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A Retro Development in Education: Evaluating the Feasibility of Integrating Place-Based Education into Mississippi Curriculum Standards

Colby K. McClain
University of Southern Mississippi

The University of Southern Mississippi

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by

Colby McClain

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Approved by

_____

David H. Holt, Ph.D.
Associate Professor of Geography,
Advisor
Department of Geography and Geology

_____

Mark Puckett, Ph.D.
Professor, Chair
Department of Geography and Geology

_____

Ellen Weinauer, Ph.D.
Professor, Dean
Honors College

Abstract

This thesis evaluates the feasibility of integrating place-based environmental education activities from *Think Green, Take Action: Books and Activities for Kids* into the Mississippi Department of Education's (MDE) Frameworks for Science and Social Studies for K-5. As children develop and experience the world, their ability to understand and interpret the surrounding environments expand; however, Mississippi schools are not focused on experiential environmental education, even though experiencing and understanding the surrounding environment is vital in fostering eagerness to learn. Due to a growing disconnect between humans and the natural world, this thesis examined 37 place- and environment-based activities for children, sixteen of which were outdoors. By pairing the activities with MDE Science and Social Studies learning objectives for K-5, percentages were calculated for each of the 37 activities as they related to the number of objectives met to the maximum possible number of objectives for each activity, grade, and content strand. Activities obtaining a score of 50% or more were then examined using various developmental appropriateness metrics to determine best practices. The thesis also determines that while it is clear many of the activities from *Think Green, Take Action* are applicable to the MDE learning objectives, only 10 activities actually use the natural world as a context for learning. Thus, even though many of the activities can be used to achieve the MDE learning objectives, more pedagogies centered around learning *in* and *about* the local place are essential to not only a healthy human development, but in fostering ecologically-conscious attitudes and behaviors towards the natural world.

Dedication

This thesis is dedicated to the ever-increasing number of children who fall by the wayside as a result of increasing accountability reforms and decontextualized curricula.

"For the Children"

The rising hills, the slopes,
of statistics
lie before us.
The steep climb
of everything, going up,
up, as we all
go down.

In the next century
or the one beyond that,
they say, are valley, pastures,
we can meet there in peace
if we make it.
To climb these coming crests
one word to you, to
you and your children:

stay together
learn the flowers
go light

[original emphasis]
— Gary Snyder, from *Turtle Island*

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Chapter One: Introduction

1.1 - Purpose Statement

The purpose of education is to provide the means for an individual to develop their full human potential. Education should prepare an individual to become a creative, responsible, intellectual, passionate, and contributing member of society that strives to fulfill and enrich human life for both the individual and the whole, an education that "encompass[es] all dimensions of human experience."[1] As children develop and experience the world, their ability to interpret and understand the surrounding environments expand; thus, the relationship between education's purpose and human development is strongly connected. As a result of this connection, many pedagogies adhering to child development theories have been developed[2,3,4,5,6,7,8]. The Mississippi Department of Education (MDE) uses the *2010 Mississippi Science Framework* and the *2011 Mississippi Social Studies Framework* to guide and assess progress in the education of Science and Social Studies in Mississippi. However, most Mississippi schools are not focused on experiential environmental education, even though

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[1] Foshay, Arthur W."The Curriculum Matrix Transcendence and Mathematics." *Journal of Curriculum and Supervision* 6, no. 4 (1991): 277.
[2] Elkind, David. *Children and Adolescents: Interpretive Essays on Jean Piaget*. Toronto, ON: Oxford University Press, 1970.
[3] Sobel, David. *Children's Special Places: Exploring the Role of Forts, Dens, and Bush Houses in Middle Childhood*. Tucson, AZ: Zephyr Press, 1993.
[4] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006.
[5] Kriesberg, David A. *Think Green, Take Action: Books and Activities for Kids*. Santa Barbara, CA: Libraries Unlimited, 2010.
[6] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[7] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[8] Santrock, John. W. *Essentials of Life-Span Development*, 4th ed. New York, NY: McGraw-Hill Education, 2016.

experiencing and understanding the surrounding environment is vital in fostering eagerness to learn. This thesis evaluates the feasibility of integrating various place-based environmental education exercises from *Think Green, Take Action: Books and Activities for Kids* into the MDE Science and Social Studies frameworks for K-5 using Jean Piaget's[9] and Erik Erikson's[10] theories on child development to provide a developmentally appropriate environmental education resource for teachers.

1.2 - Problem Statement: Climate Change, Sustainable Development, Contemporary Issues in Childhood Education, and Place-Based Education

Sustainable development, or "development that meets the needs of the present without compromising the ability of future generations to meet their own needs,"[11] is the defining paradigm of our time as climate change, resource depletion, pollution, species loss, and the human population are acknowledged by the global scientific community as the utmost prioritized concerns when analyzing the future of humankind[12]. However, many U.S. schools fail to teach these issues appropriately

[9] Ibid, 17-20.
[10] Ibid, 17-20.
[11] WCED (World Commission on Environment and Development). *Our Common Future*. Oxford: Oxford University Press, 1987, 43. Quoted in John Blewitt. *Understanding Sustainable Development,* 2nd ed. New York, NY: Routledge, 2015, 9.
[12] IPCC (Intergovernmental Panel on Climate Change). Summary for policymakers, in: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)].(Cambridge, UK: Cambridge University Press and New York, NY: USA), 1-32.

within the current education system—children are too young to either cognitively or emotionally grasp the scale and complexity of the issues[13]. As David Sobel writes:

> If we fill our classrooms with examples of environmental abuse, we may be engendering a subtle form of dissociation. In response to physical and sexual abuse, children learn distancing techniques, ways to cut themselves off from the pain…My fear is that our environmentally correct curriculum will end up distancing children from, rather than connecting them with, the natural world. The natural world is being abused and they do not want to have to deal with it.[14]

Young children in Piaget's Preoperational Stage, around the ages of four to seven, experience egocentrism, or trouble with differentiating between the self and the other. Therefore, if a child learns about harsh environmental abuse around ages four to seven, then they could possibly suffer from severe distress; and, as they are unable to differentiate between the environmental abuse and themselves, a feeling of helplessness towards environmental issues might ensue. Furthermore, in Erikson's Initiative vs Guilt Stage, including ages four to seven, children's temperament is characterized by whether they feel encouragement and comfort or guilt and shame from adults or peers when performing or failing a task, skill, or activity. Hence, one could sensibly follow that if a child is unable to differentiate between themselves and another, are exposed to examples of extreme environmental abuse, and are also witnessing not only the abuse of the natural world but also the inability or lack of proactive efforts from (adult) humans to mitigate such abuse, then children could become severely discouraged and

[13] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 3-8.
[14] "ecophobia—a fear of ecological problems and the natural world." Ibid, 4-5.

disheartened in their ability to combat environmental abuse. Simply, children associate the abuse of the natural world and the lack of efforts in mitigating the abuse to themselves, thus discouraging and shaming themselves into fault for the abuse. An example of this "ecophobic" attitude can be noticed in a 2016 YouTube video of a mother recording her six year-old son crying about multiple instances of environmental abuse he had witnessed after watching a documentary in school[15]. Although some studies have found 'ecophobic' attitudes in children, more evidence is needed to substantiate Sobel's claim[16,17]. However, it is important to note that the MDE *2010 Mississippi Science Framework* has objectives pertaining to pollution in only the 1st grade[18].

In addition, and as previously mentioned, as children might not be able to emotionally grasp issues with environmental abuse, nor are they able to cognitively grasp the scale and complexity of environmental issues. Thus, Sobel cites the ideas of another educator, Lucy Sprague Mitchell, mentioning her philosophy of education which focuses on the local place before "embark[ing] on the 'long ago and far away'," [19] because "children are not able to think logically and abstractly,"[20] Mitchell's logic

[15] Henry Marr. "Boy Crying Over Environment & People Who Throw Trash on the Ground." YouTube video, 2:06. Posted by "ABC News" June 1, 2016, https://www.youtube.com/watch?v=7x3Qh3_27Xk.
[16] Hicks, David, and Cathie Holden. "Remembering the Future: What Do Children Think?" *Environmental Education Research* 13, no. 4 (2007): 501–512.
[17] Strife, Susan J. "Children's Environmental Concerns: Expressing Ecophobia." *The Journal of Environmental Education* 43, no. 1 (2012): 37–54.
[18] Mississippi Department of Education. *2010 Mississippi Science Framework.* Jackson, MS: Mississippi Department of Education, 2010, 23.
[19] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013, 6.
[20] Ibid.

greatly follows that of Piaget's Concrete Operational Stage from ages 7 or 8 to 10 or 11 when children become able to reason logically through a world that is concrete and tangible, as opposed to a place that is abstract and out of the concrete, nearby, and tangible, world, such as the Amazon rainforest (a frequent example of environment abuse). Sobel writes:

> Let us first cultivate an understanding of the habits and life cycle of chipmunks and milkweed—organisms children can study close at hand. By cultivating children's relationships with animals that lurk in the near recesses of their minds and forests, we can develop a taxonomy of relationships that will prepare them to gradually empathize with the animals of the rainforest.[21]

Simply, children must learn about their local place to better translate the ideas and concepts of their place to places further off once they are able to reason more abstractly. A clear example of this issue is seen in MDE *2010 Mississippi Science Framework* with objectives pertaining to outer space or geologic time in only the 3rd grade[22].

While advances in information and communication technology have allowed humans to become more connected, it is also causing humans to become disconnected from their local place. In *Last Child in the Woods*, Richard Louv describes a phenomenon he names "nature-deficit disorder" in which he suggests that human's splitting relationship with nature is causing various maladies within child and human development, such as "diminished use of senses, attention difficulties, and higher rates

[21] Ibid.

[22] Mississippi Department of Education. *2010 Mississippi Science Framework.* Jackson, MS: Mississippi Department of Education, 2010, 31.

of physical and emotional illnesses"[23]. He supplements and synthesizes his research with several thousand interviews he has had over the years with communities, schools, parents, and educators as well as numerous studies pertaining to possible health benefits and costs in human's relationship with the nature. Louv, Sobel, and many others argue that not only must children be allowed time to connect with nature and the surrounding environment before we ask them to help solve such taxing issues, but through connecting with nature and the surrounding environment children also experience a happier and healthier development[24,25,26,27].

Following the disconnect between humans and the natural world are studies noting decreases in time spent outside by children[28,29,30] and increases in high-stakes, standardized testing subjects[31,32]. It has been noted, however, that there are numerous consequences of standardized testing, such as teachers teaching *to* a test rather than focusing on larger learning objectives such as problem-solving or critical thinking[33,34].

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[23] Louv, Richard. *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*. Chapel Hill, NC: Workman Publishing Company, 2005, 34.
[24] Ibid.
[25] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[26] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[27] Hutchison, David. *A Natural History of Place in Education*. New York, NY: Teachers College Press, 2004.
[28] Clements, Rhonda. "An Investigation of the Status of Outdoor Play." *Contemporary Issues in Early Childhood* 5, no. 1 (2004): 68-80.
[29] Louv, Richard. *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*. Chapel Hill, NC: Workman Publishing Company, 2005.
[30] McMurrer, Jennifer. *Instructional Time in Elementary Schools: A Closer Look at Changes for Specific Subjects Report*. Washington, D.C.: Center of Education Policy, 2008.
[31] Ibid.
[32] Kober, Nancy. *Knowing the Score: The Who, What, and Why of Testing Report.* Washington, D.C.: Center of Education Policy, 2015.
[33] Ibid.
[34] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006.

