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A LITERATURE REVIEW OF THE IMPACT OF THE
DIFFERENT INTELLIGENCES ON DIFFERENTIATED INSTRUCTION.

by

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A Research Paper Submitted to the Faculty of the
DEPARTMENT OF PHYSICS

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE IN SCIENCE

BEMIDJI STATE UNIVERSITY
Bemidji, Minnesota, USA

October 2009

STATEMENT BY AUTHOR

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With diversified classrooms, brain based research, and multiple intelligences becoming the common theme at school district trainings and PLC meetings, teachers are looking for the magic formula for classroom success. This research paper defines and examines multiple intelligences, brain cravings, emotional intelligences and other types of brain based research to seek out the truth about understanding the kids in our classrooms and the way we teach them.

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ACKNOWLEDGMENTS

The researcher would like to thank his advisor John Truedson, the committee members Dr. Richard Koch and Denise Black and his three sons, Todd, Ross and Jack for putting up with the stress of both parents working on and completing different Master's programs at the same time. The last special thanks to Joan Miller who helped me so much in keeping my paperwork in order; letting me know everything I was missing. That in itself is no easy task. Finally, my wife, Tonya who has focused my ADHD mind long enough to take all my scribbling and notes and helped me organize it and make sense of it. Anyone who reads this paper will be thankful to Tonya for having the patience to do this.

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Chapter 1: Introduction

With “No Child Left Behind” guiding today’s educational practices and the demand for increased student test scores, the old- fashioned note taking and lecture method of instruction used by many educators will not adequately ensure the success of the student in the classroom. Why do teachers fall back to this type of instruction? Some teachers feel oral lecturing will reach the auditory learners while the note-taking will encompass the visual learners. However, this “one size fits all approach” will not adequately ensure the success of all students and more importantly, those students who are not auditory or visual learners.

Too many of today’s educators struggle with engaging students in a positive manner that will help the pupils retain and apply the concepts that are being taught. Along with the educators struggling themselves, students’ attitudes toward education have also drastically changed over the past twenty-five years. These attitude changes have brought disinterest, unaccountability, and lack of motivation to the classroom which has also led to students’ not progressing. Brain research has shown that everyone learns a little differently than each other. Some suggest that we teach toward the student’s many strengths or intelligences (Barrington, 2004). When we teach to the different types of intelligences we feed the cravings the brain is longing for. It all comes down to being diversified. In the educational setting this is known as differentiated instruction. Differentiated instruction can open the door for students to re-engage and have success if done properly by the instructor. That is the challenge that today’s young teachers face as they enter into the educational work force of tomorrow.

Statement of the Problem

With traditional educational methods stalling in the classroom, other, more creative ways of expressing the concepts need to be developed. This educational process is differentiated instruction, teaching to the different intelligences (Barrington, 2004).

No matter what the education label, educators need to step up and get the job done. The question becomes, “What works best?” and “Is there any proof that it works to help the student retain and apply the concepts any better than traditional educational methods?”

Research Questions

A literature review of the impact multiple intelligences have on differentiating instruction.

1. What is differentiated instruction?
2. To be the most effective teacher in the classroom, how should a teacher pick what intelligences should be focused on?
3. What are the controversies involving the multiple intelligences?
4. What evidence is there differentiating your teaching will actually benefit students?

Significance of the Research Problem

Although new ways of educating our young people have been suggested over the years, some educators feel uncomfortable trying new methods or strategies. This discomfort may force them into falling back into their “comfort zones,” the traditional

lecture format. Learning new methods may require more extensive training. The training will require time, energy, and funding.

As a group, teachers across the country need to explore all options for helping our young people to succeed. Students need to be taught to think, explore, question, and seek out the truths of our world, and develop an intrinsic desire to learn. It is our responsibility as educators to spark this interest and make students hunger for more. If an instructor fails to spark a student's interest, then the instructor has failed the student and hindered the student's chances of succeeding in the future. If the instructor no longer learns, then the pupils no longer learn.

To reach a student's true understanding of a concept, one needs to go beyond the test score, beyond a modification, and beyond a person's ability to apply or not apply the concept. When students are emotionally attached to the concept, they will never forget it. This is where the different intelligences enter the realm of education.

Just think of a time when you lost something that you really cared about or a dramatic event that has taken place. People can remember the exact day and thing they were doing at the time the event occurred. An example of this is the attacking of the World Trade Center. Do you remember where you were and what you were doing when you first heard about or witnessed the attack? Older patrons can tell you exactly what they were doing at the time John F. Kennedy was shot. How can people remember events like this? They are emotionally attached.

Are the different intelligences being reached through using traditional methods of education? How about with using differentiated methods of instruction? Is a good balance

the way to educate students today? As a whole, it appears as if the educational system needs to determine how to accomplish this.

When a balanced education is accomplished, then we, as a country, can feel proud and say, “Our students have the best education possible” and we can once again be a world leader rather than a world follower.

Limitations and Assumptions

This literature review takes a look at multiple intelligences and emotional intelligences and their roles in a diversified educational setting. It discusses their role, function and purpose when educating regular and special education students, both males and females. It also examines which works best for student retention of knowledge and skill acquisition in today’s fast paced “I need it yesterday” society.

The focus is to explore the manner in which students learn best and to create an education plan that may combine all styles to use in the classroom setting. The large variety of cultural and economic backgrounds of students, family problems, lack of aide assistance in the classroom, and shortage of funding to implement a program may or may not have an impact on the outcomes of education. Learning is an ongoing process that needs to adapt to the ever changing needs of students.

Definition of Terms

Traditional Education – using lectures, notes, overheads, worksheets, and individual projects to monitor student comprehension and acquisition of content.

Progressive Education – using a variety of methods and materials to meet the adjusting needs of students to increase student comprehension and retention of subject matter.

Linguistic intelligence – the capacity to use language, referred to as word smart.

Logical-mathematical Intelligence – highly developed understanding of underlying principles of some kind of casual system, referred to as logic smart.

Spatial Intelligence – referring to the ability to represent the spatial world internally in your mind, referred to as picture smart.

Musical Intelligence – the capacity to think in music, hear patterns, recognize them, remember them, and manipulate them, referred to as music smart.

Interpersonal Intelligence – the understanding of other people, referred to as people smart.

Intrapersonal Intelligence – the understanding of yourself, what you are, who you are, and what you can do, referred to as self smart.

Naturalist Intelligence – the ability to discriminate among living things as well as sensitivity to other features of the natural world, referred to as nature smart.

Bodily Kinesthetic Intelligence – the capacity to use your whole body or body parts to solve a problem, referred to as body smart. (Gardner, 1997)

Spiritual Intelligence – exploring the nature of existence in its multifarious guises, thus religion and spiritual matters is just one variety of this intelligence.

Existential Intelligence – a concern with “ultimate issues”.

Moral Intelligence – a concern with rules, behaviors and attitudes that govern the sanctity of life, in particular, the sanctity of human life and the sanctity of any other living creature and the world they inhabit. (Gardner, 1997)

FIVE PARTS OF EMOTIONAL INTELLIGENCES:

Self-awareness – knowing one’s own emotions, self confidence, and self assessment.

