THE THEORY OF MULTIPLE INTELLIGENCES AND CRITICAL THINKING

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ABSTRACT

Educators believe that in order to thrive in the 21st century and the Information Age, individuals must ask questions, challenge assumptions, invent new ways of solving problems, connect new knowledge to information already known, and apply their knowledge and reasoning skills in new situations.

Individuals must develop critical thinking skills. Using techniques based on Gardner's (1983, 1993a) theory of multiple intelligences has been shown to increase student critical thinking skills.

Keywords: Multiple intelligence, critical thinking, transferable job skills.

BACKGROUND

Many adults are ill prepared to live, work, and function effectively in our fast-paced and highly technical society (Vaske, 2001).

In fact, based on the 1992 test results of adult literacy, nearly half of American adults do not perform at the level of literacy considered by the National Education Goals Panel to be necessary for competing successfully in a global economy and for exercising the rights and responsibilities of citizenship (Gronlund, 1993).

The challenge is how to develop the skills needed to be productive and informed members of a world market led by constant change.

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In response to this challenge, educators, employers, and society at large began calling for the development of critical thinking skills (Brookfield, 1987; Davis & Botkin, 1995; Glaser & Resnick, 1991; Halpern, 1993; Kerka, 1992; Paul, 1990; Sternberg, 1985). Scholars and employers argued that to thrive and compete in the Information Age, individuals must ask questions, challenge assumptions, invent new ways of solving problems, connect new knowledge to information individuals already have, and apply their knowledge and reasoning skills in new situations. In short, individuals must develop critical thinking skills (Brookfield, 1987).

Adult educators, however, may not be using the best methods of teaching adults to think critically. In the traditional classroom, a teacher lectures while standing at the front of the classroom and writes on the board, questions students about assigned readings or handouts, and waits as students finish written work (Stanford, 2003). Instead of this approach, the academic literature supports the notion of different learning styles or preferences (Knowles, 1980; McCarthy, 2000; Merriam & Caffarella, 1999; Sternberg, 1997).

Berkemier (2002) found the use of Multiple Intelligence (MI) (Gardner, 1983, 1993a) techniques in teaching math lead to increased comprehension as measured by final test scores. The MI theory was described as a philosophy of education or an attitude toward teaching (Armstrong, 1994) in the spirit of John Dewey's (1916, 1938) ideas on progressive education, rather than a set program of fixed techniques and strategies. The MI theory offers educators a broad opportunity to adapt creatively the fundamental principles to any number of educational settings. Implications for school reform and classroom application include expanded teaching strategies, curricular adaptations, and expanded student assessment.   In fact, unsuccessful, unmotivated students have experienced academic growth when exposed to the multifaceted techniques of MI (Janes, Koutsopanagos, Mason, & Villaranda, 2000).

THE PRACTICAL NEED

Both in 2005 (when the original dissertation study was performed) and in 2013 (when an updated literature review was performed), no additional research on learning outcomes and multiple intelligences were found. Yet, graduating students were not fulfilling employers' requirements for new hires, and many former students could not find employment (Sternberg, 2013). "Employers want students to have college majors that provide them with readily transferable job knowledge and skills" (Sternberg, 2013, para. 4).

A study conducted by the Association of American Colleges and Universities in 2013 ("It Takes") stated 93% of employers indicated the desire to hire employees with the ability to "think critically, communicate clearly, and solve complex problems" (Sternberg, para. 9).

In a 2012 employer survey conducted by *The Chronicle* ("The Role"), employers overwhelming expressed the need to hire employees with problem-solving skills and the ability to learn and apply new knowledge to real-life situations and decision making. Yet, Sternberg claimed higher education is still stressing knowledge transfer measured by grades and standardized scores, thereby turning out college graduates who are not employable and who have acquired a high student loan debt.

THE THEORY OF MULTIPLE INTELLIGENCES

Gardner's (1983, 1993a) theory of multiple intelligences posited that eight distinct intelligences exist. These allow individuals to function and/or excel at different aspects of life and learning. A review of each intelligence and how activities and assessment can be integrated into teaching approaches is discussed below.

