Assessment #8
Mini-Portfolio

1. A brief description of the assessment and its use in the program

This mini-portfolio is an assignment in the Science Methods course (ESEC 384/385). Students must present artifacts from coursework in their field of licensure to provide evidence that they have satisfied the standards that are stated in the scoring rubric. The mini-portfolios are presented to the College Methods instructor, to peers in the Science Methods class. The candidate also does a self-assessment on the assignment. Candidates must obtain a minimum score of 68 with no more than 5 rankings of less than 3 to receive a passing grade in the Methods course.

2. A description of how this assessment specifically aligns with the standards

This assessment specifically aligns with standards in which candidates can 1b, understand the unifying concepts of science delineated by the NSES; 1c, understand the important personal and technological applications of science in their fields of licensure, 2a&b, understand the historical and cultural development of science and the evolution of knowledge in their discipline and understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of know the world; 3a, understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge; 4a, understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues; and 7a, identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science.

3. A brief analysis of the data findings

The candidate's scores in the data table are an average of the Science Method instructor, peers, and the candidate's self-evaluation. The candidates' scores were low, although all three students in the Fall 2005 Methods class did pass the assessment. More emphasis must be placed on the contextual content of science in the candidates major classes. Candidates felt that they did understand the standards, but they were missing pieces. Either they had not saved the artifacts to demonstrate the standards or did not have the material in their courses. More communication between the Methods instructor and the instructors that teach the courses in the major is required.

4. An interpretation of how that data provides evidence for meeting standards

Candidates met the minimum requirements of this assessment, indicating a basic knowledge of the contextual content of science. The assessment is based on the National Science Education Standards (NSES).

5. Assessment Documentation

5a. Assessment Tool

Choose artifacts from the science courses that you have taken in your field of licensure that demonstrates your knowledge of the contextual content of science. Use the scoring rubric as a guide to organize what should be included in your portfolio. The artifacts must be previously graded by the professors in the course. You will present your portfolio to the Methods instructor and your peers in the class, being explicit in your presentation of how your artifacts meet the standards delineated. The Science Methods instructor, your Method peers, and you will fill in the Scoring Sheet for the Mini-Portfolio. Your grade will be the average score. You must obtain a minimum score of 68 with no more than 5 rankings of less than 3 to receive a passing grade in the Methods course. A score of 136 or greater indicates an exceptional candidate.

Rating	Description
Emerging	Little or no evidence of the unifying concepts, historical or philosophical nature of science, social contexts and applications of science, or applications of science in the community. (less than 68 points)
Proficient	The candidate exhibits minimum to intermediate demonstration of the unifying concepts, historical or philosophical nature of science, social contexts and applications of science, or applications of science in the community. Provides basic but substantially convincing artifacts that meets or moderately exceeds minimum expectations. (68-119 points)
Advanced	The candidate exhibits intermediate to advanced demonstration of the unifying concepts, historical or philosophical nature of science, social contexts and applications of science, or applications of science in the community. Provides convincing evidence with multiple examples of achievement that substantially exceed minimum expectations and show excellence in performance. (119-170 points)

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
1b Unifying Concepts and Process • Systems, order, and organization • Evidence, models, and explanation • Constancy, change, and measurement • Evolution and equilibrium • Form and function	• Systems, order, and organization o Think in terms of systems (an organized group of related objects or components that form a whole) o Identify the structure and function of systems, feedback and equilibrium o Provide examples of regularities (order) in systems o Use prediction to identify and explain observations, or changes, in advance o Use mathematics, statistical probability, to describe the relative certainty (or uncertainty) or the order of events o Describe types and levels of organization	• Systems, order, and organization o Think and analyze in terms of systems (an organized group of related objects or components that form a whole) o Identify the structure and function of systems, feedback and equilibrium, and the distinction between open and closed systems o Provide examples of regularities (order) in systems, and by extension, the universe, which leads to understanding of basic laws, theories, and models that explain the world o Use prediction to identify and explain observations, or changes, in advance o Use mathematics, statistical probability, to describe the relative certainty (or uncertainty) or the order of events o Describe types and levels of organization	• Systems, order, and organization o All of the basic components o Demonstrates the complexity, the hierarchies, and the interactions between the components of a system and/or an organization
	• Evidence, models, and explanation o Examples of observations and data on which to base scientific explanations o Use of evidence to	• Evidence, models, and explanation o Examples of observations and data on which to base scientific explanations o Use of evidence to understand interactions in order to predict	• Evidence, models, and explanation o All of the basic components o Explanations more sophisticated, including a rich scientific knowledge base, evidence of logic, higher levers of analysis, greater tolerance of

