5-6-2002

An evaluation of the effectiveness of the McGraw-Hill Mathematics Series for use with inclusion students

Margaret C. Green
Rowan University

AN EVALUATION OF THE EFFECTIVENESS OF THE MCGRAW-HILL MATHEMATICS SERIES FOR USE WITH INCLUSION STUDENTS

by
Margaret C. Green

A Thesis

Submitted in partial fulfillment of the requirements of the
Masters of Arts Degree
of
The Graduate School
at
Rowan University
2002

Approved by_____

Date Approved May 6, 2002

ABSTRACT

MARGARET C. GREEN

THE EFFECTIVENESS OF USING THE MCGRAW -HILL MATHEMATICS PROGRAM WITH INCLUSION STUDENTS

2002

DR. URBAN

MASTERS OF ARTS IN LEARNING DISABILITIES

This study examined the effectiveness of using the McGraw -Hill Mathematics Series with second grade inclusion students. Two students were pretested in October of 2001, using the final test from the Silver Burdett Mathematics Series for first graders. In March of 2002, they were tested again using the same test. The tests were compared to see what areas the students made improvement in since October. The students were also given the McGraw-Hill Cumulative Test for second grade on chapters 1-6. This was given in order to further assess the their competence on the skill areas presented in this series so far over the course of the year.

During the course of this research project, the students were instructed by both teachers in the inclusion classroom, given strategy instruction, and allowed the use of manipulatives as needed. After reviewing both pre and post test scores and analyzing the errors that were made, it appears that both students have progressed with in this mathematics series. This researcher feels that the McGraw-Hill Series is effective for use with inclusion students.

MINI-ABSTRACT

MARGARET C. GREEN

THE EFFECTIVENESS OF USING THE MCGRAW -HILL MATHEMATICS PROGRAM WITH INCLUSION STUDENTS

2002

DR. URBAN

MASTERS OF ARTS IN LEARNING DISABILITIES

This study examined the effectiveness of using the McGraw -Hill Mathematics Series with second grade inclusion students. Two students were tested in October 2001 and again in March 2002 using the same test. The students were also given the McGraw-Hill Cumulative Test on chapters 1-6. After reviewing both pre and post test scores and analyzing the errors that were made, it appears that both students have progressed with in this mathematics series. This researcher feels that the McGraw-Hill Series is effective for use with inclusion students.

ACKNOWLEDGMENTS

I would like to thank my husband Ray for all his love and support throughout the many years it has taken to complete this degree.

I would also like to thank my children, Chet and Nikki Green, for all the hugs and kisses that helped me get through this project.

Special thanks to my mother, Claire K. Jorett, for all her help babysitting and lending an ear.

Thanks also to Dolores and Ray Green Sr. for their support and encouragement.

Thanks so much, Dr. Urban for assisting me with this thesis project! I could not have done it without you!

Thanks to all my classmates, especially Sherri-Ann and Nancy, for giving me the confidence to finish my degree.

This thesis project is dedicated in loving memory to my Father, William T. Jorett, who passed away on January 27, 2002. His guidance and love are missed daily.

This project is also dedicated to my Grandmother, Margaret H. Jorett who passed away in 1996. She is missed dearly.

TABLE OF CONTENTS

Chapter 1

Background

The emphasis of special education has shifted dramatically since the early 1990's. First, with the passage of IDEA and continuing with the reauthorization of IDEA in 1997, more learning disabled students are returning to the regular education classroom with their non-disabled peers. The term "inclusion," though not specifically identified in the Special Education code, has become a popular term that connotes the education of the learning disabled with their non-disabled peers (Murphy, 1996; McCarthy, 1998). The challenge for the teachers is to educate all students using the same curriculum and materials. The teachers need to look for a curriculum that is effective for all the students that they are required to educate. They need to identify strategies and methods that will allow them to adapt the curriculum to better support the learning differences of all students.

The inclusion movement has redefined the role of both the regular education teacher and the special education teacher. Increasingly learning disabled students do not leave the classroom for all or part of the day, but remain in the regular education classroom with whatever supports and services that are necessary to help them learn. The regular education teacher cannot go into an isolated room, shut the door at 8:30, and not open it again until 3:30, since she is responsible for the needs of the learning disabled child in her class who may require the assistance of a special education teacher. This approach to programming means that the regular education teacher must share her classroom with someone else. The teaching style of the special education teacher may be similar to the teaching style of the regular classroom teacher, or her style of teaching may be totally different. The regular education teacher now must give up total

control and autonomy in the classroom. The learning disabled student and his needs are stated in the IEP, and must be met. The ideal environment that needs to occur in the classroom is a collaborative environment. This type of environment will benefit all students. Both teachers take a role in the education of all students. The students also assume a role in their own education in the inclusive classroom. It should be a place where everyone teaches and everyone learns (Giangreco, Baumgart, Doyle, 1995; Staub, 1996).

Many learning disabled children that are included in the regular education classrooms have reading disabilities, but between 6% and 7% of the school age population have some form of a mathematics disability. Research has just begun to tackle the area of mathematics. Mathematics is a very complicated area due to the complex cognitive processes involved in learning the skills necessary to solve problems. The Individuals with Disabilities Act now includes two areas of mathematics that need to be evaluated prior to classification. These areas are Mathematics Reasoning and Mathematics Computation. These problem areas interfere with school achievement and adult life.

Purpose of the Study

When a learning disabled student is placed in an inclusion classroom, he is required to perform like a regular education student and learn using the same curriculum as everyone else. It is important to know if that curriculum is effective for meeting the needs of the learning disabled. The purpose of this study is to examine the effectiveness of the McGraw-Hill mathematics program currently in use in a second grade inclusion classroom.

