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Museum Education Programming: Facilitating Critical Thinking Skills

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Abstract

Art museums have a rich history of enlightening and educating the general public. In recent years, several museums have reassessed their purpose, services, and relationship with the public, and have embarked on a new path in which educational activities and outreach has been placed at the forefront of their mission. Intrinsically, museums are a place where students can make connections to history, art, science, music and other disciplines through the examination of objects. These opportunities provide students with real-life connections that they can see and feel, opportunities that are not always available in the classroom. The use of museum objects allows students to learn in various ways, and pushes them to think critically by honing in on observation skills and allowing them to practice the skill of interpretation and analysis. Through the investigation, exploration and evaluation of objects, students can begin to think more critically about their use and meaning to develop what Benjamin Bloom called "higher order thinking."

Through the observation of ten museum programs that took place at the Newark Museum and The New Jersey Historical Society, this thesis seeks to analyze and discuss the ways in which museum educators have promoted critical thinking skills and higher order thinking through the use of questioning and other activities in museum programs. It also analyzes the methods that are used to teach students who learn through various intelligences or learning styles as proposed by Howard Gardner. Two educational theories are used to base this analysis. The first is Anderson and Krathwohl's Revised Taxonomy of Educational Objectives published in 2001. The revised taxonomy is based on Benjamin Bloom's Taxonomy of Educational Objectives: Cognitive Domain published in 1956. The second theory that used is Howard Gardner's Theory of Multiple Intelligences published in 1983. Programs analyzed for this paper took place between January and March 2004, and were taught to fifth and tenth grade students from the Newark Public School District, in Newark, New Jersey and Essex County, New Jersey VOTEC schools. All programs focused on American History.

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Introduction

The old adage, "Tell me, I'll forget; show me, I might remember; involve me, I'll always remember" still rings true today. Learning theories proposed by John Cotton Dana and John Dewey postulate that learning should occur through the use of objects and that individual learning is enhanced when people are able to touch things, create things and perform activities that involve the senses.

Museums continue to incorporate the tenets of object-centered learning, which directly correlates with Howard Gardner's and Benjamin Bloom's theories by allowing museum patrons to manipulate objects physically or mentally, analyze their use, contemplate their history, beauty or content, discuss them with others, seek personal introspection about them or use them as inspiration to express oneself in various mediums. All of these activities encourage the individual to think critically and at greater levels by analyzing, evaluating and applying what they see, touch, hear and do. Exposure to art or historical objects may also encourage the individual to seek out other learning avenues or conduct further research.

Museums have a rich history of enlightening and educating the general public. In recent years, museums have reassessed their purpose, services, and relationship with the public, and have embarked on a new path in which educational activities and outreach have been placed at the forefront of their mission. One method of doing this is by providing increased services and

programs to schools through the creation of programming that emphasizes and coordinates with school and district curriculums, as well as state and national learning standards. This increased awareness of education, has encouraged museum educators to become more familiar with current educational theory and practices, thus allowing them to provide a service to schools that creates a broader range of learning opportunities.

Intrinsically, museums are a place where students can make connections to history, art, science, music and other disciplines through the examination of objects. Through inspection of museum objects, and via discussion and activities in museums, students can evaluate what life was like during particular time periods, trace changes throughout history, and create connections between knowledge that they learn in the classroom and everyday life. These opportunities provide students with real-life connections that they can see and feel, opportunities that are not always available in the classroom.

The use and analysis of museum objects allows students to learn in various ways, and pushes them to think critically by honing in on observation skills and allowing them to practice the skill of interpretation and analysis. Through the investigation, exploration and evaluation of objects, students can begin to think more critically about their use and meaning to develop what Benjamin Bloom called “higher order thinking.” These skills can also promote critical thinking through activities aligned with the seven intelligences as proposed by Howard Gardner.

In 1956, Benjamin Bloom proposed the Taxonomy of Educational Objectives, a theory that assisted in categorizing educational objectives to be used by teachers in creating curriculum and evaluation methods. The taxonomy proposed six cognitive processes in a hierarchical fashion. The lower three processes were considered "lower order thinking," the last three processes "higher order thinking." This taxonomy was revised in 2001, with changes based on educational research and data since the original taxonomy was published.

The Theory of Multiple Intelligences, proposed by Howard Gardner in 1983, suggests that each person possesses seven distinct intelligences (linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, intrapersonal and interpersonal), which facilitates learning processes and problem solving. Some people function at higher levels and are able to solve problems of a greater magnitude in one area of intelligence, yet function at lower levels in other intelligences. This theory proposes that people learn in different ways and that teaching and learning methods should focus on these various intelligences.

This paper seeks to analyze and discuss the ways in which museum educators can promote critical thinking skills through the use of questioning which promotes discussion and other activities in museum education programs. It also analyzes the methods that are used to teach students who learn via the various intelligences as proposed by Howard Gardner. Ten museum programs at the

Newark Museum and the New Jersey Historical Society were observed and analyzed by this researcher over a three month period from January 2004 to March 2004. These programs were attended by fifth and tenth grade students from the Newark Public Schools in Newark, New Jersey and Essex County VOTEC schools, respectively.

Chapter one of this paper will discuss the relevancy of using Benjamin Bloom's Taxonomy of Educational Objectives and Howard Gardner's Theory of Multiple Intelligences in a museum setting. Chapters two through four will summarize the basic tenets of each theory: Bloom's Taxonomy of Educational Objectives, The Revised Taxonomy of Educational Objectives and Gardner's Theory of Multiple Intelligences. Chapter five will provide background information about the Newark Museum and New Jersey Historical Society curriculum and a description of the museum programs being analyzed. Chapters six and seven will summarize the methods used by the evaluator to analyze the ways that these theories are utilized in museum programming teaching methods, and will discuss the findings of the original program analysis. This paper will only analyze the teaching methods used in museums regarding these theories; it does not analyze the effectiveness of the methods, nor the knowledge and information retained by program participants.

Chapter 1

Relevancy of Using the Revised Bloom's Taxonomy and Multiple Intelligence Theory in Museum Education

Inherently, art museums teach people by drawing upon sensory experiences, and prompting individuals to ask questions about the purpose and ideas demonstrated in art or historical objects. Whether a museum has a mission to teach children to appreciate art aesthetically, to interpret art, teach the art historical background or the social, political and cultural history of objects, educators possess the ability to encourage people to use their various learning faculties to discover the meaning of art. Traditionally, museums have prompted individuals to use their senses to recognize and analyze the basic visual elements, or to think about objects in an art historical, or socio-cultural context through lecture formats in the shape of guided tours or through hands-on studio workshops.

Through time, the trends of teaching the public about art have changed. According to Heller, museums have assimilated four basic philosophies of art museum education into a conglomeration, incorporating aspects of each into every tour, lecture or program developed to accommodate various age groups.¹ The first of these philosophies, as outlined by Heller, is teaching people aesthetics and art appreciation which focuses on the awareness and beauty of objects. This type of education seeks to improve a person's character and promotes "good taste" in a person's choices of architecture, art and everyday

objects.² The Art-Historical philosophy emphasizes the iconography, period and national styles, and teaches about the artist who created an object. The third philosophy is the interdisciplinary approach, which teaches the individual about art in relation to other subject areas. This philosophy teaches an encompassing perspective that includes the performing arts, history, science, dance and music, among others. The final philosophy employs the humanities approach, which teaches individuals about art from the perspective of the society in which it was produced. This approach provides a perspective on the social setting and time in which an object was created.³

As cultural institutions with the ability to hone in on educational learning, museums possess the ability to teach people in various ways, and to accommodate peoples' various learning faculties and styles through each of Gardner's proposed intelligences. Both studies and common sense dictate that people do not all learn the same, nor do they retain information in the same manner. A study by the National Training Laboratories showed the following retention levels for various types of teaching styles: lecture, 5% retention; reading, 10% retention; audio visual, 20% retention; demonstration, 30% retention; group discussion, 75% retention; teaching others, 80% retention.⁴

As can be seen by the statistics from the National Training Laboratories study, people do not retain information gathered from teaching or learning styles such as lecture and reading as often as those that involve the senses and hand-on,

minds-on learning. For these reasons, educators are finding it to be increasingly important to incorporate learning methods which involve individuals in the learning process.

The Taxonomy of Educational Objectives has been used by educators to evaluate and plan curriculum methods that incorporate, teach and reinforce basic knowledge, as well as challenge individuals to apply, analyze, evaluate information and create new products using previous and newly learned information. In this way students are increasing their critical thinking and analytical skills. Teaching to the various intelligences also promotes critical thinking skills by challenging students to think in various ways or modes, and through learning activities that are discovery based.

Museum education programs can incorporate the various intelligences as outlined by Howard Gardner into program activities and lectures through story writing, journals or reactions, presentations, discussion, movement, skits, dance, and the creation or appreciation of music and art. Integrating peoples' various learning styles, upon theory, may seem easy; however it takes a great investment of time, creativity, materials and oftentimes money to integrate the various faculties into what museums seek to accomplish. In an effort to create a program that will involve dance or music for example, educational management must research these areas, perhaps learn more about them themselves, or seek out individuals who will volunteer or teach in a museum environment. This task

can be cumbersome, daunting and time consuming. However, if museums take the time and make the effort to enrich programs, and create ways in which various people can learn and retain information, the audience base and attendance for programs will increase in reciprocation.

In the 1994 publication of *Excellence and Equity*, the American Association of Museums (AAM) acknowledged that, "objects raise questions not addressed by documents" and that they can "be more adequately representative of natural and cultural heritages" and "provide information and enlightenment that can not be achieved through any other means."⁵ Through this document, the AAM also charged museum professionals to develop a greater understanding of the relationship among objects, ideas, and museum visitors. Furthermore, the publication challenged professionals to create educational experiences for age groups that accommodate various learning styles. *Excellence in Practice: Museum Education Standards and Principals*, published in 2002 by the AAM, also urged educators to seek out various ways to approach content, and to use knowledge and advancements in educational theory, cognitive development and teaching practices to promote voluntary, personal and life-long learning.⁶

¹ Heller, Terry. "The Historical and Philosophical Foundations of Art Museum Education in America" in Museum Education: History, Theory and Practice. Virginia: National Art Education Association, 1989: 18-19, 48-51.

² Ibid, 18-19, 48-51.

³ Heller, 56-62.

⁴ Moore, Deborah P. "Facilities and Learning Styles." School Planning & Management (April 1999) v. 38, n. 4: 22.

⁵ American Association of Museums. Excellence and Equity: Education and Public Dimension of Museums. Washington: American Association of Museum, 1992: 16-17

⁶ Excellence and Equity, 16-17. American Association of Museums. Excellence in Practice: Museum Education Standards and Principals. Washington: American Association of Museums, 2002.

Chapter 2

Bloom's Taxonomy of Educational Objectives

Since the late 1950's Benjamin Bloom's *Taxonomy of Educational Objectives* has been a steady and fundamental point from which educators have based their curriculum objectives, evaluation and teaching methods. The taxonomy has assisted educators as a tool by which they can base their objectives for units or lessons in terms of teaching students to think at different cognitive levels, ranging from teaching the basic facts and vocabulary to higher order thinking skills such as evaluating and making decisions and judgments about a topic based on specific criteria, standards and knowledge.

The Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1: Cognitive Domain, published in 1956, stemmed from an evident need among the educational community to have a standard classification of the goals and test items used within the educational system. It was projected that this classification would assist educators in dealing with communication and development problems that arose in the curriculum formulation and evaluation methods.

The taxonomy was created in three realms: cognitive, affective and psychomotor. Besides creating a basic classification of educational objectives, the cognitive taxonomy also served as a source to evaluate outcomes of learning. Teachers can use the taxonomy as a template to evaluate the area in which their

objectives fall, and whether or not emphasis on one area of cognitive skills is being addressed. Through the use of the taxonomy, teachers also have a guide that will assist in creating curriculum and planning teaching methods, as well as creating devices for evaluation of learning.

Other uses for the taxonomy include analyzing teacher's success based on the levels of objectives used in curriculum, analyzing the learning that takes place during classroom activities, and evaluating learning or ways in which a student's skills and abilities have changed based upon the various levels of thinking used.¹

The taxonomy was created by an educational team, who defined each objective based on those found in teachers' instructional plans, materials, and methods. These categories were further divided into various subgroups which defined the objective in more minute terms based on the distinctions and facilitation of curriculum and methods. The objectives are successive and hierarchical, building upon those skills, abilities and knowledge in preceding objectives. The first three objectives in the taxonomy - knowledge, comprehension and application, comprise those of 'lower order thinking.' The latter three objectives - analysis, evaluation and synthesis, require skills and abilities that function on a level of 'higher order thinking.'² Figure 1 shows the break-down of the categories and sub-categories.

Lower Order Thinking

1.00 Knowledge

According to Bloom, knowledge is defined as “the recall of specifics and universals, the recall of methods and processes, or the recall of pattern, structure or setting.”³ The knowledge objective is broken into twelve subgroups that deal with remembering and relating newly learned knowledge to previously learned knowledge. These sub-categories are knowledge of specifics, knowledge of terminology, knowledge of specific facts, knowledge of ways and means of dealing with specifics, knowledge of conventions, knowledge of trends and sequences, knowledge of classification and categories, knowledge of criteria, knowledge of methodology, knowledge of universals and abstractions of a field, and finally the knowledge of principles and knowledge of theories and structures.⁴

The remaining five objectives create a group labeled the *intellectual abilities and skills* fields. These five objectives build upon the knowledge learned by an individual and describe hierarchical cognitive abilities. The objectives provide techniques upon which students can deal with materials and problems by organizing or reorganizing previous knowledge or information.

2.00 Comprehension

Comprehension entails taking in new information that is communicated, and showing this understanding through the use of materials or explanation of ideas.

The communication can be either verbal or symbolic. This category is broken into the three sub-categories of translation, interpretation and extrapolation.⁵

3.00 Application

Application is the ability to apply knowledge of general ideas, rules, methods or principles in new situations or to use that knowledge to solve problems.⁶ In the handbook, Bloom explains this objective further by stating that

A problem in the comprehension category requires the student to know an abstraction well enough that he can correctly demonstrate its use when specifically asked to do so. "Application," however, requires a step beyond this. Given a problem new to the student, he will apply the appropriate abstraction without having to be prompted as to which abstraction is correct or without having to be shown how to use it in that situation.

Bloom further notes that when applying knowledge a student demonstrates that s/he has the ability to use that knowledge correctly in a practical manner not just that s/he comprehends it.

Higher Order Thinking

4.00 Analysis

Analysis is the breakdown of information into its component parts. In analyzing information and connections, clarifications should be made between specific ideas or concepts and the relationship among the parts. The three subcategories of this objective are the analysis of elements, relationships and organizational principles.⁷

5.00 Synthesis

Synthesis is the ability to create a new idea or concept by combining its parts or elements. By synthesizing knowledge, a person is able to create a new pattern of relationships or a new approach. Bloom states that

This is the process of working with elements, parts, etc. and combining them in such a way as to constitute a new pattern or structure not clearly there before.⁸

This objective, more than any before it, requires that the student create something by using and applying previous knowledge and materials supplied to him or her. The subcategories of this objective illustrate this creativity, in that all require the creation of a new product or concept. The sub-categories are the production of a unique communication, the production of a plan or proposed set of operations, and the derivation of a set of abstract relations.⁹

6.00 Evaluation

The final objective is that of evaluation. Evaluation is defined as the ability to formulate a judgment or make decisions about the value of an idea, material, method or criteria that has a particular purpose.¹⁰ These judgments or decisions are based on established criteria or standards, and may be qualitative or quantitative. The subcategories of this objective are judgments in terms of internal evidence and external criteria. In these subcategories, Bloom explains that the former (internal) judgments can be made based on the evaluation of the accuracy and consistency of information or evidence, while the latter form of judgment is based on remembered or chosen criteria.¹¹

Figure 1
Structure of Bloom's Taxonomy of Educational Objectives

- 1.00 Knowledge**
 - 1.10 Knowledge of specifics**
 - 1.11 Knowledge of terminology**
 - 1.12 Knowledge of specific facts**
 - 1.20 Knowledge of ways and means of dealing with specifics**
 - 1.21 Knowledge of conventions**
 - 1.22 Knowledge of trends and sequences**
 - 1.23 Knowledge of classifications and categories**
 - 1.24 Knowledge of criteria**
 - 1.25 Knowledge of methodology**
 - 1.30 Knowledge of universals and abstractions in a field**
 - 1.31 Knowledge of principles and generalizations**
 - 1.32 Knowledge of theories and structures**

- 2.00 Comprehension**
 - 2.1 Translation**
 - 2.2 Interpretation**
 - 2.3 Extrapolation**

- 3.00 Application**

- 4.00 Analysis**
 - 4.1 Analysis of elements**
 - 4.2 Analysis of relationships**
 - 4.3 Analysis of organizational principles**

- 5.00 Synthesis**
 - 5.1 Production of a unique communication**
 - 5.2 Production of a plan, or proposed set of operations**
 - 5.3 Derivation of a set of abstract relations**

- 6.00 Evaluation**
 - 6.1 Evaluation in terms of internal evidence**
 - 6.2 Judgments in terms of external criteria**

NOTES

¹ Bloom, Benjamin S. Taxonomy of Educational Objectives: the Classification of Educational Goals. Handbook 1: Cognitive Domain. New York: Longmans, Green, 1956: 7-8, 13-15.

² Unknown. "Gifted Education- A Resource Guide for Teachers." BC Ministry of Education- Special Programs, Gifted Education website. Accessed from www.bced.gov.bc.ca/specialed/gifted/process.htm on 2/17/2004.

³ Bloom, 201.

⁴ Ibid, 63-78, 201-204.

⁵ Bloom, 89-90, 204-205. Marzano, Robert J. Designing a New Taxonomy of Educational Objectives. California: Corwin Press, 2001: 6.

⁶ Bloom, 205. Unknown. "Gifted Education- A Resource Guide for Teachers."

⁷ Bloom, 120.

⁸ Bloom, 162.

⁹ Ibid, 206-207. Unknown. "Gifted Education- A Resource Guide for Teachers."

¹⁰ Bloom, 207.

¹¹ Ibid, 207.

Chapter 3

Revision of Bloom's Taxonomy of Educational Objectives

In 2001, Lorin W. Anderson, David R. Krathwohl et al. completed and published A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives which is a revision of Bloom's Taxonomy of Educational Objectives, published in 1956. The revision was based on new knowledge that professionals in the educational field felt needed to be reflected and included in the Taxonomy, regarding updated research and knowledge on child development and the ways in which teachers "plan for, teach and assess" their students. According to Anderson et al., the revision would also give new life and acknowledgement to the original Taxonomy.¹

In this book, objectives are referred to as what we want students to learn as a result of our teaching. Objectives, as used in the text of the Revision of Bloom's Taxonomy, are synonymous with the terms "curriculum standards" and "learning goals."² In the original Taxonomy, objectives consisted of a single cognitive dimension. In the Revised Taxonomy objectives are two-dimensional and include a cognitive process illustrating how a student should learn stated in verb form, and a knowledge dimension illustrating the subject matter that is to be learned by the student stated in a noun form. The cognitive processes are created along a continuum of increasing complexity, and the knowledge dimension also lies on a continuum from concrete to abstract. The revised cognitive processes are

Remember, Understand, Apply, Analyze, Evaluate and Create. The knowledge categories are Factual, Conceptual, Procedural, and Metacognitive.

The Knowledge Dimension is shown in figure 4. Unlike the original Taxonomy these dimensions are interrelated to create the Taxonomy Table as seen below in figure 2. In this table the Cognitive Processes are situated on the vertical axis or columns and the Knowledge categories on the horizontal axis or rows.³

Although the six major categories of the Cognitive Process of the Revised Taxonomy are also created as a hierarchy in order of complexity, the hierarchy is less rigid since the knowledge categories can overlap one another. Like the original Taxonomy the Revised Taxonomy is also split into lower (remember, understand, apply) and higher order (analyze, evaluate, create) thinking skills.⁴

The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual Knowledge						
C. Procedural Knowledge						
D. Metacognitive Knowledge						

Figure 2: The Taxonomy Table: The Cognitive Process Dimension³

As can be seen by the Taxonomy Table, all categories were renamed into verb forms to reflect the way that they are used in objectives. Three categories have

been renamed from their form in the original Taxonomy, these are *remember*, *understand*, and *create*, which respectively were *knowledge*, *comprehension* and *synthesis* in the original Taxonomy . The original 6.00 *evaluate* category has retained its name, but is the fifth category in revised taxonomy. In the revised taxonomy, the *create* category replaces that of *synthesis* (the fifth category in the original Taxonomy); and has also been restructured to be more complex than *synthesis* in the original Taxonomy. Each of the six cognitive process categories has two or more sub-categories associated with it. These sub-categories are written in a gerund verb form, ending in “-ing.” The cognitive processes and their sub-categories are shown in figure 3.⁶ The following are definitions of the categories of the Revised Taxonomy.

Lower Order Thinking

1.0 Remember

This category was referred to as Knowledge in the original taxonomy.

Remember means “to retrieve relevant knowledge from long-term memory.”⁷

This category is used when a teacher’s objective is for the student to retain information about presented material in the same basic form as it was taught.