Verbal-Linguistic Intelligence

Applying this intelligence will help students prepare to communicate more effectively (Smith, 2002, 2008). Employers want applicants who can communicate clearly to conduct presentations, converse with people of different cultures, and are capable of discussing change initiatives. The online curriculum design can include activities such as discussion boards, online chats, and supplemental readings (Zappia, 2013) that will engage the verbal-linguistic intelligence. Another activity might include an electronic portfolio ("It Takes," 2013).

Logical-Mathematical Intelligence

This intelligence "consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically" (Smith, 2002, 2008, para. 24). Literature has shown that a lack of teaching in the area of scientific and mathematical thinking exists (Gallenstein, 2003). "Noting that effective teaching models that emphasize critical thinking in mathematics and science are used less often in early childhood classrooms than in those for older students" (Gallenstein, para. 1). The ability to problem solve in not only computer and engineering areas, but in everyday issues is essential. Using activities such as charts, Venn diagrams or other graphs, and tables will engage the logical-mathematical intelligence (Watrous-McCabe, 2005).

Musical Intelligence

Musical intelligence is the ability to recognize musical tones, pitches, and rhythms (Smith, 2002, 2008). "According to Howard Gardner, musical intelligence runs in an almost structural parallel to linguistic intelligence" (Smith, para. Musical Intelligence). "Music educators and other stakeholders have cause for concern because music has often been marginalized in the public school curriculum of America" (Mills, 2001, p. 1). Adding music, the use of sound or rhythm, or adding spoken text will support this intelligence (Watrous-McCabe, 2005). 159

Bodily-Kinesthetic Intelligence

The bodily-kinesthetic intelligence uses the body to "solve a problem, understand, or learn" (Watrous-McCabe, 2005, para. 7).

Many activities such as matching games, drag-and-drop exercises, or online simulations will engage this intelligence. Virtual labs will also provide hand-eye coordination and engage this intelligence (Watrous-McCabe).

Visual-Spatial Intelligence

The visual-spatial intelligence has a good sense of space and direction. This intelligence can look at a single object and can easily view the object from many angles (Tyler & Loventhal, 2011). Spatial activities can include mind mapping, flow charts, fishbone diagrams, and a pictorial representation of a concept (Watrous-McCabe, 2005).

Interpersonal Intelligence

The interpersonal intelligence is the ability to "perceive and make distinctions in the moods, intentions, motivations, and feelings of other people" (Tyler & Loventhal, 2011, para. 5).

This intelligence allows a person to work effectively with other people. Educators, salespeople, religious and political leaders, and counselors all need a well-developed interpersonal intelligence (Smith, 2002, 2008). In addition, employers require the communication skills from this intelligence for collaborative team projects as well as decision making. Activities include group projects, online communities, and discussion boards (Watrous-McCabe, 2005).

Intrapersonal Intelligence

Intrapersonal intelligence entails the capacity to understand oneself, to appreciate one's feelings, fears and motivations (Smith, 2002, 2008).

In Gardner's view, it involves having an effective working model of ourselves, and to be able to use such information to regulate our lives (Smith). Online classroom activities for this intelligence include blogging, contemplation through discussion questions that encourage reflection, and the ability to select supplemental resources for learning (Watrous-McCabe, 2005).

Naturalist Intelligence

The naturalist intelligence is the ability to "recognize and classify plants, animals, and other things in nature (Armstrong, 1994, p. 2). In addition, the naturalist intelligence has a sensitivity to other natural occurrences such as cloud formation. Linking a theory to natural phenomenon or using "visual branching diagrams will help the naturalist learner better grasp the concepts presented" (Watrous-McCabe, 2005, para. 26).

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THE RESEARCH QUESTION

In considering how the use of multiple intelligences had increased math comprehension (Berkemeir, 2002), the question arose whether using MI techniques could increase mastery of critical thinking as well. The specific question unanswered by the literature review was, does perception of an instructor's use of MI techniques enhance critical thinking mastery as measured by scores on a standard test?