Self-regulation – self control, adaptability, conscientiousness, optimism.

Motivation – emotions that service a goal.

Empathy – recognizing emotions in others.

Social Skills – relationship management. (Goleman 1995)

I.E.P. – (Individual Educational Plan) this is a plan for students that qualify, through testing, with learning disabilities. Modifications to the child’s education are stated in this plan.

ELL – English Language Learner

S.R.E.I.T. – Self-Report Emotional Intelligence Test

M.E.I.S. – Multifactor Emotional Intelligence Scale

M.S.C.E.I.T. – Mayer-Salovey-Caruso Emotional Intelligence Test

S.P.S.S. – Statistical Packages for the Social Sciences

Mancova or **Ancova Test** – a parametric statistical test that assumes samples are drawn from a population that is normally distributed with equal variances.

Summary Statement

When working with adolescents, the instructor needs to engage students’ minds by any means possible. To accomplish this task, instructors must have the resources and training to be able to reach a wide variety of learning styles. Succeeding at engaging everyone may be difficult, but is surely possible. The old standby of using lectures and note taking alone cannot accomplish the task. Instructors need to look into the realm of

multiple intelligences, emotional intelligences, and differentiated instruction for help. Multiple and emotional intelligences and differentiated instruction go hand in hand. Learning what the intelligences are and how to incorporate them into their teaching may refresh and rejuvenate instructors and allow them to bring out the best in their students and themselves.

Court case after court case shows that when someone craves a particular substance, fighting the urge to obtain and consume that substance is very difficult. Ask someone who has ever been addicted to drugs, alcohol, caffeine or another substance how challenging breaking the cycle of their addiction has been.

As instructors, it is our duty to make the education of our specific topics the substance that our students crave. How to create this craving within our students is the crucial component needed for student success.

Mangione (2006) states that there are three main brain cravings: ritual, novelty, and challenge and we must feed them. Feeding these cravings involve knowing what buttons to push. Howard Gardner gives us eight to eleven intelligences and Goleman gives us five dimensions or “buttons” to push. Incorporating these “buttons” into instruction will turn our subject matter into the “drug” our students crave.

Chapter 2: Review of the Literature

Summary of Research Sampling

Writing for Education World talking about the works of Dr. Thomas Armstrong, Delisio (2007) suggests schools across the U.S. educational system are fighting an uphill battle because of their unwillingness to take a close look at themselves and change. Dr. Armstrong states the same methods that taught our grandparents and parents and used on our generation are now teaching our children! The methods are archaic and in most cases ineffective. There is more to education than memorization; why don't we actually learn it? An example of this is the teacher who uses the same worksheets, notes and tests year after year without changing or updating any of the materials and/or content.

The intelligences, a newer and more modern approach introduced in the 1980's, was and is still subjected to being picked apart and criticized rather than embraced by some educators. The methodology of teaching to the multiple intelligences is actually more engaging and very hands on. Gardner (1997) explains that the activities will bring out student's strengths in understanding language, controlling their bodies, knowing their inter-selves, becoming one with nature, recognizing the patterns in music and becoming familiar with the spatial universe.

The engaging and hands- on part of the methodology isn't the problem. The problem is whether or not multiple intelligences actually exist. Waterhouse (2006) and others speak out against multiple intelligences because they believe M.I.s is a learning style rather than an intelligence. They are dwelling on the labeling rather than focusing on the educational outcome of their use. If the methodology works, does the name really matter?

Research with M.I. confirms the fact that males learn differently than females. This information is helpful in increasing the success of the student. Boys prefer the logical manner of education, while girls are more intrapersonal (Loori, 2005). To enhance the educational process even more, different activities or quizzes show which intelligences the students are the strongest with, so teachers can present in the manner that best reaches the student. If all teachers will take the time to use these assessments, the rewards for the students will most likely increase.

Research using all 10 multiple intelligences can actually predict students' I.Q. (Furnham & Yuen, 2005). Studies confirm that students remember events, dates, and details when they have developed an emotional attachment. Attaching learning to an emotion increases the level of comprehension the student will have toward a subject studied in the classroom. Thus, the likelihood of increased test scores would also increase.

Multiple Intelligences

Gardner (1983) introduced the world to what he defines as multiple intelligences. Intelligence is one's ability to problem solve or to make something that is valued in one or more cultures. When this occurs, that ability is considered intelligence. Gardner (1997) comments however:

That ability must meet other criteria: Is there a particular representation in the brain for the ability? Are there populations that are especially good or especially impaired in an intelligence? And, can an evolutionary history of the intelligence be seen in animals other than human beings. (p. 1)

Identified in the early 1980s, the first seven intelligences are linguistic intelligence, logical-mathematical intelligence, spatial-visual intelligence, bodily-kinesthetic intelligence, musical intelligence, *interpersonal* intelligence, and *intrapersonal* intelligence.

Linguistic intelligence. Linguistic intelligence is one's ability to use their written, oral and spoken language skills. This includes one's native language and other languages as well. Human beings possessing high linguistic intelligence are able to explain and interpret ideas and information through their language skills. They are able to express themselves well and have a great understanding of the relationship between communication and its meaning. Examples of humans possessing high linguistic intelligence are writers, speakers, lawyers, orators, and media personnel.

Logical-mathematical intelligence. Persons with high logical-mathematical intelligence are successful trouble shooters. They understand how systems work and have above average reasoning and deduction skills. These people can also manipulate statistics, numbers, and solve mathematical equations in their heads. Logical-mathematical type personalities not only understand cause and effect, but they thrive on it. These people have a tendency to be scientists, engineers, accountants, statisticians, bankers, and directors. They are able to devise strategies and usually achieve their goals.

Spatial-visual intelligence. Having a spatial-visual intelligence means that one has the insight and perspective to visualize large spatial representations in their minds. They can imagine models, see shapes, and create a whole form within their minds before creating it. Persons with this ability are designers, inventors, artists, and architects with an understanding of the relationships between images and their meanings. I would refer

to spatial-visuals as visionaries. People possessing high spatial-visual intelligence are more likely to paint or sculpt rather than be a musician or writer.

Bodily-kinesthetic intelligence. When thinking of bodily kinesthetic intelligence, athletes and dancers come to my mind. Both have strong dexterity, balance, and control over their eye and body coordination and use their bodies as parts or as a whole. Being able to use the body to solve a problem, or stage a production is a strength of bodily-kinesthetic intelligence. Besides an athlete or dancer, others belonging to the bodily-kinesthetic group are fire fighters, soldiers, actors, and mimes.

Musical intelligence. Persons that have a strong musical intelligence have a keen sense of sound. Musical intelligence itself is the awareness to hear patterns, manipulate them and repeat them at will. Understanding the relationship between sound and feelings, keeping the tone and rhythm of a song is also a sign of having a musical intelligence. Members of the musical intelligence would include musicians, DJ's, piano tuners, voice coaches and sound engineers.

Interpersonal intelligence. If a person seems to have an innate ability to interpret moods from facial expressions, understand people through body language or affect the feelings of others, then that person expresses the interpersonal intelligence. Clergy, therapists, counselors, politicians, teachers, coaches, and doctors are some of the type of people that fall into the interpersonal intelligence category.