Value of the Study

A mathematics disability can hinder success in school and mathematics achievement is a very important component for success in adult life. Between 6% and 7% of school aged students show some form of a mathematics disability. Because of its importance to a students life it is necessary to examine the ways mathematics is being taught to determine if it is being taught effectively. By examining qualitative data using a case study design, It will be determined how efficiently and how effectively the children learn using the McGraw-Hill mathematics curriculum.

Research Question

The data gathered in this study will be used to answer this research question:

Question 1: What is the effectiveness of the McGraw-Hill Mathematics program when used for instruction of inclusion students?

Limitations of the Study

There are several limitations to the current study, therefore, caution should be used when generalizing the results. The first limitation of this study is the case study design. There are only two subjects being examined. Extensive generalizations of the results can not be made due to the small number of participants. The qualitative nature of the design does not lend itself to statistical analysis. Both of the participants were in the same grade and age range, so the results do not extend across the grades levels. Finally, any progress made by the participants could be attributed to the use of various inclusion teaching models during instruction. Progress could also be attributed to the use of two teachers and any remedial instruction that may occur throughout the course of the day. Also maturation of the participants through out the study could improve their

progress.

Definition of Terms

Inclusion- a program that assures that all students with disabilities participate with other students in all aspects of school (Rivera, Smith, 1997).

In-class support- Similar to inclusion. Disabled students remain in the regular education classroom and receive support or replacement instruction from a special education teacher (Selikoff, 1994).

Least Restrictive Environment (LRE)- one of the principles of IDEA that must be balanced when considering the best educational placement for the individual student with disabilities. For the greatest extent possible the disabled student will be placed in settings with nondisabled students (Rivera, Smith, 1997).

Specific Learning Disability- According to the N.J. State Administrative Code, is a disorder in one or more than one of the basic psychological processes involved in understanding or using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, write, spell, or do mathematical calculation, including conditions such as perceptual disabilities, brain injuries, minimal brain dysfunction, dyslexia, or developmental aphasia, characterized by a severe discrepancy between the student's current achievement and intellectual ability in one or more of the following areas: basic reading, reading comprehension, oral expression, listening comprehension, mathematics computation, mathematics reasoning, and written expression (N.J. State Education Department Website, 2001).

Communications Impaired- According to the N.J. State Administrative Code,

means a language disorder in the areas of morphology, syntax, semantics, and/ or pragmatics/ discourse which adversely affects a students educational performance and is not due primarily to an auditory impairment. The problem shall be demonstrated through functional assessment of language in other than a testing situation and performance below 1.5 standard deviations, or at the 10th percentile on at least two standardized oral language tests, where such tests are appropriate. When the area of suspected disability is language, assessment by a certified speech-language specialist and assessment to establish the educational impact are required. The speech language specialist shall be considered a child study team member (New Jersey Administrative code Title 6A, Chapter 14 Special Education, 2000)

McGraw Hill Mathematics- A mathematics program developed for use in general education classrooms. Currently being used in an inclusion classroom in a public school (McGraw- Hill, 2001).

Chapter 2

Introduction

The literature shows a progression in the understanding and treatment of persons with disabilities since the 1950's (Shilling &Coles, 1997). In the 1950's, most disabled persons were excluded from all areas of life. Often a disabled infant would be removed from his family and institutionalized. In recent history the attitudes of the public have changed from the total exclusion of all disabled people in the 1950's to the inclusion movement in the 1990's.

Since the 1950's much legislation has been passed to improve the lives of the disabled.. In 1968, Public Law 90-480 (The Architectural Barriers Act) was passed. This legislative mandate required that all agencies that received federal funding provide access for the physically impaired. In the 1970's, Public Law 93-112 (The Rehabilitaion Act) was passed and sections 502 and 504 of the Rehabilitation Act mandated equal access to programs and services related to transportation, employment, facilities, and programs for the disabled.

LRE Principles

In the late 1970's, Public Law 94-142 (The Education for All Handicapped Children Act) was passed. This law mandated the right to a free and appropriate education for all children and youth regardless of the handicapping condition (McCarthy, 1998). Even with the passing of PL94-142, handicapped persons were still being segregated from mainstream society. They were still being educated in separate classes and even separate schools.

In 1991, Public Law 101-366 (The Americans with Disabilities Act-ADA) was enacted. This was the first time in American history the federal legislators passed a non-discrimination law that affected all public and private facilities. ADA mandated access to all

facilities for people with disabilities (McCarthy, 1997).

In 1992, The Individuals with Disabilities Education Act (IDEA) was passed. This legislation guaranteed all children with disabilities a free and appropriate education in the least restrictive environment (Murphy, 1996; McCarthy, 1998).

What these different federal mandates meant to special education was a movement away from total exclusion toward total inclusion. In the 1950's, if a child was born with a disabling condition, he was usually institutionalized. This meant that he was taken from his family and placed in a residential facility. His family often did not have contact with him. As the federal laws were passed, this attitude began to change and was reflected in placement of disabled children in more inclusive settings. More children remained in the home with their families, but were still educated separately in special schools and segregated programs.

In the 1970's, the terms "mainstreaming" and "integration" became the popular phrases in education of the disabled. The focus of these programs was to include students with disabilities in the regular education classes for part of the day. The focus was on the student with the disability and how they were being educated in the regular education class. The needs of the general education student was not the concern of the mainstreaming movement (Giangreco, Baumgart, Doyle, 1995; Murphy, 1996).

A mainstreamed student only spent part of the day with the general education class. He might only be in the classroom for lunch and extracurricular activities like music and art. Only a select few special education students might qualify for mainstreaming or integration.

The passage of IDEA (The Individuals with Disabilities Education Act) mandated that to the maximum extent possible, children with disabilities, including those in public, private, or other

care facilities, must be educated with children who are not disabled (Murphy, 1996; McCarthy, 1998).

The term "inclusion" is not mentioned in the federal law. It is a popularly used term that refers to the practice of placing a disabled student into a regular education classroom in his home-school with same age and grade children that he would be with if he were not disabled, to the maximum extent possible (Murphy, 1996; McCarthy, 1998). Inclusion also means that all supportive aids and services are brought to the child, rather than the child leaving the classroom to receive support in a segregated setting (Murphy, 1996: McCarthy, 1998).

