that’s more elementary level, I think.” Mainly, Aimee felt that administration was “just being told to do it too” and did not really have much decision-making authority; therefore, her administrators were unable to really prepare or support her during her first year of teaching inclusion.

In relation to the variable of time, more than half (72.6%) of the general educators surveyed ($n = 162$) believed that students with LD required more time from teachers than general education students. However, more than half (56.9%) of the respondents

($n = 127$) felt that administrators did not give them sufficient time to prepare for their mathematics inclusion classes.

Resources

When asked to rate the level of available support services (e.g., counseling, resource room or teacher, instructional materials, etc.), more than half (57.9%) of the survey respondents ($n = 129$) felt that existing services were only average or below average. Approximately 43% of respondents ($n = 95$), currently teaching inclusion, had taken less than three workshops related to teaching students with LD. (Some of the respondents were not required to take any workshops.)

Most of the 15 interview (both in-depth and telephone) participants identified other people (e.g., special education teachers, aides, other inclusion teachers, counselors, etc.) as the most significant resource available to them. Further, teamwork and collaboration seemed to be an integral component. According to the survey, approximately 47% of the general educators ($n = 104$) agreed or strongly agreed with the following statement: 'General education teachers are comfortable team teaching mathematics with special education teachers.' However, more than one fourth (33.2%) of the general educators ($n = 74$) were still undecided concerning team teaching.

Kylie commented,

[We] have very, very, very effective special ed teachers here . . . and we're open to their suggestions . . . it's very cohesive and people work together, and people are very open to constructive criticism that I think that is one of the key reasons why it works.

When describing her colleagues, Lauren said,

Every day we meet that period six, and we do everything together. Which is really, I have to say, I love it. Because that's the only subject I teach—is eighth grade math, and now I share it with five people . . . I think it makes my job easier, and then we have time to do other things, like how did you teach this? Do you have a good way to teach this? That kind of thing.

Although some instructional resources were also discussed such as web sites, computers and software, overhead projectors, graphing calculators, *Mimeo* technology, manipulatives, and other hands-on materials, the participants did not seem to rely on these materials as much as they depended on people as resources. Most of the participants' schools had budgets, albeit limited, for such resources. However, two participants from RI explained that they received no monetary support for resources and were expected to pay for their own workshops, materials, additional resource books, etc.

Research Question #4: What strategies are higher education teacher preparation programs using to prepare general educators to teach in inclusive middle school mathematics classrooms?

General educators were queried about the extent to which they believed their undergraduate and graduate education programs prepared them to teach in inclusive classrooms. Three survey questions (see Table 6) were devoted to this topic and both the in-depth interviews, as well as the telephone interviews, asked participants to discuss their undergraduate and/or graduate school experiences in relation to inclusive teaching preparation.

Table 6

General Educators' Beliefs Regarding Their Teacher Preparation Programs

Beliefs Statement	No. (%) ^[a]				
	SA ^[b]	A ^[b]	U ^[b]	D ^[b]	SD ^[b]
Teacher ed programs help general ed teachers develop instructional philosophies for teaching math to students with LD	5 (2.2)	56 (25.1)	55 (24.7)	76 (34.1)	26 (11.7)
Teacher ed programs offer specific information about characteristics/needs of students with LD in math learning	8 (3.6)	49 (22)	51 (22.9)	81 (36.3)	32 (14.3)
Teacher ed programs offer specific instructional strategies for teaching math to students with LD	5 (2.2)	47 (21.1)	49 (22)	80 (35.9)	40 (17.9)

[a]The number of respondents varied because of missing cases.

[b]Abbreviations for *strongly agree*, *agree*, *undecided*, *disagree* and *strongly disagree*, respectively.

Teacher Education Programs

Only about one-fourth (27.3%) of the respondents ($n = 61$) agreed that teacher education programs helped them develop instructional philosophies related to teaching mathematics to students with LD. Half of the respondents thought that teacher education

programs failed to offer specific information about the characteristics and needs of students with LD in mathematics learning (50.6%, $n = 113$), as well as failed to offer specific instructional strategies for teaching mathematics to students with LD (53.8%, $n = 120$). Further, more than half (57.4%) of the respondents ($n = 128$) were only required to take less than three mathematics methods classes. Ten percent of inclusion mathematics teachers ($n = 23$) were not exposed to any mathematics methods courses. The responses help explain some of the issues raised above. Teachers are not provided with opportunities to learn about specific characteristics and needs of students with LD. Further, they have no information on how to tailor instruction to address the specific disabilities demonstrated by students in their classrooms.

Out of the seven in-depth interviews and eight telephone interviews, all 15 participants believed that their undergraduate and graduate schools did not effectively prepare them to teach mathematics inclusion. Approximately five of the 15 participants were required to take a special education course in either undergraduate or graduate school, but none of these courses addressed specific instructional strategies for students with LD. Mainly, the special education courses provided an overview of special education and focused on the various laws associated with special education students. In fact, one telephone interview participant from NH recalled learning in her undergraduate and graduate classes that “When you need to modify lesson plans, you just go to the special ed teacher.”