This category has two sub-categories of cognitive processes known as recognizing and recalling knowledge.⁸

2.0 Understand

This category, formerly *comprehension* in the original Taxonomy, was renamed *understand* in the Revised Taxonomy to reflect its common use or synonymous use of the term by teachers when they wanted students to comprehend information.⁹ To *understand* is to “construct meaning from instructional messages, including oral, written and graphic communication.”¹⁰ Understanding is accomplished when students relate new knowledge to previous knowledge. This category has several sub-categories, which include interpreting, exemplifying, classifying, summarizing, inferring, comparing and explaining.¹¹

3.0 Apply

The definition of *apply* is to “use procedures to perform exercises or solve problems.”¹² The application of knowledge involves two processes. The first is to execute a task which can be completed when a student already knows the procedure used to complete an exercise. The other cognitive process is the implementation in which a procedure is applied to a problem or unfamiliar task.¹³

Higher Order Thinking

4.0 Analyze

To analyze is to “break material into its constituent parts and determining how the parts are related to one another and to the overall structure or purpose.”¹⁴ This category has three sub-categories, which are differentiating, organizing and attributing.¹⁵

5.0 Evaluate

In the original taxonomy *synthesis* was the sixth category and at the highest level on the taxonomy; in the revision however, evaluation and synthesis switch order and synthesis has been renamed *create* (see figures 1 and 3).¹⁶ Evaluate is defined in the Revised Taxonomy as “making judgments based on criteria and standards.”¹⁷ Standards for making judgments in this category can be either quantitative or qualitative and are applied to criteria. This category includes two sub-categories, which are checking and critiquing.¹⁸

5.0 Create

The final cognitive process is to *create* which involves “putting elements together to form a coherent or functional whole.” When using this process, students make a new product by “mentally reorganizing some elements or parts into a pattern or structure not clearly present before.”¹⁹ This process demands creativity and the use of prior knowledge to create something new. Products fashioned in this category do not necessarily need to be new or unique. The sub-categories of this objective are generating, planning, and producing.²⁰

Figure 3
Structure of the Cognitive Process Dimension of the Revised Taxonomy

- 1.0 Remember
 - 1.1 Recognizing
 - 1.2 Recalling

- 2.0 Understand
 - 2.1 Interpreting
 - 2.2 Exemplifying
 - 2.3 Classifying
 - 2.4 Summarizing
 - 2.5 Inferring
 - 2.6 Comparing
 - 2.7 Explaining

- 3.0 Apply
 - 3.1 Executing
 - 3.2 Implementing

- 4.0 Analyze
 - 4.1 Differentiating
 - 4.2 Organizing
 - 4.3 Attributing

- 5.0 Evaluate
 - 5.1 Checking
 - 5.2 Critiquing

- 6.0 Create
 - 6.1 Generating
 - 6.2 Planning
 - 6.3 Producing

Figure 4
Structure of the Knowledge Dimension of the Revised Taxonomy

- A. Factual Knowledge
 - Aa. Knowledge of Terminology
 - Ab. Knowledge of specific details and elements

- B. Conceptual Knowledge
 - Ba. Knowledge of classifications and categories
 - Bb. Knowledge of principles and generalizations
 - Bc. Knowledge of theories, models and structures

- C. Procedural Knowledge
 - Ca. Knowledge of subject-specific skills and algorithms
 - Cb. Knowledge of subject-specific techniques and methods
 - Cc. Knowledge of criteria for determining when to use appropriate procedures

- D. Metacognitive Knowledge
 - Da. Strategic Knowledge
 - Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
 - Dc. Self-knowledge

¹ Anderson, L.W., Krathwohl, D.R., et al. "Preface" in A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of Educational Objectives (Complete Edition). New York: Longman, 2001: XXI-XXII.

² Ibid, 3.

³ Ibid, 5.

⁴ Krathwohl, David R. "A Revision of Bloom's Taxonomy: An Overview." Theory Into Practice (Autumn 2002) v. 41, n. 4: 215.

⁵ Anderson, 28.

⁶ Ibid, 30. Krathwohl, 214.

⁷ Anderson, 66.

⁸ Anderson, 66-68.

⁹ Krathwohl, 214.

¹⁰ Anderson, 70.

¹¹ Ibid, 67.

¹² Ibid, 77.

¹³ Ibid, 67, 77.

¹⁴ Ibid, 79.

¹⁵ Ibid, 67, 79.

¹⁶ Krathwohl, 214.

¹⁷ Anderson, 83.

¹⁸ Anderson, 67, 83.

¹⁹ Ibid, 84-85.

²⁰ Ibid, 67, 84-85.

Chapter 4

Theory of Multiple Intelligences

In *Frames of Mind: The Theory of Multiple Intelligences* (1983), Harvard neurophysiologist, Howard Gardner, published his theory in which he proposed that seven types of intelligences exist. He outlined his theory, which expanded the idea of intelligence to include modes beyond those of the linguistic and mathematical intelligences, the two modes that had traditionally formed the concept of a human's potential of intelligence. Gardner defines intelligence as "a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture."¹ In *Frames of Mind*, Gardner proposed that humans possess linguistic, mathematical, bodily-kinesthetic, spatial, musical, interpersonal and intrapersonal intelligences.

Gardner came to his theory after studying two populations of people: adults with brain damage, and children, some of whom were considered normal and others considered gifted. He began his studies of people who had suffered brain damage during graduate school, at the Boston University Aphasia Research Center. At the Center, he examined the pattern of abilities of those with brain damage, as well as the abilities that were hindered or lost due to damage in different parts of the brain. At Project Zero (a research group associated with

Harvard University) Gardner studied the development of children and their capacity to learn in various areas.²

When studying both groups, Gardner focused on artistic abilities. Through his work with these two significant groups, Gardner realized that people have a "wide range of capacities," and that a "person's strength in one area of performance simply does not predict any comparable strengths in other areas."³ Furthermore, Gardner delineated that "the human mind is better thought of as a series of relatively separate faculties, with only loose and non-predictable relations to one another, than as a single, all-purpose machine that performs."⁴ Based on his research, he found the following eight "signs" or criteria upon which to categorize or base the intelligences. Summarized these are:

1. The isolation of faculties in areas withstanding or non-withstanding damage of the brain
2. The existence of idiots savants, prodigies and others who show extraordinary abilities in one area or intelligence
3. The ability of a person to identify basic information in a given faculty
4. A developmental path upon which a person expands an intelligence
5. A history of human evolution
6. Support from experimental tests and studies
7. Outcomes of standardized tests
8. The creation or use of symbol systems by a culture⁵

Although Gardner determined through careful analysis that his theory of intelligences could be described in seven categories, in Frames of Mind, he states that his theory does not nullify or dismiss other theories of intelligence proposed by past psychologists or educational theorists. Furthermore, Gardner states that these "lists" (past and present) are "a priori" and an "effort by a reflective individual (or a culture) to devise meaningful distinctions among types of knowledge."⁶ Each person possesses all of these intelligences and has capacities in each. However, the intelligences "function together in ways unique to each person," with most people "being highly developed in some intelligences, modestly developed in others, and relatively underdeveloped in the rest."⁷ Gardner posited that the intelligences can be developed over time if an individual is given the proper encouragement, enrichment and instruction, and that there are many ways that a person can be intelligent within each category.⁸

The first two intelligences that Gardner describes, linguistic and logical-mathematical, have been traditionally recognized as ways in which intelligence ratings have been used for lecture and testing. The *linguistic* intelligence is the ability to learn and use words effectively, whether in written or spoken form, and the ability to understand the rules of grammar. It involves the ability to learn languages, employ them successfully to communicate and explain ideas and accomplish goals. People of high linguistic capabilities are able to persuade others with ease, write eloquently, analyze written word or tell a story in a captivating manner.⁹

The *logical-mathematical* intelligence is most commonly used by mathematicians, scientists and logicians, and fuses the ability to use numbers effectively, exploit reasoning and logistical skills, and present questions and theories about the universe. A person with a high capacity in this area possesses the ability to analyze and investigate problems in a reasonable and scientific manner.¹⁰

The next three intelligences are related to the arts, and deal closely with the body and less with the cognitive realm. A person with vast *spatial* intelligence possesses the ability to navigate him or herself through space, and therefore is skillful with directions or finding his/her way from one place to another. This person can also use areas of space or transform them efficiently and effectively, whether large or small, such as an interior designer or sculptor. Artistic elements such as color and shape are easily perceived and can be manipulated to create a desired effect. Ideas translated in a pictorial, verbal or written manner are easily visualized in the mind's eye with little trouble. A person with a high affinity in this intelligence may be an artist, nature guide or exhibit designer.¹¹

The *bodily-kinesthetic* intelligence features a person's ability to use his or her whole body or part of the body to solve problems and complete actions; this person can perform fine or gross motor skills with ease. People with strong bodily-kinesthetic intelligence are able to use and train the body to complete small, precise movements and train various muscles of the body to fulfill a task or

are able to use the entire body to evoke an idea, plan, emotion or action. This physically-oriented person is skillful at activities that involve the body, whether in the area of athletics, dancing, miming, creating, or fixing objects.¹²

Finally, the third type of artistic-related intelligence is musically oriented. A person with *musical* intelligence can perform, compose, transform or appreciate music. This person is able to learn and perform using the voice or instruments, and compose music or analyze the various elements of a musical composition. In its simplest form, a musical person appreciates various forms of music, and can remember a lyric or melody with little difficulty.¹³

The final two types of intelligence deal with an orientation to people. The first type is *interpersonal* intelligence. This person can interact well and “read” others moods, motivations, feelings and intentions. This person can work well with others, and communicates with others effectively. The last of the original intelligences is *intrapersonal* intelligence, in which a person is able to understand and analyze one’s own feelings, desires, actions and motivations, and make proper judgments and decisions based on this knowledge. Politicians, lawyers, teachers and psychologists possess strong skills in these areas.¹⁴

In his 1999 publication, Intelligence Reframed: Multiple Intelligences for the 21st Century, Gardner proposed one more concrete intelligence, and two possible intelligences. The eighth intelligence, or the *naturalistic* intelligence, involves the

ability to recognize and classify the various species that exist in a given environment. A person who has a high affinity in this intelligence is able to classify species based on agreed upon taxonomies, or is a person who has an ability to tame, care for or interrelate with other living creatures.¹⁵

The two possible intelligences that Gardner proposes are the existentialist and the moral intelligence. In Intelligence Reframed, Gardner proposes that the *existentialist* intelligence fosters concern with definitive issues, or "ultimate" issues, as Gardner calls them.¹⁶ Gardner also suggests a possible *moral* intelligence. At the time that the book was written Gardner did not feel that there was sufficient evidence to categorize these latter two possible modes as types of intelligences. However, he states that he finds the "phenomenon (of existential intelligence) perplexing enough and the distance from the other intelligence vast enough to dictate prudence." He later states that he is willing to "joke" about 8 ½ intelligences.¹⁷

As stated earlier, all people possess abilities in each of the intelligences. However, Gardner states that people usually possess greater abilities in one or more areas than in others. Regardless, all people can learn in each area and gather greater knowledge and skill in each intelligence if it is cultivated. The ability to be better in one area than another should not be confused with a talent or a gift in one particular intellectual arena. A talent, as defined by Gardner, is the potential of some individuals to quickly advance through "the basic

developmental steps in an area with relatively little tutelage.”¹⁸ Other criteria that show the possession of a talent in an area is the depth upon which a person can master skills and the power that they have over gaining those skills. For any reason, a person may seemingly possess greater skills in one area of intelligence over others. Skills in one area can increase according to the amount of social support a person has, the amount of time and effort a person puts into a particular area, or how the person is taught, the learning environments s/he are exposed to, or the way(s) in which a person is nurtured. A high potential in one area allows a person to gain information effortlessly in a particular faculty.¹⁹

Within this theory, the intelligence of a person cannot be measured by standard intelligence tests such as the Stanford-Binet, which is based on the linguistic and mathematical intelligences. Contrary to the earlier belief that intelligence could be measured by standardized methods and criteria, Gardner proposes that a general measure of intelligence should include all of these types of intelligences. Therefore, such testing would not take place using the standard paper and pencil tests; intelligence would be measured using ways in which people cultivate each intelligence.²⁰ For example, in order to test a person's improvement or learning in the spatial intelligence, a teacher may assess if a student is able to navigate his/her way around an area from multiple starting points different from the original.²¹ Gardner states that testing for learning in the various intelligences involves observing a student manipulating objects or spaces, solving problems or fashioning a product in the area of each intelligence, or in a naturalistic setting.²²

Project MUSE

From 1994-1996, a group of researchers at Harvard University completed research evaluating the "potential of museums to serve as an integrated element of education." This collaboration between global researchers, classroom teachers, museum educators and school principals was titled Project MUSE (Museums Uniting with Schools in Education). The focus of Project MUSE was not on the typical connections between art museum objects and the curriculum needs of schools or content based connections, but on process-based connections and the learning itself. In this way, students visit art museums to "develop and reflect upon thinking skills." These skills can be transferred to any subject area and used in any type of assignment. Research from the project was incorporated with that of multiple intelligence theory to create a model that incorporated museum education teaching methods, learning techniques and critical thinking skills.²³

Research for the project was collected in the form of questionnaires that were distributed to over 500 professionals involved in education through school and museum settings. Questions centered on why people visited museums, how they felt about museums, and what they learned. Based on the outcomes of the questionnaires, learning tools and educational methods were developed and then tested in various museums around the world. One of the learning tools developed was *The Generic Game*, which does not require an art background nor does it focus on a particular artwork or type of artwork.