In 1993, with the settlement of the court case Oberti vs. The Clementon Board of Education, an inclusive placement had to be considered for all disabled children when making decisions regarding their education. With the reauthorization of IDEA in 1997, Inclusion and "in class support" became even more widely practiced or considered when making a placement decision (McCarthy, 1998; Murphy, 1996).

According to IDEA, children with disabilities must be placed in the least restrictive environment (LRE) (McCarthy, 1998). When planning a disabled student's program, inclusion is part of the continuum of services that are considered before a placement decision is made (Johnston, 1994; McCarthy, 1996). When making a placement decision, educators must consider the educational benefits of both an inclusive and a more restrictive setting. Educators also consider the non educational benefits (social) of both settings and the impact of the disabled child on his nondisabled peers. Another consideration is the cost of both settings (McCarthy, 1998).

During the era of mainstreaming and integration, the focus of these programs was on the

education of the disabled child. Little consideration was given to how the non disabled student was functioning in a mainstreamed classroom. With the onset of inclusion, more thought was given to the education of all students in the inclusive setting. Research studies have examined the effects of placing a disabled student in an inclusive setting with regular education students (Staub, 1996; Klinger and Vaughn, 1999; Yakopic, 1997). The research suggests that inclusive education encourages the development of a community where everyone teaches and everyone learns (Giangreco, Baumgart, Doyle, 1995; Staub, 1996).

According to the research, many positive effects are experienced by regular education students in an inclusive setting. Regular education students develop friendships with the disabled students. They become more aware of others needs. They become more skilled in reading the behaviors of their disabled peers. They develop greater self esteem. They develop their own morals and principles and become advocates for their disabled peers. They also become more comfortable around others with diverse backgrounds and develop more patience with the slow learner (Staub, 1996; Murphy, 1996).

In order for inclusion to be successful, students and teachers both felt that certain criteria must be met. Principals and administrators attitudes toward inclusion must be positive. They are the front line and their attitude toward inclusion will influence the attitude for the whole school (Cook, Melvyn, Semmel, & Gerber, 1999)

Special education teachers' attitudes also need to be positive in order for inclusion to be successful. Due to their expertise in the field of special education, these teachers are often called upon to "sell" inclusion to the general education teachers. These teachers are not only called upon to deliver instruction, but also to provide guidance to other service providers through

collaboration and consultation. They also must take the lead for day to day implementation of inclusion reforms in the general education classroom (Cook, Melvyn, Semmel, & Gerber, 1999).

Inclusion can be beneficial to all students in the inclusive classroom when good instructional practices are used. According to the research, these good instructional practices include: recognition of learning styles, slowing down the instructional pace as indicated, clear explanations of concepts and assignments, strategy instruction, and use of multiple strategies for teaching (Council for Exceptional Children Websight, 2000).

According to Yakopcic (1997), when a student is placed in an inclusionary setting he is asked to perform like a general education student. It is the job of the teacher to help the student cope in this setting. The teacher will identify the student's learning differences and his learning style. She will also teach the student specific strategies to help him cope with the curriculum. Often these same teaching techniques are used for all students and can enhance everyone's education. The job of the teacher in an inclusionary setting is to provide the student with the best learning experience possible and give him the coping tools he needs to cope in the general education classroom (Yokopcic, 1997).

For the most part included students are required to master the same curriculum as general education students. The curriculum may or may not take into consideration the included students learning differences. They may have a disability in reading, language arts, mathematics, or any combination of those subjects. This research project will focus on the included students and their mathematics disability.

Mathematics Disorders

Between 6% and 7% of school aged children exhibit some form of a mathematics

disability. This disability is difficult to diagnose because the field of mathematics is so complex that even if two children achieve the same score on a mathematics achievement test, they still may exhibit different strengths and weaknesses (Geary, 2001). A mathematics disability can take many forms. For example, one student may have difficulty mastering basic facts. While another may have difficulty with problem solving or computation. This disability can be severe because even though it may emerge in elementary school, it can also continue to hinder the student throughout his adult life (Lerner, 1997). The reauthorized Individuals with Disabilities Act, 1997, includes Mathematics Calculation and Mathematics Reasoning in its classification criteria. Both of these areas interfer with school achievement and success in life (Lerner, 1997).

According to Geary (2001), certain general characteristics of learning disabilities can affect the student's ability to learn mathematics. These characteristics include: problems in spatial relationships, visual perception, symbol recognition, language and communication abilities, memory, graphomotor skills, and cognitive strategies (Lerner, 1997; Geary, 2001).

Learning disabled students have been struggling with mathematics for at least the last fifty years. When the Russians launched Sputnick in the 1950's, Americans suddenly felt the need to "catch up" with them. This triggered the modern mathematics curriculum. This curriculum compounded the problems that the learning disabled were having in mathematics (Lerner, 1997).

This was followed by the "Back-to-Basics" approach that emphasized math calculation skills and the computation of facts. This approach de-emphasised math concepts, quantitative thinking, and problem solving (Lerner, 1997). The advent of the Education Reform Movement, saw a decline in mathematics achievement because of higher standards and expectations. These higher standards led to more testing and more mathematics courses (Lerner, 1997).

During the 1990's, The National Council of Teachers of Mathematics (NCTM) standards were developed to make mathematics instruction more uniform through out the country. These standards set forth four basic principals that should underlie mathematics instruction. These principals view Mathematics as problem solving, as reasoning, as a communication, and as a connection to the real world (Lerner, 1997).