These trends of decreased time spent outdoors and increased pressure in standardized testing have led many educators to argue against accountability standards' place in education[35,36]. Simply, rather than education focusing on evaluating a school's, teacher's, and student's efficiency, education should be about bettering the individual and promoting a democratic society through student knowledge, critical thinking and problem solving skills, and involvement in the community. Thus, place-based environmental education gives not only the opportunity for children to learn about and improve their surrounding environment and community, but it can further help their understanding of the complexities of climate change and sustainable development.

1.3 - Climate Change as an Issue.

Climate change is the fluctuation in average global temperature and precipitation regimes. The current issue with the changing climate stems from human consumption of finite fossil fuels (i.e. coal, oil, and natural gas) emitting greenhouse gases as well as other polluting chemicals into the atmosphere. Climate change is directly related to the greenhouse effect: a process that occurs when heat radiating from the Earth is absorbed by greenhouse gases (i.e. carbon dioxide, methane, and water vapor) then reradiated into the atmosphere thus increasing diurnal average temperatures. The change in these diurnal temperatures allow for a more dynamic and warmer climate system from both a heat transference and precipitation variance, causing increased areas of flood and

[35] Ibid.
[36] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013.

drought. Warmer average temperatures affect the cryosphere seasonally changing where ice builds up and where it melts. Therefore, the problem concerning climate change temporally aligns with when humans started adding additional greenhouse gases to the atmosphere that had not previously been present, primarily through the use of finite fossil fuels as an energy source[37].

According to the 2013 report from the Intergovernmental Panel on Climate Change (IPCC), the "warming of the climate system is unequivocal" and has been warming at a rate that is unprecedented in the last 1,400 years due to an anthropogenic increase of greenhouse gases[38]. Data in the report is supported by numerous independent studies from a range of earth sciences revealing a warming in various parts of the Earth's systems (i.e. oceans, atmosphere, and glacial regions) which is "evident from an increase in greenhouse gases, positive radiative forcing, observed warming, and understanding of the climate system"[39]. Measurements taken at the Mauna Loa Observatory in Hawaii show that carbon dioxide has risen from a mean of 315.97 ppm (parts per million) in 1959 to 404.21 ppm in 2016 (Figure 1)[40]. A report from the American National Research Council claims that future projections anticipate an

[37] IPCC. Summary for Policymakers, in: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. (Cambridge, UK: Cambridge University Press, 2013 and New York, NY: USA, 2013).
[38] Ibid, 2-5.
[39] Ibid, 13.
[40] U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Earth System Research Laboratory, Global Monitoring Division, accessed March 6 2016, ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_annmean_mlo.txt.

additional warming of 2.0 to 11.5°F (or 1.1 to 6.4°C) over the twenty first century on top of the current 1.4°F observed in the past 100 years[41].

While climate change is a problem itself, it is the precursor to a vast number of other problems. As average global temperatures continue to rise, so will pressures on Earth's geo- and biophysical systems. The IPCC report *Climate Change 2014: Impacts, Adaptation, and Vulnerability* states:

> changes in precipitation and melting snow and ice are altering the hydrologic cycle, affecting water resources in terms of quantity and quality…terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions…[and] negative impacts of climate change on crop yields have been more common than positive impacts.[42]

Thus, evidence that changes in the climate system have already impacted natural and human systems has been detailed by an international scientific body. Glaciers could continue to melt faster than they accumulate new ice causing freshwater additions to the oceans. A warmer atmosphere could contribute to warmer oceans which in turn could expand the volume of the ocean resulting in sea level rise. An increase in both temperature and sea-levels can strengthen weather events causing severe damage to coastal communities via hurricanes, floods, erosion, and saltwater intrusion. Permafrost

[41] National Research Council. *America's Climate Choices: Advancing the Science of Climate Change, Report in Brief*. Washington, D.C.: The National Academies Press, 2010, accessed November 18 2016, http://dels.nas.edu/Materials/Report-In-Brief/4349-ACC-Advancing-the-Science?bname=.

[42] (IPCC) Intergovernmental Panel on Climate Change. Summary for policymakers, in: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.[Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)].(Cambridge: Cambridge University Press, United Kingdom and New York: NY, USA), 4.

should continue to thaw in the higher latitudes and altitudes which can release massive amounts of stored methane gas thus exacerbating the greenhouse effect. Seasons will continue to lengthen and shift causing migrating animals to seek food sources earlier, pollinators (i.e. bees, birds, bats, etc.) to become out of sync, and plants to need more water throughout the extended season. Furthermore, once a growing season ends, mild winters could potentially fail to kill dormant insects increasing the risk of infestations; correspondingly, as temperature zones expand and water move inland, infestations will further the range of infectious diseases. Violent weather such as hurricanes, droughts, and floods could become more frequent and powerful with a more dynamic system fostered by climate change. Increased levels of carbon dioxide is already causing the acidification of the ocean due to carbonization. Also, thermal stress from warmer temperatures is causing coral reefs to bleach (i.e., die) which is unhealthy for the aquatic communities because many species rely on coral reefs for their survival[43]. Such intricate and rippling reactions to a rapidly changing climate have the potential to fundamentally alter the human, as well as other species', way of life. Yet, despite these possible or already occurring impacts, very little has been done to curb CO_2 emissions from fossil fuels, the depletion of finite resources entailed in consuming fossil fuels, the pollution caused by extraction and combustion of fossil fuels, or the extinction of species by the above. Further, even basic education on any of these issues is eschewed by the current K-5 education system. Some argue that children should not learn about

[43] Ibid, 1-32.

these issues at this age[44,45,46], but it is imperative that children learn about the functionality of nature and environmental systems to effectively understand human's place within them.

1.4 - Sustainable Development as Concept.

Sustainable development essentially emerged out of increasing concern for and understanding of the environment during the late 1960s and early 1970s as a response to the abovementioned issues. In *Understanding Sustainable Development*, John Blewitt provides an extensive record of texts regarding the complex and diverse nature of sustainable development. Blewitt writes:

> Sustainable development requires…a dialogue of values…[it] warrants an attitude of mind that welcomes change, difference, creativity, risk, uncertainty, a sense of wonder, and a *desire and capacity to learn*. It is *heuristic – a way of learning about life and through life*. The importance of learning should never be forgotten. We can only grow, flourish, and be sustainable if we learn [emphasis added].[47]

Sustainability is the goal and sustainable development is a multidimensional process towards an equilibrium between environmental, social, and economic sustainability. Environmental sustainability relies on the integrity of ecological systems and involves

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[44] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[45] McKnight, Diane M. "Overcoming 'ecophobia': Fostering Environmental Empathy through Narrative in Children's Science Literature." *Frontiers in Ecology and the Environment* 8, no. 6 (2010): 10–15.
[46] Strife, Susan Jean. "Children's Environmental Concerns: Expressing Ecophobia." *The Journal of Environmental Education* 43, no. 1 (2012): 37–54.
[47] The emphasis is to stress the importance of individual's desire and capacity to learn through experiencing life in order to better understand sustainable development. Blewitt, John. *Understanding Sustainable Development*, 2nd ed. New York, NY: Routledge, 2015, 2.

humans living within their ecological imperatives—i.e. finite nonrenewable resources and renewable resources so far in that they are sustained and conserved properly. Social sustainability relies on cultural and systemic integrity of democratic institutions such as equity, participation, justice, opportunity, transparency, empowerment, and building human and social capital. Economic sustainability relies on the integrity of environmental and social sustainability meaning it requires consideration of ecological imperatives and allows for the equitable growth of social and human capital[48]. However, for this trifocal equilibrium to occur and because "root problems of overpopulation, over-consumption, speciesism, and ignorance seem to be deeply ingrained in human psychology […] a paradigm shift in human thought [is needed]"[49] Humans must understand they are *a part* of nature rather than *apart* from nature. Humans live by the same ecological principles as all other species—food, water, and sleep to maintain homeostasis, shelter to protect them from the elements, competition to survive—and actively impact the ecosystem in which they live. However, while humans rely on all other species for their survival, no other species relies on humans for theirs. Thus, humans must recognize their vital and integral relationship with the natural world and understand the holistic nature of life in regards to both humans and non-humans. Therefore, much of the sustainable development literature calls to localize these issues to "daily life or part of practical consciousness" in order for sustainability to be understood "in a context within which it may be validated as a process" to

[48] Ibid.
[49] Ibid, 159.

"generat[e] concrete examples of sustainable development"[50]. In other words, sustainable development cannot and has yet to be fully understood unless specific examples are developed; and, because social and environmental issues are *primarily* experienced on a *local* basis, the best examples of sustainable development or sustainability are generated through local examples. Yet, education fails to incorporate experiences in and of the local place into the curriculum. Rather, some argue education is fixated on nationwide accountability standards[51] and the rote memorization of "decontextualized"[52] facts, calling for more experiential learning, or "a process by which knowledge is created through the transformation of experience,"[53] in one's local place in order to translate their local knowledge and experiences to larger and more complex concepts[54]. In addition, as place- and environment-based education puts learning in the context of the local community, it has the potential to build the local and 'concrete examples' of sustainable development that is called for to 'validate it as a process'.

1.5 - Praxis.

[50] Ibid, 99.
[51] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006.
[52] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013, 24.
[53] Kolb, David A. "Experiential Learning: Experience as The Source of Learning and Development." Englewood Cliffs, NJ: *Prentice Hall, Inc.*, (1984): 20–38.
[54] Op cit.

Thus, as a result of the abovementioned myriad of multifaceted problems, pressure has been placed on teachers, students, and the entire academic community to which a body of literature has emerged consisting of place-based environmental education pedagogies that are framed upon a child's development stages in order to foster knowledge, awareness, and action to these environmental problems. The aim of my research is to evaluate the feasibility of incorporating environmental and place-based activities from *Think Green, Take Action: Books and Activities for Kids* by David Kriesberg as a component to the current educational framework for the state of Mississippi in an attempt to develop best practices for activities based upon Jean Piaget's and Erik Erikson's developmental theories from ages five to eleven (K-5).

Chapter Two: Literature Review

2.1 - Birth and Development of Environmental Education.

The history, development, and evolution of environmental education has aptly been described as both a tree and a stream—a "thriving robust tree with the tree's many branches representing the diversity and variety in the field,"[55] and a "metaphorical stream" to which a variety of fields have contributed "as welcome tributaries into the steady and increasing flow of influence."[56] Environmental education has its genesis in the emerging thought, understanding, curiosity, and appreciation of human's interaction with the natural world. The central themes of environmental education can be traced as far back as Aristotle in his *Nicomachean Ethics*, "for the things we have to learn before we can do them, we learn by doing them."[57] His writings led to a budding interest in the relationship between humans and their environment as well as an interest in the education of humans[58]. In the Enlightenment period (1685-1815), many natural, political, and educational philosophers tilled the soil for future environmental education. Soon after, the seeds of environmental education were planted in the Transcendentalist Movement (1820s-30s), which quickly sprouted into the American Conservation Movement (1840s-1920s). Then, with rising concern for the conservation

[55] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. Stevens Point: University of Wisconsin, 2006, accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.
[56] Palmer, Joy. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise*. New York, NY: Routledge, 1998, 22.
[57] Ross, W. D. *Nicomachean Ethics, Book II*. The Internet Classics Archive: MIT, 2009, accessed March 27 2017 from http://classics.mit.edu/Aristotle/nicomachaen.2.ii.html
[58] Elfer, Charles Joseph. "Place-Based Education: A Review of Historical Precedents in Theory & Practice." Ph.D. diss., The University of Georgia, 2011, 33-36.

of animals, landscapes, and natural resources, these sprouted seedlings grew into a variety of outdoor studies throughout the early and mid-1900s. Finally, in the 1970s, the field of environmental education began to take form and branch out into a diverse set of educations eventually fruiting into education for sustainable development (ESD) in the 1990s and early 2000s[59,60].