This game focuses on the learner through open-ended questions, accommodating learning differences and a structure that allows learners to think about their own thinking (metacognition). This game is based on the five stages in which people respond to works of art, as found in research completed by Housen and Parsons. These stages are responding to artistic properties such as color and texture, consideration of what is going on in the work of art, contextualizing the work of art, applying personal perspectives to interpretation, and judgment of the work based on personal experience and values. The game poses ten questions, as well as a pre- and post-game question to the viewer. Each question creates a scaffold for the next question; posing questions that demand critical thinking skills. Both the learning tools and educational approaches encourage visitors to find meaning in art.

A second tool, called *The Entry Point Approach*, is a structure for designing curriculum. The tool was introduced by Gardner in The Unschooled Mind, and can be used to accommodate learners of the various intelligences in the curriculum.²⁴ This learning tool utilizes methods that employ the various intelligences, and questions that promote reflection based on the seven intelligences as outlined by on Gardner's research.

NOTES

¹ Gardner, Howard. Intelligence Reframed: Multiple Intelligences for the 21st Century. New York: Basic Books, 1999: 33-34.

² Ibid, 29-32.

³ Ibid, 31

⁴ Ibid, 32.

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- ⁵ Gardner, Howard. Frames of Mind: The Theory of Multiple Intelligences, 10th Edition. New York, New York: Basic Books, 1993: 62-67.
- ⁶ Gardner, Frames of Mind, 60-62.
- ⁷ Armstrong, Thomas. Multiple Intelligences in the Classroom. Alexandria, Virginia: Association of Supervision and Curriculum Development, 1994: 8-9.
- ⁸ Armstrong, 9.
- ⁹ Gardner, Intelligence Reframed, 41. Gardner, Frames of Mind, 77. Armstrong, 2.
- ¹⁰ Gardner, Intelligence Reframed, 42. Armstrong, 2.
- ¹¹ Gardner, Intelligence Reframed, 42-43. Armstrong, 2.
- ¹² Gardner, Intelligence Reframed, 42. Armstrong, 2.
- ¹³ Gardner, Intelligence Reframed, 42. Armstrong, 2.
- ¹⁴ Gardner, Intelligence Reframed, 43. Armstrong, 3.
- ¹⁵ Gardner, Intelligence Reframed, 48-49.
- ¹⁶ Gardner, Intelligence Reframed, 60-61.
- ¹⁷ Gardner, Intelligence Reframed, 58, 66-67
- ¹⁸ Weinreich-Haste, Helen. *The Varieties of Intelligence-An Interview with Howard Gardner*. New Ideas in Psychology. (1985) vol 3, no. 4, 53.
- ¹⁹ Weinreich-Haste, 52-54.
- ²⁰ Gardner, Intelligence Reframed, 80-81.
- ²¹ Gardner,
- ²² Armstrong, 117.
- ²³ Davis, Jessica. The MUSE Book: A Report on the Work of Project MUSE. Boston: President and Fellows of Harvard College, 1996. 3-4. "Project Muse" accessed at www.pz.harvard.edu/research/MUSE.htm.
- ²⁴ Davis, 75-88, 128

Chapter 5

Museum Analysis: Curriculum

The museum analyses were conducted at the Newark Museum and The New Jersey Historical Society, both located in Newark, New Jersey between January 2004 and March 2004. Both of these institutions teach children through the use of discovery learning techniques. Discovery learning postulates that learning is an active process; that people need to physically or mentally interact with the world in order to learn. The discovery learning method allows people to learn by doing and interact in activities that require the individual to think and make connections about the world. This type of learning is often referred to as “hand on” or “minds on” learning.¹ In these two museums, students are asked to learn and come to accepted conclusions about art and history through questions, experiences, and the exploration of objects and materials with the guidance of an educator. Here, the activities that students are exploring are structured in such a way that the desired knowledge and outcomes are concluded through discovery learning.

Ten programs were analyzed for their utilization of levels of higher order thinking, as well as for the incorporation of activities and dialog that used instructional methods taught to the seven intelligences as described by Gardner. Five of the programs observed were conducted as part of the *American Stories* program, a collaboration between the Newark Public Schools, the Newark Museum, and the

New Jersey Historical Society. Three of these five programs took place at the Newark Museum, and the remaining two at the New Jersey Historical Society. The other five programs took place at the Newark Museum, and were part of collaboration between Essex County, New Jersey VOTEC schools and the Newark Museum and taught tenth grade students about American history through art.

**Curriculum: *American Stories* program
New Jersey Historical Society and the Newark Museum**

The *American Stories* program is a curriculum that was created by the Newark Museum and New Jersey Historical Society staff in 1997. Fifty of eighty-six fifth grade classes from the Newark Public School District attend each museum for instruction a total of four times, between October and May of each year. The program takes place in four distinct components that allow school children to learn about the history of America within a regional and national scope. The four parts of the series are: Native America, Colonial America, the Civil War and the Industrial Revolution. Each session incorporates dialog, activities and the use of objects that illustrate life during the various periods of American history.

At the beginning of each school year involved teachers receive classroom resource materials and attend a training day at the Newark Museum. During the training, teachers learn how to use and teach with tangible objects in their school lessons. The classroom resource packet contains photographs and transparencies of objects from each museum; one object from each museum is

provided for each historical period. The packet also contains a narrative or an “American Story” that is based on one of the objects provided, as well as a “learning by doing” section which connects the use of the object with activities that enable the children to apply knowledge learned through the narrative portion of the lesson. This packet is to be used for pre- or post-visit lessons, and the museums suggest that each class complete one or more activities before attending the museum visits.²

On the day of the visits, classes from the Newark Public Schools attend a program hosted by the New Jersey Historical Society (NJHS) in which children participate in discussion and activities with a museum educator. At NJHS, students learn about New Jersey history in the various historical periods. At the conclusion of this visit, children go directly to the Newark Museum, where they attend a guided program in the museum galleries and complete an activity. Here the children learn about the historical period on a national level. For the purposes of this research, programs from the Colonial Period and Civil War portion of the series were observed. This program was created based on Gardner’s original seven intelligences, and therefore does not include the newest intelligence, the naturalistic intelligence.

**Curriculum: Essex County VOTEC program
The Newark Museum**

The Essex County VOTEC program is currently in its second year at the Newark Museum. Like the *American Stories* program, this curriculum involves rotations

focusing on American history. Groups taking part in the program learn about Native America, the Civil War, Colonial America, and the Industrial Revolution. At the request of district teachers, they may also attend a program about African history. Students attend an interactive gallery tour and accompanying studio during each visit. For this analysis, programs focusing on the Industrial Revolution and the Civil War were observed.

This program is an interdisciplinary program in which students study history, art, literature, science and music from each era to grasp a rounded view of each time period. At the conclusion of the program, students, their families and teachers are invited to a culminating evening in which the students are congratulated on their successes, exhibit artwork created during the program, and are given the opportunity to take their family members on a tour of the museum to discuss with them the objects that they learned about in the museum program.

Museum Analysis: Description of Programs

***American Stories* Colonial America programs: New Jersey Historical Society**

Two programs were observed and analyzed at the New Jersey Historical Society located in Newark, New Jersey. These programs were based on the theme of Colonial America. Fifth graders from the Newark Public School system attended these one hour and thirty minute programs. The program was broken into distinct parts aside from the introduction and conclusion: discussion, activity, presentation of objects and the creation of a copy book.

The session began with a general introduction from the museum educator, relaying information about the museum and the plan for the day. The students were then guided to an open program space on the third floor of the museum, where a discussion began about the Colonial America. Before proceeding, the educator inquired about what the students had been studying in school.

Continuing the discussion, the educator asked the students to identify facts and information about early America, and to define terms such as Colonial America, colonies, and democracy. Certain terms and dates were then written on a portable white board at the front of the room. Students were then asked to compare life in Colonial America to life in today's society. During the discussion students compared the geographic area of Newark, New Jersey then with now, including how food, clothing, and jobs are and were obtained.

After the discussion, the students were separated into five smaller groups. Each group received a basket of original or replicated objects from Colonial times; the baskets were themed to reflect the farm, the tavern, the blacksmith shop, etc. In the basket with the objects were cards that briefly described each object. Each student was charged with choosing an object, looking it over, thinking about how it was made and possibly used, and discussing its possible use with other group members. After learning about the objects and deducing their original use, students were to either describe each object and its hypothesized use to the entire group or create a short skit that illustrated the use of all objects from the groups' basket. During the presentations or skits, the educator asked questions

of the entire group about the objects and/or provided more information regarding the objects.

After this activity was completed, students moved to another program space where they were given pre-cut and punched paper, as well as a piece of yarn. Here the educator described the use of a copy book in colonial times, and students were instructed on the assembly of the book. The copy books were then taken to the Newark Museum, where students would use the books as part of the program.

***American Stories* Colonial America and Civil War programs:
Newark Museum**

Two programs were observed and analyzed at the Newark Museum that also centered on Colonial Life and were a continuation of the New Jersey Historical Society programs. These programs took place the same day as those observed at the New Jersey Historical Society. These hour and a half programs focused on life in the United States during Colonial times. The programs took place in four distinct parts: the introduction, a gallery discussion, an interactive discussion in the Colonial school house, and a writing activity.

After a general introduction, students took part in a gallery tour in which they looked at and discussed paintings created in the early to mid-eighteenth century that depicted people who lived in various parts of the United States. During the gallery tour, students focused their attention on life in the early to mid-eighteenth

century, as well as on the symbolism that was used in painting. Through the analysis of universal symbols students learned about the people depicted in the portraits, as well as gaining knowledge on life during this time period.

The second part of the program was a discussion and studio activity that took place in the 1784 school house on the premises of the Newark Museum. In the school house, students discussed going to school during the Colonial period. Through the use of objects, the reading of proverbs, and math problems with a moral focus, students were able to compare and contrast attending school today and what it was like to attend school in a one-room school house. In the school house, students were able to sit in a period style classroom and were surrounded by objects that were used at that time. Students were able to see and touch many objects and really have a hands-on experience as a student at that time.

Here, students took part in a writing exercise using the copy books they assembled at the New Jersey Historical Society, as well as quill pens and India ink. Through the exercise, students understood the difficulty of writing with these materials and gained further hands-on experience in one portion of the curriculum during colonial times.