METHODOLOGY

The ability of instructors to enhance students' mastery of critical thinking processes is a primary objective of education. This study examined whether the use of MI techniques helped achieve this objective. The dependent variable in this study was the student's mastery of the critical thinking course material. Mastery was assessed by the use of a standard test employing matching items developed by the non-traditional adult educational institution presenting the critical thinking classes. Matching tests are useful when small samples are to be used (Gall, Borg, & Gall, 1996). The independent variable was the perception of instructor use of MI techniques during the class presentations. Information on the effectiveness and use of MI techniques in a critical thinking classroom was gathered using a quantitative questionnaire, final exam test, and a qualitative focus group approach. The quantitative questionnaire was used to identify individual student recall of instances of MI techniques within the class. The final exam for each class was used to assess the mastery of critical thinking.

The focus group discussion conducted per class used open ended questions to encourage the identification of MI techniques used by the instructor in presenting the critical thinking course material. The use of questionnaires and focus groups allowed a triangulation of the data. This mixed method approach ensured greater understanding of what the students perceived.

Research Design

This study explored the impact of MI techniques in classroom presentations. Exploratory research was used when the problem was not yet clearly defined. Exploratory research is a broad-based type of research whose major objective is to collect ideas and provide insights into the problem at hand (Churchill, 2001).

The mixed method was selected to allow the researcher to use two different data collection approaches in an attempt to confirm, cross-validate, or corroborate findings within a single study (Greene, Caracelli, & Graham, 1989; Morgan, 1998; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). Researchers used questionnaires and focus groups as the means to offset the weaknesses associated with using a single method with the strengths of using multiple methods.

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Sampling Design

The population of interest was working adult learners enrolled in a nontraditional adult educational institution. The sample group was a convenience sample and consisted of students enrolled in critical thinking courses during the 2004 fall term at the nontraditional adult education institution in the central United States. The instructors and the students of the critical thinking courses were approached for their voluntary participation. The students and instructors were informed their participation was voluntary; no rewards or inducements for participation were offered or granted. The students were randomly assigned to these classes based upon their enrollment dates at the institution. The classes ranged from 15 to 25 students. Research data were collected from seven classes.

Measures

According to Lincoln and Guba (1985), reliability and validity of a research study can be established by the use of triangulation exercises, such as the ones used in this study. The results from the questionnaire regarding students' perceptions of the instructor's teaching methods were compared and combined with the results from the focus group discussions allowing triangulation of method and data to validate the accuracy of the questionnaire.

The focus group discussion questions were developed using eight summary descriptors from Berkemeir's (2002) instrument, as well as additional descriptors from other multiple intelligence scholars (Armstrong, 1993; Campbell, Campbell, & Dickerson, 1999; Lazear, 1999). Berkemeir (2002) stated no existing multiple intelligence measurement has been fully validated as the correct approach to measure multiple intelligences. The design of this study incorporated two assessments of student perceptions of instructors' use of MI techniques, and an assessment of student critical thinking mastery.

The study collected data on two constructs:

- ➢ Measurement of student comprehension of the critical thinking concepts taught in the course through the use of a standard exam developed through the nontraditional adult education institution.
- ➢ The variable measured from the focus group discussion was the number of examples provided for each MI technique.

Examples provided by students were counted in the MI category mentioned, regardless of whether the category was correct or not. If the same example was used under multiple categories, for instance, it was counted in each mentioned category.

The reason for this is the recognition of any MI technique is more important to this study than the correct assignment of such MI technique. The descriptions used in the focus group discussions were developed by Berkemeir (2002) and aligned with the MI descriptors.

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Approvals from the Human Subjects Review Committee at the nontraditional adult educational institution in the central United States and the supervising university were obtained.

Data Collection

After obtaining permission from course instructors, the researcher administered the questionnaire after the final exam on the final night of the course. The focus group discussion followed immediately; the exam scores were provided to the researcher within one week from the instructor.

Data Analysis, Data Coding

The measurement of student perception of instructor use of MI techniques involved a second set of 40 questions. These questions were scored using a 1 to 5 scale ranging from "1. Not at All" to "5.

