MULTIPLE INTELLIGENCES AND THEIR IMPACT ON SCIENCE INSTRUCTION IN ONE SECOND GRADE CLASSROOM

THESIS

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Chapter I

INTRODUCTION

Rationale for the Study

Every day newspapers, popular magazines, and professional journals around the world report the apparent decline of the American educational system. Writers cite high school drop-out rates, declining test scores and compare American students' academic performance to students of other nations. Although it may not be necessary to focus world attention on the topic, America needs to commit time, energy, and resources to improve its schools. A common criticism of American schools is that they do not provide a practical education that prepares students thouroughly for a career. Employers in many fields complain that graduates lack specialized skills and do not have the ability to apply skills and problemsolve on the job. America, many say, has the obligation to provide an educational system that will meet the needs of our work force.

Although they are very much the voices being heard today, employers aren't the only people demanding change. Communities across the country are crying out for the restructuring of the educational system and they have targeted classroom instruction as an area in desperate need of revision. Dozens of educational watchdog groups

insist there is a shortage of quality teachers in American schools who address the problem-solving skills that help our students succeed. There are just as many teachers saying that it is not the quality of teaching that has caused this decline, but administrators, school boards, and a lack of materials which are taking away teachers' abilities to make instructional decisions in their own classrooms. And there are still other teachers and educational researchers who agree this is true but insist that a teacher still has the ultimate control over instructional decisions in the classroom. These people are examining the way that schools can address the problem-solving skills necessary to complete a challenging and fulfilling education.

One theory being developed has implications for the individualized, quality instruction of students. This theory, Multiple Intelligences (MI), provides for the existence of seven relatively independent forms of human intelligence: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal. If these seven forms of intelligence do in fact exist there must be at least seven different ways in which children learn and at least seven ways that instruction should be provided for in schools. Present statistics provide evidence that the majority of instruction in America's schools falls within only two intelligences: linguistic and logical-mathematical (Gardner, 1983). Perhaps this is part of the reason for so many students' poor performance in school - they are not receiving instruction that is focused on their strengths in the other five intelligences. If this is indeed true America's

teachers are doing a great disservice to students. American teachers then have the responsibility to learn more about the theory of Multiple Intelligences and experiment with it in their classrooms. They must ask themselves," Are these seven intelligences present in my students? What can I do to find out? If they do exist, how can I adapt my instruction to provide for them and help my students succeed?"

In recent years, the aforementioned questions have been asked in many classrooms including the one in which this study took place. The educators who have asked these questions have been at the forefront of change in our schools. As MI theory has not often been implemented in school settings, these people have been charged with the task of investigating the potential value of the theory to classroom instruction. Each of these pioneers is attempting to find his or her own way to interpret the beliefs of the theory's author, Howard Gardner. As with any new piece of knowledge, each teacher must focus on applying one small part of MI theory at a time to his/her own classroom before attempting to implement the theory as a whole. When educators across the country experiment with the component parts of MI theory, much needed changes in America's classrooms can and will be promoted.

Statement of the Question

Once a teacher has committed him/herself to experimenting with MI in the classroom, (s)he needs to select one part of the theory that is of

particular relevance to his/her specific classroom. In this study investigating the existence of multiple intelligences in students was a central focus. This primary level teacher chose learning centers in the classroom as a place to start examining MI theory. As a consequence, the following research question was developed: When science learning centers are designed with the multiple intelligences in mind, what trends in the engagement of second grade students occur?

Definition of Terms

For clarification and a common understanding of the following research, it is necessary to define a few terms that will appear repeatedly. The following terms are of utmost importance when reading the description and findings of this study:

1. Science Learning Center- An area within the classroom where children have the opportunity to work at a variety of science activities and to make decisions about their own learning.

2. Engagement- The amount of on-task behavior a student exhibits while completing a center activity as well as the student's verbal and written expression of interest in participating in center activities (i.e. completed activity evaluation forms; taped

interviews). Levels of engagement may also be assessed by observing a student's voluntary involvement in the activities.

3. Intelligence- " An ability or set of abilities that permits an individual to solve problems or fashion products that are of consequence in a particular cultural setting" (Walters & Gardner, 1985, p.3).