The final program observed involving fifth graders focused on the theme of the Civil War and took place at the Newark Museum. This program had three component parts: the introduction, gallery discussion and studio component. In

the gallery discussion, the educator and students discussed facts about the Civil War, reasons that the Civil War was fought, results of the war and how it affected people at that time. The educator began with an introduction of facts regarding the Civil War: when, why, where and by whom it was fought. By analyzing paintings and sculptures, students learned about symbols that artists used to illustrate how people felt about the war and how it affected their lives. During the gallery portion of the visit, four students were asked to create a sculpture using their own bodies, depicting the same pose as illustrated by the figures in the sculpture *Taking the Oath and Drawing Rations*.

In the studio portion of the visit, students were able to touch and feel objects that were used by soldiers in the war. They also handled two miniature statues of soldiers wearing Union and Confederate uniforms and accoutrements. Students then created a badge from air-dry clay based on a badge worn by a Union soldier during the war.

Essex County VOTEC Industrial Revolution and Civil War programs: Newark Museum

Five other programs observed and analyzed took place at the Newark Museum and involved tenth grade students from Essex County VOTEC Schools. These programs consisted of a gallery and studio portion as well. The first three programs analyzed focused on the theme of the Industrial Revolution. In this program students took part in a gallery discussion in the Ballantine House, a historical building owned and operated by the Newark Museum. This house was

owned by the president of the Ballantine Brewery, John Ballantine, and was built in 1885. At the time that the house was built, Ballantine beer was the most widely distributed beer in the United States. By touring this twenty-seven room Victorian mansion students were able to compare life in the late 1800s to life today.

This program began with an introduction about the late nineteenth century, and the rise of Industry in the United States. Through the evaluation of furniture, dishware, photographs and other objects, students were able to compare life in the early 1800s, late 1800s and today. Another focus of this program concerned stained glass. While touring the house, students were asked to compare the different styles of stained glass windows and techniques used in making the windows. Students also compared the standard of living then and now by comparing the cost of objects such as the windows and paintings, as well as the weekly salaries of servants.

In the studio component, students created their own stained glass window design based on techniques that they saw in the windows in the Ballantine House. A preliminary pencil drawing was created first, and then transferred to a sheet of acetate using marker. Students then added color to their design using permanent markers. Once the design was completed the acetate piece was matted.

The final two programs observed at the Newark Museum focused on the theme of the Civil War. These programs also had a gallery and studio component, and were of a similar format to the program for the fifth graders in the *American Stories* curriculum. This program began with a gallery session in which students discussed paintings and sculptures with the museum educator. The educator first provided an introduction to the Civil War, and then asked students to identify dates and reasons for the war, including the political background before the war began. Based on sculptures and paintings, the educator discussed slavery, the ways that the war affected the common person during that time, and how the artists visually demonstrated these ideas through the use of art using symbolism. By using the poem *My Captain, O' Captain*, written by Walt Whitman in reaction to the war, the educator began a discussion about a painting that was based upon that poem. By analyzing the symbolism in the paintings, students were urged to form opinions and judgments about how the war affected various people at the time, whether they were slaves, plantation owners, a common person or soldier. Students also learned about the Underground Railroad, and its symbolism in paintings, as well as symbols that slaves used at that time to find their way to the north. Students also discussed how the durability of artists' materials compared with the subject matter, opinions and feelings that were depicted in the art work.

In the studio portion of the program, students selected an event that occurred during the war from a list of ten that they would illustrate on a postcard. Using

watercolor pencils, students created graphic descriptions of the event and then wrote a note on the back of the card as if they had just been a part of the event and were reporting to family or friends from home. During the studio, students were also able to see photographs of the war that were published in books. They also heard an excerpt from a book accounting the prisoner camp at Andersonville, Georgia. These photographs and narrative further illustrated the imagery seen in Homer's painting *Near Andersonville* during the gallery portion of the program. Students were also able to see and feel objects from the museums collection, such as a Union soldier's bag and cap, and miniature sculptures of both a Union and Confederate soldier.

NOTES

¹ Hein, George E. Learning in the Museum. New York: Routledge, 1998: 30-33.

² Barroso, Donzelina A., Maurer, Maria. "American Stories Classroom Resource Packet." New Jersey: The Newark Museum and New Jersey Historical Society, 1998-2000: 1.

Chapter 6

Museum Analysis: Methods

Analysis of the museum programs at the Newark Museum and New Jersey Historical Society took place in two stages. In the first stage, art museum educators were observed during on-site programming. Written and audio records of the dialog topics, delivery methods used for each topic, and questions presented by the educator were recorded. Throughout the programs, students' reactions to the programming in terms of their attention, eagerness to answer questions, and their demonstrated interest in discussions and studio components were also observed and recorded.

In the second stage which took place after the sessions, program notes were reviewed by this researcher to determine three key components of the visits: the levels of higher order thinking that were incorporated through each topic, the educational objectives completed in each topic, and the types of intelligences that each instructional method or activity taught to, as set forth by the definitions, criteria and the writings of Gardner's Theory of Multiple Intelligences and Armstrong, Krathwohl, et. al.'s, Revision of Bloom's Taxonomy of Educational Objectives. Since the Revision of Bloom's Taxonomy of Educational Objectives is the most up-to-date reflection of research in their educational area at this time, this taxonomy was used to categorize educational activities and questions from the art museum programs.

The questions asked of the students during each program by the educator were categorized by this researcher in a grid according to the corresponding cognitive process category. Questions were analyzed based on verbs used by Anderson and Krathwohl in the Revised Taxonomy. A list of these verbs can be seen in Appendix 1. The questions asked in each program can be viewed in the Appendix section. Questions that did not correspond directly with a verb suggested by Anderson and Krathwohl were eliminated from the analysis.

To determine the associations between the multiple intelligences and the levels in the Revised Bloom's Taxonomy, information was analyzed based on two similar evaluative methods presented by Thomas Armstrong and Toni Noble. The first model is presented by Thomas Armstrong in his book, Multiple Intelligences in the Classroom. Armstrong's model provides a sample curriculum outline that "shows how a teacher can articulate competencies that address all eight intelligences, as well as Bloom's six levels of cognitive complexity."¹ Armstrong also states that this instructional model assists the educator to "stay on course in (your) efforts to address a number of intelligence and cognitive levels," and that "after laying the Multiple Intelligence/Bloom (MI/Bloom) template over the curriculum," that it may become apparent that some intelligences or cognitive levels are not included.²

In the Armstrong model (see figure 5), the Educational Objectives are identified on the vertical axis, and the intelligences are identified on the horizontal axis.

Figure 5: Armstrong's Multiple Intelligence Theory and Bloom's Taxonomy model³

Intelligence	Bloom's Six Levels of Educational Objectives					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Linguistic Intelligence						
Logical-Mathematical Intelligence						
Spatial Intelligence						
Bodily-Kinesthetic Intelligence						
Musical Intelligence						
Interpersonal Intelligence						
Intrapersonal Intelligence						

In the second model (see figure 6), based on her article, "Integrating the Revised Bloom's Taxonomy with Multiple Intelligences: A Planning Tool for Curriculum Differentiation," Noble presents a curriculum method similar to Armstrong's. In this model, Noble incorporates the multiple intelligences and cognitive processes of Bloom's Taxonomy. However, unlike Armstrong's model, Noble identifies the educational objectives on the horizontal axis, and the intelligences on the vertical axis. Another difference between the two is that Noble uses the Revised Educational Objectives set forth by Anderson and Krathwohl not the original educational objectives (see Figure 6 for an illustration of Noble's matrix).

Noble's matrix assisted teachers to "design learning outcomes and activities so that their students could demonstrate what they understood through different intellectual domains at the same or different levels of cognitive complexity."⁴

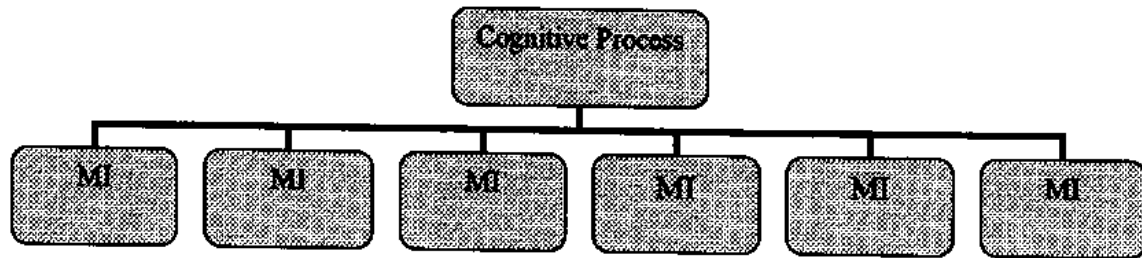


Figure 6: Noble's MI and RBT matrix for one educational objective⁵

This researcher will use a chart similar to that of Armstrong; for the purpose of program analysis. However the Revised Educational Objectives are substituted for Bloom's original educational objectives. Also, for the purposes of this paper, Gardner's first seven intelligences will be considered (see figure 7).

Figure 7: Ely's Multiple Intelligences and Revised Bloom's Taxonomy Matrix based on Armstrong and Noble models.

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence						
Logical-Mathematical Intelligence						
Spatial Intelligence						
Bodily-Kinesthetic Intelligence						
Musical Intelligence						
Interpersonal Intelligence						
Intrapersonal Intelligence						

NOTES

¹ Armstrong, 117.

² Ibid, 117.

³ Armstrong, 118-119.

⁴ Noble, Toni. "Integrating the Revised Bloom's Taxonomy With Multiple Intelligences: A Planning Tool for Curriculum Differentiation." Teacher's College Record. (January 2004) v. 100, no. 1: 194-195.

⁵ Ibid, 197.

Chapter 7

Museum Analysis: Findings

During museum education programs at both museums, educators initiated discussions about the content of painting, sculptures and historical objects in the galleries, as well as educational objects used for hands-on analysis. Through these discussions students relayed previous knowledge and understanding of the subjects being discussed. Through questioning the educators prompted students to think critically and extend their previous knowledge to analyze, evaluate and hypothesize about the content of the art objects being discussed.

The Revised Bloom's Taxonomy – Question Analysis

In this part of the data analysis, questions asked during the programs at the New Jersey Historical Society and Newark Museum were categorized in one of the six categories of the Revised Bloom's Taxonomy based on their association with the verbs identified by Anderson and Krathwohl (see Appendix 1). A small number of questions could be categorized in more than one category as can be seen in Appendix 5 and 6, and six percent of questions; those that did not correspond directly with verbs suggested by the authors were eliminated.

Data analysis revealed that overall, almost half of the questions asked during the museum programs challenged children to think at higher levels or more critically. Overall, 47% of the questions asked in the ten programs analyzed lie in the

higher order thinking categories of the Revised Bloom's Taxonomy (RBT). Four of the ten programs analyzed had a significantly higher percentage of questions asked in the analysis, evaluate and create categories. It is significant that three of these four programs were conducted with high school students. Very few questions in any of the programs challenged children to apply concrete procedural knowledge by executing or implementing a procedure to carry out or solve an exercise or problem. A majority of the application questions asked of the children required them to employ math skills to carry out familiar mathematical exercises.

Findings: *American Stories Programs*

In the programs conducted with fifth graders, overall 61% of the questions asked were categorized in the lower order thinking categories of remember, understand and apply. A majority of these questions focused on lower-order thinking skills, such as the recall of facts or specifics, or required children to explain concepts, compare and contrast people, objects or time periods, or infer about people or things in paintings and sculptures. Students were asked questions that challenged them to explain and contrast differences from Colonial times and the Civil War period with today based on previous or experiential knowledge.