Intrapersonal intelligence. Knowing ones self inside and out is having an intrapersonal intelligence. Everyone has this type of intelligence. Knowing your strengths and limitations gives you an insight of what you can and can't do in a particular

situation. This is having a grasp on your intrapersonal intelligence and using it to accomplish what you want to achieve.

Naturalist intelligence. In 1997 during an interview with Kathy Checkley (1997), Gardner introduced us to an eighth intelligence he called the naturalist intelligence. With the naturalist intelligence, you are able to discriminate between different animals, plants, cloud formations and other features of the natural world. The most common type of persons for this intelligence is farmers, hunters, botanists and chefs.

Spiritual/existential intelligence and moral intelligence. Later on, Gardner suggests yet two other intelligences, spiritual/existential and moral intelligence. Spiritual/Existential intelligence deals with ones understanding of religions and topics dealing with ultimate issues. Clergy, faithful people and professors are good candidates to have a motivated spiritual/existential intelligence. Moral intelligence is based on ones ethics, humanity and value of life. Persons who have a strong moral intelligence see things in black and white. It's either right or wrong, there is no middle ground.

To use the multiple intelligences in the classroom a teacher needs to understand that there is no single intelligence that is better than the rest for all of your students. You need to find the right combination of intelligences for each individual student (Checkley 1997).

Comparing boys and girls. Another fact that we must remember is girls learn differently than boys. Studies indicate that boys are prone to prefer activities involving logical and mathematical intelligences. Girls tend to excel at learning activities that involve the intrapersonal intelligences (Loori, 2005).

The study also indicated that females were more self-motivated and independent than boys of the same age. Even though girls have a tendency to score higher on tests than their male counterparts, males always rate themselves as having higher I.Q.s than females. Girls will also rate boys I.Q.'s higher than their own, even when they have earned better grades than the boys.

Cultural differences also play a role with minority groups in the classroom. I've noticed very distinctive patterns that have developed and have seen how the different ethnic backgrounds play a role on how the girls perform in the classroom. Regardless of sex, when it comes to ethnic diversified groups, using multiple intelligences in the classroom did help with standardized test scores and the retention of subject matter (Neto, Furnham, & Paz, 2007). Neto and Furnham and Paz did a study comparing Portuguese and Macanese university students. They used 139 male and 192 female Portuguese subjects and 90 male and 107 female Macanese subjects in their study comparing self and parental estimations of IQ's using Gardner's 1999 list of 10 intelligences. The hypothesis tested were: would there be sex differences in self-rated mathematical and spatial intelligence, with men giving higher self estimations than women? It was predicted that there would be cultural differences between Macanese and Portuguese, with the former awarding themselves and their parents significantly lower scores than the latter; participants would rate their fathers as more intelligent overall than their mothers; the best predictors of overall IQ would be logical/mathematical, spatial and verbal intelligence. The study was carried out using questionnaires.

The results came back as expected for both groups rating their fathers higher than their mothers when it came to IQ. The Macanese results showed no gender differences,

but the Portuguese results did. The big difference in the study was culturally. Portuguese rated their fathers higher in the verbal, mathematical, spatial, interpersonal, intrapersonal, existential and naturalistic intelligences than the Macanese. The Portuguese also rated their mothers higher in verbal, mathematical, spatial, musical, interpersonal, intrapersonal, existential, spiritual and naturalistic intelligences than the Macanese. For the self rating, the Portuguese again rated themselves higher than the Macanese.

Table 1

Analyses of Variance for Self-estimates of Multiple Intelligences Controlling for Age

TABLE 1
Analyses of variance for self-estimates of multiple intelligences controlling for age

Variable	M				F	
	Macanese		Portuguese		Gender	Culture
	Men	Women	Men	Women		
Verbal or linguistic intelligence (the ability to use words)	100.31	100.66	110.46	108.86	0.15	46.11***
Logical or mathematical intelligence (the ability to reason logically, solve number problems)	100.33	103.42	107.66	99.21	0.89	0.01
Spatial intelligence (the ability to find your way around the environment, and form mental images)	104.62	106.96	114.25	104.43	2.30	0.13
Musical intelligence (the ability to perceive and create pitch and rhythm)	101.49	96.58	103.98	101.41	5.43*	1.45
Body-kinaesthetic intelligence (the ability to carry out motor movement, e.g., being a surgeon or dancer)	101.21	100.17	109.96	106.52	1.25	19.99***
Interpersonal intelligence (the ability to understand people)	104.52	104.04	116.88	116.26	0.33	53.38***
Intrapersonal intelligence (the ability to understand yourself and develop a sense of your own identity)	106.30	105.41	112.48	109.24	1.54	12.43***
Existential intelligence (the ability to understand the significance of life, the meaning of death and the experience of love)	109.65	106.20	112.79	108.09	6.67**	3.63
Spiritual intelligence (the ability to engage in thinking about cosmic issues, the achievement of a state of being, e.g., achieving trance states, and the ability to have spiritual effects on others)	96.55	93.54	99.54	97.58	2.43	2.25
Naturalistic intelligence (the ability to identify and employ many distinctions in the natural world, e.g., categorizing species membership)	100.48	98.51	108.89	102.19	14.90***	8.92**

* $p < .05$; ** $p < .01$; *** $p < .001$.

Note. Arguments against multiple intelligences and for multiple intelligences

Lynn Waterhouse, a child behavior researcher from the College of New Jersey, is against using multiple intelligences and emotional intelligence theories in the classroom. According to Waterhouse, Gardner claims that multiple intelligences research is based on empirical evidence. She believes that his work and research lack adequate empirical support (Waterhouse, 2006).

Waterhouse states neural systems do not support the claims of multiple intelligences and are therefore invalid as empirical evidence. She contends that the brain's primary visual cortex sends visual information to the ventral and dorsal processing streams where they connect with different neurons that hook up with the senses but doesn't offer evidence to multiple intelligences. Being able to apply multiple intelligences in education still doesn't provide empirical support. By applying the intelligences one assumes the validity of the intelligences. Waterhouse also argues that Gardner and his adherents need to make a set of testable psychological subcomponents for each of the intelligences in order for them to have empirical evidence. Waterhouse disagrees with calling them intelligences. She believes that they are merely different types of learning styles while castigating educators for building practices on an "unproven theory."

Gardner and Moran (2006) counter Waterhouse's claims. They believe Waterhouse doesn't understand the definitions of the different intelligences and has a naïve view of science. In his response to Waterhouse, Gardner says that the multiple intelligences encompass cognitive and developmental psychology, differential psychology, neuroscience, anthropology, and cultural studies. Gardner counters Waterhouse with the hundreds of studies from the various disciplines. There is plenty of empirical evidence to support the Multiple Intelligence Theory.

Successful teachers attempt many different strategies to help engage students in the classroom. If they find something that works and have success, do they really need empirical evidence to support their results? Barrington (2004) states that Multiple

Intelligence can be a vehicle by which some educational demands can be met, not only at the elementary and secondary levels, but also at the college and graduate levels.

Some suggest if more college instructors used the intelligences to teach, more students would have a chance to achieve success. If instructors can match their teaching with the students' learning, encourage students to stretch out their abilities and develop all their intelligences as fully as possible, and honor and celebrate diversity they would have a hard time not being successful (Özdemir, Güneysu, & Tekkaya 2006).