Limitations of the Study

It is important to concede that the design and findings of this study are only fully applicable to the second grade classroom in which it took place. The engagement levels are unique to the twenty-two children who participated in the study and could easily have differed with the slightest changes in design or procedure. Many factors, including home life, illness and state of mind, influence a young child's engagement every day.

Materials and peer choices may have influenced a child's selection of center activities. Therefore, one may not be able to assume that a child's choice of activity automatically indicates a preference for a single intelligence over all others.

The intelligences of the children were only monitored for three weeks across six center activities. Conclusions about the existence of the

multiple intelligences in these children would be better assessed through a longer period of study.

Chapter II

REVIEW OF LITERATURE

The Need for a New Concept of Human Intelligence

In order to provide instruction that meets the individual needs of students, one must first examine the types of students who are in the schools. One must consider their inherent abilities and goals and then work to design instruction that will prepare them for the future. Keeping with tradition, American schools abundantly provide various levels of instruction geared to the potential mathematician, writer, scientist, and historian in each person. Students recieve information in these content areas primarily through verbal and logical reasoning means. Students are regularly assessed in these areas with teacher made and standardized tests which again cater to the verbal and logical-mathematical intelligences. A number of students do learn and perform well through these means and are consequently considered "intelligent" by those standards But how does the same instruction provide for the many students whose success comes instead, on a baseball field, in an art studio, the student council, an orchestra pit, or when involved in independent projects? The current educational system does not supply significant amounts of instructional support for students who learn and

achieve best through these means. Instead, the student who is a gifted pianist but only scores 85 on an IQ test is not considered "intelligent".

According to this "traditional" point of view, intelligence is a general ability found in all individuals to some degree. Schools have spent decades giving intelligence tests designed to assess this presumable intelligence in the form of an IQ score. Many teachers have raised their expectations for students who test with high IQ's and lowered them for students with lower IQ scores. This predisposition may have hampered the achievement of many students over the years. The development of thousands of future doctors, lawyers and world leaders may have been inhibited simply because they scored low on one standardized test. Jencks, 1972, found : "IQ tests predict school performance with considerable accuracy, but they are only an indifferent predictor of performance in a profession after formal schooling " (p. 113). This finding is but one indication that the type of intelligence we are presently assessing is most likely not the only type of intelligence that exists. If it was, IQ tests would be able to predict success in endeavors other than school. Therefore, the student who achieves a high score on a IQ test and does well in school will not necessarily end up being successful in his/her future career.

In their 1985 publication Walters and Gardner ask readers to: "Suspend the usual judgment of what constitutes intelligence and let your thoughts run freely over the capabilities of humans- you (may be) drawn to the brilliant chess player, the world-class violinist, and the champion

athlete; such outstanding performers deserve special consideration " (p. 3). In this article the authors challenge one to think about the intelligence displayed in the accomplishments of these people. If one agrees that intelligence is demonstrated in these performances, one must question why current tests of intelligence fail to identify these people as intelligent. If disagreeing, one must ponder how these talented people accomplish such remarkable feats if they do not possess marked intelligence.

The ideas of Thomas Armstrong are also strong evidence for this alternative view of intelligence. In his 1988 article, Armstrong explores the demonstrated intelligence of those children who are frequently labled "learning disabled" (LD) because they are not very gifted in linguistic or logical-mathematical intelligence and therefore have difficulty achieving in school. While conducting research for his doctoral dissertation on the strengths of learning disabled children, Armstrong found: "...that kids labeled "LD" are often nonverbally creative; better than average at visual-spatial tasks; and talented in mechanical, architectural, musical, and athletic pursuits. Some are even highly talented in specific language and mathematical areas " (p. 34). Armstrong argues that the abilities of many children, including those outside the LD label, are never displayed because schools don't provide the opportunity within the curriculum. Many of these children function below grade level during school hours and learn more when they are away from school. This inarguably indicates the need for changes in classroom instruction.

