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ABSTRACT

This report discusses the outcomes of a project that investigated whether the Multiple Intelligences (MI) model could be used to address specific problems in learning in special population classrooms. Dyads were created in which two students were paired together who displayed opposite strengths and weaknesses on the eight independent multiple intelligences. Initially, one student who displayed strengths in the academic areas of mathematics and reading but was weaker in the area of emotional social skills was paired with another student displaying the opposite profile. A mathematics curriculum was designed and the two students worked interactively on the various mathematics activities. The use of the physical intelligences to address kinesic abilities was incorporated as a method of instruction using hands on activities, computer games, manipulatives, and movement activities. In a follow-up study, students (n=16) in two separate 9th grade special population science classes were paired as lab partners on a science project; one class was paired using MI skills assessments and the other class was paired randomly. Generally, students in the MI groups improved in their weak areas in both studies. MI groups scored higher in the concept area when there was higher student cooperation. (Contains 13 references.) (CR)

Use of Kinesic Abilities Within a Complementary Dyad in a Special Population

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Abstract

The Multiple Intelligences (MI) model, by Howard Gardner, deserves careful consideration when working with children from special populations. Not all students have specific strengths in the traditionally measured ability areas of linguistic and logical-mathematical skills. Nonetheless, it is important to address these traditional ability areas in a meaningful way so that all students meet high standards. It was with this in mind that we decided to investigate whether we could use the MI model to address specific problems in learning in special population classrooms.

We designed the project around the idea that we wanted to use student's individual strengths in order to help them remediate mutual weaknesses in each other within a dyadic setting. We created dyads in which two students were paired together who displayed opposite strengths and weaknesses on the eight independent multiple intelligences. We initially worked with one core dyad after we had assessed them on a battery of MI skill areas. One student displayed strengths in the academic areas of mathematics and reading but was weaker in the area of emotional and social skills. The other student displayed the opposite profile having strong social and emotional intelligence but weak school-based skills. We designed a mathematics curriculum and had the two students work interactively on the various mathematics activities. We incorporated the use of the "physical intelligence" to address "kinesic abilities" as a method of instruction using hands on activities, computer games, manipulatives and various movement activities.

In a follow-up study, students in two separate 9th grade special population science classes were paired to work as "lab partners" on a science project; one class was paired using MI skills assessments, in a similar fashion, matching opposite weaknesses and strengths on the eight independent multiple intelligences, and the other class was paired randomly. Four dyads per class were considered for the comparison: an experimental group with complementary MI abilities in one ninth grade class, and a control group that were randomly grouped in another ninth grade class, with the use of a science curriculum involving seed germination.

Generally, both students improved in their respective weak areas in the both MI groups of both studies. However, in the first study, the interpersonal interaction between

the students for any particular activity was dependent on the difficulty level of the mathematical concept. It also appeared that the higher evaluation rating of the interpersonal interaction between the two students, the higher the evaluation rating on the mathematical concept became. Moreover, the activities that involved extensive physical movement were highly motivational and increased the interpersonal interaction between the two students. Additionally, in the follow-up study, the higher the cooperative evaluation scores of the dyads, the higher the concept evaluation scores on the science concept was noted with specific regard to the experimental group. With both studies, the MI groups scored higher in the concept area when the cooperative evaluation score was higher. In addition, the use of the "physical intelligence" or "kinesic abilities" aided in motivation, instruction and understanding of the concepts introduced.

Introduction

Multiple Intelligences theory (MI; Gardner, 1983, 1993, 1999) deserves careful consideration in working with children from special populations. Not all students have specific strengths in the traditionally measured ability areas of linguistic and logical-mathematical skills. However, it is important to address these ability areas if all students are to meet high intellectual standards. These kinesic abilities projects were designed to address the weaknesses of students in special populations by capitalizing on their hidden strengths in the school context by complementary dyadic grouping of the students. Through the use of the "physical intelligence" or "kinesic abilities," hands-on instructional activities were designed to be used as a method of intervention for the topics introduced both in mathematics and science in the two separate studies.