Traditional instruction vs. multiple intelligence based instruction. Today's high school curriculums are demanding that teachers be creative in the classroom. This is essential for teacher survival. However, when faced with challenging students, some teachers fall back into the traditional instruction method entailing the use of notes, worksheets, and the lecture style of teaching. Traditional instruction is their comfort zone.

In a nine week study comparing two different science classes with similar class demographics, Koksal and Yel (2007) found that there was a statistically significant effect upon the success of the students who were taught with multiple intelligence based learning over those who were taught using traditional based learning. The experiment took place at Ankara Anatolian High School. Sophomores with similar grades in Biology were grouped for the nine week study. The classes were randomly picked and then randomly selected as the control and experimental groups. One class was taught the respiratory system and classification of vertebrates using traditional lecture, notes, and handouts. The other group was taught using the MIT-based learning methods

emphasizing on multiple construction of the intelligences and multiple approaches to the material. The data obtained from the test, scale, and inventory were analyzed by SPSS. Statistical evaluations were carried out by tests for the independent variables and MANCOVA. Results were evaluated at .05 significance level on both tests.

With student drop out rates escalating, educators need to step up their efforts in finding different ways to make students enjoy their educational experience. It's obvious that the traditional educational setting is not working. Educators must look beyond the traditional realm of teaching and be on the look out for other talents students display and bring those to the forefront of their learning targets (Delisio, 2007).

Instructors need to look for students' compassion, courage, emotional maturity and common sense and harness these strengths in the classroom. Doing this will force the teachers of the classroom to think "out of the box" and discover other instructional strategies. It will also demand teachers to pay attention to classroom happenings from different perspectives so they can assess the situations and decide how to devise the best educational plan for each individual student. The classroom facilitator will have to think about diversifying the ways in which they teach because one size doesn't fit all.

This is not a simple solution that is going to happen right away, so teachers need to be committed to finding what is best for all students and stay on course. Universities need to better prepare prospective teachers for this type of reform. This preparation will extinguish teaching with an iron fist or "my way or the highway" attitude that so many first year teachers and older teachers display.

Multiple Intelligences

In an article titled “Inspired” (Brooks, 2007) researchers incorporate the M.I.’s into game into an educational Star Wars video game. Brooks had the makers of Legos Star Wars video game insert science facts dealing with space, and star systems. After students played the game and mastered it, Brooks questioned the students on the facts. The retention level was very high.

Video games aren’t the only type of playing that has been examined by others involved with multiple intelligences. Guss (2005) examined dramatic playing to determine the affects that theatrical arts had upon students. We already know that students in music better understand math concepts, so what do the theatrical arts have to offer?

Guss wanted to study dramatic play a step further than Gardner, and prove that children who play without adults in a dramatic fashion can and do more than make a connection with the interpersonal and intrapersonal intelligences like Gardner suggested in his book *Frames of mind; The theory of multiple intelligences* (1983). Guss studied preschool children in dramatic play and noticed how they developed their own expressive skill, form their own languages, and interpreted their own cultures in their dramatic play. The children incorporated their dramatic playing skills into other areas of their lives.

The theatrical arts offer a spatial understanding when working on a stage. Actors need to know where they are at and where they are to go. Acting itself teaches students body control or body-kinesthetic motion. This also helps develop core in a person and if you are going to be an athlete a strong core is essential. Playing and using the imagination have been lined to student’s development of critical thinking skills. Another

very important component of theatrical play or just any type of playing is the learning of socialization. With so many different skills being developed with dramatic play, Guss suggest that the children form a dramatic intelligence that can be measured.

Emotional Intelligences

Mayer and Salovey (1997) define Emotional Intelligences as the capacity to reason about emotions, and of emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth (Goldenberg, Matheson, & Mantler 2006).

Emotions are a great tool to motivate people. If a student's emotions can properly be harnessed a in the classroom, the successes potential could be phenomenal. When it comes to learning, the article states that emotions can take students farther than I.Q.s. However, one needs to be careful with not crossing the line when managing the emotion. To review and make Emotional Intelligences easier to understand Salovey along with John D. Mayer of the University of New Hampshire divided Emotional Intelligence into four branches: a. perceive emotion, b. use emotion to facilitate thought, c. understand emotions, and d. manage emotion (Mayer, & Salovey, 1997).

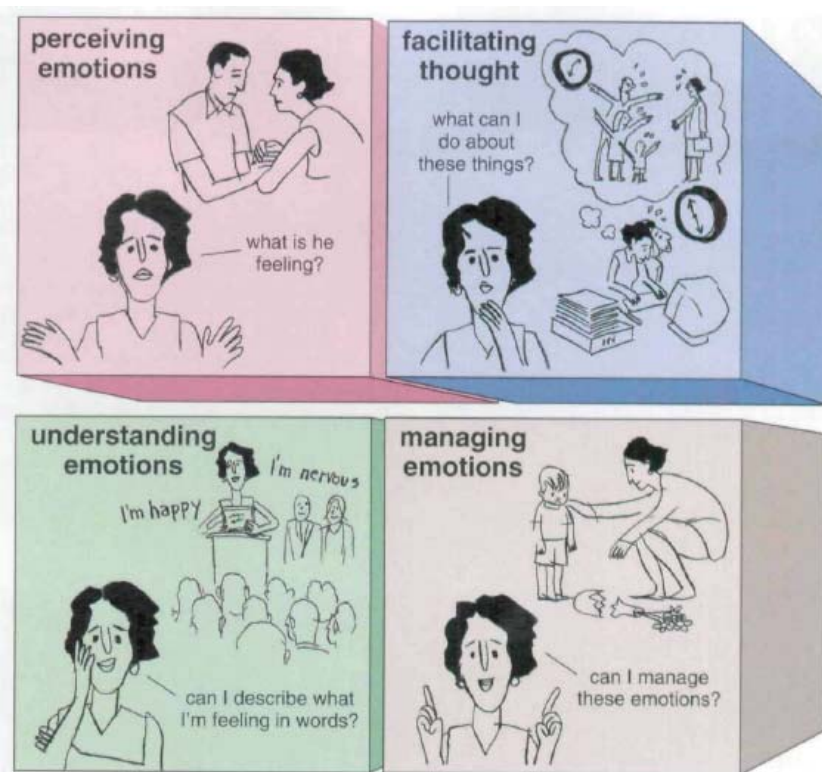


Figure 1. Emotional intelligence is a set of skills that author Peter Salovey and colleague John D. Mayer organized into four domains: the ability to perceive emotions accurately, the ability to use emotions to facilitate thinking and reasoning, the ability to understand emotions and the ability to manage emotions both in oneself and in others (Mayer and Salovey 1997). Differences in these skills are seen to have consequences at home, school and work, and in social relations.

Branch 1. Perceiving the emotions involves the ability to recognize emotions of others by looking at their facial expressions, posture, and voice reflection. You need to be in tune to both verbal and non-verbal communications.

Branch 2. Facilitating thought involves the ability to use your emotions to help you think. It's the feelings component of emotional intelligence. This branch can be one of the harder branches to control because when people get emotionally charged; they have a tendency to over do it.