The Theory of Multiple Intelligences

Since Howard Gardner's book, Frames of Mind: The Theory of Multiple Intelligences, was published in 1983, interest in this very different view of human intelligence has increased rapidly. Mainstream teaching publications such as Instructor are including brief informational pieces on MI theory in growing numbers. To understand the theory fully however, one must use Gardner's 1983 book as a primary resource. In it Gardner reviews the history of IQ testing in the United States and expresses his belief that: "The tasks are definitely skewed in favor of individuals in societies with schooling and particularly in favor of individuals who are accustomed to taking paper-and-pencil tests, featuring clearly delineated answers" (p.16). Conceding to this inequality in testing, Gardner then proceeds to explore an expanded view of intelligence through a global perspective.

As stated earlier in this work, Gardner defines an intelligence as: "An ability or set of abilities that permits an individual to solve problems or fashion products that are of consequence in a particular cultural setting" (Walters and Gardner, 1985, p.3). When looking at intelligence in this manner, Gardner states: " The problem-solving skill permits one to approach a situation in which a goal is to be obtained, and to locate and pursue appropriate routes to that goal (i.e. creating an ending to a story, repairing a quilt, predicting a chess move)" (Walters and Gardner, 1986,

p.165). In practical terms, someone is considered intelligent if they can solve the problems of life in a variety of ways and also when they are able to produce things that their culture considers valuable. When looking at intelligence in this manner, one begins to formulate a very different concept. Instead of a single, static entity, intelligence is an ever-changing, fluid set of abilities. This theory begins to justify the variety of human accomplishments that exist in schools and society today. Gardner believes that of the infinite numbers of intelligences that may exist, all people possess each to some degree. Because of heredity and the influence of formal training experiences with each intelligence however, individuals will vary in their combination of skills. All the roles a person plays in society will require a combination of all their intelligences.

Gardner admits that the seven intelligences he proposes in Frames of Mind are not the only intelligences that exist. He does, however, explain how he arrived at those seven intelligences and the criteria that can be used to identify more in the future. David Lazear's book Seven Ways of Knowing summarizes Gardner's lengthy chapter on the criteria for an intelligence (a way of knowing) quite well. On pages 17 and 18 of his introduction, Lazear presents the five criteria in the following format:

1. **Biological origin**. This is the biological/physiological tendency to participate in a particular way of knowing and problem-solving such as body movement, communication with others, etc. Each of

these tendencies is rooted within our biology as humans. Likewise, an intelligence has a distinct developmental journey, which ranges from novice to master.

2. **Universal to the human species.** Each particular way of knowing and problem-solving is found in every culture, regardless of socio-economic and educational conditions. Likewise, the roots of an intelligence are traceable to our earlier evolution as a species.

3. **Cultural valuing of the skill.** Each particular way of knowing is supported and reinforced by human culture and is part of the wisdom a culture transmits to its young.

4. **Identifiable neurological base.** For each intelligence there is an identifiable core operation or set of operations in the brain that can be "activated" or "triggered" by certain external or internal information.

5. **Capable of symbolic representation.** Each intelligence can be encoded in symbols or in some culturally contrived system of meaning. This capability is the key to transmitting and teaching intelligence.

Gardner affirms that of all the intelligences he has examined, only those meeting all five criteria were considered bona fide intelligences (1983). The criteria for each intelligence also had to be supported across diverse fields: "Including, psychology, medicine, education, business, cognitive patterning, sociology, anthropology, brain research, linguistics, biofeedback, and the human potential movement " (Lazear, 1991,p.189). The credibility that Gardner's theory draws from these fields has invoked new lines of thought while exploring the possibilities of human intelligence in all cultural roles.

Chapter III

RESEARCH DESIGN

As the following study was implemented in a classroom that incorporated the use of learning centers as a method of classroom instruction, it is important to mention some research advocating their use at the primary level. McIntyre (1982) found learning centers to: " Offer the balance of structure and freedom young children need to explore diverse sensory experiences" (p.54). In such a way, learning centers address more than one intelligence at a time; increasing the possibility for all students to learn from the activities. Orlich, Gebhardt, Harms, and Ward (1982) found that: " Learning centers allow teachers to design supplemental science curricula which more closely match the developmental levels of their students" (p.18). This again increases a student's chances for attaining the knowledge conveyed through instruction. The more a teacher provides for the many different intelligences of his/her students, the more likely that true learning will occur. Learning centers are one way of integrating MI theory in the classroom and appeared to be the ideal place to start in this primary level study.