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
	understand interactions in order to predict changes in both natural and designed systems o Examples of models which help scientists understand how things work	changes in both natural and designed systems o Examples of models which help scientists understand how things work o Provide an example of a scientific explanation which incorporates existing scientific knowledge and new evidence from observations, experiments, or models into an internally consistent, logical statement.	criticism and uncertainty, and a clearer demonstration of the relationship between logic, evidence, and current knowledge.
	• Constancy, change, and measurement o Provide examples of events/concepts of constancy o Provide examples of events/concepts of change o An example that quantifies change or constancy	• Constancy, change, and measurement o Give clear and relevant examples of events/concepts of constancy o Give clear and relevant examples of events/concepts of change o An example that quantifies change or constancy	• Constancy, change, and measurement o All the basic components o Further depth into constancy versus change (e.g., changes in rate, scale, and pattern, including trends and cycles) o Quantifying data in the form of graphs to show change in rate
	• Evolution and Equilibrium o Provide an example of evolution o Provide an example of a physical state of equilibrium	• Evolution and Equilibrium o Demonstrate an understanding that evolution is that the present arises from materials and forms of the past o Provide an example of a physical state of equilibrium	• Evolution and Equilibrium o All the basic components o Examples not only includes a biological theory, but a second example, such as change in the universe o More than one example of equilibrium, including steady state,

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
			balance, and/or homeostasis
	• Form and Function o Examples of form and function in one of the following: objects, organisms, and systems in the natural world o Explanation of function by referring to form and explain from by referring to function	• Form and Function o Examples of each of the following relating form and function: objects, organisms, and systems in the natural and designed world o Explanation of function by referring to form and explain from by referring to function	• Form and Function o All the basic components o Several examples of how form and function are interrelated and how it applies to different levels of organization
2a, 3a Historical and Philosophical Nature of Science. How science history clarifies • Different aspects of scientific inquiry • The human aspects of science • The role that science has played in the development of various cultures (Historical Perspectives)	• Different aspects of scientific inquiry o Only one example of how science distinguishes itself from non-science knowledge	• Different aspects of scientific inquiry o Provide examples that science distinguishes itself from other ways of knowing through the use of empirical standards, logical arguments, and skepticism o Examples of scientific explanations that are consistent with experimental and observational evidence about nature o Examples of scientific ideas that have been subjected to several reviews	• Different aspects of scientific inquiry o All of the basic components o An example of an issue where two scientists differ in their interpretations of the evidence or theory
	• The human aspects of science o One example of science as	• The human aspects of science o Example of an ethical	• The human aspects of science o All the basic components

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
	a human endeavor • The role that science has played in the development of various cultures. o One historical scientific event that influenced society	scientific issue o An example of where a scientists was influenced by societal, cultural, and/or personal beliefs • The role that science has played in the development of various cultures. o An example where a culture contributed to scientific knowledge or technological invention	o Several examples of scientists influenced by each of the following: society, culture, and personal beliefs • The role that science has played in the development of various cultures. o All the basic components o An example of how difficult it was for scientific innovators
1c, 2b, 4a Social Context and Applications of Science • Personal and community health • Population growth • Natural resources • Environmental quality • Natural and human-induced hazards • Science and technology in local, national, and global challenges	• Personal and Community Health o Able to provide some evidence of importance of physical fitness, injury prevention, knowledge of nutrition or sexually transmitted diseases, and awareness of the hazards of smoking, alcohol or drug abuse, environmental hazards • Population Growth o One example of the degradation of the	• Personal and Community Health o Provide evidence of the importance of physical fitness o Example of injury prevention o Examples of the risk of smoking, alcohol and drug abuse o Demonstration of the knowledge of nutrition o Knowledge of sexually transmitted diseases o Knowledge of environmental hazards • Population Growth o Examples of the degradation of the environment due to	• Personal and Community Health o Detailed and documented evidence of the topics listed under basic • Population Growth o Population density study o Several detailed examples of