A Lot." These questions were grouped into their related MI technique using the key in Appendix E of the original dissertation. The scores for each MI technique were the sum of the responses related to each MI technique. The 40 questions and their assignment into each of the eight MI categories were developed and used by Berkemeir (2002).

The focus group discussions were scored by counting the number of unique examples provided by the students in response to each of the eight questions. The focus group discussions were recorded, and the data collection occurred from the analysis of the recording. In conducting the focus group discussions, the facilitator read each question sequentially. After each question was read, the facilitator paused for student comments. After the first pause in the student responses, the facilitator asked, "Any other examples?" If other examples were presented at this point, a final probe of "Anything else?" was used. Each question was discussed for no more than 5 minutes before moving to the next questions.

Class instructors graded the final exam and provided the researcher with the results. The student preference questions were identified by a student-generated code. This code was provided to the instructor, but not the researcher, during the first week of the course. The instructor had the student/code list available during the last session of the course in case any students forgot their code. This list was used by the instructor to link the final exam grade to the code and, by extension, to the questionnaire responses. Exam scores were provided to the researcher by the individual's code.

Data Cleaning

Students appeared to have used different codes for pre- and post-class questionnaires in several instances. When students used an inconsistent code, an attempt was made to match the codes if there was only one instance in a class.

When there was more than one instance, the data were excluded from pre- and post-analyses. Students who did not complete the questionnaires using a code that could be matched between pre, post, and final exam were included in the focus group discussion. One instructor told the class this researcher's study was the reason they were having a final exam. Although the final exam was a requirement of the course and the instructor was joking, the resulting data had inappropriate responses such as pictures and doodling rather than the scale of numbers. As a result of this biased data, data from three additional courses were collected in an attempt to increase the sample size.

A second issue involved inconsistent grading of the final examines. A 10-item matching examine should have scores that are multiples of 10, however one instructor provided scores with several ending in 5. Since these still provided interval differences in achievement, these scores were included in the analysis.

Limitations of Methodology

The relationship between instructor use of MI techniques and student achievement was based on perception, as mentioned above. If students do not perceive the use of MI techniques, then there would be no expected relationship. The key limitation, then, was the accuracy of the perception; the correct MI technique is unimportant but the perception of an MI technique being used at all is critical to this study.

This limitation was addressed by the use of multiple descriptors in the questionnaires.Since this study was based on a convenience sample, the findings from this study cannot be generalized to the larger population of adult learners in a nontraditional educational institution. Samples were drawn from two cities in an effort to minimize this limitation.

EXPECTED FINDINGS AND ETHICAL ISSUES

The expected findings were the more the instructor used the full variety of multiple intelligence methods, the greater the student mastery. A limiting factor to the MI inventory relates to self-reporting. Surveys or questionnaires do not represent complete objectivity (Berkemeir, 2002). According to the Berkemeir study, five factors that may generate misleading information exist:

> ➢ Surveys only tap respondents who are accessible and cooperative.
> ➢ Respondents have to feel their participation is a normal and natural process to avoid any form of slanted or biased answers.
> ➢ The researcher has to be careful of arousing response sets.
> ➢ Participants should be encouraged to not over rate or under rate their responses.
> ➢ Participants were unable to accurately identify their self-perceived multiple intelligences.

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Data Collection and Analysis

The measurement of student comprehension of the critical thinking concepts taught in the course was measured by a standard exam from the nontraditional adult education institution. The exam was a 10 question matching test. Counts of MI techniques used in each classroom were assessed in the focus group by members of the discussion giving an example for each of the eight intelligences. The data from the focus group discussion is used in the analysis of the research question.

Data Analysis Process and Statistical Procedures

The research question to be answered was, do students reporting more use of MI techniques by an instructor achieve higher critical thinking test scores? The key issue being measured and evaluated in this study involves relationships, how changes in one variable (perception of instructor use of MI techniques) impacts other variable (final exam scores).

Relationships are measured by correlations. Pearson's product movement correlation was used on interval level data. The significance of the correlations was tested using the correlation *t* test (Cooper & Schindler, 2003). The significance level was chosen as alpha equals .05.