Classroom Setting

This study was conducted in a large, suburban school district in Western New York. The study involved all 22 children in the second grade class shared by two teachers. For this study these teachers will be referred to as Teacher A and Teacher B. These teachers incorporated the use of learning centers in classroom instruction. Accordingly, students were accustomed to several activities occurring at once in the classroom. The science learning center was located in an area away from other instruction and had its own bulletin board where all important information was posted for students. All materials were located in the center area and students had a choice of five different places within the center area to work in. All students in the study were working at or near the second grade level in science.

Student Grouping and Scheduling

For the purposes of management and increased learning, students were put into five groups of four or five students. Group members were selected on the basis of their academic achievement in science and by considering any time conflicts their scheduled activities outside of the classroom had with center times. Heterogeneous ability groups were created. The groups were assigned a letter name which appeared on a

schedule posted on the center bulletin board. Each group had one hour a week to work in the science center. That hour of center time fell on the same day of all three weeks of the study unless school-wide activities interfered with the daily schedule. If this conflict arose, groups were assigned a make-up day. The bulletin board also had a folder filled with activity evaluation sheets (see Appendix E) and folders numbered one through five. Every member of each group was assigned to a folder.

Notification of Students and Parents

Since the theory of multiple intelligences was being applied to a primary level classroom, it was necessary to create a simplified explanation of the intelligences that seven and eight year old children could listen to and comprehend before taking part in the research. Fortunately, the students in the class had heard their teachers mention the "seven different ways that people are smart" prior to this research. Therefore, only one of hour of instruction on the multiple intelligences was built into the study design. Most of the hour was spent discussing the seven different types of intelligence and finding strong examples of each within the students in the classroom. Notifying parents about classrooom activities, especially classroom research, is essential in a primary setting. Therefore, the rest of the hour was spent having the children write letters to their parents. The children described what they understood of MI Theory and how it was going to be used in their classroom. A few days

later a letter from Teacher A was sent home explaining the classroom research. A brief informational article on the intelligences was also attached to clarify any misunderstandings parents may have had when reading the student letters. (See Appendix A and Appendix B for examples of both letters.)

Design of the Centers

A consistent center design was used throughout the three weeks in which this study took place. A table in the science center area of the classroom was divided into seven rows- one for each of Gardner's intelligences. Each of the intelligences was then assigned a color that remained constant throughout the study:

RED- Linguistic

BLUE- Logical-Mathematical

YELLOW- Visual-Spatial

PURPLE- Musical

GREEN- Bodily-Kinesthetic

BLACK- Interpersonal

ORANGE- Intrapersonal

At the bottom of each row an envelope with that intelligence's color on it was taped to the table. Each envelope had several strips of colored construction paper in it which matched the color on the envelope. Above each envelope were five sets of materials for each activity. There was a

room divider behind the table which was used to post directions and relevant information directly above the row of each intelligence. All directions were posted on colored paper that corresponded with the appropriate intelligences. To the left of the table was another room divider on which seven folders in the assigned colors were attached in the same order they appeared on the table. The folders contained copies of any data sheets or special types of paper required for each of the activities. Masking tape was used to divide a counter into five different work stations. (See Appendix C for a diagram.) All materials were created so that the science learning center could accomodate five children working on a possibility of seven different activities at a time - one designed for each of Gardner's seven intelligences.

Three themes in second grade science were chosen for this study: temperature, sound and birds. The themes were being explored during other classroom instruction at the time of this study. Each topic, in sequence, was assigned to one week of the three week study. An hour of instruction was spent on the new center topic every Monday so that students would be familiar with the center activities before taking part in them. The steps for each activity were explained and modeled for students at this time as well.