Branch 3. The understanding of the emotion consists of the ability to reflect, analyze the emotion, predict what can happen and understand what the outcomes of the emotion will be. For example, you are in an automobile accident and wreck your parent's

favorite vehicle. You may become very emotionally apprehensive. First, recognize what you did, reflect, and know that you are probably going to get yelled at, but understand why your parents are yelling.

Branch 4. The management of the emotion involves your whole personality. Emotions are gauged by ones self awareness, goals and self-knowledge. This branch usually grows as your get older.

When it comes to measuring Emotional Intelligences three approaches have been basically used: self-report test, reports made by others and ability-based tests.

Self-Report Emotional Intelligence Test (SREIT) asks the test taker to agree or disagree with items that attempt to capture different aspects of perceived intelligences. An example would be, agree or disagree with the following comments: “I have control over my emotions” or “Others find it easy to confide in me.” The difficulty in assessing these types of test is the fact that the tests often extend beyond the definitions of emotional intelligence and tend to incorporate facets of personality and character which are already measured in existing personality tests.

Reports made by others use people who commonly interact with each other to rate one another’s apparent degree of emotional intelligences with questions like, “this person has control over his or her emotions.”

Ability-based test take out the highly vulnerable to biased viewpoints and subjective interpretations of behavior. The first test used was the Multi-factor Emotional Intelligence Scale (MEIS). It had some problematic items that where removed and the test was rewritten and released in 2002 as the Mayer-Solovey-Caruso Emotional

Intelligence Test (MSCEIT). The test consists of eight different tasks with two tasks devoted to each of the four branches of emotional intelligences.

For the first branch of emotional intelligence, perceiving emotion, the test will have participants do a task such as being shown photographs of facial expressions and ask the participant to rate the amount of the certain emotion shown in the photo. The second branch, using your emotions, is tested by asking participants to indicate how helpful a certain mood is for performing a specific task. The third branch, understanding the emotion, the testing includes questions that ask participants to complete questions using their knowledge of vocabulary dealing with emotions. The fourth branch of emotional intelligence, management of emotions, is tested by the participants being given different real-life scenarios and choosing the best strategy for so deal with the scenario.

The following are a couple of examples of the types of questions on the MSCEIT:

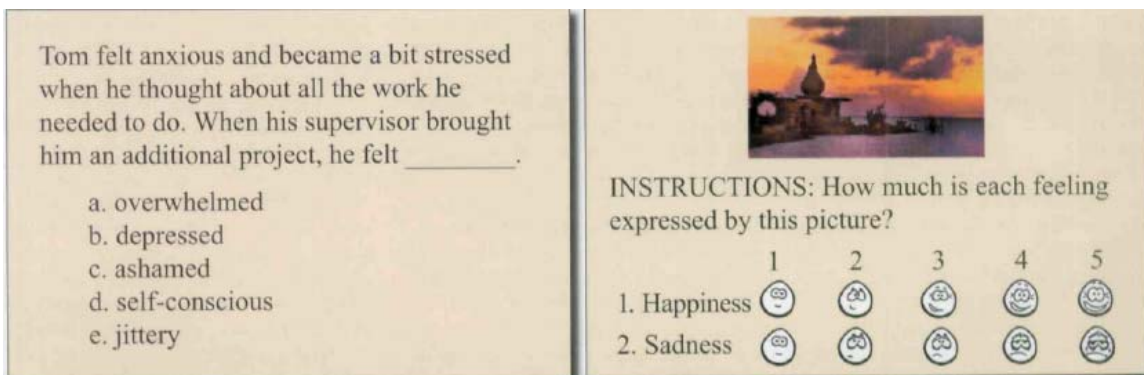


Figure 2. Many attempts at testing emotional intelligence rely on self-reporting or the ratings of friends and colleagues. These tests often capture personality or character attributes. The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), released in 2002, attempts to provide an ability-based measure less susceptible to bias. These panels show sample questions similar to those used in the MSCEIT.

Through testing, Mayer, Salovey, and Caruso (2004) were able to show that emotional intelligences can be used to predict both academic performance, deviant and

positive behaviors in people. To use emotional intelligence in a useful way one needs to understand and know the cultural norms that are accepted by their surroundings.

The history of Emotional intelligence takes root in ancient Greece and Rome. The Greeks and Romans believed that emotions were far too heated and unpredictable to be of much use to rational thought (Goldenberg et al., 2006). They considered emotions to be a sign of femininity and represented a weak and inferior human.

It was sexist and stereotypical to think that emotions were for women. Even in the modern age men thought of women as being the emotional being. This type of thinking lasted two millennia. In the 1930's, the term social intelligence first appeared. People now thought social intelligence was the ability to perceive their own and others internal states, motivations, and behaviors by the emotions they wore on the outside.

In 1983 Gardner wrote a book *Frames of the Mind* and suggested that we all have an "intrapersonal intelligence" very similar to the current conceptualization of emotional intelligence. In 1995, Time magazine wrote an article with a cover asking "What is your E.Q.?" E. Q. was the counterpart to a person's I.Q. Unlike an I.Q. that you can't change, you could hire E.Q. coaches to change your E.Q." (Gibb, 1995)

It then became popular to express emotions. Even Dr. Spock on *Star Trek* exhibited emotions when his father originated from a planet whose inhabitants had no emotions.

People experiencing lesions on the ventromedial prefrontal cortex of the brain lose their ability to express emotion. When comparing these patients with a group of humans who could express emotions, it was determined that emotions helped people to make better life decisions. Using the four branch method of defining emotional

intelligence Grewal & Salovey (2005) ran a series of tests including the MSCEIT, MEIS, SREIT and were able to determine predictors for different behaviors. They even stated that emotional intelligence is a better indicator for academic success than the SAT, which is highly correlated with ones IQ.

Brain Research

How do we teach students to learn new topics? According to brain research on learning, we should attach the new subject to something already in our memory, engage it to an emotion, or make it relative to set up a pathway to your long term memory (Wehrheim, 2005).

After we achieve this as instructors, our students will then have time to process the information, absorb it, and develop inferences with the information. When students can use information over and over again with inferences, then we know they have not only learned, but retained the information that we wanted them to learn.

To guide us in understanding how the brain works, Barrett (1991) have developed 12 principles for brain based learning. The principles can be used to help us understand how to engage the brain to reach the pathway to long term memory. The 12 principles are:

1. The brain is a parallel processor.

The brain multi-tasks by processing thoughts, imagination, emotions and many other different functions to ensure health maintenance and learning are taking place all at the same time. Educational facilitators needs to use all the different dimensions of parallel processing to let the students experience the most out of their educational settings.

2. Learning engages the entire physiology.

Learning is as natural as breathing. As teachers, we can either inhibit it or facilitate it. The hard wiring of students' minds is actually affected by life occurrences and by educational experiences. Anything that affects a physiological control has the capacity to teach and learn.

3. The search for meaning is innate.

The brain has survival instincts that recognize what is familiar to us, while searching for different types of novel stimuli. To make education a success, we as teachers, need to have a positive combination of what is familiar and what is novelty.