Examples of questions asked during the Colonial America programs are:

Did this shape change too much (referring to a metal iron) from then until now?

Do you want to explain how they would use that as a heater?

Is this school different from your school? How?

How did you get clothes (in colonial times)?

Why is Aunt Eliza wearing this black thing around her neck?

Further examples illustrating lower-order thinking skills that required students to rely on previous knowledge are:

What does that mean 'Prisoner of War'?

Outside the house, what does this (gourd) symbolize?

What was the difference between the North and the South at that time?

Questions in these programs used the technique of scaffolding, in which questions asked by educators required children to identify knowledge using the lower order cognitive processes, and then analyze, evaluate and hypothesize information based on prior knowledge identified and visual cues found in museum objects.

Questions asked in the higher order thinking categories required the children to analyze, discriminate, distinguish or deconstruct information in paintings or through objects, or make judgments about situations or people. Questions requiring evaluation often required children to judge or decide how the people in the paintings, sculptures or settings felt in a given situation or how they themselves would feel if in that situation. The following questions asked in either

American Stories Colonial America program or the Civil War program illustrates these cognitive processes.

Do you think these people were wealthy? Why or why not?

When would a woman wear this broach?

Can you tell me something about the woman in this painting?

How do you think you would feel if you had to sit in the corner with this hat on?

What does the gourd have to do with the sky?

If you were going to a war site, what would you paint?

Students were also often asked to hypothesize or generate interpretations based on provided criteria in paintings and sculptures, challenging them to create new ideas. This type of cognitive process can be illustrated by the following questions:

If the South won, then what would that mean for her (referring to slave woman)?

There is no man in the painting; where do you think the man is?

What's going to happen if this kitten lets go of the ribbon and pulls on the table cloth?

If you were in the shop, what would you be doing?

How did they move this building to this spot?

Questions such as those illustrated above challenged students to think critically, to expand previous notions, to organize information and to think deep and clearly.

As can be seen by the data, significantly more questions were asked during the Colonial America and Civil War programs with fifth graders than were asked of the tenth graders (see appendix 2, 3, 5, 6, 8, 10, 11, 12, 14, 15).

Essex County VOTEC programs

Instructors of the Industrial Revolution and Civil War programs asked a greater number of questions that required critical thinking by the tenth grade students than those questions asked of the fifth graders. 54% of the questions asked of the high school students were in the analyze, evaluate and create categories. As can be seen in appendix 10, 11 and 12 less than fifteen questions were asked of the tenth graders during each of the Industrial Revolution programs. This may have been due in part to the subject matter (stained glass and a Victorian Era home). However, questions during this program were more evenly distributed among the all cognitive processes, a majority of the questions focusing on stained glass or the Victorian Era and evaluation and comparison of life in today's society to that of life in the Victorian Era. Examples of such questions in the various categories are as follows.

Apply

How much would a person making \$2 a week for 52 weeks make in a year?

If you made \$2 a week, how long would it take you to save the money for this window (\$450)?

Analyze

Can anyone figure out why the mirror is up so high?

Do you notice a difference in the style (of the stained glass windows)?

Evaluate

Where do you think Mrs. Ballantine would sit?

How much do you think a can of beer cost in the 1890s?

Create

What would have happened to your business (during prohibition)?

Why do you suppose people came to America at that time (late 19th c.)?

As can be seen in appendix 14 and 15, over 65% of the questions asked during the Civil War program could be categorized in the analyze, evaluate and create categories. In both programs more than 26% of the questions required students to distinguish, and deconstruct knowledge and observations to come to conclusions about what they saw in paintings and sculptures. The following are examples of Analyze questions from these programs.

He (Whitman) says: "O the bleeding drops of red, Where on the deck my Captain lies, Fallen cold and dead." What do you think he means by that?

During the war it would have been hard to get metal, why is that?

How can you tell that the war is going on?

In the first Civil War program with tenth graders, 21% of the questions asked the students to formulate judgments about the imagery, feelings of people in the paintings and sculptures or regarding historical events. More than 20% of the

questions in the Civil War programs required students to make hypotheses about the symbolic meaning of images or the consequences of the actions of people in the paintings or sculptures. Examples of these two cognitive processes as illustrated by the questions from these programs are:

Evaluate

Who is that (battles on Southern soil) an advantage for?

Can a doorway be a symbol for something?

There is a flag behind her back here, what is that a symbol for?

Create

If you were to push this (clay) statue over onto the floor what would happen to it? What about the bronze one?

What do you think this woman did (after becoming free)?

Where are they taking these Northern soldiers?

Overall, these programs challenged students to think critically based on the visual stimuli and images that they were observing. Students in all programs were attentive and interested in the discussion and activities.

Multiple Intelligences and Revised Bloom's Taxonomy Matrix

In this matrix (see appendix 4, 7, 9, 13, 16) the activities that took place during the programs were categorized according to the Multiple Intelligences and categories in the Revised Taxonomy that they corresponded with. This matrix

assists in the assessment of levels of thinking that students employ, as well as the intelligences that are incorporated into learning activities.

Overall data analysis showed that in a majority of programs (eight of ten) all levels of thinking according to the Revised Taxonomy were incorporated in activities. The analysis also reveals that the programming fell short in addressing the musical intelligence, and that a majority of activities completed required the children to employ the linguistic intelligence.

In all museum programs, students took part in a studio activity, and created an original product. Some of these activities incorporated many of the intelligences. As part of the fifth grade Colonial America program (see appendix 7) at the New Jersey Historical Society, children created a group skit or individual presentation that demonstrated how a group of colonial objects were used. This activity required that the children use an ample amount of the space provided (spatial intelligence) to convey the use of the objects to the overall group, demonstrate the objects use (bodily-kinesthetic intelligence), and by working together as a group the children employed the interpersonal intelligence or if the child opted to present individually the students employed the intrapersonal intelligence.

In a studio activity that took place at the Newark Museum during the tenth grade Civil War program (see appendix 16), students created a post-card that illustrated an event that took place during the Civil War (spatial intelligence &

bodily-kinesthetic), then wrote a message to a friend or family member about the event (linguistic intelligence) conveying their personal feelings about the event, how they felt about being involved in war or away from their families (intrapersonal intelligence).

During the gallery portion of the tenth grade Civil War program, an activity centered upon Walt Whitman's *O Captain! My Captain* poem incorporated several intelligences and Revised Bloom's Taxonomy (RBT) categories. The poem was first read to the class by one to three students (linguistic and interpersonal intelligences). After reading the poem, the instructor asked the students to explain several of the metaphors used in the poem (linguistic intelligence and understand), as well as to distinguish the meaning of the phrases as conveyed by Whitman (linguistic intelligence and analyze). Students then examined a painting completed by James Hamilton that was based on this poem, and found the symbols in the painting that illustrated the various phrases in the Whitman poem (spatial intelligence, analyze and evaluate).

In the *American Stories* programs conducted with fifth-graders, more than one-third of the activities involved the linguistic intelligence, while less than one tenth of the activities involved the intrapersonal intelligence. In VOTEC programs almost half of the activities conducted involved the linguistic intelligence, while none of the activities were offered that incorporated the musical intelligence. Although intrapersonal experience was not the focus of the activities, it can be

hypothesized that intrinsically students find an intrapersonal connection through the program discussion and activities given that viewing and evaluating art calls on some type of affective response.

Conclusion: Final Thoughts

In past decades, museums have been changing the focus of their services and missions to incorporate educational offerings for people of all ages. Museums have also been shifting their educational offerings to embody the state and national core-curriculum standards, as well as incorporating recent educational philosophies, theories and research about learning into programming. For nearly fifty years, educators in schools have used Bloom's Taxonomy of Educational Objectives to plan their curriculum and testing methods so that educational activities will include a range of cognitive processes. In this way, teachers can assess areas that necessitate an increase to the incorporation of learning in higher order thinking areas.

Museum educators can also use this method when creating programs. It is common thought that viewing, assessing, evaluating and creating art challenges people to think critically and at higher levels. Many recent advocates of art education such as Elliot Eisner, David Perkins and Harry Broudy advocate that "multifaceted, comprehensive, sequential art education helps students both understand the aesthetic dimensions of works of art and to develop their minds."¹

In a time when cut-backs in school funding and the arts are being made and financial sources are being stretched thin, several museums have found a niche in filling in this gap by providing programming that supplements the school

curriculum in a cross-disciplinary way, and assists schools in providing visual and arts education.

Many schools and educators have also begun to evaluate their curriculum and teaching methods to incorporate the multiple intelligences theory proposed by Gardner. It has been proposed that people learn differently and that all people possess various intelligences, as well as that educational methods need to expand past that of the linguistic and logical-mathematical realm and involve children in other ways. David Perkins espouses the development of thinking skills through viewing art. He states that art "invites, rewards, and encourages a thoughtful disposition, because works of art demand attention to discover what they have to show and say." He also states that people make connections to art at other levels such as social and personal.²

The methods used in this analysis can be used by museum educators when creating museum curriculums. In her recent study, Noble has shown that the RBT and MI Matrix (see figure 6) has proved successful in schools by assisting teachers in "diversifying their teaching and learning strategies to cater for their students' different intellectual strengths."³ This method allows educators to cross-check their programming in the stages of development to analyze if the programs include the various intelligences and cognitive processes.

Museum programming incorporating discussion about museum objects and studio or other learning activities create an environment in which children can learn about art, history, society, literature and other subject areas through hands-on experience using visual objects. Creativity through writing, drama, art or other activities also involves children in higher order thinking skills by stimulating them to create new products.

The data from this analysis demonstrate that overall the museums' curriculum and programming incorporated activities that teach to the various intelligences, as well as challenge students to call upon previous knowledge, learn or discover new knowledge and information through a visual means, and then use this information to find connections, formulate personal judgments or create hypotheses or new products. All of these processes involve students in critical thinking skills based on the visual elements in paintings, sculptures and historically valued objects. Educational researchers continue to conduct studies to evaluate whether critical thinking skills can then be transferred across disciplines to enhance thinking and problem solving skills in other areas.

It must be remembered that the museum programs in this thesis were conducted in short periods of time, and therefore it is challenging for educators to conduct activities that speak to each of the intelligences. The museums were successful in testing previous and experiential knowledge through questioning and building upon that knowledge through the development of questions that challenged

children's critical thinking skills. Overall, the museums incorporated six of the seven intelligences assessed and challenged children's critical thinking skills in approximately 50% or more of the questioning.

Use of the Theory of Multiple Intelligences and the Revised Taxonomy of Educational Objectives or the original Taxonomy of Education Objectives can assist museum educators in developing curriculum, as well as ways to teach children about art, to talk about art, and create and cultivate activities that encourage children to view art from various vantage points. Open-ended and guided questioning techniques encourage children to look more deeply at what they are seeing in art objects through analysis of images, symbols and iconography in the works. By incorporating these techniques, educators can reach a broad and diverse audience through activities and discussions that challenge them to see art from various viewpoints.