2.2 - The Enlightenment (1685-1815): Setting the Stage.

The Enlightenment is characterized by revolutions in science, philosophy, society, and politics that helped spark the scientific revolution as well as many political and ethical theories that has shaped much of the world today. Among some of the most pertinent thinkers to environmental education were Jean-Jacques Rousseau (1712-1778), Alexander von Humboldt (1769-1859), and Friedrich Fröbel (1782-1852). These men all contributed to the shifting thought in man's relationship to the natural world as well as the implications of that relationship.

Rousseau wrote, *Emile, or On Education*, a piece on the nature of education and man in which he advocated for teachers to act as facilitators rather than instructors. He believed education should emphasize the surrounding environment and discussed human development and both their implications in learning. Rousseau writes:

> We are born sensitive and from our birth onwards we are affected in various ways by our environment…the real object of our study is man and

[59] Op cit.
[60] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. Stevens Point: University of Wisconsin, 2006, accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.

> his environment…We begin to learn when we begin to live; our education begins with ourselves.[61]

As soon as humans are born, they come in contact with a world apart from themselves; and, it is only through time and experience in that world that humans learn. Rousseau understood not only the fundamental connection between humans and their environment but also the relationship between the surrounding environment and the developing person as well as both of their implications in education.

Alexander von Humboldt, often called one of the founding fathers of Geography, wrote extensively on his travels throughout the world. One of his most famous works, *Voyage de Humboldt de Bonpland*, or *Voyage of Humboldt and Bonpland*, described accounts from his trip to South America with his friend and botanist Aimé Bonpland. In the 30 volumes, he explained his ideas about the diversity of organic life as it varied in differing climate conditions. While in South America, Humboldt climbed mount Chimborazo (around 19,000 feet) bringing numerous devices to measure rainfall, air pressure, temperature, and more. It was in this ascent up Chimborazo that Humboldt formulated the early basis for the field of biogeography as he noticed vegetation changes in relation to elevation. He went on to do experiments with magnetism, volcanoes, and isothermal maps and his lectures were received by thousands. Shortly before he died, Humboldt released his most famous work, *Kosmos*, which outlined his

[61] Rousseau, Jean-Jacques. *Emile, or Education*. Translated by Barbara Foxley, M.A. London & Toronto, ON: J.M. Dent and Sons, 1921; New York, NY: E.P. Dutton, 1921, 7-10, accessed March 2 2017, http://oll.libertyfund.org/titles/2256>.

ideas of the physical world and beyond[62]. Humboldt's experiences throughout the world greatly influenced his view on humans and the natural world. He writes:

> The earth is loaded with plants, and nothing impedes their free development. An immense layer of mold indicates the uninterrupted action of organic powers. The crocodiles and the boas are masters of the river; the jaguar, the peccary, the tapir, and the monkeys pass through the forest without fear and without danger…This aspect of animated nature, in which man is nothing, has something in it strange and sad.[63]

While Humboldt admires the "free" and "animated" state of the natural world, it also seems to sadden him in man's disjunction from the liveliness of nature. Humboldt's strange and sad feelings signify a discontent with human's separation from nature. Therefore, not only did Humboldt learn about the natural world through his experiences, he also noticed an odd disconnection between man and the world in which man lives.

In 1782, Friedrich Fröbel was born. In his early life, Fröbel learned through the knowledge of plants and natural phenomena while studying mathematics and language. He worked as a forester until finding his calling as an educator. As he grew older and the Romantic movement was in full swing, the spiritual and philosophical idea of "nature" began to culminate in his life with the works of Goethe and Schelling[64]. One author writes, "The study and investigation of nature now seems to be the foundation of all education…This is, indeed, just in the line of his own future work:

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[62] Keene, Ann T. *Earthkeepers: Observers and Protectors of Nature*. New York, NY: Oxford University Press, 1994, 40-44.
[63] Ibid, 41.
[64] Works by Goethe and Schelling include *On the World-Soul* and *The System of Transcendental Idealism* respectively. Snider, Denton J. *The Life of Frederick Froebel, Founder of the Kindergarden.* Chicago, IL: Sigma Publishing Co., 1900, 17-64, accessed March 2 2016, https://archive.org.

nature is the grand means of unfolding man into the knowledge of himself."[65] The author is referring to Fröbel's most famous work—the creation of Kindergarten or "garden of children". While the author is referring to nature as in innate forces at work pushing forward a particular process, he is also referring to being in nature and the natural world. Fröbel believes that children should be in their natural state—playing and singing—to learn as well as *in* nature. In 1816, Fröbel created his Kindergarten and as principal he let children be children. The author notes:

> no more punishment, no more bad boys, for punishment is what makes them bad, no discipline through order and the return of the deed upon the doer; a going back to nature, to the country, to the woods, and a handing over the child to himself, to his natural impulses and caprices; and this is his training to freedom.[66]

Not only did Fröbel believe young children should play and simply be kids without negative repercussions, he also believed they should be playing outdoors and in nature as well. It should be noted that Fröbel's philosophy of education is similar to Piaget's and Erikson's child development theories; he believed in play in the concrete world and the avoidance of punishment. Yet, Fröbel's Kindergarten today is nearly all indoors or sitting at a desk. Nevertheless, as the Kindergarten idea spread in the following decades, the Enlightenment came to a close with a similar movement across the Atlantic.

[65] Ibid, 121.
[66] Ibid, 144-145.

2.3 - Transcendentalist Movement (1820s-1840s): Awakening.

The Transcendentalist Movement was an American literary, political, and philosophical movement during the late 1820s with roots in Unitarianism, a liberal sect of Christianity that believed in "harmony, stability, rational thought, progressive morality, classical learning and other hallmarks of Enlightenment Christianity"[67]. In 1810, Unitarians gained a foothold in Harvard education where their liberal teachings eventually spurred the Transcendentalist Movement in which many young Unitarians, namely Henry David Thoreau and Ralph Waldo Emerson, longed for a more intense spiritual experience[68]. The author notes that Transcendentalism was not solely a result of Unitarian's teaching but it was also influenced by "English and German romanticism"[69] during the Enlightenment, meaning spirituality and thought was based primarily on sensory experience, instinct, and man's place in nature. However, transcendentalists believed humans had distinct "knowledge about themselves and the world around them that 'transcends'" or goes beyond their senses, that knowledge came through "intuition and imagination rather than logic or the senses…accept[ing] ideas not as religious beliefs but rather as a way of understanding life relationships."[70] Thus, while primary experience played a role in transcendentalism, spirituality was

[67] Finseth, Ian F. "American Transcendentalism" an excerpt from "Liquid Fire Within Me: Language, Self and Society in Transcendentalism and Early Evangelicalism, 1820-1860," M.A. thesis, University of Virginia, 1995, [3], accessed November 16 2016, http://thoreau.eserver.org/amertran.html.
[68] Ibid, [7-20].
[69] Ibid, [10].
[70] USHistory.org. "Transcendentalism, An American Philosophy." *U.S. History Online Textbook*, accessed November 12 2016, http://www.ushistory.org/us/26f.asp.

obtained through the transcendence of experience in the natural world. Therefore, nature was a large part of American Transcendentalism.

The Transcendentalist Movement was pioneered by Ralph Waldo Emerson (1802-1882) who wrote *Nature* in 1836, an essay that suggested humans can further understand reality through the study of human's relationship with nature. He writes:

> In the woods, we return to reason and faith. There I feel that nothing can befall me in life,—no disgrace, no calamity (leaving me my eyes), which nature cannot repair. Standing on the bare ground,—my head bathed by the blithe air and uplifted into infinite space,—all mean egotism vanishes. I become a transparent eyeball; I am nothing; I see all; the currents of the Universal Being circulate through me; I am part or parcel of God.[71]

Emerson believed there was a vital spiritual connection between humans and nature; he viewed it as a spiritual resource. Finseth writes, "experiencing nature was of critical importance because the natural world was the face and essence of God; becoming physically closer to nature, contemplating it, understanding it…brought man closer to his maker"[72] Although, the idea of nature being a bridge between the natural world and the divine is not new. Similar to Greek Christianity, one author writes, "the Greek saint contemplates…God had made nature, nature must reveal the divine mentality"[73] These similarities show that while Emerson and others used nature to connect with God, a

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[71] Emerson, Ralph. *Selections from Ralph Waldo Emerson,* edited by Stephen Whicher. Houghton Mifflin Company, 1960, 105. Quoted in Finseth, Ian F. "American Transcendentalism" an excerpt from "Liquid Fire Within Me: Language, Self and Society in Transcendentalism and Early Evangelicalism, 1820-1860," M.A. thesis, University of Virginia, 1995, [17], accessed November 14 2016, http://thoreau.eserver.org/amertran.html.

[72] Finseth, Ian F. "American Transcendentalism" an excerpt from "Liquid Fire Within Me: Language, Self and Society in Transcendentalism and Early Evangelicalism, 1820-1860," M.A. thesis, University of Virginia, 1995, [18], accessed November 14 2016, http://thoreau.eserver.org/amertran.html.

[73] White, Lynn. "The Historical Roots of Our Ecological Crisis" in *Environmental Ethics: What Really Matters, What Really Works.* 2nd ed., edited by David Schmidtz and Elizabeth Willott. New York, NY: Oxford University Press, 2012 9.

spiritual relationship with nature is not a new idea. As nature continues to present itself as an emerging multidimensional theme, Emerson, along with other literary figures, gave rise to a new genre of American literature—the "nature essay"—consisting of artistic, philosophical, biographical, and scientific pieces regarding the natural world; thus, the American Conservation Movement began[74].

2.4 - American Conservation Movement (1850s-1920s): Understanding.

The American Conservation Movement gained headway throughout the mid-eighteenth century and is characterized as growing out of "scientific and technological concerns…philosophical, ethical, and spiritual values…[and] aesthetic considerations."[75] As evidence grew concerning the impacts humans had on the natural world, efforts in managing those impacts to support human life were coming to the fore. As previously mentioned, while the natural world began to be redefined as a spiritual resource for many, others saw intrinsic beauty or recreational value in nature's diverse wildlife, vast wilderness, and physical landscapes, deeming it a necessity for a happy and healthy life.

Throughout the mid-1800s, Henry David Thoreau (1817-1862), a scholar and member of Emerson's Transcendentalist Club, gave speeches and wrote philosophical

[74] Library of Congress. "Documentary Chronology of Selected Events in the Development of the American Conservation Movement, 1847-1920." The Evolution of the Conservation Movement, 1850-1920, accessed November 14 2016, http://www.memory.loc.gov/ammem/amrvhtml/cnchron1.html.
[75] Library of Congress. "Preface: The Early Conservation Movement in Context." The Evolution of the Conservation Movement, 1850-1920, accessed November 14 2016, http://www.memory.loc.gov/ammem/amrvhtml/conspref.html.

pieces expressing his feelings towards nature, spirituality, education, and a growing technological society. Likely influenced by Enlightenment writings, Thoreau's philosophies in education, nature, and the human-environment relationship mirrored much of Rousseau's, Humboldt's, and Fröbel's. In 1837, Thoreau was dismissed from Harvard for refusing to whip his students and started an elementary school the subsequent year (supposedly inventing the 'field trip')[76]; like Fröbel, Thoreau believed in nature-based education and was against punishment. In 1851, he gave a speech to the Concord Lyceum stating, "in Wildness is the preservation of the World" [77] advocating not only for the preservation of forests and other natural landscapes but for humans to reconnect to the natural world and rekindle the roots of their humanity. Several years later, Thoreau took on an experience living in the woods outside of Concord, Massachusetts next to Walden Pond which culminated into his most well-known work—*Walden,* or *Life in the Woods*. In *Walden* lies his contempt for modern society's exemption from the natural world. He also critiques education's lack of experience-based learning:

> 'but,' says one, 'you do not mean that the students should go to work with their hands instead of their heads?' I do not mean that exactly, but I mean something which he might think a good deal like that; I mean that they should not *play* life, or *study* it merely…but earnestly live it from beginning to end. How could youths better learn to live than by at once trying the experiment of living? Methinks this would exercise their minds as much as mathematics [emphasis in the original].[78]

[76] Thoreau, Henry D. "Walden." In *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 1.
[77] Library of Congress. "Documentary Chronology of Selected Events in the Development of the American Conservation Movement, 1847-1920." The Evolution of the Conservation Movement, 1850-1920, accessed November 14 2016, http://www.memory.loc.gov/ammem/amrvhtml/cnchron1.html.
[78] Op cit, 17.