4. The search for meaning occurs through "patterning."

The brain rejects meaningless stimuli and looks for patterns in the stimuli it receives. Once the brain perceives a pattern, learning takes place so the pattern is recognized the next time. For education to be effective, learners need a chance to discover and make patterns on their own.

5. Emotions are critical to patterning.

Self-esteem, emotions, prejudices, mindsets and emotions encompass how we learn. A safe and stable emotional climate is essential to a healthy education.

6. Every brain simultaneously perceives and creates parts and wholes.

Even though there is a distinction between "right brain", "left brain", the brain uses both hemispheres interactively during every activity we perform. Using the "two brain" doctrine shows that the brain weeds out the interference and perceives things as a whole. As educators, we need to teach in a "holistically" way to do what's best for the students.

7. Learning involves both focused attention and peripheral perception.

The brain absorbs and reacts to information that it is directly aware of, as well as, the information beyond the immediate focus of attention. The direct signals and the peripheral signals are extremely important to learning. Therefore, teachers need to be aware of all factors occurring in the classroom and the educational environment.

8. Learning always involves conscious and unconscious processes.

Much of the learning process takes place hours later when students are at home as a result of their unconscious processing. This may even occur days, weeks, and months later. As a result, teachers need to organize what they do to facilitate the unconscious learning by students.

9. We have (at least) two types of memory systems: spatial and rote learning.

A human's spatial learning is very detailed and continuous. This learning is motivated by novelty. Our rote learning takes place because of a series of rewards and consequences. Thus, meaningful and meaningless learning takes place, organizes, and stores information in different ways. For this reason, it is important to learn for meaning and understanding.

10. The brain understands and remembers best when facts and skills are embedded in natural spatial memory.

Languages are learned through multiple, interactive experiences. All things are acquired faster and more permanent when it is embedded into real experiences.

11. Learning is enhanced by challenge and inhibited by threat.

The brain works best when it is relaxed and challenged and shuts down when threatened. The classroom needs to be a relaxed and challenging atmosphere, not a place where people feel threatened.

12. Every brain is unique.

Though we all have the same set of brain systems, we are all different. We all need to have as many choices, variety, and multisensory processes as possible take place to make learning and instruction meaningful.

As brain research is becoming more and more understood the potential for use in the classroom increases. Educators need to do get out of their “comfort zones” and experiment with brain research in the classroom and find ways to motivate and help our students learn.

Chapter 3: Conclusion

The reason for this research paper was to help me understand what multiple intelligences and differentiated instruction actually are, because until seven years ago, I really had no idea. I was filled with the erroneous beliefs and fears that other teachers had provoked into me as a young and naïve teacher. The more I dove into the topics, the more intrigued I got. I started trying different strategies in my classroom and even started noticing more things related to the topics with my own children at home. I started having some very big successes with my “at risk” students. The more I researched, the more I shifted from the feeble classroom teacher to a highly seasoned classroom facilitator. The transformation was quickly noticed by my peers. It’s amazing that brain-based research on the multiple intelligences, emotional intelligences and other brain based research have been around since the 1980’s but is just now becoming common terms in the educational realm. Even though many teachers over the years have been differentiating in their classrooms and having success, the successes have not always been understood by their peers and looked upon as an evil of giant proportions.

At the onset of this paper four questions were posed and to find the true, correct answer is not as simple as one would like to believe. Each answer is complicated in its own right and has different answers depending on how you interpret the articles.

1. What is Differentiated Instruction?

Some would say, anytime you make a change an assignment for someone on an I.E.P. you are making an accommodation and that is differentiation. Little do they realize how wrong that can really be or how right they are, depending on what they do while making the accommodation. I believe differentiated instruction starts where the kids are and it’s my job to bring the students up to an understanding that meets the

normal standards of understanding. It's tailoring your instruction to meet the individual needs of the student regardless of their abilities. It can be accomplished with or without technology. To fulfill the needs of the students, one needs to understand how each of your pupils think, how they understand, how they learn a topic, and how you are going to teach toward that understanding so that your student not only learns the topic, but retains the information presented. To have differentiated instruction you need to change your delivery of the material itself, not just the number of answers in a multiple choice question. The student should actually show a comprehension level that they did not show before the change of delivery.

Differentiated instructions isn't something one rushes through, it should be well thought out and carefully planned. Take time to reflect on your own comfort level of the topic you are teaching and know the skill level with the subject matter. Think of ways to improve your delivery while maintaining the integrity of your classroom. Practice or discuss the delivery with your colleagues if you are unsure of the method or want more ideas of how to present the topic to your class. Be specific on the skills and knowledge you want your students to possess and to be able to show an acceptable level of comprehension. An example of how to use differentiated instruction would include in what you as the instructor would do and the outcome you are striving for. This example came from a workshop I took several years ago and has worked very well for me. It is only a guide and can be changed.

Table 2

Differentiated Teaching sample Matrix

What would I see teachers doing?	What would I see students doing?
Select a topic to match the chosen learning target.	Some students will be self selecting a topic or a level that they will perform at. Students select a product that matches their learning intelligence to present.
Providing choice, scaffolding, or different levels of instructions in groups.	Working on different things at different levels of comprehension.
Setting up peer tutoring	Students working in pairs that have been self selected by the comprehension level of the topic.

Note. Comparison of instructor and student responsibilities

I would stress to a new teacher or any other teacher that is not sure of what differentiated really is to research it, ask fellow instructors that actually use it, and learn what differentiated instruction really is. Do not to fall into the trap of believing, because you have changed a question on a test, worksheet, or some other assessment type of assignment, or made any other type of modification for a student that you are using differentiated instruction.

2. To be the Most Effective in the Classroom, which Intelligence should be Focused on?

If you are searching for the one magical solution to all classroom learning problems and think the answer can be found using only one intelligence, then don't stop here! This question depends on the total dynamics of your classroom. Since boys learn differently than girls, and different ethnic groups learn differently than each other, this is a very hard question to answer. Sharing what I have noticed over my 20 years of teaching, boys seem to be more logical & mathematical and visual & spatial while girls seem to be more verbal & linguistic and interpersonal & intrapersonal.

Teaching on an Indian Reservation for 11 years and working with Africans and Bosnians for the past four years I have noticed cultural differences also. In the female population, I feel the American Indian girls seem to be more confident than African American and Bosnian girls. I contribute this to the fact that historically the American Indian males did the hunting while the females ran the tribal councils and took care of all other leadership roles in the tribe. The only male with the power that would match or supersede that of the women was the chief. African girls were on the other hand raised in a culture of being put in their place and held down by the men. They were basically wives or slaves. When it comes to the Bosnian and Gypsies in my school district it seems that there is no value placed on education. Girls typically wait until they are 16, then drop out and get married. Very few Bosnian girls ever graduate in my school district, however the Native Americans and African girls do have a higher graduation rate. You need to understand the needs of each different type of population you work with.

With 10 multiple intelligences, emotional intelligences, and new brain research being done, and hundreds of different topics being taught it is unlikely you will find a single intelligence that should be used more often than the others in a classroom.