Through the use of MI theory and its positing of a unique bodily-kinesthetic intelligence, a mathematics curricula was designed in the pilot study, to address problems in learning in two specific students: Robert aged 11.8 and Samantha aged 13.4, with complementary disabilities. That is, a dyad was created in which one student's academic strengths helped remediate the other's academic weaknesses, specifically Samantha's linguistic and mathematical deficits and Robert's interpersonal and bodily-kinesthetic weaknesses. The use of hands-on activities such as: the use of manipulatives, movement activities, and computer games, was incorporated into the curriculum, to facilitate learning through the use of "physical intelligence" (Seitz, 1992, 1993, 2000a, 2000b, in press). With the use of one student's strengths in interpersonal intelligence and the other's strengths in linguistic and mathematical abilities, that this complementary dyadic pairing would, indeed, capitalize on strengths to help each of the students' in their deficit areas by working cooperatively on all activities.

Students labeled with learning disabilities have been labeled as such simply due to low performance on psychometric IQ tests measuring reading (i.e., linguistic) and mathematics (i.e., logical-mathematical) abilities (Armstrong 1994, 1999; Gardner, 1983, 1993, 1991, 1999; Sternberg & Grigorenko, 1999; Teele, 1999). Besides being judged deficit due to the lack of abilities in traditional areas, Armstrong states, "over the history of the special education movement in the United States, educators have a disturbing tendency (gifted educators excepted) to work from a deficit paradigm—focusing on what children can't do in an attempt to help students succeed in school" (Armstrong, 1994, p. 134). MI theory addresses those intelligences missing from standardized psychometric measures of intelligence. By assessing all intelligences, students' strengths can be recognized and utilized to address those weaknesses that are identified in the classroom context. Indeed, Sternberg & Grigorenko maintain: "we believe that individuals with learning disabilities often have enormous strengths which the current educational system frequently fails to tap or even draw out. We believe that individuals with learning disabilities should be helped to make the most of their potential" (Sternberg & Grigorenko, 1999, p. 6).

In an additional follow-up study, it was decided to address a classroom of special population students by complementary pairing their abilities similarly and incorporating a science curricula. Furthermore, the complementary dyadic groups would be compared to a similar class of randomly grouped dyads. Four dyads were created in two separate 9^{th} grade special population science classes. The curricula involved a host of activities that included similar hands on activities such as: use of the computer, science experimentation, and movement activities (see Tables 3 and 4).

Theoretical Perspective

The theory of Multiple Intelligences, as described by Gardner (1983, 1991, 1993, 1999), posits nine unique intelligences. He defines intelligence as, "a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (Gardner, 1999, p. 34). Gardner has set criteria for identifying each unique intelligence: "The potential of isolation by brain damage; an evolutionary history and evolutionary plausibility; an identifiable core operation or set of operations; susceptibility to encoding in a symbol system; a distinct developmental history along with a definable set of expert "end-state" performances; the existence of idiot savants, prodigies, and other exceptional people; support from experimental psychological tasks; and support from psychometric findings" (Gardner, 1999, pp. 36-41).

Linguistic intelligence and logical-mathematical intelligence have been the means by which intelligence has traditionally been measured. Linguistic intelligence can be described as "word-smart" (Armstrong, 1994). It encompasses strengths in reading, writing, listening, and speaking. Logical-mathematical intelligence includes the ability to solve problems logically and scientifically, including skills in mathematical computation and logic. Spatial intelligence is the ability to create visual mental images, the ability to "manipulate" those images in the mind, and the ability to render graphic depictions. Musical intelligence pertains to strengths in melody, sonority, and rhythm. Intrapersonal or "emotional" intelligence refers to one's ability to know one's self, including the ability to access one's feelings, symbolically elaborate on them, and to use them to guide one's behavior. Interpersonal or "social" intelligence refers to the ability to "read" how others think and feel as well as the ability to persuade others to do things you want them to do. Bodily-kinesthetic intelligence is the ability to use one's body and motor skills successfully and creatively. Naturalist intelligence refers to strengths in recognizing and categorizing flora and fauna. Existentialist intelligence pertains to a concern with "ultimate" issues such as questions of where do we come from and why are we here? Everyone possesses each of these intelligences to some degree, but how they are nurtured and fostered, in part, determines where the strengths will lie (Gardner, 1983, 1991, 1993, 1999).