Programming that incorporates higher order thinking and several intelligences to teach critical thinking skills is illustrated in the *American Stories* and VOTEC programs that currently take place at the Newark Museum and New Jersey Historical Society. These curriculums were tailored to support the school curriculum of different age groups. Programming that incorporates multiple intelligences to teach critical thinking is exemplified by the *Generic Game* created by Project MUSE, which challenges children and families to evaluate art critically and expand their looking. As David Perkins advocates, looking at art "requires

thinking – art must be “thought through” and “thoughtful looking at art has an instrumental value. It provides an excellent setting for the development of better thinking.”⁴

NOTES

¹ Stankeiwicz, Mary Ann. “Foreword” in The Intelligent Eye: Learning to Think by Looking at Art written by David N. Perkins. Santa Monica, California: The Getty Center for Education in the Arts, 1994; ix.

² Ibid, 4.

³ Noble, 205.

⁴ Perkins, 3.

Appendix 1: List of Verbs

These verbs were used to categorize the questions from Museum program analysis. The verbs are from the text and from the Table of the Cognitive Process Dimension (pages 67-68) of A Taxonomy For Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.

Remember:

Recognize, Identify
Recall, Retrieve

Understand:

Interpret, Clarifying, Paraphrasing, Representing, Translating
Exemplify, Illustrate, Instantiate, Identify, Define
Classify, Categorize, Subsume
Summarize, Abstract, Generalize
Infer, Conclude, Extrapolate, Interpolate, Predict
Compare, Contrast, Map, Match
Explain, Construct, Model

Apply:

Execute, Carry out
Implement, Use

Analyze:

Differentiate, Discriminate, Distinguish, Focus, Select
Organize, Find, Coherence, Integrate, Outline, Parse, Structure
Attribute, Deconstruct

Evaluate:

Check, Coordinate, Detect, Monitor, Test
Critique, Judge

Create:

Generate, Hypothesize
Plan, Design
Produce, Construct

Appendix 2: Questions Asked During Museum Program

Museum: The Newark Museum

Program: Colonial America (1/10)

Grade: 5th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	What was on top of the building when you came in? Did you see what year was on the fish (weathervane)? What do you call this thing (blackboard)? What does idle mean? Who was the president in 1784? What is it (quill pen) called? What bird did they go to to get it (feather)? What subjects do you have in your school? What is a symbol? Did all boys and girls go to school in 1848? What is a symbol of the U.S.A.? Does anyone know someone who wears long shirts?	Who would have rang the bell? What is that thing (dunce cap)? Where did the boys & girls go when they needed a new pen? Do you have desks & chairs like this (in your class room)? What did you learn? *Is this school different from your school? How? *Everyone agrees this is a female?	What is the answer to the math problem?	What is this building made of? What are the benches made of? What is the roof made of? What was on the weathervane? *Is this school different from your school? How? Is it easier to change a diaper when a baby is wearing pants or a dress? How could you tell?	What do you think George Washington said to the kids when he visited the kids? What do you think the three subject students learned in this school were? Why wouldn't you tell your parent's you were whipped at school? Do you think these people were wealthy? Why or why not? *Everyone agrees this is a female?	How did they get this building to this spot? What do you think they made ink out of? What can you tell me about this man, based on what is on the book?
% of total questions	12/38= 31%	8/38= 21%	1/38= 3%	8/38= 21%	6/38= 16%	3/38= 8%

*Question fits into more than one category.

Appendix 3: Questions Asked During Museum Program

Museum: Newark Museum

Program: Colonial America (3/10)

Grade: 5th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	<p>What subjects do you have?</p> <p>What were the subjects (taught during Colonial times)?</p> <p>Do you spell whipped that way?</p> <p>What is the real name of this? (quill)</p> <p>What is this string for?</p> <p>What is a symbol?</p> <p>What is a symbol of the United States?</p> <p>What is a portrait?</p> <p>What person is holding it (flower)?</p> <p>Were things the same 160 years ago?</p> <p>Who is this?</p>	<p>Why didn't girls go to school?</p> <p>What would the teacher use this (bell) for?</p> <p>How many subjects do you think they had at this school?</p> <p>What does 'the idle fool is whipt at school' mean?</p> <p>Can you tell me something about this (painting)?</p> <p>Do these people look alike?</p> <p>Why is Aunt Eliza wearing this black thing around her neck?</p> <p>What made you think this was a boy?</p> <p>How is this school different than your school?</p> <p>*How do you know this is a boy?</p> <p>Why is she holding this (book)?</p> <p>Are the people in the painting dressed like we are today?</p> <p>Why was he wearing a dress?</p> <p>Why aren't these people smiling?</p> <p>*Can you tell me something about the woman in this portrait?</p>	<p>How many years ago was that? (1844)</p>	<p>Why did they use this (slate) instead of paper?</p> <p>Does it look like she is jumping or hanging?</p> <p>What's on her head?</p> <p>When would woman wear this broach?</p> <p>*How do you know this is a boy?</p> <p>Were they wealthy or poor?</p> <p>Is this a male or female?</p> <p>*Can you tell me something about the woman in this portrait?</p> <p>What did this man do based on what the book says?</p> <p>*What can you tell me about her?</p> <p>*Why are these people in the painting if they are not Thompson's?</p> <p>*Why are Aunt Eliza and Margaret living with the Thompson's?</p>	<p>Do you think they had all 5th graders in this class in those days?</p> <p>Do you think that you would go home and tell your parents that you were whipped at school?</p> <p>What happens to farmers who drink rum?</p> <p>How do you think you'd feel if you had to sit in the corner with this hat on?</p> <p>You learned what 10 minus 3 is, but did you learn anything else?</p> <p>Is it easier to change a diaper if a child is wearing a dress?</p> <p>Do you think this girl could really play the harmonium?</p>	<p>Do you think all children went to school in 1844?</p> <p>Why is he holding this flower?</p> <p>Who do you think this is?</p> <p>What do you think the flower may be a symbol of?</p> <p>Why would they have had to live there?</p> <p>*What can you tell me about her?</p> <p>Where do you think the painter slept?</p> <p>Where did he get his food?</p> <p>*Why are these people in the painting if they are not Thompson's?</p> <p>How do you think her husband died?</p> <p>*Why are Aunt Eliza and Margaret living with the Thompson's?</p>
% of total questions	11/57= 19%	15/57= 26%	1/57= 2%	12/57= 21%	7/57= 12%	11/57= 20%

*Question fits into more than one category.

Appendix 4: Multiple Intelligences and Revised Bloom's Taxonomy Matrix
Museum: The Newark Museum Program: Colonial America (1 & 3/10)

Grade: 5th

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence	Identify the meaning of words.	Compare and contrast school in colonial times to school today	Read the phrases on the blackboard. Read the words in a painting. Read word problems.			
Logical-Mathematical Intelligence			Solve three word problems.	Distinguish relevant from irrelevant information in a word problem. Distinguish the various materials objects are made of.		
Spatial Intelligence		Compare and contrast symbols from one painting to another.	Write in copy book using a quill pen.			
Bodily-Kinesthetic Intelligence				Feel, see and touch objects		
Musical Intelligence						
Interpersonal Intelligence			Share materials, while writing in copy books.			
Intrapersonal Intelligence					Decide whether the children in a painting are male or female. Evaluate which objects in a painting are symbols and what they are a symbol for.	

Appendix 5: Questions Asked During Museum Program

Museum: New Jersey Historical Society

Program: Colonial America (2/10)

Grade: 5th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	What is democracy? When did colonial times take place? Where did the people come from? Does anyone know when the revolutionary war took place? Where did they (colonists) live? What happened to make the 13 colonies? What is this? (iron)	When we say colonial, what do we mean? If you got sick what would you do? How do you learn about history? How do you do research? How did you tell what time it was (back then)? Where did they get milk? Did they (colonists) go to the grocery store when they needed food? Did they have markets? How did they cook their food? How were clothes different? What does a blacksmith do? Did this shape change too much (referring to iron) from then until now? How was life different in 1776? Do you want to explain how they would use that as a heater? What kind of exhibit is this? *What was it (object) used for?	How many years ago was 1776?	What's the difference between how you got your shoes and how colonial people got theirs? *What was it (object) used for?	Would you know this was a house by looking around? Do you think they were Christian?	What would they do there? (tavern) What is this made of (referring to object)? What kind of work would you do if you were wearing such a thing (referring to an apron)?
% of total questions	7/31= 23%	16/31= 52%	1/31 = 3%	2/31 = 6%	2/31= 6%	3/31 = 10%

*Question fits into more than one category.

Appendix 6: Questions Asked During Museum Program

Museum: New Jersey Historical Society

Program: Colonial America (4/10)

Grade: 5th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	What makes tea sweet? Who was here with the Native Americans? What does fragile mean? Where does wool come from? What animal? Who was the important person you remember from your history books? Were there children (living here)? Were there families? Were there stores? Did they have cars? What did they have (instead of cars)? What did they do? What did all houses have to keep warm?	Do you pick wool from the ground? How did they get food? What do you think the colonists liked to drink? How did they get clothes? Explain what a tavern is. What else went on? What do you plant (if you are a farmer)?		What two groups are indoors groups?	What are you wearing (colonial garment)? How was colonial life? What do you think? What did we learn today?	What do you think this might be? What was life like for the colonists? What do you think this is used for? What do birds do inside this? What does a blacksmith do? If you were in the shop what would you be doing? How would you break the sugar off the cone?
% of total questions	13/32= 41%	7/32= 22%	0/32=0%	1/32= 3%	4/32=12%	7/32=22%

Appendix 7: Multiple Intelligences and Revised Bloom's Taxonomy Matrix

Museum: New Jersey Historical Society

Program: Colonial America (2 & 4/10)

Grade: 5th

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence	Identify dates of Colonial era. Identify facts about life during Colonial times.	Explain concepts about life in colonial times. Compare and contrast life in colonial NJ to life in contemporary NJ.				Develop and construct a presentation demonstrating the use of a Colonial object.
Logical-Mathematical Intelligence			Compute how long ago 1776 was.			
Spatial Intelligence				Analyze the use of Colonial objects.		As a group, create a skit showing how Colonial objects were used.
Bodily-Kinesthetic Intelligence			Demonstrate ways in which colonial objects were used. Assemble copy book.	Feel, see, touch museum objects.		As a group, create a skit showing how Colonial objects were used.
Musical Intelligence						
Interpersonal Intelligence				Discuss the use(s) of various objects with your group.		As a group, create a skit showing how Colonial objects were used.
Intrapersonal Intelligence					Evaluate and make a judgment about the use of an object.	Create an individual presentation demonstrating the use of a Colonial object.