Center Management

Students were informed that they must complete two of the center activities during their scheduled hour of center time. To keep track of this requirement with ease, students were to take one strip of colored paper corresponding with the activity they were about to do and place it in their folder on the center bulletin board. This action also helped the teacher tally the number and type of activities the students chose most frequently. Next, the students took one set of materials from the area on the table where the color of the activity they chose was located. They found a place to work in and then went over to the appropriate folder to take one copy of the data sheet or paper required for the activity. When students completed each activity they put the completed data sheet in their folder on the center bulletin board. At that time they took one evaluation sheet from the bulletin board, filled it out and put that in their folder as well. Then each student cleaned up his/her own materials, put them back on the table and proceeded complete his/her second activity in the same manner.

Interviewing Process

Before the study six students were selected to participate in an interviewing process that was designed to keep track of their engagement

in center activities. Three boy and three girls were chosen to prevent gender bias in the study. The students were selected on the basis of their prior academic achievement in science. To ensure that all levels of students were included in the the study, one boy and one girl representative of high, average, and low achieving students was chosen. Each student was interviewed once a week on the day that (s)he completed the center activities. The questions remained the same for all three sessions. Interviews took approximately 15 minutes per student. Therefore, each student chosen for this process spent about 45 minutes during the three week period doing interviews. The interviews were taped for the purposes of researcher facilitation. (See Appendix D for interview questions.)

Chapter IV

FINDINGS

The purpose of this study was to see if any trends in student engagement would occur if the science learning centers in which they participated were designed with MI theory in mind. In defining engagement earlier in this work, four possible indicators were listed: 1. amount of on-task behavior while completing center activities 2. verbal expression of interest in participating in center activities 3. written expression of interest in participating in center activities 4. voluntary invlovement in center activities. The classroom teacher kept anecdotal records of all four engagement indicators and tape recorded interview sessions while students particpated in center activities. Therefore, one method of organizing the findings of this study is to review the four areas. An additional way to measure engagement while focusing on the multiple intelligences is to report the intelligences of the activities most frequently chosen by students. Both methods will be included in this chapter.

Amount of On-Task Behavior

In this study the amount of on-task behavior of a student was determined by teacher observation. Students who were observed spending their scheduled center time exclusively on center activities were

considered "on-task". This behavior came in many forms including: obtaining and setting up materials, reading directions, conducting experiments, completing data sheets, helping other students with activity directions, discussion of activities (interpersonal activities), evaluating center activities, center clean-up, and asking the teacher questions relevant to center activities. Of the forty-five hours of center observation, the teacher found six occasions where students were off task.

Verbal Expression of Interest in Participating in Center Activities

Students verbal expression of interest in center activities occurred frequently during center times. Most frequently comments were specific to the task at hand. Some examples are, "Ooh! I like doing these things (center activities) with the cold stuff!" and ," Hey! Teacher A. This one part of the experiment was hot before but now it's only warm. I like doing this!" Seventy-four comments like this were heard while students participated in center activities.

Verbal expressions of interest also appeared in the taped student interviews. Each time these six students were directly asked the question," Did you like doing this activity?", they all answered,"yes." Four of the six regularly cited reasons why they were interested in the center activities. An example of this type of comment is: " Yes. Because I got to work with other people and got to see them work and see how they did things and all that."

work with other people and got to see them work and see how they did things and all that."

Verbal interest in the centers was also expressed at other times in the school day. Daily, students would ask when it was their group's turn to work in the centers again. Twice, student arguments ensued from this topic. The teacher was consistently confronted with the question, " Can we use the centers during recess?"

Written Expression of Interest in Participating in Center Activities

Written expressions of interest were first seen in the students' letters to their parents. Six of the students predicted for their families the activities they might like. Four of the students directly asked their families," Which one of the intelligences do you think I will like?" The most regular form of written interest was found in the activity evaluation sheets the students filled out after each activity. Of the 128 evaluation sheets completed, 125 indicated a like for the activity, 2 expressed mixed feelings about the activity, and 1 conveyed a dislike of the center activity. (See Appendices A and E for samples of a student letter and completed evaluation sheet.)

Voluntary Involvement in Center Activities

This voluntary behavior was observed in the context of the interpersonal center activities. As a partner was required to complete the activities, and no partners were assigned, students were permitted to ask anyone in the class (except students in their center group) to join them in interpersonal activities. Of the 36 children asked to be a partner in an interpersonal activity, 0 refused to participate. At one point during the study all five children in a center group selected the interpersonal activity and ten children were working in the center, voluntarily, at once.