Methods and Results

Initial study: Dyadic evaluation and curricula considerations. In the design of the first dyadic learning project, several factors were taken into consideration. First of all, it was necessary to find two students possessing roughly opposite strengths and weaknesses. A modified version of "Multiple Intelligences Assessment Checklist" (Armstrong, 1999) was administered to all students in a special population classroom (11 students) where the first author was a teacher-in- training. The Checklist was used (a) to have the students evaluate themselves, (b) to have the parents evaluate their children, and (c) to have the teacher evaluate the children. Care was taken in the evaluation of the responses to ensure that preferences were not mistaken for capacities. After evaluating all responses, two students were chosen who displayed opposite strengths in several of the multiple intelligence areas: Robert, a male student, displayed strengths in reading and logical-mathematical abilities but exhibited weak interpersonal skills, while Samantha, a female student, displayed weaknesses in reading and math but had strong interpersonal skills. Robert was 11;8 years-old, multi-handicapped child with cerebral palsy. His standardized test scores indicated a 6th grade level equivalent in reading and his 5 1/2 grade level equivalent in mathematics. Socially, he was shy and socially withdrawn. Samantha was 13;4 years-old and learning disabled. Her IEP (IEP, Individualized Educational Plan) noted scores on the WISC-III ranging from Borderline to Low Average. Her standardized test scores indicated a high 3rd grade level equivalent in reading, and a 5th grade equivalent in mathematics. Socially, she was outgoing and loquacious.

A mathematics curriculum involving the concept of fractions was the focus of mutual learning within the dyad. Activities were designed for the students to work cooperatively with manipulatives and hands-on math games as well as use of the computer. Gardner refers to five entry points that can be used to teach concepts: "the experiential approach that students learn best with is a hands-on approach, dealing directly with materials that embody or convey a concept" (Gardner, 1991, p. 246). Similarly, "This natural learning mode has made its way into education as hands-on learning. When actual objects are used to demonstrate numerical concepts, such as fractions, hands-on learning can be highly effective" (Seitz, 1993, p. 52).

Interpersonal skills and understanding was addressed by the cooperative nature of the dyad and the inclusion of various mathematical games: "Board games are a fun way for students to learn in the context of an informal social setting. On one level, students are chatting, discussing rules, throwing dice, and laughing. On another level, however, they are engaged in learning whatever skill or subject happens to be the focus of the game" (Armstrong, 1994, p. 80). The student's cooperation was observed and recorded by the investigator on a rating scale of 1-5 with 1 being the lowest and 5 being the highest. Interpersonal skills considered were interaction on sharing materials, communicating ideas through discussion, modeling, etc., and cooperation within each activity.

The curriculum was implemented throughout the course of a school year. The students met with the teacher on a weekly basis for two 40-minute sessions, depending upon both the availability of the students and the school calendar. A rating scale was designed to rate the students' success with the math activities and the social interaction between the students during each session, as observed by the teacher. Thus, each student was rated low, moderately low, average, moderately high, and high in both the mathematics activities and interpersonal interaction within each activity session (see Table 1 and 2).