Even though the participants took at least one mathematics methods course, the methods course did not expose the participants to any instructional methods for students with LD, nor did the course even refer to inclusion. In reference to her mathematics

methods course, Lauren explained that she never learned how “you teach factoring. No, nothing like that. And that’s what I think will be beneficial. So you get thrown into teaching with, really, no preparation.”

Four of the participants attributed their knowledge of students with LD and effective instructional strategies for such students to their experience teaching inclusion. Sam claimed that her classroom strategies resulted from “on-the-job training.” Lauren’s statements concurred with Sam; Lauren said, “Experience, I guess, is always the best thing.”

Since Jess was a first-year teacher and did not have the benefit of prior teaching experience from which to draw, she stressed that she needed more skills in teaching students with LD. She stated,

It amazes me that I just graduated in May, and I don’t know what to do in this room . . . I don’t want to say graduate school failed me, but it’s like anything else . . . we’re not prepared . . . I don’t feel they truly informed me of what inclusion would mean to me as a regular ed teacher. And I think out of 36 credits that I did in graduate school, more of it should have been than just three.

Further, Jess wished that her graduate program had required her to observe other general educators teaching inclusion or, at the least, show her videotapes of inclusive environments and discuss the teacher’s effectiveness. She commented, “I just think that the best way for me to learn would have been seeing more what really is in the classroom.”

All of the data point to the greater need for teacher education programs at the secondary education level to address inclusion and prepare teachers for working with students with a range of disabilities. Further, strategies need to fit in with the structures and requirements of middle school, as elementary grade level strategies do not address the curriculum requirements or typical instructional arrangements that are faced by middle school teachers. Whereas teachers learn some generic strategies from their colleagues, they are not provided with opportunities to learn topic-specific strategies, which appears to be a need, as per the survey responses.

In the next section, implications for the above findings will be presented, along with some recommendations for future teacher preparation and school administration.

Discussion

The present study explored middle school mathematics general educators' beliefs and knowledge about inclusion and their instructional practices with included students with LD. Another goal of this research was to investigate teachers' perceptions of the administrative support and resources available to general educators teaching in mathematics inclusive classrooms, as well as teacher preparation for working with included students.

The findings of this study revealed five central themes:

1. Teacher collaboration is the most beneficial and available resource to general educators teaching mathematics inclusion.
2. General education mathematics teachers are not fully aware of their included students' level of attention or skilled at assessing their included students' comprehension of mathematics lessons.

3. There is an inconsistency between general educators' beliefs and knowledge of instructional needs and/or required modifications for students with LD and their classroom practice.
4. Teacher education programs for mathematics general educators do not address teaching in inclusive classrooms.
5. Administrators are not providing effective professional development opportunities and are not affording enough preparation time for general educators teaching mathematics inclusion.

Theme One: Teacher Collaboration

Results indicated that the most valuable resource to general educators, who taught mathematics in inclusion programs, was other people—mainly special education teachers, aides, guidance counselors, and/or school psychologists. Most of the participants sought help, on a daily basis, from the special education experts in their school. Whether it was advice on the ways in which to handle a specific student or simply to gain a deeper understanding of a certain disability, the participants looked to their colleagues, who had special education backgrounds, to provide them with assistance. Some of the general education participants even sought the counsel of other general educators who taught inclusion. Collaborative strategies and a genuine team mentality were the central reasons the general educators were able to endure the challenges of their mathematics inclusion classes and transform these challenges into some level of success. The results support the findings of Brownell and Pajares (1999), who cite collegiality as a key component in the success of inclusion programs.

The team support also helped many, but not all, of the general educators to remain positive in their attitudes toward mathematics inclusion, as well as toward the students with LD whom they instructed. These findings support other studies that have shown when teachers cooperate and collaborate, successful inclusive programs can be created and positive changes in the attitudes toward inclusion can occur (McLeskey & Waldron, 2002; Miller & Savage, 1995). Although some of the participants still did not favor mathematics inclusion, it seemed that teaching inclusion would have been completely unbearable to these teachers without any human support system.

Theme Two: Knowledge of Learning Needs

Even though teacher collaboration gave the participants opportunities to bounce ideas off other people, it seemed that teacher collaboration did not assist general educators much with broadening their pedagogical knowledge-base of students with LD or implementing specific instructional modifications in their inclusive mathematics classrooms. Both in-depth interviews and observations revealed that the special education collaborating teacher or teaching assistant was mainly responsible for instructional modifications, if any were implemented. Although the middle school mathematics teachers were able to name several adaptations, they indicated that anything they did was directed to all students in the class.

Tracking students' time-on-task is one way teachers can assess the value of a lesson and the level of students' involvement in the lesson. According to the researchers Jones, Wilson and Bhojwani (1998), "obtaining high levels of achievement requires effective management of instruction" (p. 163). The current study's observation data showed that most of the participants were not even aware when their included students

were not on task. Some students seemed to be daydreaming for most of the lesson before participants even noticed.