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
	environment due to population growth	population growth	degradation of the environment due to population growth
	• Natural resources o Few natural resources identified	• Natural resources o Identification of natural resources	• Natural resources o Identification of natural and man-made resources o Recycling plan
	• Environmental quality o Example of a environmental change	• Environmental quality o Example of a change in environment and its effect on population (e.g., resource use, population distribution, over consumption, the capacity of technology to solve problems, poverty, the role of economics, political, and religious views)	• Environmental quality o Example of an ecosystem and the cycles in the system that maintain the quality of that ecosystem o An example of a natural change in the environment and its effect on the population, pros and cons o An example of a man-made change on the environment and its effect on the population, pros and cons
	• Natural and human-induced hazards o Explanation of a natural hazard o Explanation of a human-induced hazard	• Natural and human-induced hazards o Explanation of a natural hazard and its effects on population o Explanation of a human-induced hazard and its effects on population	• Natural and human-induced hazards o Example of a human activity that can enhance potential for hazards (e.g., urban growth, waste disposal) o Examples of natural catastrophic events o Examples above include benefit and risk assessment and the costs and trade-offs of various hazards

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
	• Science and Technology o Examples of how science and technology affect local, national, and global issues	• Science and Technology o Example demonstrating basic concepts and principles of how science and technology influence economics, policies, politics, and ethics of various science- and technology-related challenges o Proposal involving new research and the introduction of new technologies with an assessment of alternatives, risks, costs, and benefits and consideration of who benefits and who suffers, who pays and gains, and what the risks are and who bears them	• Science and Technology o The basic components o Example of how funding priorities can influence science and technology
7a Applications of science in the community • Museums, zoos, science centers • Public officials, legislators • Business and industry	• Museums, zoos, science Center o Demonstrate communication with one of the above • Public officials, legislators o Demonstrate communication with one of the above	• Museums, zoos, science center o Demonstrate communication with more than one of the above • Public officials, legislators o Demonstrate communication with both of the above	• Museums, zoos, science Center o Demonstrate participation in a science related activity • Public officials, legislators o Demonstrate an activity that resulted from the communication with one of the above

Standards	Emerging (1-3)	Proficient (4-7)	Advanced (8-10)
	• Business and industry o Demonstrate communication with one of the above	• Business and industry o Demonstrate communication with both of the above	• Business and industry o Demonstrate an activity that resulted from communication with one of the above

Scoring Sheet for Mini-Portfolio

Candidate Name	Evaluator's Name:	Licensure Area(s) Date:

Please note on the form below the appropriate evaluations points based on the above rubric.

Standard		Rating Evaluation (Points)	Evidence used and Comments
1b Unifying Concepts and Process	• Systems, order, and organization		
	• Evidence, models, and explanation		
	• Constancy, change, and measurement		
	• Evolution and equilibrium		
	• Form and function		

	Score for this section _____		
2a, 3a Historical and Philosophical Nature of Science.	• The role that science has played in the development of various cultures (Historical Perspectives)		
	• The human aspects of science		
	• Different aspects of scientific inquiry		
	Score for this section _____		
1c, 2b, 4a Social Context and Applications of Science	• Science and technology in local, national, and global challenges		
	• Natural and human-induced hazards		
	• Environmental quality		
	• Natural resources		
	• Population growth		
	• Personal and community health		

	Score for this section _____		
7a Applications of science in the community	• Museums, zoos, science centers		
	• Public officials, legislators		
	• Business and industry		
	Score for this section _____		
	Total Score		

Students must obtain a minimum score of 68 with no more than 5 rankings of less than 3 to receive a passing grade in the Methods course.

Attachment C: Candidate Data

Year		1b Unifying Concepts and Process	2a, 3a Historical and Philosophical Nature of Science	1c, 2b, 4a Social Context and Applications of Science	7a Applications of science in the community	Total
Fall 2005	Methods Student #1 Methods Student #2 Methods Student #3	25 20 30	18 15 21	36 30 42	12 9 15	91 74 108
Fall 2006	Methods Student #1 Methods Student #2 Methods Student #3 Methods Student #4	25 20 25 25	15 20 25 25	40 42 45 40	12 12 18 12	92 94 113 92
Fall 2007	Methods Student #1 Methods Student #2	25 25	20 15	45 40	18 18	108 98
Fall 2008	Methods Student #1 Methods Student #2 Methods Student #3	25 25 25	25 25 25	40 42 45	18 18 18	108 110 113