Intelligences of Activities Selected

Through the mangagement system, it was possible to record the activity choices of individual students and the entire class. The following chart displays those selections.

Student#	Intelligence of Activity Chosen							#of Activities Completed
	Verbal	Logical	Spatial	Musical	Bodily	Inter.	Intra.	
1	0	0	2	1	1	1	1	6
2	2	1	0	0	0	2	1	6
3	0	1	2	1	0	2	0	6
4	0	0	1	2	1	2	0	6
5	1	0	0	1	1	3	0	6

6	0	1	1	1	1	2	0	6
7	0	1	2	0	2	1	0	6
8	0	1	1	1	0	2	1	6
9	1	0	1	0	1	1	0	4
10	0	1	1	0	3	1	0	6
11	0	1	1	1	3	0	0	6
12	0	0	2	1	1	1	1	6
13	1	0	2	1	0	2	0	6
14	0	0	1	0	2	3	0	6
15	0	1	0	1	1	3	0	6
16	0	1	1	1	1	2	0	6
17	0	1	1	0	2	2	0	6
18	0	0	1	2	2	1	0	6
19	0	0	3	0	1	2	0	6
20	0	0	2	0	1	1	0	4
21	0	0	2	1	1	2	0	6
22	0	0	2	1	2	0	1	6
Total	**5**	**10**	**29**	**16**	**27**	**36**	**5**	**128**

Chapter V

IMPLICATIONS OF THE RESEARCH

Discussion

The researcher in this study was somewhat suprised at the findings of this study. Many different indicators of student engagement support the unexpected findings. Of the six instances where students were found to be off task during participation in center activities, four occurred with the same student. This student has a medical history of difficulty with attentiveness. Therefore, his off-task behavior may well be the result of physical difficulties rather than disengagement with the activities. Of the remaining two instances of off-task behavior, one is due to student dislike of the activity itself as he reported on the activity evaluation sheet. There is no clear reason why the sixth instance of off-task behavior occurred. In any case, when working with seven and eight year old children for hour long sessions, six instances of off-task behavior is a very minute number.

Primary level students are very verbal by nature. Thus, one would expect high numbers of verbal expressions of interest in center activities if students were truly engaged. In this study there were seventy-four verbal expressions of interest. What is surprising to this researcher, however, is that this relatively high number occurred when the majority of activities were done in isolation from other students. In most cases, the only

person a student had to express him/herself to was the teacher observing the centers. Comments like," I like doing this because you learn about yourself, and it's fun and you learn at the same time " indicate that students were truly engaged in learning and that more activities like the science learning center should be incorporated into regular classroom instruction.

The students' written work was by far the most telling indicator of engagement with learning centers and the multiple intelligences. A review of the activity evaluation sheets indicated three things students felt about the activities. First, many of the students comments revealed that they had some intuitive knowledge about the intelligence that each activity was based on. The question " Why did you like this activity?" produced answers like: " I like to make drawings and coloring " for visual activities; "It really made you write and I like to write" for verbal activities; " Because you get to work with a partner" for interpersonal activities; and " Because it is a feeling paper and I like feeling" for bodily-kinesthetic activities.

The evaluation sheets also revealed that the primary intelligence the teacher designed an activity for was not always what the students believed it was designed for. Comments like: " I like to draw" in response to an interpersonal activity indicate that the student saw the role of the visual-spatial intelligence in the activity. Thus supporting Gardner's statement that the intelligences almost never work in isolation.

The final finding this researcher would like to comment on is the insight she gained on her students throughout this study. The centers allowed the teacher more time to observe individual students and obtain their views and opininons more than would normally occur in the "traditional" classroom structure. By reading one little girl's comments on an evaluation sheet the teacher learned that instead of trying to avoid as much difficult academic work as possible, which appeared to exist in the student's avoidance of classwork, the student really," ...like(s) hard things that make me think hard."

Conclusions

The findings of this study indicate to this researcher that there is a high level of engagement in second grade students participating in science learning centers designed with the multiple intelligences in mind. Second grade students do exhibit a range of intelligences. The students are capable of understanding the plurality of intelligence and are aware of their intelligence strengths as displayed in their choice of center activities and their verbal and written comments. Given a choice, students prefer to learn through methods that incorporate a variety of intelligences and activities.