The participants also seemed to lack a strong understanding of the specific pedagogical strategies, which may strengthen the mathematical learning of students with LD. The mathematical comprehension of students with LD can be fostered through encouraging these students to “discuss, critique, explain, and when necessary, justify their interpretations and solutions” (Cobb, Wood, Yackel, Nicholls, Wheatley, Trigatti & Perlwitz, 1991, p. 6). Students with LD can be encouraged to share their mathematical thought processes through journal writing and small group interaction (Thornton, Langrall & Jones, 1998). During the classroom observations, none of the participants had students reflect, through words, on the process of solving mathematical equations. Further, none of the participants even spoke about journal writing during the interviews. Lauren mentioned that writing was being incorporated into the district’s mathematics curriculum, and students were asked to write about their mathematical process on tests, but there was no evidence that the mathematics teachers were developing this skill in their classes. In addition, only one of the participants used collaborative learning during her lesson, and she admitted that this was not a “typical” lesson.

Theme Three: Inconsistency Between Beliefs and Practice

Many researchers have argued that curricular modifications and the ways in which the curriculum is delivered are integral in creating effective mathematics programs for students with LD, and instruction should be geared toward the individual needs of students with LD (Rivera, 1998; Carnine, 1998; Jones et al., 1998; Montague, 1998). The results of the present study indicated that even though many general educators believed,

in theory, that instructional and/or curricular modifications were their responsibility, actual practice demonstrated that general educators did not adapt their instruction to meet the needs of students with LD. In addition, none of the participants admitted to modifying their mathematics curriculum to better assist the students with LD in their inclusion classes. These results are consistent with the findings of other studies that found general educators did not prepare written, individualized instructional plans for students with LD and did not use many of the instructional methods that researchers have proposed as effective for students with LD (Schumm, Vaughn, Haager, McDowell, Rothlein, & Saumell, 1995; deBettencourt, 1999).

Further, if more than half of the survey respondents perceived themselves as comfortable in their abilities to adapt instruction to meet the needs of students with LD, then where is the classroom evidence of these instructional modifications? Again, there appears to be a chasm between beliefs and practice. This inconsistency is related to the problem, which is of great concern, that most, if not all, of the participants believed that there was no distinction between a student with a learning disability and a low-performing student. Therefore, the participants believed that the modifications they used for low-performing students (e.g., slower pace, colored markers, etc.) would be sufficient for students with LD. None of the participants really seemed to understand that students with LD have a whole host of individualized learning challenges that need to be addressed through instructional modifications. In addition, participants did not have a sound understanding of the definition of an instructional strategy. For example, none of the participants realized that modifications such as the use of colored markers or overhead projectors are not considered instructional strategies. The participants believed

they were modifying mathematics instruction through the use of specific strategies when in reality they were simply using tools (e.g., colored markers, overhead projectors, etc.) to enhance instruction.

Theme Four: Inadequacy of Teacher Preparation for Inclusion

Since they have not been exposed to authentic instructional strategies for students with LD, the general educators seemed to truly believe that the minor modifications they made were also effective for students with LD. This point leads to the fourth central theme of this research: inadequately designed teacher education programs for general educators teaching in inclusive classrooms, which leads to general educators' unfamiliarity of specific teaching strategies and/or modifications for students with LD.

Consistent with findings of Rao and Lim (1999), the respondents in the current study unanimously agreed that their higher education teacher preparation programs did not equip them with the necessary skills to face the challenges of teaching mathematics inclusion. Some of the participants were not required to take any special education courses, and the participants who were required to take one or two classes said that the classes did not focus on instructional strategies, specific characteristics of students with LD, or inclusive frameworks. Instead, many of these required courses were survey-type courses that gave an overview of special education, including broad descriptions of disabilities (mainly physical disabilities) and special education laws. The participants had similar, negative experiences when they reflected on their mathematics methods courses. The mathematics methods courses neither addressed the topic of inclusion, nor specific mathematics instructional strategies for students with LD.

Further, most of the participants believed (and these beliefs were confirmed during the observations) that one of their primary tasks was to convey mathematics content to the students. After all, the general educators thought that they were the experts in mathematics; modifying was left to the special education teachers and/or aides. The knowledge-base of the participants was mainly steeped in mathematics, not in inclusive practices for students with LD. When asked what made her an effective mathematics teacher, one of the participants, Aimee, said that she had a “good understanding of it [mathematics].” Understanding mathematics is not the only aspect of effective teaching, especially when teaching inclusion. Parmar and Cawley (1998) defined knowledge of mathematics as,

- (a) understanding the meanings, principles, and processes of a wide range of mathematics appropriate to the needs of the students; (b) recognizing unusual performance on the part of a student and how to adapt activities to determine the basis for this performance; and (c) knowing the developmental characteristics of the student in such detail that individualized curriculum choices can be made. (p. 225)

Teacher education programs have the potential to positively impact both teachers’ beliefs and practices (Pligge, Kent, & Spence, 2000), and this potential needs to be realized. However, as Hasazi et al. (1994) have cautioned, teacher education programs frequently fail to foster positive relationships between preservice special education and general education teachers, and the rift is exacerbated by state policies for differential certification and failure to require coursework in inclusion and collaboration.