Thoreau's belief is similar to Fröbel and Rousseau in that education should primarily focus on experiences in the natural world, learning from 'natural impulses', and 'beginning to live'. Thoreau's philosophy of education is essentially the foundation of heuristic learning mentioned in the previous chapter[79]and this thesis; rather than children learning through a textbook teaching phenomena separate from their experience, they should learn through experiencing phenomena first-hand.

In 1847, George Perkins Marsh (1802-1882), a U.S. Congressman from Vermont, delivered a speech to the Agricultural Society of Rutland County, Vermont advocating for the conservation of forestry due to the environmental impacts of deforestation from human activity, or rather the "injudicious destruction of the woods"[80]. Ten years later, he published a *Report, Made under Authority of the Legislature of Vermont, on the Artificial Propagation of Fish*, outlining the possible effects deforestation, agricultural practices, and industries had on fish populations[81]. In 1864, as a fervent advocate for understanding and conserving natural resources, Marsh released his most famous work *Man and Nature; or Physical Geography as Modified by Human Action*, keenly criticizing human's exploitation of the natural world. He writes,

> But man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords. The proportions and accommodations which insured the stability of existing arrangements are

[79] See section 1.4 above.
[80] Library of Congress. "Address delivered before the Agricultural society of Rutland County, Sept. 30, 1947. By George P. Marsh..." The Evolution of the Conservation Movement, 1850-1920, accessed November 14 2016, http://www.memory.loc.gov/ammem/amrvhtml/cnchron1.html.
[81] Library of Congress. "Documentary Chronology of Selected Events in the Development of the American Conservation Movement, 1847-1920." The Evolution of the Conservation Movement, 1850-1920, accessed November 14 2016, http://www.memory.loc.gov/ammem/amrvhtml/cnchron1.html.

> overthrown. Indigenous vegetable and animal species are extirpated, and supplanted by others of foreign origin, spontaneous production is forbidden or restricted, and the face of the earth is either laid bare or covered with a new and reluctant growth of vegetable forms, and with alien tribes of animal life. These intentional changes and substitutions constitute, indeed, great revolutions; but vast as is their magnitude and importance, they are, as we shall see, insignificant in comparison with the contingent and unsought results which have flowed from them…The fact that, of all organic beings, man alone is to be regarded as essentially a destructive power, and that he wields energies to resists which, nature—that nature whom all material life and all organic substance obey—is wholly impotent, tends to prove that, *though living in physical nature, he is not of her* [emphasis added].[82]

Thus, even as we are witnessing similar and worse events today nearly a century and a half later, humans still fail to recognize the vital relationship between humans and the natural world and the holistic nature of life—humans continue to live apart from nature rather than a part of nature. Nonetheless, *Man and Nature* is considered to be "the fountainhead of the conservation movement"[83]; and Marsh, along with many writers, painters, and naturalists, helped spark new government regulations, departments, and agencies, new environmental organizations, and a new understanding of the natural world:[84]

- 1864 – Congress declares Yosemite Valley a California public park
- 1870s – Growing number of state-level attempts to conserve fish and game
- 1870 – "An Act to prevent the Extermination of Fur-Bearing Animals in Alaska"
- 1871 – "Joint Resolution for the Protection and Preservation of the Food Fishes of the Coast of the United States"

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[82] Marsh, George P. "Man and Nature" in *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 72.
[83] Ibid, 71.
[84] All bullets points are from the following source. Library of Congress. "Documentary Chronology of Selected Events in the Development of the American Conservation Movement, 1847-1920." The Evolution of the Conservation Movement, 1850-1920, accessed November 14, 2016, http://www.memory.loc.gov/ammem/amrvhtml/cnchron1.html.

- 1872 – "An Act to set apart a certain Tract of Land lying near the Head-waters of the Yellowstone river as a public Park"
- 1873 - Congress passed the "Timber Culture Act", offering 160 acres if trees were cultivated on a fourth of the land for 10 years.
- 1875 – American Forestry Association founded; and, Congress passed "An act to protect ornamental and other trees on Government reservations and on lands purchased by the United states, and for other purposes"
- 1877 – Congress passed the "Desert Land Act", offering 640 acres at $1.25 an acre if irrigated
- 1879 – Congress established the United States Geological Survey within the bureau of Interior Department to classify public lands
- 1881 – Department of Agriculture established to disseminate information and advice
- 1886 – Congress creates the Division of Economic Ornithology and Mammalogy
- 1887 – Boone and Crockett Club founded by George Bird Grinnell and Theodore Roosevelt advocating for sportsmen to be conservationists
- 1890 – Congress established Sequoia National Park, Yosemite National Park, and General Grant National Park
- 1891 – Congress repeals Timber Culture Act of 1873 and created the foundation for "forest reserves" later known as national forests
- 1892 – John Muir and other founded the Sierra Club
- 1893 – Historian Frederick Jackson Turner published "The Significance of the Frontier in American History" claiming that the American Frontier has closed
- 1894 - Congress passed the "National Park Protective Act" protecting birds and animals from hunting
- 1898 – Giffort Pinchot appointed head of Division of Forestry and begins campaign to convert public and private forests to support scientific management
- 1899 – Congress established Mount Rainier National Park, Washington
- 1901 – Theodore Roosevelt elected president and conservation is a cornerstone of his policies
- 1906 – National Association of Audubon Societies is established (renamed National Audubon Society in 1940)
- 1907 – Congress renames Forest Reserves "National Forests"
- 1900s – Congress passed numerous bills establishing countless national parks, monuments, and forests throughout Oregon, North and South Dakota, Colorado, Oklahoma, California, Arizona, Nebraska, Utah, Montana, Washington, Wyoming, New Mexico, Maine, Alaska, and Hawaii; and, multiple bills protecting migratory bird species

Hence, newfound knowledge and concern for the environment during the late 1800s and early 1900s led to the Nature Studies Movement.

2.5 - Nature Study Movement (early 1900s): Early Development.

Due to amassing knowledge of both humans and the environment during the late 1800s and early 1900s, a progressive education movement followed in which numerous educators became pioneers in various educational philosophies stressing nature-based and holistic approaches to education. In 1891, Wilbur Jackman (1855-1907) published *Nature Study for the Commons School* which aimed to guide teachers and schools wishing to teach Natural Science using nature-based experiential learning. His work is much like that of Rousseau, "life, in the final analysis the individual's own life, is the center of all study,"[85] in that one's own life is essentially the basis of all knowledge because knowledge can only be obtained through one's own operations and retentions of phenomena experienced. Jackman writes:

> The life, health, and happiness of the individual is dependent upon his knowledge of the things about him, and upon the understanding that he has of their relations to each other and to himself. This knowledge and apprehension of relations can only be acquired by actual personal contact and experience with the things and forces which make up and govern the universe.[86]

Jackman's philosophy on education, as Rousseau's, Fröbel's, and Thoreau's, is one in the same, emphasizing concrete experience in the natural world (Figure 2)[87].

[85] Jackman, Wilbur S. *Nature Study for the Commons Schools.* New York, NY: H. Holt & Co., 1894, iv.
[86] Ibid, 1.
[87] Wilbur, Jackman S. *Nature Study for the Commons Schools*. New York, NY: H. Holt & Co., 1894, iv.

In 1908, Liberty Hyde Bailey (1858-1954), an advocate for Nature Studies, established The American Nature Study Society to further promote its philosophy[88]. In the 1930s, issues with deforestation, improper agricultural techniques, and drought spurred the infamous "Dust Bowl" which led various state, federal, and private agencies to fund the Conservation Education Movement (1930s-1950s)[89]. Subsequently, John Dewey's progressive education movement was growing, advocating for more hands-on, child-centered, holistic approaches to education, greatly influencing environmental education philosophies today[90]. In one of his most well-known books *The School and Society*, he writes:

> From the standpoint of the child, the great waste in the school comes from his inability to utilize the experiences he gets outside the school in any complete and free way within the school itself; while, on the other hand, he is unable to apply in daily life what he is learning in school. That is the isolation of the school—its isolation from life. When the child gets into the schoolroom he has to put out of his mind a large part of the ideas, interests, and activities that predominate in his home and neighborhood. So the school, being unable to utilize this everyday experience, sets painfully to work, on another tack and by a variety of means, to arouse in the child an interest in school studies.[91]

Dewey believes that if children are unable to connect life and school experiences, then they lose interest in school. As with Rousseau's, Fröbel's, Thoreau's, and Jackman's

[88] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. Stevens Point: University of Wisconsin, 2006, accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.
[89] Ibid.
[90] Ibid.
[91] Dewey, John. *The School and Society*. Chicago, IL: The University of Chicago, 1899, 67, accessed December 8 2016, https://www.archive.org.

philosophies on education, Dewey too advocated for experience-based, student-centered learning in the hopes of fostering an eagerness to learn.

2.6 - The Rise of Environmentalism (1950s- early 1970s): Impetus of Environmental Education.

The 1950s and 60s marked the beginnings of the American Environmental Movement. Similar to the Conservation Movement, the Environmental Movement developed out of "a growing concern that economic growth, development consumerism and related lifestyle demands were undermining the ecological balance, economic stability and security of the planet."[92] In 1948, over a dozen people died and hundreds fell sick in Donora, Pennsylvania as industry released sulphur oxide and other toxicants which culminated into a deadly air inversion[93]. In 1949, Aldo Leopold published *A Sand County Almanac*, calling for a "land" ethic in which "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise,"[94] meaning a decision that has an effect on the biotic community is ethical only when it takes into consideration the effects that decision will have on the biotic community. His land ethic was meant to extend human ethics to encompass ecological systems, "soils, waters, plants, and animals, or collectively: the land"[95] in

[92] Blewitt, John. *Understanding Sustainable Development.* 2nd ed. New York, NY: Routledge, 2015, 7.
[93] Roueche, Berton. "The Fog." in *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 295-312.
[94] Callicot, J. Beard. "Beyond the Land Ethic." in *Reflecting On Nature: Readings in Environmental Ethics and Philosophy* 2nd ed. Lori Gruen, Dale Jamieson, and Christopher Schlottmann. New York, NY: Oxford University Press, 83-84.
[95] Leopold, Aldo. "A Sand County Almanac," in *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 278.

which humans and ecological systems are both members of the same ethical community; thus, in human's sharing ethics with the land, humans have a responsibility to respect the land. Leopold writes:

> We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect…That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics.[96]

He believed that humans harmed the land because they act as if they are apart from the land rather than a part of the land. Therefore, if humans are to solve environmental issues, then they must reconnect to the land and act as if they are a member of the biotic community. While it was published in 1949, *A Sand County Almanac* was rediscovered in the 1960s becoming one of the defining texts for the emerging environmental movement[97].