One correlation was between the average number of MI techniques reported by individual students and their final exam scores. The other correlation was between the focus group discussion sum of reported instances and the average final exam per class.

FINDINGS AND RESULTS

Quantitative Findings
Research Question

Do students reporting more use of MI techniques by an instructor achieve higher critical thinking test scores?

Two approaches were utilized for this question. The first approach was the average rating of instructor use of MI techniques correlated to each student's final exam score. The second approach was a correlation between the average number of MI techniques recalled by the students in each class during the focus group discussion and the average final exam score for each class.

On average, students reported about the same average use of MI techniques across instructors except for the naturalist intelligence, which was not recognized by any individual student (See table 1). The focus group sessions provide more examples of all 8 intelligences than individuals reported. This suggests that group discussions can stimulate recall of previously unreported data.

The correlation between individual recall and final exam scores was not significant, while the correlation between group recall and average final exam scores was significant at the 0.05 level.

Table: 1
Research Question

	Class						
	1	2	3	4	5	6	7
Student perception frequency average	3.2	2.9	3.0	3.3	3.3	3.1	
Focus sum	33	48	11	67	14	20	28
Final average	90.9	86.1	75.0	91.0	81.3	78.5	92.1

	Correlation	t	p value
Correlation between student perception average and final exam	0.450	1.008	0.185
Correlation between focus group count and final exam	0.684	2.094*	0.045

Note. *Significant .05 level

Qualitative Analysis

When focus group members were asked to identify examples of the eight MI techniques, responses were varied. Positive responses included listing examples of when the instructor used different methods to emphasize a particular point.

Positive comments included, "He/She did a lot of different ways of teaching us," "I really enjoyed all the different methods," and "It's great to have more than one way of learning something."

The negative responses included, "I don't like to play games," "School should be more serious and focused on the textbook rather than contests or personal reflection," and "The instructor wanted to entertain us rather than help us learn," "All the instructor did was read from the PowerPoint slides," "I didn't even need to come to class; all I needed to do was read the book," and "Why don't instructors learn more than their favorite way of teaching?" The students gave the following comments on each MI:

> ➢ **Verbal/Linguistic. Examples given for this method included telling a story and illustrating how the instructor was trying to teach her granddaughter about using critical thinking skills with the neighborhood bully; making the decision to buy a house, get married, and so forth; used words to draw a mental picture; and wrote key points on the board.**

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- Logical/Mathematical. Examples given for this method included making an outline on the board of what would be covered in each class, used an equation to show the components of an argument, and used a formula to test the validity of an argument.
- Visual/Spatial. Examples given for this method included using colors when writing on the board to emphasize different parts of the argument, provided handouts, and used PowerPoint slides.
- Musical. Examples given for this method included the rhythm and pace used by an instructor, and the instructor referred to lyrics in a popular song.
- Bodily/Kinesthetic. Examples given for this method included moving around the room when working in pairs or teams, standing in front of the class for oral presentations, instructor brought manipulatives to class to use during the fallacy role modeling, and moving to the computer lab during class.
- Intrapersonal. Examples given for this method included class members working in pairs to reflect on each individual's assumptions, and listened in conversations outside class to analyze the soundness of an argument.
- Interpersonal.Examples given for this method included class members worked in pairs or teams to analyze a case study, collaborated in a class conversation discussing real-world examples of fallacies in advertising and politics, and role-playing and demonstrating the use of fallacies.
- Naturalist. Examples given for this method included the instructor referring to spring as the season of renewal and growth and then compared spring to opening a person's mind with critical thinking.

Focus group members were able to identify examples of MI techniques used by their instructor. It became obvious from the number of examples given that students were able to perceive differences in teaching styles. Comments such as, "Why do I have to take a final exam to prove my knowledge?" and "What difference does it make how many ways an instructor presents material?" were made.

This indicated students did not understand the value of MI and may not have been truly receptive to taking the time and effort in identifying them. When focus group members were asked to identify examples of the eight MI techniques, enthusiastic responses included, "I loved the storytelling, because I could relate to the point our instructor was trying to get across with the stories," "Terrific idea to have us work in pairs and do reflection in class," "The role-playing in class really helped me cement the lesson in my mind and was a lot of fun," and "Using the brain teasers as a contest in class was interesting and helped me see not everything appears the same to everyone."