Initial study: Pedagogical methods. A variety of tasks were designed to introduce the concept of fractions and incorporate cooperative learning with the inclusion of manipulatives, movement activities, games, worksheets, and computer activities. The students were initially introduced to the concept of fractions with a simple worksheet asking them to shade in various dimensions of fraction forms to test their prior knowledge. Once their basal level of fractional knowledge was determined, activities were fashioned accordingly. First, the students undertook a "fraction circles." Then, they were introduced to a game entitled, "Pizza Party." Several activities were enacted with this game in order to associate the concept of equivalent fractions and the concept of whole. Other uses of manipulatives included the use of Fraction Tiles, Fraction Bars, and work on a "Fraction Search" Worksheet. This required the students to search for fractions adding up to a whole and circling them horizontally, diagonally, or vertically (similar to a word search puzzle). The students also used manipulatives for a worksheet game, "Fraction Olympics," which required arithmetic addition of two cards drawn from a pile and then shading in the appropriate shape on a worksheet. In addition, a worksheet using words was introduced in which the two students had to make new words by taking a fractional portion of several words. Moreover, movement activities were designed in which the students were asked to find "Environmental Fractions," or items within the environment that could be considered fractions. And finally, a computer game was used entitled, "Number Heroes," in which the students were required to shade in a specific fraction on a specific shape to launch fraction fireworks.

All of these activities incorporated the concept of equivalent fractions as well as addition, subtraction, and division of fractions. Multiplication was not introduced. The cooperative nature of these activities involved the students working on one worksheet, sharing the various manipulatives, as well as interacting together on all games (see Appendix A).

Inital study: Results. With this particular study, both students selected had rather extreme differences across a range of interpersonal and mathematical abilities. Although Robert did not increase significantly in his interpersonal rating, there was some improvement. It was noted that Robert is quiet and withdrawn and may have other psychological issues that cannot be addressed in an academic setting. His disability, as well, may account for his limited success. Samantha, however, showed marked improvement in her mathematical ability as the result of an assessment after the study was completed and as reported by her regular classroom teacher. Moreover, Robert's performance in his regular classroom mathematics curriculum improved as well.

It was observed throughout the project that when a new or more difficult mathematical concept was introduced, Robert's interpersonal rating would decrease. However, if the activity involved physical movement, as in the "Environmental Fractions" activity, both students' interpersonal rating increased, regardless of the difficulty level of the concept. Indeed, the greater the physical activity involved in the task, the higher the interpersonal rating was for both students. Moreover, the more familiar the students became with each other and the greater the physical activity involved between them, the higher their ratings were on both the academic concept and the interpersonal interaction. It seems that the use of "physical intelligence" or "kinesic abilities" enhanced the students performance of the mathematical concepts as well as on the interpersonal interaction rating. It also appears that the use of complementary abilities enhanced each student's deficits, Robert's being his interpersonal rating and Samantha's being her mathematical concept rating.

Follow-up study: Dyadic evaluation and curricula considerations. In the follow up study, two ninth grade special population classes with similar learning disabilities, age ranges from 14-15 years, were grouped in a similar fashion creating dyads as "lab partners." One 9th grade class was assessed on a battery of MI skill areas and paired with students of complementary MI ability areas. There were 4 sets of dyads per class used for this study, eight students per class (see Table 3).

Similarly, students in the experimental group were administered the "MI Checklist" to evaluate themselves as well as the "Teele Inventory of Multiple Intelligences," (TIMI, Teele Inventory of Multiple Intelligences). Information on the students IEP's was obtained for their grade equivalent math and reading scores (See Table 3). Care was taken to compare the evaluations and the IEP information to group the students. The students were matched similarly to those of the pilot study; those with social and emotional intelligence strengths to those with linguistic and mathematical strengths. The "bodily-kinesthetic" intelligence was noted as a strong point for all students involved in the MI assessments. This intelligence was also used for the instructional methodology, therefore; was not considered for the MI ability pairing of the MI complementary abilities group (see Tables 3 and 4).