According to the research learning difficulties in mathematics seldom cause children to be referred for evaluation (Garnett, 2001). Mathematics disabilities range from mild to severe and most children do not exhibit the same types of problems in mathematics(Garnett, 2001). Because the field of mathematics disabilities has become so complex it is difficult to remediate. Complexity in the field of mathematics results from the many domains and subdomains in each skill area. Examples of domains in the field of mathematics are arithmetic, algebra, and geometry. Within each domain are subdomains. For example in the domain of arithmetic there are subdomains such as numbers, counting, concepts, and procedures. Even solving a basic math fact may involve the use of a combination of subdomains within a mathematical domain. A mathematics disability may result because a student may be able to master one subdomain, but be unable to grasp another area. For example, to master the arithmetic domain, a student must be able to understand numbers, counting, concepts, and procedures. Concepts might include understanding the base 10 number system. Procedures might include knowing how to borrow from one column to the next (Geary, 2001). A mathematics disability can result from a difficulty learning any one or a combination of these basic skills (Geary, 2001).

The research also suggests that the language aspect of mathematics can lead to confusion about terminology, difficulty in following verbal explanations, and or weak verbal skills for

monitoring the steps of complex calculations (Garnett, 2001). It has been suggested that perhaps one-half of the students diagnosed with reading disabilities may also have a mathematics disability. Research in this area shows that some evidence suggests that the same basic memory deficient that may cause a disability in reading may result in the fact retrieval problems in children with mathematics disability (Geary, 2001). Remediation of mathematics disabilities have hampered due to the fact that research is lacking in the nature and course of this subject. According to Geary (2001), it is hard to develop effective remedial techniques for a disorder that is not well understood.

Approaches to Mathematics Instruction

Research has suggested various approaches that could be used to help a learning disabled student hone his mathematics skills. The first theory suggests that learning takes place along a continuum that needs to be gradually strengthened. This theory is called the Concrete to Abstract learning model. Students move gradually from a level that is concrete where manipulatives are used; through the representational level where pictures of manipulatives may be used; to the abstract level where the student knows that the numeral 8 stands for 8 blocks and can add and count without manipulatives and pictures (Lerner, 1997; Miller, Mercer, 1996).

Another approach suggested to teach mathematics to learning disabled students is called the Constructive Learning theory. This model requires the student to become an active participant in his own learning. The student needs to actively construct accurate theories on how to answer questions and problem solve in mathematics (Lerner, 1997; Grobecker, 1999).

A third theory is Direct Instruction. Direct Instruction is a program that teaches students mathematics skills through its explicit, carefully structured and planned lessons. It is sequential in

nature and includes a very specific script to follow when presenting information. This program includes guided practice and review of the new skills so that mastery will be achieved (Lerner, 1997). The direct instruction approach is an effective method according to a large body of research (Lerner, 1997).

Another theory that has been used to remediate mathematics disabilities in children is called the Learning Strategies approach. This approach helps the learning disabled student control his own success by teaching specific strategies that can be used to help solve problems (Lerner, 1997). Learning disabled students often use no strategies or use the strategies in inappropriate ways (Lerner, 1997). They need to learn strategies through consistent and concise methods inorder to successfully use them for attacking and solving math problems.

One of the most difficult areas for learning disabled students to master is problem solving. Problem solving is the kind of thinking required to internally verbally mediate a word problem. This kind of complex cognition requires the very receptive and expressive language skills that are frequently deficient in learning disabled children. In problem solving, students are required to read, analyze, and interpret data so that they can make selections and decisions. They require systematic teaching in order to combine thinking and language with calculation and concepts for problem solving (Lerner, 1997). Problem solving also requires that students be able to apply these skills across settings (Lerner, 1997). The language aspect of mathematics hampers the learning disabled student's mastery of the skills (Cawley, J. et al., 2001; Garnett, 2001).
Concrete materials can help the students overcome their language problems in mathematics. Also learning strategy instruction can assist students in working through the complexities of language based mathematics and problem solving (Garnett, 2001).

According to a Cawley et al (2001), students both with and without learning disabilities do not learn mathematics the way the commercial math series are organized. Most series are organized by grade level mastery of the content rather than across grade level mastery. Grade level mastery is an ineffective way to measure a child's mastery of the content (Cawley, J. et al, 2001). The basals used in the inclusive classroom have been criticized because they progress too rapidly. This leaves little time for practice and review. This practice and review is a necessity to ensure that the students will remember what they have learned.

Learning disabled children have been receiving less than quality instruction in mathematics. According to the research students that are pulled out to the resource room for mathematics and reading replacement spend less than 1/3 of the their instructional time learning mathematics. The quality of the mathematics instruction that the learning disabled child receives in the resource room is often at a lower level than they can handle (Cawley, J. et al, 2001).

Learning disabled students in the inclusive setting often do not fare much better. This setting does not pay enough attention to the learning differences of the learning disabled (Lerner, 1997). The regular mathematics curriculum has been criticized because it does not allow enough time for instruction, guided practice, review, or practical application. The regular mathematics curriculum does not consider a student's prior knowledge for the skills being taught. It has also been criticized for progressing at too great a rate of speed and for a lack of the systematic teaching of strategy instruction. It has also been noted that regular education teachers spend too much time lecturing and not enough time letting the students have actual hands on experiences (Garnett, 2001; Lerner, 1997). Many of the instructional activities in the regular education classroom show a lack of coherence as well as a lack of conciseness in their presentation. Also the

regular mathematics program does not require that the students master math facts or achieve mastery in the skill being taught, before moving on.

Generally, more attention and research has been paid to students with reading disabilities than students with mathematics disabilities who have been overlooked. Few studies have been done in the field of mathematics disabilities. This field is multifaceted and it is difficult to find two students with precisely the same mathematics disability. Remediation, therefore, should be considered on an individual basis. Often in the inclusion classroom, this is difficult due to time constraints and the speed of the presentation. If inclusion students are to be successful in the regular education mathematics series, they must be presented with useful tools to assist them. Manipulatives such as counters and numberlines are helpful. Strategy instruction is also an important component of any math program and will benefit all students. More visual and hands on materials can be used to enhance all students' learning. Also, stating clear and concise directions and giving instruction in a step by step manner will enhance the students performance.