I conclude that there is not a single intelligence that can be used to cover the whole class. Though it seems like that is how teaching was done in the past and is still being taught by many today, the truth of the matter is, to reach all students a teacher needs to be willing to go beyond the realm of normal duties in the classroom and learn to access their students inside and out of the classroom. Instructors need to teach toward as many of the intelligences they can, each and every day, if they want to reach every student. This includes teaching to several of the multiple intelligences, the emotional

intelligences, the brain craving and the brain based research principles. These all intertwine to make the learning process complete. We know that if the learning process is complete, then all students are going to learn and retain the lesson. By using the different intelligence to teach and learn from, more successes can be found inside and outside of the classroom. (Gardner, 1997)

3. What are the Controversies Involving Multiple Intelligences, Emotional Intelligences, and Brain-based Research?

A simple, yet complicated question with a simple, yet complicated answer. The first controversy is the fact that people don't understand the basics of the research. Some say that emotional intelligence is the same as the intrapersonal intelligence, and the multiple intelligences are mistaken for or are confused with learning styles. The emotional intelligences are often confused with the intrapersonal intelligence of Gardner. I think they are basically the same thing. If this is the case, then you can use the empirical evidence for emotional intelligence and apply it to intrapersonal intelligence. Now the multiple intelligences have more empirical data to back them up, which is what Waterhouse (2006) was criticizing. In the beginning, I myself have wondered if it's actually an intelligence that a person is born with or just another type of learning style that helps people retain facts. Is it actually intelligence versus a learning style? I am now leaning toward intelligence. The more I read about the subject, and the results that I have been seeing in my room haven't cleared the argument up for me, all I know is it works. I teach to the intelligences and the students enjoy themselves, turn out a quality product and have a good understanding of the topics covered. Regardless of the title, the question remains, are multiple intelligences a valid tool to use in the classroom. I believe they are!

The biggest problem with the intelligences according to skeptics is the fact they lack empirical or scientific evidence to support the theories. Waterhouse and others argue with Gardner about the lack of empirical data to support the claims made on behalf of the multiple intelligences. Gardner and his constituents shoot back with - you don't understand the research and never attempt to show empirical evidence. It doesn't help that some researchers said "they don't get it" in response to critics. In the last few years, researchers have been able to make large jumps in this field. Thanks to modern technology and medicine, researchers have been able to use M.R.I.'s and CAT Scans to understand what's occurring in the brain. Along with the research studies that have been done in the last 10 years, researchers are now compiling the empirical and scientific data that the skeptics so readily want and need.

The other big argument against the different intelligences and brain research is the fact that they haven't been accepted by teachers, as a whole, across this country. People are skeptical and don't want to think out of the box and try something new. I have seen how well they work in the classroom and believe it comes down to the fact that teachers are either too lazy to try it or just don't want to take the time to try something new, even if what they are doing isn't working. As brain research is becoming more and more understood the potential for use in the classroom increases. Educators need to do get out of their "comfort zones" and experiment with new ways to incorporate the research into the classroom and find ways to motivate and help our students learn.

4. What evidence is there that differentiating in the classroom will benefit your students?

Thanks to the improvement of technology and studies being done, researchers are proving something that teachers have known for a long time that students learn in

different ways. In case after case, when subjects are presented to pupils in the manner they understand, students are scoring higher on standardized achievement tests, college entrance exams, and show a higher level of retention of a subject over time.

For as long as I can remember, teachers have been trying to get students to learn through playing games. The thought behind this is if kids are having fun while retaining facts, then they will like what they are doing and learn without trying. Earlier I mentioned a study by Brookes that put facts into Legos Star Wars game. I wasn't sure about what to think until after I bought my sons the Lego's Star Wars game and started watching them play, the light bulb came on! My sons were clearing stages by the inferences they had from watching the movies. They were then able to add Indiana Jones to the game and then used inferences from both series of movies. Their understanding of the weapons, ships, star systems and the increase of geography of places on earth totally amazed me. I thought, wow, if you could put science facts, math computations, and actual geography into these games, imagine the learning that would take place!

Being a one to one teacher in my school district, I have had the advantage of having a laptop computer for each of my students. The different ways I have been able to incorporate technology and tie in the Multiple Intelligences has been unlimited. When it comes to doing projects in my classroom, I've broken away from the mold that all students have to complete the same type of project. (E.G. everyone is doing a powerpoint project.) I've created a list of project types, attached what type of intelligences are involved and let the students pick what kind of project they want to do. My only rule is it has to be something they like doing and are good at. The projects that have been turned in are so much better than I've had turned in over the previous 16 years of teaching. They

also demonstrate a much higher level of understanding of the topic they were assigned. The results have even impressed my peers. I've done in-services for my school district.

The projects also give me an inventory of what type of intelligences the students like to use without taking some on-line test or survey. This gives me a guide to what type of intelligences I tend to teach toward. When I teach toward different intelligences, the success rate goes up in my classroom. I am convinced that if you incorporate multiple intelligences, emotional intelligences, and differentiation into the classroom, you can't help but to succeed.

I've researched articles covering all of these areas and am impressed by the results given. It seems to me that all types of educators are having success incorporating the different intelligences in the classroom. I would argue that if it works for others, give it a try. It may work for you too!

The more teachers and students understand about the different intelligences, differentiation, and brain-based research, the more students will benefit. We, as a nation, can start healing the wounds that plague public education. A larger success rate would occur, which means a smaller dropout rate would follow. The critics of public education would have to find something else to rip apart and criticize.

Without a doubt, the intelligences and brain research have a major impact on education if the teacher utilizes it. The size of the impact depends on the classroom instructor's willingness to take the time to find out how the kids are wired and then diversify their classroom in a way that will most likely help the students. The more teachers that do this across the country, the bigger the impact will be. If enough teachers

start using the intelligences in the classroom and teach a diversified curriculum, then maybe “No child left behind” can be closer than we think.

Bottom line is, the more ways we introduce materials to our students the better chances we as educators have in seeing our students succeed and grow in and out of the classroom. As a teacher I feel it is my job, duty, and responsibility to reach every single student in my classroom. Educators need to strive for each and every student to have successes regardless of their abilities and prep them for their futures. Every kid counts, not only the good students. When we can successfully get each and every pupil engaged to reach their true potential, then we as teachers have done our jobs to the fullest. Is there any reward better than to see the children you have taught become successful in life and be positive contributors in our communities?

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Appendix A. Activities that I incorporate into my classroom

When doing chapter projects in class I have a list of activities matched up with the different multiple intelligences. I give the list of activities to the students without the M.I.s attached. I tell them they can do any activity they choose from the list. I tell them to pick something they enjoy. After they pick out the activity, I then assign a topic.