A science curricula was designed which involved students working within their dyad for a science project involving seed germination. A laboratory experiment was designed to implement hands on activities with the planting of lima bean seeds in various locations in the classroom. The students used plastic bags and placed the beans in moist paper towels and then sealed the bags shut and placed the seeds in various locations in the classroom: a drawer, in the sun, in a locker and in the freezer. They were required to observe, collect and record data over a period of one month. A similar fashioned rating scale was designed by the teacher to measure the students cooperation within their dyads. They were rated for cooperation in various areas: helping, listening, participating, persuading, questioning, respecting, and sharing. They were rated from 1-none of the time, 2-some of the time, 3-most of the time, 4-all of the time (See Appendix C). All of the scores for each category were totaled for a total out of 28 possible and each of the scores were transformed into a percent. For their science concept evaluation, a similar assessment tool was used to rate the students' understanding in two areas; process and product. Measuring the process area involved: having clear vision of a final product, being organized to complete a project, managing time wisely, acquiring needed knowledge base, and communicating efforts with the teacher. Product measurement involved the final end products including their projects and demonstrations. They were measured for: format, mechanics of speaking/writing, organization and structure, creativity, and demonstration of knowledge. Their actual reports and demonstrations were graded from 1-3 for below average, 4-6 for average, and 7-9 for excellent in both the process area and the product area. The scores for each category were tallied and a total possible out of 99 was scored (see Appendix B).

For this paper, preliminary results are reported, as this study is still ongoing. The students were rated for a rough draft report on their findings with the seed germination results. They will be producing a final product incorporating research on the topic and a final paper along with a presentation. These items will be rated similarly along with their cooperative evaluations within each dyad. The students will also be asked to evaluate the project and other academic subject teachers will be given student evaluation forms on the participants to request information on the generalization of any improvements in their subject areas that were noted in their classes relevant to this science project (see Appendices B and C).

Follow-up study: Pedagogical methods. A science curriculum was designed according to the scope and sequence of the 9th grade science curriculum at JHS 157 Q. The students studied living systems and were introduced to the process of seed germination in this particular study. As described earlier, the students were grouped in dyads, the experimental were grouped according to MI complementary abilities, and the control group was grouped randomly. Rather than a variety of tasks as in the pilot study, this project involved a simple study that was carried out by the students over the period of one month. The use of the "scientific method" was stressed throughout the project, i. e. defining their topic, gathering information, making a hypothesis, designing an experiment and carrying it out, observing and recording data, organizing and analyzing data, and making a conclusion. Students were required to work cooperatively with their partners to complete a science project involving the germination of lima bean seeds placed in various locations throughout the classroom: a drawer, in the sun, in a locker and in a freezer. They were given directions on how to accomplish each task and were required to observe, record and analyze data. Each individual student was required to hand in a simple report involving their hypothesis, observations and conclusions on their group experiments. Partners were required to assist each other throughout the experiment. The "physical intelligence" was addressed by the hands on nature of this project as well as the follow up activities that the students are required to complete for their end products, i.e.

presentations, demonstrations, etc. Cooperative learning was the emphasis on this project rather than teacher directed lectures. Teacher observations were used to note the nature of the students' cooperation in each session.

Follow-up study: Preliminary findings. In evaluating the preliminary findings of this part of the science project, the control group has a lower cooperative evaluation score for each dyad than the experimental group. Moreover, the scores on some of the experimental groups' concept evaluation are much higher than that of the control group. In the experimental group, it is interesting to note that there are higher scores for students with lower reading grade equivalent scores than that of the control group. The more the interaction between the students, the higher the understanding of the concept seems to be as also noted in the pilot study (see Table 3).

There are some higher scores in the control group in terms of concept evaluation; however, this may be attributed to the students' higher grade equivalent reading scores as noted at 6th grade level from their IEPs. Moreover, the higher cooperative evaluation scores of the experimental group show a higher concept evaluation score in three specific students having 5th grade level reading scores as noted from their IEPs. There was also one student with a 4.5 grade reading level, whose concept evaluation score was notably higher. Whereas, there are 5 students having 6th grade level reading scores in the control group, but their scores on concept evaluation are similar in nature and not higher as would be anticipated given their grade equivalent scores (See Table 3). These results show that the students in the control group with higher reading level scores, scored similarly to those of the experimental group. Those in the experimental group with higher cooperative scores, scored markedly higher on their concept evaluation scores as compared to their lower reading level scores. It would seem that the complementary grouping of MI abilities has some impact on these students' concept understanding of this project as also noted in the initial study.