Summary

The placement of children eligible for special education has progressed from self contained settings to the current implementation of least restrictive environment principles as the driving force behind the making of placement decisions. Mainstreaming and integration were interim phases in the evolution of placements and the current "inclusion" model is often considered the ideal good. In this latter placement, children eligible for special education are placed in a classroom with regular education students and with all the supports and services necessary for them to meet with success. A teacher trained in special education may also accompany the special education student in this placement. The special education teacher may determine the methods of

instruction and modify the materials so that the student will meet with academic success. The research on the effectiveness of these various approaches is still in its infancy.

Chapter 3

Design of the Study

This study will examine how effective the McGraw-Hill Mathematics series is when used with classified students in a second grade inclusion classroom.This study will use two students as subjects and employ a case study approach. To protect their identity the students will be referred to as "Jane" and "John."

Subject Profile

Jane and John attend a rural public elementary school in Southern New Jersey. The school houses Pre-K through second grade. There are nine second grade classrooms in their school. There is also a second grade resource room and a second grade learning and language classroom. The subjects are in a second grade inclusion classroom. The inclusion program is new to the school and the program is in its second year. There are two teachers assigned to Jane's and John's classroom. There is a full time second grade teacher and a part-time special education teacher. The special education teacher is in the classroom from 9:00 until 12:30.During this time frame, reading, phonics, mathematics, grammar, spelling, and writing are covered. Both teachers work cooperatively and share the instructional load. Both teachers switch roles as the lead teacher and the assistant. Both teachers work with small groups for extra help and as part of reading instruction.

The first subject, "Jane," is a female age 8 years and 0 months. Her educational classification is Specific Learning Disability which means that after evaluation by the Child Study Team, she has met the criteria for a classification of Specific Learning Disability according to the New Jersey State Special Education Code. She was originally evaluated in March of 2000 during

her Kindergarten year. She began to receive services in January of 2001 during first grade. She attended a resource center program for first graders from January, 2001 until June, 2001. In the small group setting of the resource center, she experienced academic success.

At her annual review meeting in June of 2001, she was recommended for the inclusion classroom for second grade. Currently, Jane receives all her instruction in the second grade inclusion classroom with what ever supports are necessary for her to be successful. According to her evaluation by the LDT/C, Jane has much difficulty with visual processing. She makes many errors with reversals and transpositions of letters and numbers. She has a slow processing rate when reading and decoding. She is a very poor speller and word decoder. She does not have her basic math facts memorized and her rate for completing mathematics assignments is very slow. She has a sweet personality and is willing to keep trying. She is open to suggestions and is willing to use the strategies that are taught to help her.

"John" is a 7 year, 10 month old male. He was assessed in December of 2000 and met the criteria presented in the New Jersey Special Education Code for elegibility as a Communications Impaired child. Though he is a product of a Bilingual household his impairment is not a result of being bilingual. He was placed in the first grade resource center from January, 2001 until June, 2001. He received instruction in Reading and Language Arts in the resource room. Mathematics was a strength. He also received Language instruction from the speech therapist twice a week.

He was successful in the resource center. At his annual review meeting, his teacher recommended him for the second grade inclusion classroom. Mathematics is an area of strength for John. He has memorized his basic addition and subtraction facts and has a fast pace for

completing these assignments. Word problems are a little more difficult for John due to their language requirements. He is very willing to try different strategies and is very cooperative overall.

McGraw-Hill Mathematics Series

The McGraw-Hill Mathematics Series was designed and structured to enable every students to master the skills necessary to face the challenges and opportunities ahead (McGraw-Hill, 2001). Today's environment requires that children today master mathematics and critical thinking skills inorder to excel as students and to be prepared for adult life.This mathematics series is guided by the NCTM standards adopted by states around the country. The authors of the series are some of the nation's top mathematicians and teachers (McGraw-Hill, 2001). The series was designed and organized to help children achieve mastery of mathematics skills.

The series is divided into 14 chapters and each chapter is divided into two sections called clusters. A cluster is a group of lessons related to a mathematics concept. This clustering" allows students ample practice on a concept prior to moving on to the next concept. At the end of each cluster students are assessed to determine whether they need remediation or are ready to move on. After students complete the second cluster in the chapter and successfully complete the assessment called "check you progress," they are ready to take the end of chapter assessment. At this point they should have mastered the concept and had any remediation needed and should pass the chapter test successfully.

The McGraw-Hill series is designed in a spiral format which means that as new skills are being introduced and taught, old skills are being reviewed over and over until mastery is obtained. In this format students are less likely to forget what has been taught because of frequent review.

According to the research, ample time for review and practice of skills is often lacking in many mathematics curricula. McGraw-Hill allows for much review of the concepts through their spiral format and this allows the students to master the skill permanently.

A transition program called "Bridging the Gaps" can be used to decide what skills students are lacking prior to teaching a chapter. Then these missing skills can be remediated and the gaps can be filled in.

At the second grade level students may still be at the concrete level. This series introduces skills using manipulatives. This is important because research shows that students must master the concrete level before they can move on to the abstract level of learning. The students begin each lesson using manipulatives and gradually move away from needing these tools.

According to the research, Direct Instruction has been identified as a very effective teaching technique for learning disabled students. The McGraw-Hill Series includes Direct Instruction boxes for the instruction part of each lesson. These Direct Instruction boxes show the tasks that the students are working on with their manipulatives. Direct Instruction of the basic math facts provides a bridge between conceptual understanding and the memorization of these facts (McGraw-Hill, 2000). A goal for use of Direct Instruction when teaching the basic facts is for the students to be able to solve them with automaticity. Automaticity of the basic facts will facilitate the solving of more difficult math concepts in the future.