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Summary

The statistical data analyses found only a single significant correlation. This was between an instructor's use of MI techniques and the class average final exam score. The focus group discussions revealed student ability to recall specific examples of instructor use of MI techniques. Students could identify, remember, and relate MI techniques to their experiences in class.

SUMMARY, FINDINGS, RECOMMENDATIONS

Summary of the Study

According to the results of a 1992 survey of adult literacy, nearly half of American adults do not perform at the level of literacy considered by the National Education Goals panel to be needed for competing in a global economy and for exercising the rights and responsibilities of citizenship (Gronlund, 1993).

In response to developing the necessary skills needed to be a productive and informed member of a world market driven by constant change, educators are calling for the development of critical thinking skills (Brookfield, 1987; Davis & Botkin, 1995; Glaser & Resnick, 1991; Halpern, 1993; Kerka, 1992; Paul, 1990; Sternberg, 1985a). Educators argue in order to thrive in the 21st century and the Information Age, individuals must ask questions, challenge assumptions, invent new ways of solving problems, connect new knowledge to information already known, and apply their knowledge and reasoning skills in new situations. In other words, individuals must develop critical thinking skills.

Adult educators, however, may not be using the best methods of teaching adults to think critically. In the traditional classroom, an instructor stands at the front of a classroom and lectures while students passively absorb information. The academic literature supports the notion of different learning styles or preferences (Knowles, 1980; McCarthy, 2000; Merriam & Caffarella, 1999; Sternberg, 1997).

A more effective method of teaching and perhaps increasing student comprehension could be to actively engage the students in the learning process by using Gardner's (1983, 1993a) theory of multiple intelligences.

Gardener's (1983, 1993a) theory of MI states humans have eight distinct intelligences: verbal/linguistic, logical/ mathematical, visual/spatial, musical, bodily/kinesthetic, interpersonal, intrapersonal, and naturalistic. Attention to these intelligences in the classroom can significantly change education by engaging learners in the educational process. Presenting course material in a variety of instructional techniques has a great opportunity for reaching an increasing number of students; because the literature supports the notion, unsuccessful, unmotivated students have experienced academic growth when exposed to the multifaceted techniques of MI (Janes et al., 2000).

This study was an exploratory study of the impact of MI instructional techniques used for teaching critical thinking skills. An exploratory research approach is a broad-based type of research used when a problem is not clearly defined; its purpose is to collect ideas and provide insights into the problem (Churchill, 2001).

A mixed methodology was used in this study in order to provide triangulation of data. A survey and a focus group discussion were used in an effort to ensure a greater understanding of what the students perceived. The survey assessed student perception of MI techniques used by their instructor. A focus group discussion asking students to identify specific examples of the MI techniques used by their instructor was conducted during the last meeting of the course. A final exam was given during the last meeting of the course.

This study used a convenience sample; a convenience sample is based on the availability of research individuals (Worthen et al., 1997). The sample group consisted of students enrolled in seven critical thinking courses at a local nontraditional adult educational institution.

There were 93 volunteer student participants, although data from 15 students had to be excluded because of an apparent bias when answering the surveys.

FINDINGS AND CONCLUSIONS

Research Question
Do students reporting more use of MI techniques by an instructor achieve higher critical thinking test scores?

This question examined whether the class average final exam scores improved with increased student recognition of instructor use of MI instructional techniques.

This finding supports that instructors using more MI techniques achieve higher class average final exam scores.

The implication for instructors in nontraditional adult educational institutions is the more MI instructional techniques used, the greater the critical thinking comprehension as measured by the class average final exam scores.

Comparison to Theory
According to Gardner (1983, 1993a), using the theory of multiple intelligences as a guide to instructional techniques should result in increased learning comprehension. Berkemeir (2002) found Gardner's theory to be true in teaching mathematics.Gardner's (1983, 1993a) theory provided the basis for this study. This study did, in fact, affirm components of his theory.