Theme Five: Lack of Specific Administrative Support

The final theme revealed through the existing data concentrated on the level of support from middle school administrators. The majority of the participants believed that they were not given adequate support before being assigned to teach mathematics inclusion. The problem seemed to stem from ineffective professional development workshops, which, as was the case with teacher education programs, did not offer the general educators specific instructional strategies for teaching mathematics to students with LD. These mandatory workshops broadly focused on disabilities, in general, instead of teaching general educators ways to individualize and modify lesson plans to accommodate students' disabilities. As Brownell and Pajares (1999) discovered in their survey research, teachers viewed their instruction of included students as more successful when the teachers had been involved in professional development programs that concentrated on the needs of students with disabilities, the curricular and instructional adaptations for students with disabilities, and various behavior management techniques for students with disabilities. Unfortunately, the participants were not exposed to this type of professional development; hence, they were not prepared to commence teaching students with LD. The inadequate professional development opportunities for the participants in the in-depth interviews and observations were particularly surprising, since several of their school administrators had backgrounds in special education.

Limitations in Design

The present study intended to address limitations inherent in previous studies that focused on the relationship between teachers' beliefs and mathematics instruction. The survey instrument used in the present study covered the domains investigated in prior

research on teacher attitudes toward inclusion. In addition, the survey incorporated items that listed specific learning needs of included students and items that focused on specific mathematics topics for the middle grades as listed in the New York State Curriculum guide. Telephone interviews were conducted with volunteer respondents to shed light on survey responses.

Many prior researchers only combined survey and interview data to assess the relationship between teachers' beliefs and instructional methods. Therefore, researchers' data only consisted of teachers' self-perceptions of their teaching methods, which could be vastly different from the actual way in which they taught. By adding actual classroom observations, this researcher was able to examine whether or not there was a consistency in stated beliefs, practices, and actual classroom instructional programming. The observations and in-depth interviews provided considerable insight into how teachers address the needs of included students in day-to-day teaching situations.

However, the current research was also plagued by its share of limitations. First, all of the observations were confined only to classrooms in three small suburban districts in New York State. Observational data would have been richer if a larger number of teachers, representing a variety of states, were observed. Further, data would have been more substantial if participants' inclusive mathematics classes were observed two or three times. Second, the survey sample was not randomized. Since there was no central mailing list that coincided with the required sample criteria, it was difficult to randomize the sample, as well as obtain an equal representation of respondents from all geographic regions. These limitations led to cautions when interpreting the study's results.

Implications and Recommendations for Teacher Education Programs

Although mathematics teacher education programs have improved drastically in recent years and continue to enhance the focus of their instruction and curriculum, mathematics inclusion still needs to be better integrated into the general education teacher preparation curriculum. With the increase in inclusive classrooms, general educators are now faced with the challenge of teaching mathematics to students with all types of disabilities, most especially learning disabilities. General educators are no longer walking into routine classrooms, charged with teaching a very traditional mathematics curriculum, using conventional instructional methods. If teacher education programs do not grasp this reality, the future teachers of mathematics inclusive classes will be ill prepared to face their students, and ultimately, included students will suffer academically.

All mathematics undergraduate teacher education programs should require preservice teachers to spend at least one semester student teaching in an inclusive classroom. In addition, inservice (regardless of whether they have or have not taught inclusion) and preservice teachers should be required to observe inclusive classrooms in at least two or three different schools. Video tapes of actual inclusive classes should be incorporated, on a routine basis, into undergraduate and graduate lessons, and graduate professors should foster in-depth discussions on the inclusive instruction seen on these videos. Further, methods classes must strive to educate mathematics inservice and preservice teachers in specific instructional methods for students with LD. Mathematics teachers need to be familiar and comfortable with effective strategies for teaching challenging topics, such as fractions, decimals, geometric formulas and computer spreadsheets, to students with LD. Mathematics inclusive teachers must have practical

skills and lessons that can be easily recalled and quickly applied, during a mathematics lesson, when a student with LD is having trouble understanding a concept. It is not enough for the special education teacher to understand the individual needs of a student with LD; the general education teacher also needs to be aware of the needs of *every* student in his/her class.

Implications and Recommendations for Middle School Administrators

For general educators to become effective inclusion teachers, middle school principals must realize that general educators need specific training to sharpen their instructional skills. Workshops that focus only on one disability, such as ADHD, will not adequately prepare general educators for the inclusive classroom. School principals should schedule frequent professional development sessions that focus on specific mathematics topics and strategies for teaching such topics to students with LD. Further, school principals need to understand that general educators require additional time to plan for their inclusive mathematics classes; one lesson plan will not suffice for all of their students. Included students require individualized lesson plans, which involve extra time on the part of the general education teacher. Principals need to demonstrate commitment to their schools' inclusive programs, as well as commitment to their inclusive teachers, by arming them with the appropriate resources, including additional planning and preparation periods, in order for mathematics inclusion to be truly successful and for all included students to achieve mathematics competency.