This series also stresses problem solving strategies for use in mathematics and across the curriculum. It is very important when a skill like problem solving is learned that the skill can be generalized to other subjects and situations. This is especially true for the science standards. The

series contains problem solving strategies related to mathematics and science.

The McGraw-Hill series stresses universal mastery of the concepts for all learners. It supports and gives suggestions on how to teach different learning styles, abilities, and languages. The mathematics concepts are developed along a continuum. Each chapter reviews what has been learned, it introduces what will be learned in that chapter, and it provides a preview of the concepts that will be taught in future chapters.

Subject Selection

The subjects used in this study were chosen because of accessability to the researcher. They are two of the students in this researcher's classroom. They are inclusion students and they are required to learn using the same curriculum as their non-disabled peers. Due to the nature of this sample, the results of this research study should be interpreted with caution.

Research Design

This research study uses a case study approach. Two subjects will be examined in depth throughout pretreatment, treatment, and post-treatment conditions. The subjects will be pretested using the end of the first grade post-test from the Silver Burdett/ Ginn mathematics series used at this school up until the 2000- 2001 school year. Throughout the course of this study chapter test grades will be used to evaluate their progress. At the end of the study the children will be post-tested to determine their progress using the McGraw-Hill Series.

The students will be taught by both the regular teacher and the special education/ inclusion teacher. They will receive instruction both in a whole group and in small group settings. Activities will be presented using manipulatives, an overhead projector, and teacher modeling. The class will have opportunities to use the manipulative while working at their seat during independent work

time. They will also be taught various strategies for the solving of mathematical problems.

Analysis of Data

Post test scores will be evaluated to measure gains in the student's achievement. The student's rate or speed for completing mathematical problems on the post-test will also be evaluated for each subject. The data collected will be throughly examined and an interpretation provided in order to answer the research question.

Chapter 4

Introduction

The two second grade inclusion students that were evaluated as part of this research project were initially assessed using the Silver Burdett and Ginn first grade Final Test (Silver Burdett & Ginn, 1992). This assessment was given in October of 2001 at the beginning of this research project. The students were re-administered the first grade Final Test in March of 2002 to evaluate the progress they had made since October. The students were also given the McGraw-Hill Cumulative Test on Chapters 1-6, to further evaluate the students strengths and weaknesses at this point in the curriculum. The research project was designed to determine what, if any, gains the students made after being exposed to and instructed by the McGraw-Hill Mathematics series.

Research Question

Question 1: What is the Effectiveness of the McGraw-Hill Mathematics Series when used for instruction of Inclusion Students?

Results

Subject 1: Jane-inclusion student- classified Specific Learning Disability.

Jane was 8 years and 0 months at the beginning of the study. She is now 8 years and 5 months. She was given the Silver Burdett and Ginn first grade Final Test in October of 2001. Due to her severe reading problem with dyslexic traits, she struggled with the language of the test and had to have it read to her. Her mental processing and output were extremely slow. Therefore, she could not complete the fifty math problems on this test in a reasonable amount of time. The time allotted for this assessment was not long enough to allow her to complete the entire test. She had to stop working because of time constraints within the regular classroom's curriculum. Unfortunately, she

was not timed to see how long it took her to solve each problem and how long she worked on the test.

On the pretest, she completed 30 out of 50 math problems. She obtained 21 out of 30 correct.She demonstrated strength in basic number concepts. She could count sets of objects; match the sets to a number; and sequence numbers using the words /before/,/ after/, and /between/. She understood the concepts of less and greater. She identified ordinal numbers and could count by 10's. She could match a number sentence to a picture to solve a word problem. She could add basic facts using her fingers or a number line. She understood the terms /fact families/, /related fact/, and /sum/. She could also add 3 single digit numbers together to find the sum using a number line.Other areas of strength that were noted were reading a graph and problem solving with picture clues.

She had many areas of weakness that were noted. She had much difficulty solving basic subtraction problems and did not even attempt to solve two digit subtraction problems. She did not know how to regroup in either addition or subtraction. She could not identify coins, count coins, or tell time and geometry was another area of weakness. Her rate for problem solving was extremely slow and, even with the test read to her, did not complete the assessment. She lacked confidence in her ability and did not attempt problems she did not feel she could be successful with. Therefore she did not complete or even attempt 20 out of 50 problems.

During the time period allotted for this research study, Jane was given instruction in mathematics using the McGraw Hill Mathematic Series. She received instruction from both the regular classroom teacher and the inclusion teacher. Jane was taught to use an array of strategies to assist her mathematics ability. She also used manipulatives to assist her when needed. She was

also exposed to a review of the skills being worked on through a McGraw -Hill computer program. This was used once a week in the computer lab.

Jane was retested in March of 2002 at the end of this research study to see what gains she had made over the course of the year. She was retested using the Silver Burdett and Ginn Final Test. She was much more confident in her abilities and more independent in her work. She read most of the test herself and completed the whole test with in a reasonable amount of time. Her rate for problem solving was much quicker. She implemented the problem solving strategies she had been taught through out the year and they helped her improve her skills.

An area that Jane improved in was two digit addition with out regrouping. She used the counting on strategy to assist her with solving two digit problems. She would look for the bigger number in the problem, then count on from that. For example: 8+6=, she would find the 8 then count forward 6 more to get to 14.

She also improved in her basic subtraction facts. She used a strategy that she had learned called counting up to help her solve subtraction facts. For example: 11-2= ?, she was taught to put 2 in her head by tapping the side of her head with her hand. Then she was taught to count from 2 up to 11. She then was able to tell that the answer was 9. This strategy also helped her solve two digit subtraction problems with out regrouping and it also helped her increase her rate when completing the math test.

Regrouping in both addition and subtraction still proved to be difficult for Jane. She often forgot when she was supposed to carry to the tens place or regroup form the tens place. This was a relatively new skill and had just been taught, so more practice was needed.