Educational Implications

MI theory deserves careful consideration in education, but particularly in the realm of special populations. Students from special populations do not always have the equivalent linguistic and mathematical abilities of their peers. However, this indicates a need to address their unique strengths in remediation of their weaknesses. Students in special education classrooms frequently receive truncated instruction due to their limited abilities in traditional academic areas. However, by using their individual strengths to help remediate their deficits, there can be a marked improvement in traditional academic areas. Of particular interest is the use of bodily and gestural skills in the remediation of educational weaknesses. Moreover, studies have shown that cooperative learning and peer tutoring are instrumental in abetting students' classroom learning. Thus, it is important to create complementary peer groupings as a method to individualize classroom instruction and educate students of diverse intellective profiles.

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Appendix A

The following worksheets were obtained from the World Wide Web:
http://www.forum.swarthmore.edu

1. Fraction Shapes
2. Fraction Olympics
3. Searching for Wholes
4. Mars Hunt (Linguistic/Mathematic Worksheet)

The following worksheet was obtained from the World Wide Web:
http://www.black-hole.com/users/rsch/fractip.html

Rick's Math Web Fractions Tips and Tricks

The following games were used

1. Number Heroes (for the computer)
2. Pizza Party

The following manipulatives were used:

1. Fraction Circles
2. Pattern Blocks
3. Fraction Bars

Appendix B – Evaluation Criteria for Science Project used for Concept Evaluation

Name: ____________________ **Date:** ____________________

Project Title: ____________________ **Teacher(s):** **Ms. P. Elfers**

Evaluation Criteria For Science Project

Process	Below Avg.	Satisfactory	Excellent
1. Has clear vision of final product	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
2. Properly organized to complete project	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
3. Managed time wisely	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
4. Acquired needed knowledge base	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
5. Communicated efforts with teacher	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**

Product (Project)	Below Avg.	Satisfactory	Excellent
1. Format	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
2. Mechanics of speaking/writing	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
3. Organization and structure	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
4. Creativity	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
5. Demonstrates knowledge	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**
6. Other:	**1, 2, 3**	**4, 5, 6**	**7, 8, 9**

Total Score: ____________________

Teacher(s) Comments:

Note: Each of the students were rated for concept evaluation with this evaluation criteria. The scores in each of the categories were tallied for a total score, the highest possible—99. Number 6 in the Product section, "Other," was not used in this assessment.

Note: This Evaluation criteria was obtained from the World Wide Web from a site entitled "Rubrics Generators," at http://www.teach-nology.com/web_tools/rubrics/

Appendix C – Evaluation Criteria Used for Cooperative Evaluation Within Each Dyad

JHS 157 Q

Evaluation Criteria For Each Cooperative Work Group for Science Project

Skills	Criteria				Points
	1	2	3	4	
Helping The teacher observed the students offering assistance to each other.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Listening The teacher observed students working from each other's ideas.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Participating: The teacher observed each student contributing to the project.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Persuading: The teacher observed the students exchanging, defending, and rethinking ideas.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Questioning: The teacher observed the students interacting, discussing, and posing questions to all members of the team.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Respecting: The teacher observed the students encouraging and supporting the ideas and efforts of others.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___
Sharing: The teacher observed the students offering ideas and reporting their findings to each other.	***None* of the Time**	***Some* of the Time**	***Most* of the Time**	***All* of the Time**	___

Note: This evaluation criteria was used to rate the students' cooperation within each dyad for a possible total score of 28/28. These scores were each transformed into a percent.