Directions for Future Research

Teacher beliefs and practices regarding inclusion require further investigation to determine what constitutes an optimal program, and what are effective ways to ensure

that student learning needs are being met without compromising curriculum and instructional goals for other students in the classroom. Future researchers could examine model programs to identify key components of success. For example, teacher collaboration was not specifically addressed in the present study but was mentioned by many respondents as being a key variable.

Additional research studies that collect actual implementation data through observation would be useful in developing an understanding of teachers' actions toward included students in middle school and discovering ways in which students can be more effectively included. Teachers in the present study mentioned some modifications that were made for all students to learn better but did not appear to implement many strategies to ensure the success of included students in particular. This warrants further investigation.

Researchers in various states could look at the impact of state policies on inclusion in middle school mathematics. For example, in the present study, respondents from New York State indicated that they felt pressure to prepare students for the standardized examination and, therefore, were not able to modify curriculum. Despite the recommendations to change pacing of instruction, teachers thought they had to cover numerous topics and, therefore, could not take time for additional coverage of a topic. In other states the conditions may differ. Other dimensions of variation to be explored could include (a) small versus large middle schools; (b) low versus high administrative support; (c) provision of various types of support services in the classroom; (d) availability of various types of resources; and (e) impact of urban, suburban, and rural locations.

References

- Anastasi, A. (1976). *Psychological testing* (4th ed.). New York: MacMillan.
- Barnett, C., & Monda-Amaya, L.E. (1998). Principal's knowledge of and attitudes toward inclusion. *Remedial and Special Education*, 19 (3), 181-192.
- Bender, W. N., & Vail, C. O., & Scott, K. (1995). Teachers' attitudes toward increased mainstreaming: Implementing effective instruction for students with learning disabilities. *Journal of Learning Disabilities*, 28 (2), 87-94.
- Bogdan, R. C., & Biklen, S. (1998). *Qualitative research for education: An introduction to theory and methods* (3rd ed.). Needham Heights, MA: Allyn & Bacon.
- Borko, H., Eisenhart, M., Brown, C. A., Underhill, R. G., Jones, D., & Agard, P. C. (1992). Learning to teach hard mathematics: Do novice teachers and their instructors give up too easily? *Journal for Research in Mathematics Education*, 23 (3), 194-222.
- Brantlinger, E. (1996). Influence of preservice teachers' beliefs about pupil achievement on attitudes toward inclusion. *Teacher Education and Special Education*, 19 (1), 17-33.
- Brownell, M. T., & Pajares, F. (1999). Teacher efficacy and perceived success in mainstreaming students with learning and behavior problems. *Teacher Education and Special Education*, 22 (3), 154-164.
- Carnine, D. (1998). Instructional design in mathematics for students with learning disabilities. In D. P. Rivera (Ed.), *Mathematics education for students with learning disabilities* (pp. 119-138). Texas: Pro-Ed.

- Chow, P., & Winzer, M. M. (1992). Reliability and validity of a scale measuring attitudes toward mainstreaming. *Educational and Psychological Measurement*, 52 (1), 223-228.
- Coates, R. D. (1989). The regular education initiative and opinions of regular classroom teachers. *Journal of Learning Disabilities*, 22 (9), 532-536.
- Cobb, P., Wood, T., Yackel, E. Nicholls, J., Wheatley, G., Trigatti, B., & Perlwitz, M., (1991). Assessment of a problem-centered second-grade mathematics project. *Journal for Research in Mathematics Education*, 22 (1), 3-29.
- Cochran, H. K. (1998). Differences in teachers' attitudes toward inclusive education as measured by the scale of teachers' attitudes toward inclusive classrooms (STATIC). *Proceedings of the Annual Meeting of the Mid-Western Educational Research Association*, Chicago, IL, 3-33.
- deBettencourt, L. U. (1999). General educators' attitudes toward students with mild disabilities and their use of instructional strategies: Implications for training. *Remedial and Special Education*, 20 (1), 27-35.
- DeSimone, J. R. & Parmar, R. S. (2004). *Survey on Teaching Mathematics to Students With Learning Disabilities in Middle School*. Unpublished manuscript, St. John's University, New York.
- Ernest, P. (1989). The knowledge, beliefs and attitudes of the mathematics teacher: A model. *Journal of Education for Teaching*, 15 (10), 13-33.
- Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, 38 (1), 47-65.
- Garvar-Pinhas, A., & Schmelkin, L. P. (1989). Administrators' and teachers'

attitudes toward mainstreaming. *Remedial and Special Education*, 10 (4), 38-43.

Hasazi, S. B., Johnston, A. P., Liggett, R. A., & Schattman, A. M. (1994).

A qualitative policy study of the least restrictive environment provision of the Individuals with Disabilities Education Act. *Exceptional Children*, 60 (6), 491-507.