Jane could identify nickels, quarters, and pennies, but still had trouble identifying dimes.

She was also unable to count the coins. She forgot how much a dime was worth and this made counting coin combinations difficult. Her limited reading ability affected her ability to complete word problems independently. These problems were read to Jane and she was successful. She missed one problem that was completed correctly in October. This referred to the amount of time that it took to complete various activities. But she was able to tell time by the half hour, read a calendar, and do measurement.

The McGraw-Hill Cumulative test for chapters 1-6, was used to get a better understanding of Jane's strengths and weaknesses after being taught these chapters. This assessment showed that Jane had difficulties with counting coin combinations with dimes; adding three two digit numbers with regrouping; word problems; and subtraction with regrouping. She also made a mistake by neglecting to note whether a problem was addition or subtraction and completing the wrong operation.

Subject 2: John-Inclusion Student-classified Communication Impaired.

John was 7 years, 10 months at the beginning of this research study. He is now 8 years, 2 months. He was assessed in October 2001 using the Silver Burdett and Ginn first grade Final Test. He worked independently and attempted all fifty problems. He missed 9 out of the 50 problems that he attempted.

The following number concepts were an area of strength for John: counting sets of objects; matching the sets to a number; and sequencing numbers using the words /before/, /after/, and /between/. He understood the concepts of /less/ and /greater/ and could identify ordinal numbers and count by 10's. He could match a number sentence to a picture to solve a word problem. He could add basic facts with out using his fingers or a number line. He understood the terms /fact

families/, /related fact/, and /sum/. He could also add 3 single digit numbers together to find the sum. Other areas of strength noted were reading a graph, counting money, reading a calendar, and telling time to the half hour. He was also able to add two digit numbers with out regrouping.

The areas of weakness that were noted were addition with regrouping; subtraction with and without regrouping; geometry; and probability. Word problems gave John some difficulty due to his communication disorder and his bilingual background. He read the whole test independently, but had difficulty solving five word problems.

During the time period allotted for this research study, John was given instruction in mathematics using the McGraw Hill Mathematic Series. He received instruction from both the regular classroom teacher and the inclusion teacher. John was taught to use an array of strategies to assist him as needed to solve problems. He was also given manipulatives to use to learn new math skills. Once a week in the computer lab, John had the opportunity to review the skills being worked on through the use of the McGraw -Hill computer program.

John was retested in March of 2002 at the end of this research study to determine gains made over the course of the year. He was retested using the Silver Burdett and Ginn Final Test. He missed only 5 questions out of the 50 presented. His strengths were in number concepts; basic addition and subtraction facts; addition and subtraction of two digit numbers without regrouping; addition with regrouping; reading a graph; identifying money; counting coins; problem solving with money; and problem solving.

Areas that were still presenting John with difficulty were geometry, estimation, probability, and subtraction with regrouping. For the most part these skill areas had not been

taught yet. Subtraction of two digit numbers with regrouping was a newly taught skill that may need further practice.

The McGraw-Hill Cumulative test for chapters 1-6, was used to get a better understanding of John's strengths and weaknesses after being taught these chapters. This assessment showed that John had no difficulties in any skill area covered in the first 6 chapters. He completed the assessment independently. He even was successful in solving the word problems independently. He made two errors in calculation of basic subtraction facts.

Summary

Subject 1, Jane, and Subject 2, John, both showed improvement in their mathematics ability after being instructed using the McGraw-Hill Mathematics Series. Jane improved by attempting all fifty problems within 30 minutes. She missed only 8 out of 50. She became faster at solving basic math facts, using those facts to solve two digit addition and subtraction problems. Although her dyslexic traits and low sight vocabulary still hamper her reading ability, she showed an improvement in reading and solving word problems. She improved with money identification, but counting coin combinations involving the dimes was difficult. She needs further practice with addition and subtraction with regrouping.

On the McGraw-Hill Cumulative Test 2 that Jane was given to further assess her skill with what had been taught in chapter 1-6 of the mathematics series, she attempted 20 out of 20 problems, but made 8 errors. She had problems counting money and could identify quarters, half dollars and pennies, but had trouble remembering the value of a nickel and a dime. She could add and subtract without regrouping, but forgot to carry or borrow when she needed to. She also tried to regroup when she did not need to. She read the 5 word problems independently,

but made 3 out of 5 errors.

Subject 2, John, demonstrated an improvement in his mathematic skills on the retest given in March. He completed the 50 problems in 20 minutes. He missed only 5 out of 50 as compared to 9 out of 50 in October. He did well with addition with regrouping, subtraction with out regrouping, and problem solving. All problems on the test involved reading a set of directions prior to solving them. Six problems were designed like word problems. On the original test he completed 5 out of 6 of the word problems incorrectly. On the retest he improved and completed only 2 out of 6 incorrectly.

On the Cumulative Test 2 for chapters 1-6 in the McGraw-Hill Series, John worked independently and completed the 20 problems in 25 minutes. He correctly solved problems from all 6 chapters that have been covered so far this year. His only errors were in calculation of basic facts. For example: 15-7=7, and 8+3=12. He read all 5 word problems independently, determined the correct operation, and solved 4 out of 5 successfully. The problem that he missed was not due to a lack of ability in reasoning since he determined the correct operation, rather he made his error in basic subtraction.

Both students continue to be successful in the McGraw-Hill Mathematics series. They have passed all 6 chapter tests during the course of this research study. It appears that this series is beneficial for use with inclusion students.

Chapter 5

Summary

This study examined the effectiveness of using the McGraw -Hill Mathematics Series with second grade inclusion students. Two students were pretested in October of 2001, using the final test from the Silver Burdett Mathematics Series for first graders. In March of 2002, they were tested again using the same test. The tests were compared to determine areas where the students made improvement in since October. The students were also given the McGraw-Hill Cumulative Test for second grade on Chapters 1-6. This was administered in order to further assess the their competence on the skill areas presented in this series so far over the course of the year. Throughout the course of the year the students were given end of chapter tests in which their competence on the skill areas of each individual chapter was assessed. Both students successfully passed each chapter that they were tested on. During the course of this research project, the students were instructed by both teachers in the inclusion classroom, given strategy instruction, and allowed the use of manipulatives as needed.