Another major text of the 1960s was Rachel Carson's *Silent Spring* in which she warned of the dangers of dichlorodiphenyltrichloroethane (DDT). During World War II, DDT was used as an insecticide for food production but came into common use after the war as people used it in their houses and gardens[98]. However, DDT was a bioaccumulator, meaning the chemical multiplied in concentration as it moved through biotic trophic levels, "[finding] its way into rivers, where it was absorbed by plants that were eaten by fish. Fish were then eaten by humans, and residues of the poison were

[96] Keene, Ann T. *Earthkeepers: Observers and Protectors of Nature*. New York, NY: Oxford University Press, 1994, 153.
[97] Ibid, 154.
[98] Ibid, 177.

now being found in the fatty tissues of the entire population."[99] *Silent Spring* was named so because of the decline in songbirds from the effects of DDT causing their eggs not to hatch. As a result, the U.S. banned the chemical and helped save the national symbol - the bald eagle[100].

In 1966, economist Kenneth Boulding published "The Economics of the Coming Spaceship Earth" describing Earth as a spaceship with limited resources where "man must find his place in a cyclical ecological system."[101] The essay argued that humans must live within their ecological imperatives: limited and recycled nonrenewable resources and renewable resources so far in that they are conserved for sustainable use. His 'spaceship Earth' idea was then reinforced two years later with *Earthrise*, a picture taken from the Apollo Eight spacecraft of Earth as seen from the moon (Figure 3)[102,103]. Thus, as humans began to recognize their impacts and place on Earth, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) held a Biosphere Conference in which they called for the "development of curriculum materials relation to the studying the environment…and the stimulation of global awareness of environmental problems."[104]

[99] Ibid, 178.
[100] Carson, Rachel. "Silent Spring." in *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 365-376.
[101] Boulding, Kenneth E. "Economics of the Coming Spaceship Earth." in *American Earth: Environmental Writing Since Thoreau*, edited by Bill McKibben. New York, NY: Literary Classics of the U.S. Inc., 2008, 399-404.
[102] Blewitt, John. *Understanding Sustainable Development*. 2nd ed. New York, NY: Routledge, 2015, 7.
[103] NASA. Accessed from https://www.nasa.gov/multimedia/imagegallery/image_feature_1249.html.
[104] Palmer, Joy A. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise.* New York, NY: Routledge, 1998, 5

2.7 - Development of Modern Environmental Education (1960s-2000s): Structure and Defining.

After the Biosphere Conference in 1968, the International Union for the Conservation of Nature and Natural Resources (IUCN or the World Conservation Union) reported that the conference was the first global recognition in the need for environmental education. As a result, The National Environmental Policy Act of 1969 was passed with the purpose to:

> encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation.[105]

The following year, the National Environmental Education Act was passed in the U.S. and IUCN and UNESCO held the International Working Meeting on Environmental Education in the School Curriculum and delegates agreed on the first definition of environmental education:

> Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitude necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality.[106]

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[105] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. Stevens Point: University of Wisconsin, 2006, accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.

[106] IUCN. *International Working Meeting on Environmental Education in the School Curriculum Final Report.* Switzerland: UNESCO, 1970, 11.

In the following years, the IUCN organized conferences around the world to promote this definition. As awareness for the need of environmental education spread, organizations began to form their own definitions and guidelines. In 1974, the Scottish Department of Education released a report outlining recommendations of environmental education:

> 1a Both formal and informal education should use the local and distant environments to provide knowledge, training in appropriate skills, and first hand experiences;
>
> b pupils and young people should be introduced to environmental concepts and values, given practice in decision-making and afforded opportunities for personal involvement;
>
> c pupils and young people should be trained to assess critically the many views being expressed today on current environmental issues;
>
> 2a environmental education should permeate the whole curriculum both inside and outside the school;
>
> b every school should have adequate arrangements for planning and implementing a programme of environmental education;
>
> c to make environmental education a separate subject is neither desirable nor possible;
>
> d the programme of environmental education begun in primary school and pursued into secondary school should continue into informal education and later life; and
>
> e efforts should be made to co-ordinate the total programme of environmental education.[107]

[107] Palmer, Joy A. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise.* New York, NY: Routledge, 1998, 9.

These recommendations greatly reflect the ideas and philosophies of previous sections: local-based education, first-hand experiences, nature and environment based experiences, student-centered learning, and holistic education for the whole individual. Many strategies of environmental education were characterized as 'in' 'about' and 'for' the environment—"as a medium for education…as a subject for investigation…[and] the conservation and improvement as a goal of education."[108] In 1975, *The Belgrade Charter: A Framework for Environmental Education* was published, setting the goal of environmental education:

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solution to current problems, and the prevention of new ones.[109]

The objectives of environmental education were listed as: (1) awareness, (2) knowledge, (3) attitude, (4) skills, (5) evaluation ability, and (6) participation[110]. These six objectives were then transformed into the Tbilisi goals of environmental education:

> (a) to foster clear awareness of, and concern about, economic, social, political, and ecological inter-dependence in urban and rural areas;
>
> (b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
>
> (3) to create new patterns of behavior of individuals, groups, and society as a whole towards the environment.[111]

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[108] Ibid, 9-10.
[109] UNESCO. *The International Workshop on Environmental Education Final Report*. Belgrade: UNESCO/UNEP, 1975, 3.
[110] Ibid, 3-4.
[111] UNESCO. *The International Workshop on Environmental Education Final Report*. Tbilisi: UNESCO, 1977, 26.

Thus, as emphasis on awareness, attitudes, and values about the environment grew, the idea of sustainable development emerged.

In 1980, the IUCN published *World Conservation Strategy* advocating for sustainable development which meant finding a balance between conserving limited resources, improving human life for all, and improving a deteriorating environment[112]. Then in 1987, *Our Common Future* was published stressing the importance of environment education (and providing a definition of sustainable development):

> In the long run, nothing significant will happen to reduce local and international threats to the environment unless widespread public awareness is aroused concerning the essential links between environmental quality and the continued satisfaction of human needs. Human action depends upon motivation, which depends upon widespread understanding. This is why we feel it is so important that everyone becomes environmentally conscious through proper environmental education[113]

Hence, sustainable development and environmental education relied on motivation and understanding of environmental issues.

In 1990, U.S. Congress passed the National Environmental Education Act authorizing an Office of Environmental Education under the Environmental Protection Agency's jurisdiction[114]. In 1991, *Caring for the Earth: A Strategy for Sustainable Living* was launched placing education towards sustainability as the central aim of environmental

[112] Blewitt, John. *Understanding Sustainable Development.* 2nd ed. New York, NY: Routledge, 2015, 8.
[113] Palmer, Joy A. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise.* New York, NY: Routledge, 1998, 15.
[114] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. Stevens Point: University of Wisconsin, 2006, accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.

education[115]. The next year, the UN held the Earth Summit in Rio de Janeiro and was attended by over 120 over countries which produced numerous agreements such as: *Agenda 21*, *The Climate Change Convention*, *The Biodiversity Convention*, and *Forest Principles*— encouraging solutions for environmental issues of sustainability, climate change, biodiversity loss, and deforestation respectively[116]. In 1994, the United States' President's Council on Sustainable Development held the National Forum on Partnerships Supporting Education about the Environment in San Francisco, California which produced *Education for Sustainability: An Agenda for Action*, a document used to direct the U.S. on the path to sustainable development[117]. Then in 1995, the North American Association for Environmental Education (NAAEE) established the Environmental Education and Training Partnership (EETAP)[118]. In 1996, the George C. Marshall Institute's Independent Commission on Environmental Education released the report *Are We Building Environmental Literacy?* which provided a list of recommendations to strengthen environmental education in the U.S.[119]. The same year, the U.S. EPA's National Environmental Education Advisory Council also released the report *Assessing Environmental Education in the United States and the Implementation of the National Environmental Education Act of 1990* which advocated for greater flexibility

[115] Tilbury, Daniella. "Environmental Education for Sustainability: defining the new focus of environmental education in the 1990s." *Environmental Education Research* 1, no. 2 (1995): 195-212.
[116] Palmer, Joy A. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise.* New York, NY: Routledge, 1998, 18.
[117] McCrea, Edward J. "The Roots of Environmental Education: How the Past Supports the Future." Environmental Education and Training Partnership. (Stevens Point: University of Wisconsin, 2006), accessed March 2 2016, http://files.eric.ed.gov/fulltext/ED491084.pdf.
[118] Ibid.
[119] Ibid.

within its confines[120]. The NAAEE and EETAP's National Project for Excellence in Environmental Education also produced *Environmental Education Materials: Guidelines for Excellence* which set the guidelines "of recommendations for developing and selecting environmental education materials"[121]. In 1997, the Public Linkage, Dialogue, and Education Task Force of the President's Council on Sustainable Development published a report *From Classroom to Community and Beyond: Educating for a Sustainable Future*[122].

Then in 1998, a breakthrough report by Gerald Lieberman and Linda Hoody *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning* proved what hundreds of years of educational philosophers said—humans learn through their surrounding environment. The report states, "using the Environment as an Integrating Context (EIC) for learning defines a framework for education: a framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning."[123] The report's findings concluded that the EIC programs showed better performance on standardized testing in reading, writing, math, science, and social studies; it reduced classroom disruptions and increased engagement and enthusiasm for learning; and, students took greater pride in their accomplishments[124]. The study also reported, "EIC students gain…a comprehensive understanding of the

[120] Ibid.
[121] Ibid.
[122] Ibid.
[123] Lieberman, Gerald A. & Hoody, Linda L. *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning Executive Report*. San Diego, CA: State Education and Environment Roundtable, 1998, 1.
[124] Ibid.

world; advanced thinking skills leading to discovery and real-world problem-solving; and, awareness and appreciation of the diversity of viewpoints within a democratic society."[125] Thus, using the surrounding community as a context for learning allows children to incorporate the natural world into learning, improves core subject knowledge, and gives them the real-life critical thinking skills needed to comprehend issues with sustainable development. In 2013, Harvard Education Press published *Education and the Environment: Creating Standards-Based Education in Schools and Districts* by Lieberman which provided a large summary regarding the positive benefits of environment-based education (EBE) programs from numerous studies[126]. Briefly, here are a few:

- English Language Arts: 98% of standardized test scores indicated that students in the EBE programs performed as well or better than students in traditional programs (n = 240 grade-level student assessment comparisons in four pairs of California school with a total of 3,720 students)[127]

- Mathematics: 92% of standardized test scores indicated that students in the EBE programs performed as well or better than students in traditional programs (n = 80 grade-level student assessment comparison in four pairs of California schools with a total of 3,720 students)[128]

- Science: 75% of standardized test scores indicated that students in the EBE programs performed as well or better than students in traditional programs (n = 4 grade-level student assessment comparison in three schools in three states)[129]

- History/Social Science: 73% of standardized test scores indicated that students in the EBE programs performed as well or better than students in traditional

[125] Ibid, 1.
[126] Lieberman, Gerald A. *Education and the Environment: Creating Standards-Based Programs in Schools and Districts*. Cambridge, MA: Harvard Education Press, 2013.
[127] Ibid, 211.
[128] Ibid, 214.
[129] Ibid, 215.

programs (n = 11 grade-level student assessments comparisons in eight pairs of California schools)[130]

- Critical Thinking: 96% of teachers reported that their students were more proficient in critical thinking as a result of implementing their Environment as an Integrating Context (EIC) model (n = 167 teachers in forty schools in thirteen states)[131]. 97% of teachers reported that their students were more proficient in solving problems and thinking strategically as a result of implementing their EIC Model program (n = 167 teachers in forty schools in thirteen states)[132]

2.8 - Brief Modern Overview: Branches of Environmental Education.

Nature studies, rural studies, fieldwork, environmental studies, outdoor education, and adventure education were hands-on, 'in' the environment approaches to education. While fieldwork and the various environmental studies educations put emphasis on scientific methods such as problem-solving, observations, and measurements of empirical data, outdoor and adventure education techniques provided activities such as canoeing, mountain-walking, and climbing in order to encourage appreciation for the environment[133].