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Instructor use of more MI techniques in the class did increase learning comprehension as measured by the class average final exam scores; this finding does support Gardner's theory.

Study Limitations

The ability of the raters to recognize an MI instructional technique proved a limitation in this study. Examination of the rating on instructor use of MI instructional techniques showed a wide variation within each class.

These variations included some students using the same rating for all 40 questions to different rank orders of instructor use of MI techniques.

This limitation impacted the findings of research questions 1 and 2 by reducing the strength of the observed correlations. Training in recognizing MI techniques for the raters might improve individual rater consistency.

While a standard final exam (Appendix B in original dissertation) was used, scores indicated grading inconsistencies with the use of partial credit by some instructors. The development of a standard scoring approach would eliminate the problem.

A more representative randomly selected sample involving more than a single nontraditional adult educational institution would strengthen the ability to generalize results beyond a specific institution.

Finally, variables omitted from this study that might have had an impact and should be examined include ethnicity, age, gender, and socioeconomic background.

RECOMMENDATIONS

Practical Use

Gardner's theory of MI can be used as an educational curriculum framework to aid instructors in actively engaging their students in the learning process. Too often, educators teach to their own strengths, typically verbal/linguistic and logical/mathematical (Gardner, 1983, 1993b), which is plausible in its own right but does not address the learning styles and interests of all learners. The debate over Gardner's theory of multiple intelligences may now shift from a discussion of whether the eight intelligences exist to how educators can better facilitate these intelligences in a classroom setting (Armstrong, 1994).

Wolfe and Sorgen (1990) stated what educators do in a classroom should be based on what we know about how people learn. Gardner regarded his theory of multiple intelligences as an endorsement to Wolfe and Sorgen's idea of knowing how people learn, as Gardner bases the MI theory on three key ideas:

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We are not all the same, we do not all have the same kinds of minds (that is, we are not all distinct points on a single bell curve); and education works most effectively if these differences are taken into account rather than denied or ignored. (1999, p. 91)

Future Research
Replication of this Study
Replication of this study could involve traditional, nontraditional, and online adult educational institutions teaching critical thinking.

Additionally, examining other academic subjects beyond critical thinking could be a logical next step. Finally, issues involving demographic f actors such as gender, racial make-up, and learning styles could be examined.

IMPLICATIONS

This study proves an approach for instructors to improve average class comprehension levels of critical thinking. Gardner (1999) stated changes in our world are so rapid and so decisive that it will not be possible for schools to remain as they have always been or to introduce a few, superficial adjustments.

A more complex, multicultural global society creates new expectations for educational outcomes.Learning critical thinking skills is desperately needed for adults to function in the 21st century.

Adults who are capable of evaluating information and making decisions can strengthen a democratic republic (Gardner, 1983, 1993a). Similarly, employees skilled in conflict resolution contribute to a strong economic society.

Learning Curriculum Design – Appropriate for Critical Thinking
Instead of teaching solely with a focus to assessment measured by standardized test scores or grades, higher education faculty can begin to integrate the theory of multiple intelligences into the curriculum in an effort to begin providing college graduates with the skills desired by employers, such as critical thinking and decision making (Watrous-McCabe, 2005). Instructional developers have a broad variety of activities and assessments that can appeal to each of the eight intelligences.

Multiple Intelligences Reinforce Critical Thinking
Assuming that these findings can be duplicated in other disciplines and courses, educators can integrate the theory of multiple intelligences into different classes with an expectation of naturally reinforce critical thinking skills. Gardner's theory includes eight different intelligences: linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal, and naturalist intelligence (Smith, 2002, 2008).

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CONCLUSION

Employable individuals who have graduated from colleges and universities must be inquisitive, challenging problem solvers. Graduates must be able to take the knowledge that they learned and apply this to new knowledge and reasoning skills in the new work environments they will encounter.

It is necessary for educators to apply Gardner's (1983, 1993a) theory of multiple intelligences to enhance the learning experience of the students. To continue to remain employable, critical thinking skills must be taught and applied to real-world experiences.

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