The limitations of this study were that the inclusion students had different classifications and different levels of skill in mathematics at the beginning of this study. Also, the case study design in itself did not allow for enough data for evaluation. One student had a very slow processing rate when tested in October 2001. She should have been timed to see if her processing speed increased by March 2002.

After reviewing both pre and post test scores and analyzing the errors that were made, it appears that both students have progressed with in this mathematics series. This researcher feels that the McGraw-Hill Series is effective for use with inclusion students.

Conclusion

At this point in the implementation of the McGraw-Hill Mathematics Series, both children have demonstrated meaningful gains in there mathematics abilities. Therefore, the McGraw -Hill Series appears to be an effective choice for use with both regular education students and included students.

Discussion and Implication

The McGraw Hill Series was found to be effective for the inclusion students assessed for this research project. The students enrolled in the inclusion program at this rural elementary school were specially selected from the resource room program at their annual review meeting for placement in the inclusion classroom. These students were not behavior problems and were deemed to have sufficient competence to benefit from instruction in the regular education setting. The inclusion classroom had nineteen non-classified students, two inclusion students, and one pullout resource center student. The inclusion classroom had two teachers during the course of the morning, which was when mathematics was taught.

The entire district started with the McGraw Hill Series in September of 2001. Manipulatives that were standard for the series were supplied to all classrooms. The teachers also had access to the computer lab for weekly review of the skill areas taught.

Replication of this study may yield different results since both inclusion students had different classifications and had been referred to the Child Study Team for different academic difficulties. The results could also vary depending on the inclusion model being used, the teaching style, lesson presentation, use of strategy instruction, and the use of manipulatives. Also the number of students included in the classroom could effect the results.

Having greater access to the computer program for review might also effect result of this study.

Because the second graders were just being exposed to this series as it was newly purchased by the district this year, results could also vary as students are exposed to the series from kindergarten on. They should show more improvement due to the fact that the spiral curriculum returns to the various skills each year and builds on them. Also having the manipulatives included with the series from kindergarten on, will help the students move from the concrete to abstract level more quickly. Research has shown that students must master the concrete level before they are able to move on. Effective use of the manipulatives should help students move from the concrete level to a more abstract level at a greater rate of speed. Therefore, the students entering second grade should have mastered the prerequisites needed to master the second grade mathematics curriculum.

Implications for Further Study

This study could be implemented over a longer period of time and across grade levels in order to gauge the effectiveness of the McGraw-Hill Program over time. The same two students could be followed across grade levels to determine the effectiveness of the program when different teaching styles and inclusion models are used. Two groups of students with similar classification could be assessed in two different classrooms to determine the effect of teacher and setting as independent variables. Overall, this researcher feels that the results obtained from this research study determined that the McGraw -Hill Mathematics Series was effective for use with inclusion students.

REFERENCES

Cawley, J., Parmar, R., Foley, T.E., Salmon, S., & Roy, S. (2001). Arithmetic Performance of Students: Implications for Standards and Programming. Exceptional Children, 67, 1-18. Online (Available- http://www.cec.sped.org/osep/news14html).

Cook, B.G., Semmel, M. I., & Gerber, M.M. (1999). Attitudes of Principals and Special Education Teachers Toward the Inclusion of Students with Mild Disabilities. Remedial and Special Education, 20, 199-207.

Garnett, K. (2001). In LD online. Available http://www.ldonline.org/ld_indepth/math_skills/garnett.html.

Geary, D.C. (2001). In LD online. Available http://www.ldonline.org/ld_indepth/math_skills/geary_math_dis.html.

Giangreco, M.F., Baumgart, D.M.J., & Doyle, M.B. (1995). How Inclusion Can Facilitate Teaching and Learning. Intervention in School and Clinic, 30, 273-278.

Grobecker, B. (1999). Mathematics Reform and Learning Differences. Learning Disability Quarterly, 22, 43-56.

Johnston, W.F. (1994). How to Educate All Students... Together. Schools in the Middle, 3, 9-14.

Klinger, J.K., & Vaughn, S. (1999). Put on Your Listening Ears: Students Speak Out on Inclusion. In Council for Exceptional Children [online]. Available: http://www.cec.sped.org/osep/news12.html. (Eric Document).

Lerner, J. (1997).Learning Disabilities; Theories, Diagnosis, and Teaching Strategies. (7th edition). Boston, Mass: Houghton Mifflin.

McCarthy, M.M. (1998). Inclusion of Children wth Disabilities: Seeking Appropriate Balance. educational HORIZONS, 76, 116-119.

Miller, S.P., & Mercer, C.D. (1993). Using Data to Learn About Concrete- Semiconcrete-Abstract Instruction for Students with Math Disabilities. Learning Disability Research and Practice, 8, 89-96.

Murphy, D.M. (1996). Implications of Inclusion for General and Special Education. The Elementary School Journal, 96,469-478.

Rivera, D.P., & Smith, D.D. (1997). Teaching Students with Learning and Behavior Problems. Boston, Mass: Allyn and Bacon Publishers.

Selikoff, B. (1994). Achieving Success in the Implementation of the Resource Center Program Option of In-Class Support Instruction. N.J.A.S.A. Perspective, 10-14.

Shilling, M.L., & Coles, R. (1997). From Exclusion to Inclusion: A Historical Glimpse into the Past and Reflection of the Future. Leisure Today, 68, 22-23.

Staub, D. (1996). Inclusion and the Non-Disabled Student. Learning, 25, 76-78.

Yakopic, M. (1997). Making Inclusion Work. NJEA Review, 71, 20-22.