Urban studies, urban ecology, and heritage education promoted the understanding of the surrounding urban environment. These educations focused on the interaction between the social, physical, and natural characteristics of the urban environment. Urban studies encouraged the improvement of the surrounding urban

[130] Ibid, 217.
[131] Ibid, 218.
[132] Ibid, 218.
[133] Palmer, Joy A. *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise.* New York, NY: Routledge, 1998, 28-30.

environment through working with various professionals such as architects, planners, and local government officials[134].

Development education, peace education, and human rights education focused on the understanding of social, political, and economic complexities faced by developing countries. Global education then formed out of a combination of these educations in an attempt to lump them under one inclusive education. Earth education combined the constituents of global education and various environmental educations in order to "break down barriers in the natural world, encourage an understanding of how ecosystems work, and develop positive caring attitudes to the Earth"[135]. Humane education then broadened Earth education to "provide the basis for responsible planetary citizenship" and focused on human treatment of all living things in order to stray away from anthropocentric attitudes. Futures education used peoples' ideas of the future to influence the way they act in the present in an attempt to engage them in environmental education. Then, education for sustainable development essentially amalgamated all the previous ideas of environmental education, future education, and human rights education into one to support the growing idea of sustainability and its importance[136].

2.9 - Place-Based Education (early 2000s): A Retro Development in Education.

[134] Ibid.
[135] Ibid.
[136] Ibid.

In 2002, several New England foundations and educational organizations formed the Place-based Education Evaluation Collaborative (PEEC) with their mission to evaluate place-based education (PBE) programs and serve as a resource for PBE program developers to lay the groundwork for the future of place-based education. In his book titled, *Place-Based Education: Connecting Classroom and Community*, David Sobel describes the "place-based" educational philosophy as:

> the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school.[137]

While researching, I discovered David Sobel has been an early defining figure of the place-based education movement. In his first book, written in 1993, *Children's Special Places: Exploring the Role of Forts, Dens, and Bush Houses in Middle Childhood*, Sobel examines the places special to children and where they spent their free time playing to develop a better understanding of child development[138]. For the studies performed, Sobel wanted to use children's geographic interests as a basis for curriculum development and evaluation in order for "the building block of the foundation upon which geography, environmental education, and social studies curricula could be

[137] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013, 11.
[138] Sobel, David. *Children's Special Places: Exploring the Role of Forts, Dens, and Bush Houses in Middle Childhood.* Tucson, AZ: Zephyr Press, 1993.

built."[139] Sobel conducted studies in England and Carriacou using a 'map-and-interview' technique asking children to draw a map of their neighborhood, or the area around their house where they spent their free time, with the only stipulation being that the map had to include the child's house. Sobel noticed differences in the maps corresponded with age[140]. While using Joseph Pearce's Matrixes of Human Development to framework his idea, he attributes to Piaget, Erikson, Jung, other psychologists, and even the Catholic Church to outline his personal sense of child development change occurring around the ages six and seven[141]. Sobel strongly emphasizes fostering a sense of place by allowing children to explore and play in the natural world. He writes, "If we allow children to shape their own small worlds in childhood, then they will grow up knowing and feeling that they can participate in shaping the big world tomorrow."[142] Later, in 1996, Sobel reinforces these ideas suggesting three stages for the future of environmental education which emphasized the relationship between a child's development and their growing understanding of the natural world: fostering a sense of empathy for the natural world around ages four to seven, exploring the surrounding landscape around ages eight to eleven, and becoming an actively involved citizen within the community around ages twelve to fifteen and beyond[143].

[139] Ibid, 7.
[140] Ibid, 19-37.
[141] Ibid.
[142] Ibid, 161.
[143] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013, 14-15.

Thus, as extensively outlined throughout this literature review, the damaging impacts resulting from a detached human-environment relationship and environmental education's central theme of nature-based, student-centered, holistic, and experiential education nurturing the development of the whole individual have been reiterated throughout history. Yet, as these reoccurring themes persist, it is imperative that humans become a part of the natural world and reconnect with nature to lessen the damaging impacts; and in doing so, humans will not only experience a happier and healthier development, but they will foster in themselves a sense of place and environmental stewardship, and better comprehend the complexities of sustainable development. Children must spend less time in classrooms learning about the outside environment and more time out of classrooms learning within the environment.

Chapter Three: Thesis and Research Questions

The thesis of this paper is to evaluate the feasibility of incorporating place-based environmental education as a component to the current educational framework for the state of Mississippi using Piaget's and Erikson's child development theories from ages five to eleven (K-5). The questions of my research were:

1. What are the characteristics of Jean Piaget's and Erik Erikson's developmental theories adhering to ages five to eleven?

2. What are the MDE curriculum standards from Kindergarten to 5th grade (ages five to eleven) for Science and Social Studies?

3. As a proof of concept, are the activities presented in *Think Green: Take Action*, a good fit into the MDE curriculum standards?

Chapter Four: Methodology

4.1 - What are the characteristics of Jean Piaget's and Erik Erikson's developmental theories adhering to ages five to eleven?

Step 1: After reading *The Best Schools: How Human Development Research Should Inform Educational Practice* and *Essentials of Life-Span Development*, I studied the key characteristics of Piaget's cognitive development theory and Erikson's psychosocial development theory from ages five to eleven to find metrics to measure educational activities. These books provided insight into the prevailing characteristics of Piaget's and Erikson's developmental theories and offered types of educational practices that reinforce their theories:

- **Piaget's Preoperational Stage** (ages 5 to 7) is characterized by the lack of logical operations and the Intuitive Thought Substage (ITS). The preoperational stage is best reinforced and nurtured by games (G), songs, stories, and free-play.
- **Piaget's Concrete Operational Stage** (ages 7 to 11) is characterized by concrete operational thinking, seriation—the ability to arrange numbers in a logical sequence (S), and transitivity—the ability to understand relationships (T). The Concrete Operational Stage is best reinforced and nurtured by activities that entail real-world, concrete examples (C).
- **Erikson's Initiative vs Guilt Stage** (ages 5 to 7) is characterized by whether a child feels encouragement and comfort vs guilt and shame when performing or failing a task, skill, or activity. The Initiative vs Guilt Stage is best reinforced and nurtured through play (P) and by giving encouragement and comfort to a child when they are performing or failing a task, skill, or activity (I).
- **Erikson's Industry vs Inferiority Stage** is characterized by a child's eagerness and excitement to learn, "discover, invent, create, and explore," vs a child's lack

of motivation or curiosity to learn[144]. The Industry vs Inferiority Stage is best reinforced and nurtured through the encouragement to learn, build, create, discover, and explore (ECS) rather than given facts to learn and/or repeat[145].

Step 2: After gaining understanding of the criterion of Piaget's and Erikson's theories, I constructed a chart with capabilities expected in each theory and types of educational practices that reinforce those theories which are hereafter named developmental metrics or metrics. As seen in Figure 4, the upper-most row of the chart lists Piaget's and Erikson's developmental stages and the metrics chosen. The following row lists the grades and corresponding ages to which the developmental stages occur. The left-most column of the chart lists the activities from *Think Green, Take Action*:

- Outside/Secret Spot/Nature Journals
- Cycle Games
- Fox/Rabbit/Grass Game
- Animal Adaptation Research
- Bird Watching
- Counting Plants
- Bioaccumulation Game
- Overconsumption (Fish Game)
- Green Space Survey
- Watching the School's Wild Animals
- Success Stories
- Local Endangered Species Research Project/Protection Poster
- Design a Zoo
- Mining Chocolate Chips/How Much Do We Take?
- How Many Trees Does It Take to Build a House?
- How Much Is Left Over?
- Who Needs Soil?
- Racing for Soil Game
- Erosion, Weathering, and Soil

[144] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006, 94-102.
[145] Ibid.

- Food Waste
- Energy Audit
- Saving Resources: Design Challenges
- Solar Power Experiments
- Understanding Pollution: Wonderful Water
- Making Oxygen
- Making Carbon Dioxide
- Electrical Generation
- Watershed History Lesson
- Oil Spills
- Acid Rain Game
- Pollution Indicators
- Water Detectives
- Water Testing
- Indicator Species
- Model Sewage Treatment
- Making Greenhouses
- Climate VS Weather

The following rows and columns are metrics of the development theories as they correspond to the activities in the left-most column. The right-most column are considerations to be taken into account due to the nature of the activity as it relates to developmental theories (i.e. may require reading, writing, and math or may contain or relate to an environmental issue). (Figure 4)

4.2 - What is the current Mississippi Department of Education curriculum standards from Kindergarten to 5th Grade in Science and Social studies?

Step 1: I obtained the *2010 Mississippi Science Framework* and *2011 Mississippi Social Studies Framework* from the MDE website (www.mde.k12.ms.us/ESE).

Step 2: From the *2010 Mississippi Science Framework,* I pulled the learning objectives from each content strand from K-5 in "Inquiry" "Life Science" "Physical Science" and "Earth

and Space Science" (See Appendix A). From the *2011 Mississippi Social Studies Framework*, I pulled the learning objectives from each content strand from K-5 in "Domestic Affairs" "Global Affairs" "Civil Rights/Human Rights" "Economics" and "Culture" (See Appendix B).

Step 3: From the frameworks, I constructed a chart for both Science and Social Studies (Figure 5 and 6 respectively). The upper-most row of the charts lists the "Kindergarten" "1st Grade" "2nd Grade" "3rd Grade" "4th Grade" and "5th Grade" columns. The far-left column lists the 37 activities from *Think Green, Take Action*. The rows beneath the Grade columns are the content strands with learning objectives met by the activities in the far-left, adjacent *Think Green, Take Action* activities column.

4.3 - Of the activities presented in Think Green: Take Action, which exercises best fit the MDE curriculum standards?

Step 1: Using the activities in *Think Green, Take Action*, I read through each activity and evaluated it for feasibility of use in the curriculum objectives and how well it met the developmental metrics for Piaget and Erikson. For example:

The "Outside/Secret Spot/Nature Journals" activity involves immersing a child in the natural world and asks them to quietly observe their surroundings using their senses. The activity asks that a child or a classroom find a "Secret Spot"—a spot where a child can sit and observe the natural world on a relatively daily basis such as the back, front, or side yard, a park, or nearby nature reserve—and sit in silence focusing on what their senses reveal about their natural surroundings, asking themselves what can I see,

hear, feel, or smell? Maybe a bird chirping, a bug crawling on a nearby tree root, or the sound, feeling, and features of nearby grass and trees as the wind blows past. The teacher can also ask the children about the observations they made during the activity. The activity can involve nature sketches of their secret spot like blind contour drawing, memory drawing, gesture drawing, or free sketching and map drawing of their secret spot, such as sound maps, animal and plant maps, and wonder maps. The activity may vary depending on the age and older children can make nature journals. Nature journals should include the date, location, time, and details about the weather. The journals should record observations made and include some questions the child has regarding their observations. The nature journals can become more advanced as the child gets older and culminate into a "Ultimate Nature Entry Project" which includes all the above activities as well as answering specific questions asked by the teacher such as "What evidence of food chains do you observe?" "What interrelationships do you observe?" or "Are there any examples of symbiosis in your area?".