Recommendations for Further Study

One recommendation to teachers who want to further investigate the existence of multiple intelligences and learning centers in the classroom would be to complete a full-year, longitudinal study. This would give more validity to the findings as apparent inconsistencies in student performance could be explored over time. Teachers would have more time to prepare students with the content knowledge required to complete center activities. Students would not be limited to only one hour and two activities a week. Students would have the freedom to experience all center activities if they so desired. This would make student intelligence preferences even more apparent.

The study might focus on a smaller sample of students. Time for twenty-two students to participate in one center area was hard to find in the daily schedule of a second grade classroom. Centers in other content areas could be used to alleviate this problem. The study could be conducted with one group of students assigned to the math center, one to the language arts center, and so on. This would be more difficult to manage but would produce some very interesting instructional variations.

A study could be done to focus more on the changing role of the classroom teacher. Though more preparation for instruction had to be done ahead of time, the teacher in this study had more time to observe students and play the role of a true facilitator of learining instead of a

transmitter of knowledge. As Bruce Campbell said of his classroom research on the multiple intelligences: " I began to observe my students from seven new perspectives. I began working with them rather than for them" (1990, p.7).

My final recommendation would be to include the multiple intelligences in all areas of instruction. " So long as one takes only a single perspective or tack on a concept or problem," Gardner states in Gursky's 1991 piece," it is virtually certain that students will understand that concept in only the most limited and rigid fashion" (p.42). This inadequate fashion of teaching exists in many of America's classrooms today. We must alter it so that all students without the proverbial linguistic and mathematical blend of intelligences can thrive in our schools as is their right to do.

Appendices

Appendix A

Example of A Student Letter to Parents

April 16, 1998

Dear Mom and Dad,

We are learning about 7 intelligences for 3 weeks here are some of them music, math, working by yourself, or working with another person. I am in group B. I think I will like music do you? tell katie and Billy I said hi! I think learning adout the 7 intelligences is going to be fun do you? And here are some of the people in my group I :) M ;) E and me

Love,
Me

Appendix B

Informational Letter to Parents from Teacher

May 3, 1993

Dear Families,

Last week you should have received a letter from your child that was in his/her take-home folder. The children wrote those letters to explain some research they are taking part in. After reading the letter many of you are probably still wondering exactly what the children were talking about. I am writing this brief letter to explain the basis of the research in the classroom. As you all know, I am currently a graduate student at SUNY Brockport. As part of the requirements for my Master's degree I must complete a research project. I've chosen to study something called the Multiple Intelligences Theory. It was developed by a man named Howard Gardner who is a professor at Harvard University. The theory proposes that there are at least seven different intelligences that all human beings possess: linguistic, logical-mathematical, visual-spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal. As I know we have the brightest group of second grade children in the world, I decided to investigate the existence of these intelligences in our students.

What I have done is design science learning centers geared toward each of the intelligences. I am tracking student choices and I am trying to find out if these selections demonstrate a child's strengths in each of the intelligences. I hope to include a multiple intelligences profile for each child in the last report card.

The attached article will further explain the theory and how it can be used to help children learn. I hope you find it as interesting as I have. As always, if you have any questions, please contact me at school.