Individuals with Disabilities Education Act Amendments of 1997,

Pub. L. No. 105-17, § 602, 612, [On-line]. Available Internet:

<http://www.ed.gov/offices/OSERS/Policy/IDEA/IDEA.pdf>

Janney, R. E., Snell, M. E., Beers, M. K., & Raynes, M. (1995). Integrating students with moderate and severe disabilities: Classroom teachers' beliefs and attitudes about implementing an educational change. *Educational Administration Quarterly*, 31 (1), 86-114.

Jones, E. D., Wilson, R., & Bhojwani, S. (1998). Mathematics instruction for secondary students with learning disabilities. In D. P. Rivera (Ed.), *Mathematics education for students with learning disabilities* (pp. 155-176). Texas: Pro-Ed.

Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist*, 27 (1), 65-90.

Kearney, C. A., & Durand, V. M. (1992). How prepared are our teachers for mainstreamed classroom settings? A survey of postsecondary schools of education in New York State. *Exceptional Children*, 59 (1), 6-11.

Larrivee, B., & Cook, L. (1979). Mainstreaming: A study of the variables affecting teacher attitude. *Journal of Special Education*, 13 (3), 315-324.

Lesar, S., Benner, S. M., Habel, J., & Coleman, L. (1997). Preparing general

- education teachers for inclusive settings: A constructivist teacher education program. *Teacher Education and Special Education*, 20 (3), 204-220.
- McLeskey, J., & Waldron, N. L. (2002). Inclusion and school change: Teacher perceptions regarding curricular and instructional adaptations. *Teacher Education and Special Education*, 25 (1), 41-54.
- McLeskey, J., Waldron, N. L., So, T. H., Swanson, K., & Loveland, T. (2001). Perspectives of teachers toward inclusive school programs. *Teacher Education and Special Education*, 24 (2), 108-115.
- Mewborn, D. S. (2002, April). *Examining mathematics teachers' beliefs through multiple lenses*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Miller, K. J., & Savage, L. B. (1995, March). Including general educators in inclusion. In *Reaching to the Future: Boldly facing challenges in rural communities. Conference proceedings of the American Council on Rural Special Education*. (ERIC Document Reproduction Service No. ED 381 322).
- Montague, M. (1998). Cognitive strategy instruction in mathematics for students with learning disabilities. In D. P. Rivera (Ed.), *Mathematics education for students with learning disabilities* (pp. 177-199). Texas: Pro-Ed.
- National Center for Education Statistics. (2004). *National Assessment of Educational Progress. The nation's report card: Mathematics highlights 2003, NCES Report 2004-451*. Washington, DC: NCES.
- National Center for Education Statistics. (2003). *Overview of public elementary and secondary and districts: School year 2001-02, NCES Report 2003-411*.

Washington, DC: NCES.

- Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies*, 19 (4), 317-328.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62 (3), 307-332.
- Parmar, R. S., & Cawley, J. F. (1998). Preparing teachers to teach mathematics to students with learning disabilities. In D. P. Rivera (Ed.), *Mathematics education for students with learning disabilities* (pp. 219-235). Texas: Pro-Ed.
- Peterson, P. L., Fennema, E., Carpenter, T. P., & Loef, M. (1989). Teachers' pedagogical content beliefs in mathematics. *Cognition and Instruction*, 6 (1), 1-40.
- Pligge, M. A., Kent, L. B., & Spence, M. S. (2000, April). *Examining teacher change within the context of mathematics curriculum reform: Views from middle school teachers*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Rao, S. M., & Lim, L. (1999, May). *Beliefs and attitudes of pre-service teachers towards teaching children with disabilities*. Paper presented at the annual conference of the American Association on Mental Retardation, New Orleans, LA.
- Raymond, A. M., & Santos, V. (1995). Preservice elementary teachers and self-reflection: How innovation in mathematics teacher preparation challenges mathematics beliefs. *Journal of Teacher Education*, 46 (1), 58-69.
- Reed, F., & Monda-Amaya, L. E. (1995). Preparing preservice general educators for

- inclusion: A survey of teacher preparation programs in Illinois. *Teacher Education and Special Education*, 18 (4), 262-274.
- Rivera, D. P. (Ed.). (1998). *Mathematics education for students with learning disabilities* (pp. 219-235). Texas: Pro-Ed.
- Rust, J., & Golombok, S. (1989). *Modern psychometrics: The science of psychological assessment*. New York: Routledge.
- Schumm, J. S., Vaughn, S., Haager, D., McDowell, J., Rothlein, L., & Saumell, L. (1995). General education teacher planning: What can students with learning disabilities expect? *Exceptional Children*, 61 (4), 335-352.
- Scruggs, T.E., & Mastropieri, M. A. (1996). Teacher perceptions of mainstreaming/inclusion, 1958-1995: A research synthesis. *Exceptional Children*, 63 (1), 59-74.
- Stipek, D. J., Givvin, K. B., Salmon, J. M., & MacGyvers, V. L. (2001). Teachers' Beliefs and practices related to mathematics. *Teaching and Teacher Education*, 17 (2), 213-226.
- Thompson, A. G. (1992). Teachers' beliefs and conceptions: A synthesis of the research. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 127-145). New York: MacMillan Publishing Company.
- Thompson, A. (1984). The relationship of teachers' conceptions of mathematics and mathematics teaching to instructional practices. *Educational Studies in Mathematics*, 15, 105-127.
- Thornton, C. A., Langrall, C. W., & Jones, G. A. (1998). Mathematics instruction for elementary students with learning disabilities. In D. P. Rivera (Ed.),

Mathematics education for students with learning disabilities (pp. 139-154).