In Appendix A, this activity *could* meet the following objectives for Kindergarten: 1. a, b, c, d, e, and f; 2. a, b, and c; 3. a, b, c, d and e; and 4. a, b, c, d, e, f. For Inquiry, objective "a" could be met because the activity asks that children provide a question for the teacher. The activity asks that the children interpret their surrounding environment using their senses and record their observations; thus, a teacher could ask a student to describe the similarities and differences of phenomena based on size, shape, color, and texture or by asking the above question "What interrelationships do you observe?" to meet objective "b". The activity asks that they make maps or record weather conditions

which could meet objective "c" by using a ruler or thermometer. Objective "c" could also be met by a teacher asking simple questions such as "What could we use to measure how hot or cold it is outside today?" or "What could we use to see this bug up close?" which would incorporate a thermometer or hand lens into the activity. Objective "d" could be met by a teacher pointing out that the questions the children ask are ways to "recognize that people have always had questions about their world" and that through inquiry and observation, "science [is] one way of answering questions and explaining the natural world." Objective "e" could be met by children answering questions a teacher asks or through sketches and objective "d" could be met by the teacher asking the children "Do you notice any similarities between the secret spot this week and last week?"

For Physical Science, objective "a" could be met through the teacher asking questions about the characteristics various objects around the secret spot. Objective "b" could be met by a child or a teacher leaving two containers in the secret spot, one open and one closed. Objective "c" could be met by the teacher asking questions about the motions of the observable phenomena near the secret spot, perhaps a bird, an ant, or a car. However, objective "d" could not be met unless a magnet was brought into the secret spot and used to observe the interaction between the magnet and phenomena in the secret spot.

For Life Science, objective "a" could be met by the teacher asking the students questions about the similarities in observed plants and animals near the secret spot. Objective "b" could be met by the teacher asking the students questions about the

senses they use during the secret spot activity and the characteristics of those senses and the body parts that use them. Objective "c" could be met in a similar fashion that objective "b" could be met. Objective "d" could be met by a teacher asking the students the relationship to their parents, or by observing the similarities between observed critters in or near the secret spot. Objective "e" could be met by the teacher explaining the difference in living and non-living things and by asking the students what is living and non-living in or near the secret spot.

For Earth and Space Science, objective "a" could be met by the teacher asking the students to describe and/or "sort, separate, and classify" the earth materials in or near the secret spot. Objective "b" could be met by the teacher asking the students to describe characteristics and properties of various observable phenomena in or near the secret spot. While a Kindergartener is unable to fully read and write, objective "c" could be met by the class as a whole collecting and displaying weather data from each day in the secret spot. Objective "d" could be met by the teacher explaining observable phenomena in or near the secret spot, such as a tree or plant that conserves water, or by explaining an observed sprinkler in or near the secret spot. Objective "e" could be met by a teacher first explaining the effects the sun has on living and non-living things, then understood by observing first-hand the warmth of the sun and its effects it has on plants in or near the secret spot. The objective could also be met by the teacher asking the students what effects the sun has on certain observable phenomena in or near the secret spot. Objective "f" could be met by children simply observing the changes in

shadows of phenomena in or near the secret spot and by experiencing, through their senses, the sun as an object of light and heat.

As seen above, many of the objectives are met by facilitation of the teacher. A teacher's primary responsibility is to be a facilitator and to ease the connections between concepts, learning objectives, and the real-world. However, easing the connections does not mean to simply give a student an answer; rather, being a facilitator means to help the student make the connection for themselves. Thus, many of the objectives met using activities from *Think Green, Take Action* were met using the idea of a teacher being a facilitator, meaning some objectives could have been met through a teacher's simple explanation of something or by additional questions asked to students. Therefore, it is the primary responsibility of the teacher to facilitate the connections between the activities in this thesis and the objectives in the Mississippi Science and Social Studies Frameworks.

Step 2: After creating the aforementioned charts (Figure 5 and 6), I created another chart calculating percentages by dividing the number of objectives met by the total possible number of objectives in each content strand and grade for the Science and Social Studies frameworks (Figure 7).

Step 3: After calculating the objectives an activity met in each content strand for each grade for Science and Social Studies, I constructed multiple charts to depict possible best practices. In two charts (Science and Social Studies), activities were placed in columns of descending order from most to least overall objectives met for K-5 (Figure 8 and 9).

In two other charts (Science and Social Studies, Figure 10 and 11 respectively), activities scoring 50% or higher were listed in descending order from most to least objectives met. The upper-most row (apart from the Legend) of the charts listed the grades; the second row listed the content strands; and the following rows listed the activities from most to least objectives met. The activities were organized in descending order from most to least objectives met using four colors: Dark Green (all objectives met), Light Green (all but 1 objective met), Yellow (all but 2 objectives met), and Dark Yellow (all but 3 objectives met). The activities were then given one or two asterisks denoting their age appropriateness: 1 asterisk (*) denoted "May not be age appropriate" and 2 asterisks (**) denoted "Environmental tragedy until the fourth grade" The age-appropriateness was decided using the "Considerations" metric from the developmental theories chart (4.1 or Figure 4). The "Environmental tragedy until the fourth grade" metric was decided by David Sobel's maxim, "No [environmental] tragedies before the fourth grade."[146] (Figure 10 and 11).

[146] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013, 33.

Chapter Five: Results

5.1 - Piaget's and Erikson's Development Metrics Chart

In Figure 4, the title reads "Piaget's and Erikson's Development Metrics." In the figure, the 37 activities from *Think Green, Take Action* are listed in the left-most column of the chart. The upper-most row of the chart lists the "Piaget's Preoperational Stage: Intuitive Thought Substage (ITS) and Games (G)" "Piaget's Concrete Operational Stage: Concrete (C), Seriation (S), and Transivity (T)" "Erikson's Initiative VS Guilt: Initiative/Exploration (I) and Play (P)" "Erikson's Industry VS Inferiority Stage: Encouragement in Creating or Solving (ECS)" columns with corresponding grades and age groups beneath them. The metrics used for Piaget's and Erikson's development stages are listed in their respective columns. Piaget's Preoperational stage contains ITS and G ranging from Kindergarten (age 5 to 6) to 1st Grade (age 6 to 7), while his Operational stage contains C, S, and T ranging from 2nd Grade (age 7 to 8) to 5th Grade (age 10 to 11); and, Erikson's Initiative VS Guilt stage contains I and P ranging from Kindergarten (age 5 to 6) to 1st Grade (age 6 to 7), while his Industry VS Inferiority stage contains ECS ranging from 2nd Grade (age 7 to 8) to 5th Grade (age 10 to 11). The right-most column is the "Considerations" column listing considerations to be taken into account when using an activity. Possible considerations are: Outdoors, *May* require reading/writing skills, Requires reading/writing skills, Requires math skills, Environmental issue, Drawing, Creativity, Requires adult supervision, or Related to Environmental issue. The chart is read from left to right— using 'X' activity in the left-

most column, one can see which metrics 'X' activity meets in each developmental stage and which considerations should be taken into account if using 'X' activity.

5.2 - 2010 Mississippi Science Framework: Content Strands and Objectives and 2011 Mississippi Social Studies Framework: Content Strands and Objectives Charts

In Figure 5 and 6, the titles read "2010 Mississippi Science Framework: Content Strands and Objectives [1. Inquiry] [2. Physical Science] [3. Life Science] [4. Earth and Space Science]" and "2011 Mississippi Social Studies Framework: Content Strands and Objectives [1. Domestic Affairs] [2. Global/International Affairs] [3. Civil Rights/Human Rights] [4. Economics] [5. Culture]" respectively. In each Figure, the 37 activities from *Think Green, Take Action* are listed in the left-most column of the chart. The upper-most row of the chart lists the "Kindergarten" "1st Grade" "2nd Grade" "3rd Grade" "4th Grade" and "5th Grade" columns. Beneath each column are the content strands with the letter objectives met by the adjacent activity. Each content strand number and objective letter correspond to the content strands and objectives found in the Science or Social Studies Frameworks (Appendix A and B). The chart is read from left to right—using 'X' activity in the left-most column, one can see which letter objectives 'X' activity meets in each content strand for each grade.

5.3 – Numbered Results from 2010 Mississippi Science Framework and 2011 Mississippi Social Studies Framework

In Figure 7, the 37 activities from *Think Green, Take Action* are listed in the left-most column of the chart. The upper-most row of the chart lists the "Kindergarten" "1st Grade" "2nd Grade" "3rd Grade" "4th Grade" and "5th Grade" columns with "Science" "Social Studies" and "Total" columns beneath each grade column. Beneath the "Science" and "Social Studies" columns are the content strands with the number of objectives met divided by the total number of objectives (given a percentage). Beneath the "Total" columns are the sums of objectives met from all content strands divided by the total number of objectives from all content strands (given a percentage). The numbers of objectives in each content strand met correspond to the letter objectives and content strands in Figure 5 and 6. The total number of objectives possible correspond to the objectives listed in the Science and Social Studies Frameworks (Appendix A and B). The chart reads from left to right—using 'X' activity in the left-most column, one can see the number of objectives 'X' activity meets in each content strand for each grade and the sum of all objectives 'X' activity meets from all content strands for each grade for Science or Social Studies.

5.4 – Most and Least Objectives Charts

In Figure 8 and 9, the titles read "Science: Most to Least Objectives met" and "Social Studies: Most to Least Objectives met" respectively. In each Figure, the upper-most row lists the "Kindergarten: Most to Least Objectives met" "1st Grade: Most to

Least Objectives met" "2nd Grade: Most to Least Objectives met" "3rd Grade: Most to Least Objectives met" "4th Grade: Most to Least Objective met" and "5th Grade: Most to Least Objective met" columns. Beneath each column lists the 37 *Think Green, Take Action* activities in order from the most to least objectives met overall for each grade. The higher the activities in the column the more objectives met, the lower the activities the less objectives met. Each activity contains a percentage taken from the "Total" columns in Figure 7. The chart reads top to bottom—using the grade listed at the top of the column, one can see which activities met the most to least objectives overall in decreasing order for each grade.

5.5 – Possible Best Practices Charts

In Figure 10 and 11, the upper-most row provides the legend. The following row beneath the legend contains the grades. Beneath each grade lists each content strand with the total number of objectives possible within that content strand. Beneath each content strand lists possible best practice activities for that content strand. The activities shown obtained a score of 50% or more from Figure 7. The development metrics, content strands, total number of objectives possible, and activities correspond to the data in Figures 4, 5, 6, and 7. The activities listed in each column are coded using the Legend: Dark Green = All objectives met, Light Green = All but one objective met, Yellow = All but 2 objectives met, Dark Yellow = All but 3 objectives met, * = May not be age appropriate, and ** = "Environmental tragedy until the fourth grade." The chart reads from top to bottom—using the grade and content strand listed at the top of each

column and the Legend, one can see, in decreasing order, which activities met all objectives, all but 1 objective, all but 2 objectives, and all but 3 objectives and which activities might not be age appropriate or involve an environmental tragedy.

Chapter Six: Discussion

6.1 – Piaget's and Erikson's Developmental Theories and Chart Discussion

6.1.1. Background Information. Piaget's Preoperational Stage from age 2 to 6 or 7 is characterized by a lack of logical operations or reasoning processes such as: numeration—the ability to apply a unit to a number, seriation—the ability to arrange numbers in a logical sequence, or reversibility/transitivity thinking—the ability to understand relationships. The stage is also characterized by "egocentrism… the inability to distinguish between one's own perspective and someone else's perspective"[147] and symbolic thinking or "animism" meaning an object can stand for something else or share the same characteristics of the child[148]. The latter half of the Preoperational Stage is characterized by the Intuitive Thought Substage when children "begin to use primitive reasoning and want to know the answers to all sorts of questions."[149] Erikson's Initiative vs Guilt Stage from age 2 to 6 or 7 is characterized by whether a child feels encouragement and comfort or guilt and shame when failing at a task, skill, or activity. Children should be encouraged and comforted when failing at this age and punishment that invokes guilt and shame should be avoided[150]. Both Piaget and Erikson, as well as others, believed that play nurtures a child's cognitive development and further studies suggest stories and singing nurture their development

[147] Santrock, John W. *Essentials of Life-Span Development*, 4th ed. New York, NY: McGraw-Hill Education, 2016, 140.
[148] Berger, Kathleen S. *The Developing Person: Through the Life Span*, 9th ed. New York: Worth Publishers, 2014, 245-246.
[149] Op cit, 141.
[150] Ibid, 276.

as well[151,152,153]. Thus, in Figure 4, the metrics used in Piaget's Preoperational Stage are Intuitive Thought Substage (ITS) and Games (G); and, the metrics used in Erikson's Initiative vs Guilt Stage are Initiative (I) and Play (P). Activities that may encourage a child's questioning are marked ITS and activities that involve a game are marked G. Activities that involve skills, tasks, or activities that can be encouraged are marked I and activities that involve play are marked P.