The following is my list of activities:

Project	Intelligence
Puppet Show (group of 2)	Bodily/Kinesthetic & Interpersonal
Create a lab or demo	Logical/Mathematical
Flash cards	Logical/Mathematical
Game - board/card/computer	Logical/Mathematical
Puzzles/riddles	Logical/Mathematical
Venn Diagrams	Logical/Mathematical
Working model	Logical/Mathematical & Visual/Spatial
Song or Rap	Musical/Rhythmic
Cheers/chants	Musical/Rhythmic & Verbal/Linguistic
Poem	Verbal/Linguistic
Write a play	Verbal/Linguistic
Newsletter	Verbal/Linguistic & Intrapersonal
Power point	Verbal/Linguistic & Visual/Spatial
Brochure	Visual/Spatial & Verbal/Linguistic
Cartoon Strip	Visual/Spatial & Verbal/Linguistic
Graffiti poster	Visual/Spatial
Model	Visual/Spatial
Mural	Visual/Spatial
Photostory III	Visual/Spatial & Verbal/Linguistic
Movie Maker (group of 2)	Visual/Spatial & Interpersonal
Graphic Design Poster	Visual/Spatial & Logical/Mathematical
Commercials	Visual/Spatial/Verbal/Spatial, bodily/kinesthetic & Intrapersonal
Interview (news reporter)	Bodily/Kinesthetic & Interpersonal, Verbal/Linguistic
Role Play the character w/music composed during same time period	Musical/Rhythmic & Verbal/Linguistic

After the projects have been assigned, I go and look at the most common type of intelligences picked by the students and I start gearing more of my lessons toward those specific types of intelligences. You add projects and fit them into the M.I.s for more choices. The quality of the projects I have received has increased by leaps and bounds. Other teachers have asked for my list.

With a large range of students in my room, I tear drop assignments. I make a square with a three step stair case. The bottom step is the lowest level of information the student should know. The middle step is approaching mastery, it's material that is grade level. The third step is a high degree of mastery. These students are fired up and self-motivated. Then I take a sticky note and create a project for each level. The high degree students get to pick any of the projects from the list above. I will give an example of what I do for the atom.

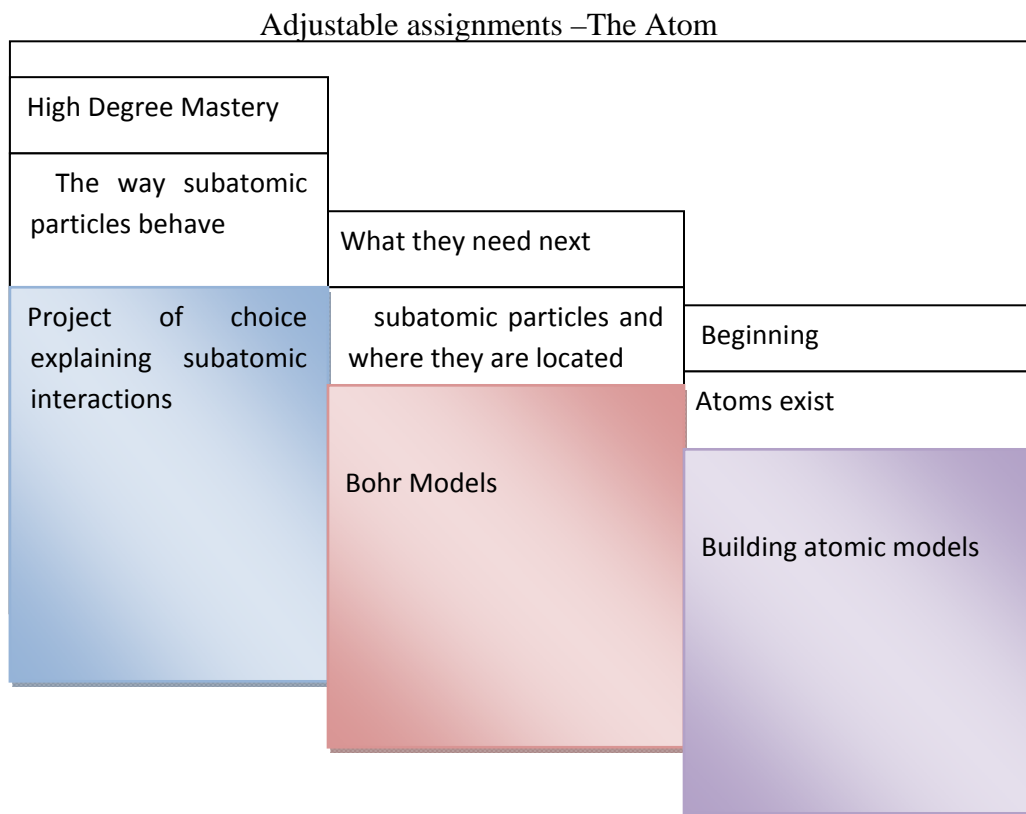


Figure 3. A tear drop adjustable assignment I made in my class for different level student knowledge on atoms.

Bull's Eye is an activity I use for pretesting at the beginning of a chapter or during a chapter to check the understanding of the students. I place a circular piece of cardboard on the ground in the center of the room with desk cleared out of the way. Have students form a circle around the room. Explain to them that if they have no clue what the answer is then don't move. If they know it a little, take one step toward the circle. If they know it pretty good then take two steps toward the circle, but if you know it good enough to explain it to the class, then put a foot on the circle (bull's eye). The truth is I never have them explain it to the class because then nobody would step on the bull's eye.

Rumor Mill is a pretest activity I like because it can dispel any false ideas the students may have. Clear out the center of your room. Split the students into two groups. Have one group make a small circle in the middle of the room and the second group make a larger circle around the smaller circle. Make sure all students on the outside of the circle are matched up with a student on the inside of the circle. Instruct the students that when the music starts the inside circle is to move clockwise and the outside circle move counter clockwise. The students are to stop when the music stops and match up with the person straight across from them. After the music stops, read a question, the person on the inside circle then has one minute to tell the person on the outside of the circle everything they know about the question. After one minute is up the person on the outside gets to tell the person on the inside everything they know about the question. Start the music again, and stop it when the group is mixed up, repeat the process. Do this two to three times per question, then have the students take their seats and have a class discussion going over the facts about the questions. If the students are getting the facts mixed up or totally wrong, now is a great time to correct them.

Tic, Tac, Toe is a way to handout assignments to students for a chapter. It involves putting assignments in a tic, tac, toe format marking the center for all students. The students must pick three in a row going through the center in any direction they like. The A's and B's in the boxes signify the highest grade they can receive for doing that particular box. I give A's 4 pts and B's 3 pts. You can add C's and D's if you like. I they pick a route that has an A and a B then the highest grade they can get is a 3.5 average or B+. Some students choose to go for B's while others go for A's.

Create 3 conversion problems to share with your shoulder partner. B	Create slogan for sequence of the scientific method. A	Create a game with the chapter vocabulary. B
Create a slogan for metric prefixes A	Create 5 review questions for this chapter. All	Select a scenario from a hat and go through the scientific method. A
Create 3 density problems to share with your shoulder partner. B	Design an experiment to determine the density and identify unknown metals. A	CSI simulation: select one crime scene and identify the scientific method steps. A

Figure 4. Tic Tac Toe example board for choosing assignments for a chapter.

Choosing work partners I use a sheet with four scientists on it. I have each student go and choose who will write their name next to a particular scientist that doesn't have anyone on the same scientist blank on their own paper. Both students then become the other's say Bohr partner. When it is time to do group work I tell the students to get their Newton partner or Einstein partner etc... They look at their paper and whoever is in that scientist slot is their work partner for the day. This way the kids have picked their own partners and they have ownership in the partnership.

Appendix B. Scientist Partners