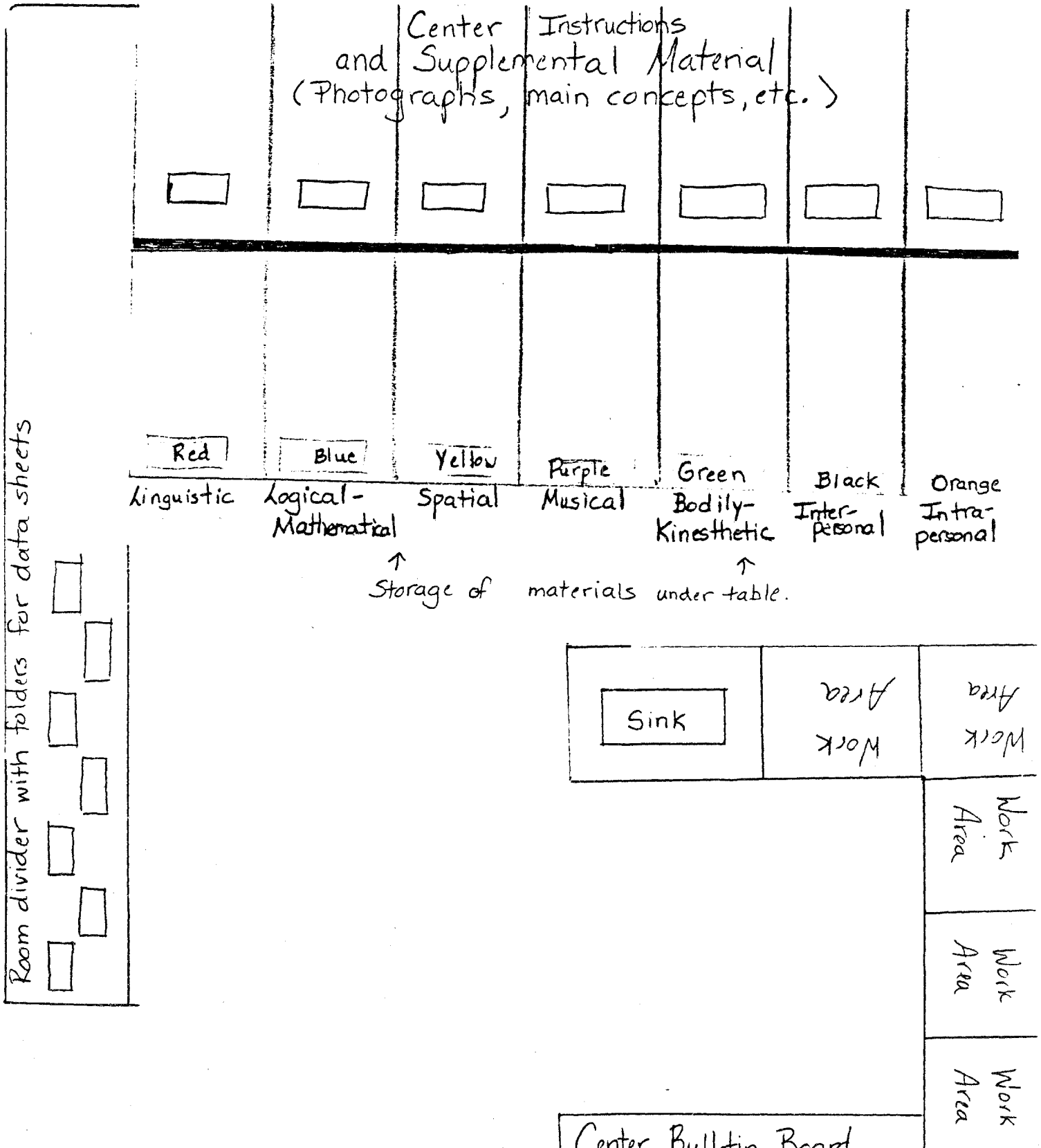
Sincerely,

Teacher A

Teacher A

Appendix C

Diagram of Center Area



Appendix D

Interview Format

Question 1: What color was the activity you chose today?

Question 2: Why did you choose that activity?

Question 3: Do you know which of the seven intelligences that activity was about?

Question 4: What about the activity told you that the activity was about the _____ intelligence?

Question 5: Do you think that intelligence is something that you are very strong in? Why?

Question 6: Did you learn anything about yourself by doing this activity? What?

Question 7: Have any of your teachers ever talked with you about the way you learn best? (This question was only asked during the first interview session.)

Question 8: Do you think teachers should create more activities like this for children to learn through? Why or why not?

Appendix E

Sample Evaluation Sheets

Name J

1. Which activity did you do? [redacted]

2. Did you like this activity?

3. Why or why not? Becase it took time and i like the tools

Name M

1. Which activity did you do? [redacted]

2. Did you like this activity?

3. Why or why not? becuse It is a fealing paper and I like feeling hot and cold water.

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