Appendix 8: Questions Asked During Museum Program

Museum: Newark Museum

Program: Civil War (5/10)

Grade: 5th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	<p>While you were at the historical society what did you see?</p> <p>What document did he (Abraham Lincoln) make?</p> <p>What did it mean when he said emancipation?</p> <p>Where was cotton grown?</p> <p>What does the eagle mean?</p> <p>What two groups fought the Civil War?</p> <p>What was the Union?</p> <p>What color uniforms did the North wear? The South?</p> <p>What were their jobs?</p> <p>What were the names of their farms?</p> <p>Does anyone have cousins in the south?</p> <p>She is a woman from the _____?</p> <p>What is this newspaper?</p> <p>What is the animal you see in this badge?</p> <p>Is there a war going on somewhere now?</p> <p>What does the eagle have in his beak? His talons?</p>	<p>What does that mean 'Prisoner of War'?</p> <p>What does agrarian refer to?</p> <p>Which soldiers are carrying rifles?</p> <p>Outside of a house, what does this (gourd) symbolize?</p> <p>Who is this guy?</p> <p>What kind of soldier wore this cap? This one?</p> <p>Who is the person in the painting?</p> <p>What do those branches mean?</p> <p>What was going on in the North?</p> <p>What was a safe house?</p> <p>What was another sign of a safe house?</p> <p>Where else did that cotton go?</p> <p>What was the difference between the North and the South at that time?</p>	<p>Can you lean over like this?</p>	<p>It (sculpture) is made of?</p> <p>What did they use it for?</p> <p>What are the children doing?</p> <p>What does the gourd have to do with the sky?</p>	<p>Look at the adults, are they very happy?</p> <p>Do you think she is a field worker or a house worker?</p> <p>If you were going to a war site, what would you paint?</p> <p>How do you think that makes her feel?</p> <p>What does her expression say to you?</p>	<p>What did the gourd symbolize in this time period?</p> <p>If the South won, then what would that mean for her?</p> <p>What might happen?</p> <p>What were they doing?</p> <p>What were people in the Southern states doing?</p> <p>There's no man in the painting, where do you think the man is?</p> <p>What's happening in this painting?</p> <p>What's gonna happen if this kitten let's go of the ribbon and pulls on the table cloth?</p> <p>Why would the U.S. choose an eagle?</p>
% of total questions	18/51= 35%	14/51= 27%	1/51= 2%	4/51= 8%	5/51=10%	9/51=18%

Appendix 9: Multiple Intelligences and Revised Bloom's Taxonomy Matrix

Museum: The Newark Museum

Program: Civil War (5/10)

Grade: 5th

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence	<p>Identify who fought the Civil War.</p> <p>Identify the colors of uniforms and other facts about the Civil War.</p> <p>Recall the meaning of words.</p>	<p>Explain or summarize why the civil war was fought.</p> <p>Explain the meaning of words.</p>				<p>Determine the connection between a gourd, the North star and freedom</p>
Logical-Mathematical Intelligence				<p>Analyze the materials objects are made of.</p> <p>Analyze cause-effect relationships.</p>		
Spatial Intelligence				<p>Examine and analyze symbols in paintings.</p>	<p>Decide what you would paint if you were to paint about war.</p>	<p>Create and carve a badge from clay.</p>
Bodily-Kinesthetic Intelligence				<p>Feel, see and touch objects.</p>		<p>Create a human sculpture as seen in the sculpture 'Taking the Oath and Drawing Rations'</p>
Musical Intelligence						
Interpersonal Intelligence					<p>Evaluate the effect of the Civil War on a family whose father went to war.</p> <p>Evaluate the effect of war on a slave.</p>	<p>Work as a team to create a human sculpture.</p>
Intrapersonal Intelligence						

Appendix 10: Questions Asked During Museum Program

Museum: Newark Museum

Program: Industrial Revolution (6/10)

Grade: 10th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	What are immigrants? Do you know what a philanthropist is? Who remembers what this window was supposed to represent?	How did they have heat in the house? What happened in the '20s? How is this window and the one in the library different?	How much would a person making \$2 a week for 52 weeks make in a year? Can anyone find (in the label) the cost of this window?	Do you notice a difference in the style?	How much do you think a can of beer cost in 1890s?	What would have happened to your business?
% of total questions	3/11=27%	3/11=27%	2/11=18%	1/11=9%	1/11=9%	1/11=9%

Appendix 11: Questions Asked During Museum Program

Museum: Newark Museum

Program: Industrial Revolution (7/10)

Grade: 10th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	Do you know what a brewery is? The sun rises in the ___?	What direction might the window showing the sun set face?		Can anyone figure out why the mirror is so high up? What are those things on the windows?	How much do you think that window cost? How much do you think it (sofa) might have cost?	Why do you suppose people came to America at that time?
% of total questions	2/8=25%	1/8= 12.5%	0/9=0%	2/8=25%	2/8=25%	1/8=12.5%

Appendix 12: Questions Asked During Museum Program

Museum: Newark Museum

Program: Industrial Revolution (8/10)

Grade: 10th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	What is glass made of? What shape was the glass in the Tiffany lamp?	What about the fashion, how was it different? How did they color the glass?	Two dollars times fifty weeks is ___? If you made \$2 a week, how long would it take you to save the money for this window?	What are all these spoons used for? How are these window pieces connected?	The brown glass, what would you say it looks like? Where do you think Mrs. Balantine would sit?	How are these pieces cut?
% of total questions	2/11= 18%	2/11=18%	2/11= 18%	2/11= 18%	2/11=18%	1/11=9%

Appendix 13: Multiple Intelligences and Revised Bloom's Taxonomy Matrix

Museum: The Newark Museum

Program: Industrial Revolution (6, 7, 8/10)

Grade: 10th

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence	Identify the parts of a stained glass window. Recall the meaning of words. Find the cost of stained glass windows in 1885.	Read labels to the group. Explain the meaning of words.		Distinguish the differences between clothing and furnishing styles in the Victorian Era and now.		
Logical-Mathematical Intelligence			Solve a math problem.			
Spatial Intelligence					Evaluate the aesthetic differences between stained glass windows.	Draw a design for a stained glass window. Create an artistic product (stained glass window design on acetate).
Bodily-Kinesthetic Intelligence						
Musical Intelligence						
Interpersonal Intelligence					Discuss the differences between clothing styles in Victorian Era and now.	
Intrapersonal Intelligence				Analyze and examine the differences between life in the late 1800s and your personal life.		

Appendix 14: Questions Asked During Museum Program

Museum: Newark Museum

Program: Civil War (9/10)

Grade: 10th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create	
Questions	<p>Who's this guy (Lincoln) right here? Where was most of the Civil War fought? What hand is going on the bible? Can you see what is going on behind her? Do you guys see a flag? What is the title of this piece?</p>	<p>What do you know about him (Lincoln)? What else? What do you need to have a war? Are there any people who can help her (slave) if she wants to run away? Does anyone know how it got the name the "underground railroad"? Who is this woman back here? Who's this guy? And this guy who's tipping his hat? What did you notice about her (Greek Slave)? Do we have slaves like her (greek slave) in the U.S.?</p>			<p>Does anyone want to tell me who you think these people are? What is notable about her? Who is the "Captain" in this poem? (In the poem) What is the prize he says they won? He says: "O the bleeding drops of red, Where on the deck my Captain lies, Fallen cold and dead." What do you think he means by that? What kind of medium is this made of? During the war, it would have been hard to get metal. Why is that? What type of medium is this? What type of paint? Does she have any choices? What can she do if she wants to run away? Does she have any choices though?</p>	<p>Who is that an advantage for? Where is the soldier from? How about this woman? Is she from the North or the South? What is his expression? Why is he in awe? Can a doorway be a symbol for something? Where do you think she's from? Since many people in the South were slaves, would they have wanted to go and fight? There is a flag behind her back here, What do you think that means for this woman? What do you think he's (slave boy) thinking? Do you think the material an artist uses has anything to do with what he is trying to say? Guys, if you wanted to buy a girl something, a girl that you really cared about, would you get her a ring made of plastic or a diamond?</p>	<p>What do some of those images in the picture mean? If you were to push this (clay) statue over onto the floor, what would happen to it? What about the bronze? What do you think the advantages are that the North would have had? What do you think this woman did? What are these children celebrating? What do you think the artist is trying to say in this painting? What do you think she's thinking?</p>
% of total questions	6/49 = 12%	10/49 = 20%	0/49 = 0%	12/49 = 25%	13/49 = 27 %	8/49 = 16%	

Appendix 15: Questions Asked During Museum Program

Museum: Newark Museum

Program: Civil War (10/10)

Grade: 10th

Objective	Remember	Understand	Apply	Analyze	Evaluate	Create
Questions	<p>Who did the Union soldiers fight for? What colors are they wearing? Were there really cars running underground like the subway? Are they carrying guns? Do you all know what the big dipper is? What happened to Abe Lincoln about a month after the war? How was he killed? Do you know who shot him? Do you know what a metaphor is? Is there slavery today?</p>	<p>What is a victory? What does the North star symbolize? What did they mean (by the underground railroad)? What did they look at the stars for? How was he the Captain? How is she (plantation woman) dressed? What are they pretending to do? What do you think darkness would represent for slavery?</p>		<p>What soldiers are in the back? Where is he looking? Up at what? What is she looking at? Look closely, can you tell what color they are? They couldn't cast this in bronze until after the war. Could you imagine why? What was his ship? In the poem who was the "Captain?" "The fearful trip is done." What was the trip? "The prize we sought is won," what is the prize? It talks about him "Where on the deck my Captain lies, Fallen cold and dead." Why? How can you tell that the war is going on? Why did she have to be naked? Mostly men would see it (the sculpture), why mostly men?</p>	<p>She has a little baby in her arms, but is she really paying much attention? Was he a rich man or a poor man? What soldiers are in the back? What colors are they wearing? Do you think Abe Lincoln was admired more by the North or the South? Would a slave boy be able to look her in the face? Do children really understand about war?</p>	<p>Where are they taking the Northern soldiers? What possible cause of action could she take? Who do you think she is? Look at her hands holding onto her apron. How does she feel? What do you think her job is? If she's living in the South in the Civil War who do you think she is? Who do you think this little boy is? What is she thinking? Who do you think this woman is? And who is he? Where do you think the dad is? This woman had to remove her clothes. Why? What do you think they put in their it (haversack)?</p>
% of total questions	10/ 52= 19%	8/52= 15%	0/52=0%	14/52= 27%	7/52= 14%	13/52=25%

Appendix 16: Multiple Intelligences and Revised Bloom's Taxonomy Matrix
Museum: The Newark Museum Program: Industrial Revolution (9, 10/10)

Grade: 10th

	Remember	Understand	Apply	Analyze	Evaluate	Create
Linguistic Intelligence	<p>Read a poem by Walt Whitman to the class.</p> <p>Identify who Abraham Lincoln was.</p> <p>Identify the meanings of words.</p> <p>Identify facts about slavery.</p>	<p>Summarize Abraham Lincoln's accomplishments.</p> <p>Explain who fought the Civil War and why.</p> <p>Explain the metaphors used in Walt Whitman's poem <i>O Captain! My Captain</i>.</p>		<p>Distinguish the meaning of phrases used in Walt Whitman's poem <i>O Captain! My Captain</i>.</p> <p>Attribute the parallels between the Walt Whitman poem and the images/symbols in the James Hamilton painting.</p>		<p>Create a message to a friend or family member about one of ten events during the Civil War</p>
Logical-Mathematical Intelligence				Analyze the materials used to create objects.	Evaluate the strength of the objects.	
Spatial Intelligence				<p>Analyze photographs of the Civil War.</p> <p>Analyze Hamilton painting for symbols that illustrate the phrases in the Whitman poem</p>	Evaluate the meanings/symbolism of colors, light and shadows in art works.	Create a picture illustrating one of ten events during the Civil War.
Bodily-Kinesthetic Intelligence			See and feel objects.			
Musical Intelligence						
Interpersonal Intelligence	Read a poem by Walt Whitman to the class.	Compare and contrast how people were affected by war in different areas of the U.S.				
Intrapersonal Intelligence				Analyze the meaning of a poem.	Make a judgment about how you think people felt during the war, or how the people in the paintings and sculptures felt.	Create a message to a friend or family member about one of ten events during the Civil War.

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Provides basic information about the history and mission of *Project Muse*.