Texas: Pro-Ed.

United States Department of Education. (2003). *Table AB2 – Percentage of children ages 6-21 served in different educational environments under IDEA, Part B, by Disability*. Retrieved August 28, 2005 from http://www.ideadata.org/tables27th/ar_ab2.htm

Walsh, W. B., & Betz, N. E. (1990). *Tests and assessment* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Wilson, M. & Goldenberg, M. P. (1998). Some conceptions are difficult to change: One middle school mathematics teacher's struggle. *Journal of Mathematics Teacher Education*, 1 (3), 269-293.

Appendix I
**Survey on Teaching Mathematics to Students With Learning Disabilities
 in Middle School**

Dear Teacher, for my dissertation, I am conducting research on middle school mathematics teachers' views about teaching mathematics in inclusive classrooms. I invite you to participate in the study, which hopefully will provide a deeper understanding of mathematics general educators' beliefs and knowledge toward inclusion and inclusive instruction. Please know that all data collected for the purpose of this study will remain confidential. Thank you for taking time to answer all of the questions. Your assistance is greatly appreciated.

Part I: Background Information (Please circle your answers.)

- 1) Number of years teaching:

1-2	3-8	9-14	more than 15
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- 2) Number of years teaching in an inclusive classroom:

1-2	3-5	6-10	more than 10
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- 3) Gender: Male Female
- 4) Type of school where you teach: *(please circle all that apply)*

Urban	Suburban	Rural	Private	Public
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- 5) Number of students in your school:

1-200	201-500	501-800	801-1100	More than 1100
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- 6) Average number of students in your inclusive classes:

Less than 15	15-20	21-25	26-30	31-35
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- 7) The number of professional development workshops related to teaching students with learning disabilities I have been exposed to has been:

0-2	3-4	5-6	7-9	10 or more
-----	-----	-----	-----	------------
- 8) The level of administrative support for teaching an inclusive class in my school is:

Extremely low	Low	Average	High	Extremely high
---------------	-----	---------	------	----------------
- 9) The level of additional support services (e.g., counseling, resource room or teacher, instructional materials, etc.) for teaching an inclusive class in my school is:

Extremely low	Low	Average	High	Extremely high
---------------	-----	---------	------	----------------
- 10) The following best describes my level of education:
 - Completed bachelor's degree
 - Pursuing master's degree
 - Completed master's degree
 - Pursuing professional diploma
 - Completed professional diploma
 - Pursuing doctoral degree
 - Completed doctoral degree

11) In your undergraduate or graduate program, have you taken any mathematics teaching methods courses? If yes, how many?

Yes (number of courses _____)

No

12) Certifications held: (*please circle all that apply*)

Elementary education

Secondary education

Special education

Other (name) _____

Part II: Beliefs (*For each statement, please circle the number that best describes your level of agreement or disagreement. Please note that "learning disabilities" is abbreviated "LD."*)

SA=Strongly Agree; A=Agree; U=Undecided; D=Disagree; SD=Strongly Disagree

	SA	A	U	D	SD
1) Students with LD should be afforded every opportunity to learn mathematics with general education students.	5	4	3	2	1
2) Students with LD are best taught mathematics in inclusive classrooms.	5	4	3	2	1
3) Students with LD who are taught mathematics in inclusive classrooms will have a better chance of succeeding in society than students taught in resource room settings.	5	4	3	2	1
4) Students with LD cause the most behavioral problems in inclusive classrooms during mathematics instruction.	5	4	3	2	1
5) In inclusive mathematics classrooms, general education teachers often are the primary ones responsible for modifying instruction for students with LD.	5	4	3	2	1
6) In inclusive mathematics classrooms, general education teachers have the major responsibility of ensuring that the students with LD succeed academically.	5	4	3	2	1
7) In inclusive mathematics classrooms, students with LD require more time from teachers than general education students.	5	4	3	2	1
8) General education teachers are given sufficient time to prepare to teach mathematics in inclusive classrooms.	5	4	3	2	1
9) General education teachers are comfortable team teaching mathematics with special education teachers.	5	4	3	2	1
10) For the most part, middle schools are effectively implementing inclusive programs.	5	4	3	2	1
11) Resource rooms are effective in meeting the mathematics learning needs of students with LD.	5	4	3	2	1
12) Teacher education programs help general education teachers to develop an instructional philosophy related to teaching mathematics to students with LD.	5	4	3	2	1
13) Teacher education programs offer specific information about the characteristics and needs of students with LD in mathematics learning.	5	4	3	2	1
14) Teacher education programs offer specific instructional strategies for teaching mathematics to students with LD.	5	4	3	2	1

Note: Parts I and II have been adapted from surveys by Larrivee and Cook (1979); Coates (1989); Chow and Winzer (1992); and McLeskey, Waldron, So, Swanson and Loveland (2001).