Note: This Evaluation criteria was obtained from the World Wide Web from a site entitled "Rubrics Generators," at http://www.teach-nology.com/web_tools/rubrics/

Table 1
Ranking of Student's Understanding of the Concept of Fractions in Multiple Activities

Activity	Description	Male	Female
1	Fractional Shapes-Intro to Concept	2	3
2	Fraction Circles	5	5
3	Pizza Party Game I	3	3
4	Linguistic/Mathematic Worksheet I	1	1
5	Pizza Party Game II	3	5
6	Pizza Party Game III	1	1
7	Linguistic/Mathematic Worksheet II	2	4
8	Environmental Fractions I	3	5
9	Environmental Fractions II	3	5
10	Environmental Fractions III	4	5
11	Pizza Party Game IV	3	2
12	Pattern Blocks Intro	4	3
13	Pattern Blocks II	5	2
14	Pattern Blocks III	5	4
15	Pattern Blocks IV	5	5
16	Fraction Bars w/Search Game I	3	4
17	Fraction Bars w/Search Game II	5	5
18	Fraction Olympics Game	2	3
19	Fraction Bars w/Search Game III	3	3
20	Computer Number Heroes	5	4

Table 1-Legend-
1-Low
2-Moderately Low
3-Average
4-Moderately High
5-High

Table 2
Ranking of Students' Interpersonal Interaction Socialization During Multiple Activities

Activity	Description	Male	Female
1	Fractional Shapes-Intro to Concept	1	1
2	Fraction Circles	1	2
3	Pizza Party Game I	2	4
4	Linguistic/Mathematic Worksheet I	1	2
5	Pizza Party Game II	3	5
6	Pizza Party Game III	1	3
7	Linguistic/Mathematic Worksheet II	2	4
8	Environmental Fractions I	4	4
9	Environmental Fractions II	4	5
10	Environmental Fractions III	5	5
11	Pizza Party Game IV	1	2
12	Pattern Blocks Intro	2	3
13	Pattern Blocks II	3	1
14	Pattern Blocks III	4	5
15	Pattern Blocks IV	5	5
16	Fraction Bars w/Search Game I	4	4
17	Fraction Bars w/Search Game II	5	5
18	Fraction Olympics Game	2	4
19	Fraction Bars w/Search Game III	5	5
20	Computer Number Heroes	5	5

Table 2-Legend-
1-Low
2-Moderately Low
3-Average
4-Moderately High
5-High

Table 3

Experimental Group (Grouped with MI Ability Considerations to form complementary dyads)

Name	Age	Reading Scores	Math Scores	Cooperative Evaluation	Concept Evaluation
Sam-A	14.4	5.5	4.5	75	76
Mary-A	14.9	5.5	4.5	75	80
Dan-B	15.5	6.0	4.5	82	74
Nazia-B	15.7	5	3.5	82	74
Bob-C	14.5	5.5	6	68	74
Jason-C	14.10	2.5	3.5	68	62
Victor-D	14.4	4.5	4	78	71
Steph-D	14.8	5	5.5	78	70

Control Group (Grouped Randomly without MI abilities being considered.)

Name	Age	Reading Scores	Math Scores	Cooperative Evaluation	Concept Evaluation
Sal-A	14.4	6.5	5.5	68	67
Cassie-A	14.11	5.5	5	68	71
Ronnie-B	15.9	6	5.5	68	72
Hector-B	14.10	6	7.5	68	72
Aaron-C	14.7	6	5.5	68	74
Jared-C	14.11	2	4	68	65
Kevin-D	14.10	6.0	6.5	68	62
Earl-D	14.7	2.5	2.5	68	64

Note: Reading and Math Scores are Grade Equivalent scores obtained from the their IEP's

Cooperative Evaluation Scores from a possible 28/28 changed to a percent. Concept Evaluation Scores from a possible 99 total.

Table 4

Table for MI Assessment of Strengths for Experimental Group

Linguistic	Logical	Spatial	Musical	Bodily-Kinesthetic	Intrapersonal	Interpersonal	Naturalist
Sam	Sam			Sam			
			Mary	Mary		Mary	Mary
		Stephanie		Stephanie			Stephanie
Nazia				Nazia		Nazia	Nazia
	Bob	Bob		Bob		Bob	Bob
	Victor		Victor	Victor	Victor		
		Jason	Jason	Jason		Jason	
	Dan	Dan		Dan			