Part III: Knowledge (*Please circle the number that corresponds with your level of comfort.*)

How comfortable do you feel in your ability to adapt your instruction for students with LD who have the following learning characteristics?

	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
1) Difficulty attending to tasks	4	3	2	1
2) Difficulty maintaining attention for the class period	4	3	2	1
3) Difficulty keeping place on a page in the text or workbook	4	3	2	1
4) Difficulty correctly identifying symbols or numerals	4	3	2	1
5) Difficulty using a number line	4	3	2	1
6) Difficulty recalling math facts	4	3	2	1
7) Difficulty with following a sequence of steps to solution	4	3	2	1
8) Difficulty with memory of given information in word problems	4	3	2	1
9) Difficulty with oral communication in mathematics	4	3	2	1
10) Difficulty with written communication in mathematics	4	3	2	1
11) Difficulty interpreting pictures and diagrams	4	3	2	1

How comfortable do you feel in your ability to adapt your instruction in the following topics for students with LD?

	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
12) Reading and writing integers, rational and irrational numbers	4	3	2	1
13) Describing equivalence of fractions, decimals and percents	4	3	2	1
14) Performing arithmetic operations on decimals and fractions	4	3	2	1
15) Solving one- and two-step arithmetic word problems	4	3	2	1

How comfortable do you feel in your ability to adapt your instruction in the following topics for students with LD? (continued)

	Very Comfortable	Quite Comfortable	Somewhat Comfortable	Not Comfortable
16) Understanding inverse relationships between x and \div , roots and exponents	4	3	2	1
17) Constructing scale drawings	4	3	2	1
18) Locating points on a coordinate plane	4	3	2	1
19) Interpreting line and bar graphs	4	3	2	1
20) Using compasses, rulers and protractors	4	3	2	1
21) Understanding square and cubic units	4	3	2	1
22) Measuring size, quantity and capacity	4	3	2	1
23) Using graphing calculators	4	3	2	1
24) Using computer spreadsheets	4	3	2	1
25) Using estimation as a problem-solving strategy	4	3	2	1
26) Identifying, describing and creating patterns	4	3	2	1
27) Solving one- and two-step equations	4	3	2	1
28) Using different representations to describe a functional relationship	4	3	2	1

Note: these topics are from the NY State Core Curriculum for grades 7 and 8.

Part IV: Telephone Interview:

If you would be interested in participating in a telephone interview, please print your name and phone number on the line below. Once again, all data collected for the purpose of this study will remain confidential.

NAME

TELEPHONE NUMBER (including area code)

Appendix II

Interview Questions

Each interview will begin with a review of the purposes of the interview and an assurance of confidentiality.

1. Please tell me a bit about your undergraduate education classes. How many special education classes were you required to take? Did your mathematics methods courses address teaching in inclusive classrooms?
2. Please tell me a bit about the graduate education classes that you have taken so far. What specific strategies have you learned for teaching mathematics to students with LD?
3. How do you define good – or effective – mathematics instruction?
4. What do you think are the three most important responsibilities/roles of the general educator teaching in an inclusive classroom?
5. What are your thoughts on how inclusion is working at your school? Please focus specifically on the mathematics learning of students with LD.
6. Why do you feel it is or is not being effectively implemented? Please give specific reasons.
7. What is your definition of a student with a learning disability? Create a profile of this type of student. What types of specialized instruction do you think this student needs for effectively learning mathematics?
8. How did you first prepare for teaching in an inclusive classroom? Did you attend workshops? Did you meet with special education teachers? Did you read research on teaching mathematics to students with special needs? Did you observe other inclusive classrooms?
9. Please describe, in detail, one of your typical mathematics lessons.
10. How, if at all, have your instructional methods changed since teaching in an inclusive environment? Which strategies have you adopted that you never used when teaching in a general education classroom? Please provide a specific example of an instructional method you have adopted that addresses the specific learning characteristics of students with LD.
11. Using your mathematics curriculum, please provide specific examples of curricular adaptations you have made since teaching included students. Who has been responsible for assisting with such adaptations?
12. What resources (e.g., resource teacher or classroom, counseling, instructional materials, etc.) are currently available to you to aid with instructing included students?

Appendix III

Phone Interviews

NAME:
DATE:
E-MAIL:
STATE:

1. How many years have you been teaching mathematics?
2. How many years have you been teaching mathematics inclusion?
3. How well did your undergraduate or graduate school prepare you for teaching in an inclusive classroom?
4. Please provide some instructional strategies that you utilize for your students with LD?
5. Which specific mathematics topics do you think require instructional adaptations for students with LD?
6. Please provide specific examples of curricular adaptations you have made for your inclusion classes?
7. What resources are currently available to aid you with instructing included students?
8. What has been your greatest challenge in teaching inclusion?