Piaget's Concrete Operational Stage from age 7 to 10 or 11 is primarily characterized by a child's ability to "reason logically as long as reasoning can be applied to specific or concrete examples."[154] Two other main characteristics of Piaget's Concrete Operational Stage are "seriation…the ability to order stimuli along a quantitative dimension" and "transitivity…the ability to logically combine relations to understand certain conclusions."[155] Erikson's Industry vs Inferiority Stage is characterized by a child's eagerness and excitement to learn, "discover, invent, create, and explore," or a child's lack of motivation or curiosity to learn[156]. Similar to Erikson's previous stage, children should be encouraged to learn, build, create, discover, and explore rather than given facts to learn and/or repeat[157]. Thus, the metrics used in Piaget's Operational Stage are Concrete (C), Seriation (S), and Transitivity (T); and, the metric used in

[151] Op cit.
[152] Simatwa, Enose M. W. "Piaget's theory of intellectual development and its implication for instructional management at pre-secondary school level." *Educational Research and Reviews*, 5 no. 7 (2010): 366-371.
[153] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006, 73-75.
[154] Santrock, John W. *Essentials of Life-Span Development*, 4th ed. New York, NY: McGraw-Hill Education, 2016, 198.
[155] Ibid, 199.
[156] Armstrong, Thomas. *The Best Schools: How Human Development Should Inform Educational Practice.* Alexandria, VA: Association for Supervision and Curriculum Development, 2006, 94-102.
[157] Ibid.

Erikson's Industry vs Inferiority Stage is Encouragement in Creating or Solving (ECS). Activities that involve a concrete, real-world example are marked C; activities that involve seriation or numeration are marked S; and activities that involve understanding relationships are marked T. Activities that involve creating, discovering, or solving are marked ECS.

Each activity has "considerations" to be taken into account when deciding to use an activity. The considerations were decided when reading *Think Green, Take Action*. Activities that involved the outdoors were marked "Outdoors" in bold; activities that required reading and writing skills were marked "Requires reading/writing skills" while activities that have the choice of involving reading and writing were marked "*May* require reading/writing skills"; activities that required math skills were marked "Requires math skills"; activities that required drawing or creativity were marked "Drawing" and "Creativity"; activities that involved experiments or required scientific equipment were marked "Requires adult supervision"; and activities that required the knowledge of an environmental issue were marked "Environmental issue" whereas activities that related to or could involve an environmental issue component were marked "[Related to] Environmental issue." In following David Sobel's maxim, "No environmental tragedies until the fourth grade…tragedies are big, complex problems beyond the geographical and conceptual scope of young children,"[158] the activities requiring knowledge of an environmental issue should wait until the fourth grade.

[158] Sobel, David. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*, 2nd ed. Great Barrington, MA: The Orion Society, 2013, 33.

6.1.2. Intuitive Thought Substage (ITS) & Initiative (I) Activities. In Figure 4, all 37 activities are marked ITS and I, meaning that each activity may encourage a child's questioning and that the skills, tasks, or activities involved may and should be encouraged. Questions asked after or during these activities should be answered or by assisting the child in finding the answer to help nurture the child's development. Failure at a skill, task, or activity involved in the activities should not be punished or penalized, rather they should be encouraged and helped in order to succeed.

6.1.3. Games (G) & Play (P) Activities. In Figure 4, the six activities: "Cycle Games," "Fox/Rabbit/Grass Game," "Bioaccumulation Game," "Overconsumption (Fish Game)," "Racing for Soil Game," and "Acid Rain Game" are all marked G and P meaning that these activities involve a game and play and would be better suited for younger ages. However, each of these six activities are marked S and T meaning they involve seriation and transitivity and a younger child may not fully comprehend the idea behind the activities. The six activities are also marked C in that they involve concrete and real-world examples meaning they are better applicable to the older ages; but none of the six activities are marked ECS. One key consideration to be taken into account is that each of the six activities are outdoors, meaning children are learning in the natural world. However, another key consideration to be taken into account is that "Bioaccumulation Game," "Overconsumption (Fish Game)," and "Acid Rain Game" all involve the knowledge of an environmental issue and would best be suited for fourth grade and up. While "Cycle Games," "Fox/Rabbit/Grass Game," and "Racing for Soil Game" may involve seriation and transitivity, it does not mean the games cannot be

played at the younger ages as long as the larger concepts involved in those activities are introduced later. Therefore, "Cycle Games," "Fox/Rabbit/Grass Game," and "Racing for Soil Game" might be played by all ages, whereas "Bioaccumulation," "Overconsumption (Fish Game)," and "Acid Rain Game" should be played in fourth grade and up. Nonetheless, I must point out many psychologists advocate unstructured, open-ended, free play as opposed to structured play, meaning children should be playing on their own accord rather than playing a structured game with rules[159,160].

6.1.4. Other Activities Applicable to Younger Ages. In Figure 4, when using the "Considerations" column, other activities that can be used at the younger ages are "Outside/Secret Spot/Nature Journals," "Bird Watching," "Mining Chocolate Chips/How Much Do We Take?," "Who Needs Soil?," "Erosion, Weathering, and Soil," "Saving Resources: Design Challenges," "Electrical Generation," "Pollution Indicators," "Indicator Species," "Model Sewage Treatment," and "Making Greenhouses". These activities are applicable to the younger ages because none involve reading, writing, or math skills or an environmental issue. While some are related to an environmental issue, it does not mean they must be exposed to the knowledge of the environmental issue in using the activity. Of the activities, "Outside/Secret Spot/Nature Journals," "Bird Watching," "Erosion, Weathering, and Soil," "Pollution Indicators," "Indicator

[159] Ibid, 73-87.
[160] Op cit.

Species," and "Making Greenhouses" are all outdoors, meaning children can learn in and about the natural world.

6.1.5. Seriation (S) & Transitivity (T) Activities. In Figure 4, the activities that do not involve a concrete example, marked as S, T are "Animal Adaptation Research," "Green Space Survey," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "Design a Zoo," "Who Needs Soil?," and "Climate VS Weather". However, while these activities are marked ECS in that they are better suited for older ages, none of them involve concrete examples which can be conducive to learning. Of these activities, "Animal Adaptation Research," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "Design a Zoo," and "Climate VS Weather" all involve reading and writing skills meaning they would be better suited for older ages; whereas, "Green Space Survey" and "Who Needs Soil?" involve drawing and would be better suited for the younger ages.

6.1.6. Concrete (C) & Transitivity (T) Activities. In Figure 4, the activities that do not involve seriation, marked at C, T are "Erosion, Weathering, and Soil," "Understanding Pollution: Wonderful Water," "Electrical Generation," and "Oil Spills" meaning they could be better suited for the younger ages if the relationship (i.e., T) to the larger concept of the activity was not stressed. However, using the considerations for these activities means "Erosion, Weathering, and Soil" and "Electrical Generation" are the only applicable activities to the younger ages because the other "Understanding Pollution: Wonderful Water" and "Oil Spills" involve environmental issues.

6.1.7. Encouragement in Creating or Solving (ECS) Activities. In Figure 4, the activities "Outside/Secret Spot/Nature Journals," "Animal Adaptation Research," "Bird Watching," "Counting Plants," "Green Space Survey," "Watching the School's Wild Animals," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "Design a Zoo," "Mining Chocolate Chips/How Much Do We Take?," "How Much is Left Over?," "Who Needs Soil?," "Erosion, Weathering, and Soil," "Food Waste," "Energy Audit," "Saving Resources: Design Challenges," "Solar Power Experiments," "Understanding Pollution: Wonderful Water," "Making Oxygen," "Making Carbon Dioxide," "Electrical Generation," "Watershed History Lesson," "Oil Spills," "Pollution Indicators," "Water Detectives," "Water Testing," "Indicator Species," "Model Sewage Treatment," "Making Greenhouses," and "Climate VS Weather" are all marked ECS meaning they are better suited for the older ages. Of these activities, "Understanding Pollution: Wonderful Water," "Watershed History Lesson," and "Oil Spills" all involve an environmental issue meaning they should not be used until the fourth grade and up.

6.1.8. Outdoors Activities. In Figure 4, the activities "Outside/Secret Spot/Nature Journals," "Cycle Games," "Fox/Rabbit/Grass Game," "Bird Watching," "Counting Plants," "Bioaccumulation Game," "Overconsumption Game (Fish Game)," "Watching the School's Wild Animals," "How Many Trees Does It Take to Build a House?," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Solar Power Experiments," "Acid Rain Game," "Pollution Indicators," "Water Testing," "Indicator Species," and "Making Greenhouses" are all marked outdoors in the considerations to

be taken into account when choosing an activity. The activities are also marked C because they involve using a concrete example. Due to the benefits of children learning within the natural world and with concrete, real-world examples, these activities should be preferred above the others. "Cycle Games," "Fox/Rabbit/Grass Game," and "Racing for Soil Game" would best be suited for the younger ages as they involve play and do not involve an environmental issue; however, the larger concepts involving seriation and transitivity should not be introduced. "Outside/Secret Spot/Nature Journals," "Bird Watching," "Erosion, Weathering, and Soil," "Pollution Indicators," "Indicator Species," "Water Testing," and "Making Greenhouses" are also applicable to the younger ages because they do not involve reading, writing, or math skills; however, they are only applicable if larger concepts involving seriation, transitivity, or environmental issues are not introduced. While all these activities are best suited for the older ages, "Bioaccumulation Game," "Overconsumption (Fish Game)," and "Acid Rain Game" should not be used until fourth grade and up because they involve environmental issues.

6.2 – Most to Least Objectives Charts Discussion

6.2.1. Background Information. In Figure 8 and 9 (Science and Social Studies respectively), activities were listed in descending order from most to least objectives met for each grade. The activities were given a percentage based on the total number of objectives from all content strands an activity met divided by the total possible number

of objectives from all content strands. The percentages were taken from the "Total" columns in Figure 7.

6.2.2. Science: Best Across the Board. In Figure 8, the highest-ranked activity across K-4 was "Outside/Secret Spot/Nature Journals"; however, it ranked second to last in 5th Grade. The drop in 5th Grade was due to the nature of 5th Grade's Science objectives switching to strict research-based objectives in Inquiry and Physical Science. "Indicator Species" was the only activity ranking above 50% for every grade. Since both of these activities are outdoors, involve concrete, real-world examples, and do not require math, reading, or writing skills as well as not involving the knowledge of an environmental issue, these two activities are considered best possible practices overall for Science across K-5.

6.2.3. Science: Kindergarten. In Figure 8, the activities listed in the Kindergarten column that rank 50% or above are (in descending order) "Outside/Secret Spot/Nature Journals," "Cycle Games," "Design a Zoo," "Model Sewage Treatment," "Bird Watching," "Watching the School's Wild Animals," "How Many Trees Does It Take to Build a House?," "Saving Resources: Design Challenges," "Indicator Species," "Climate VS Weather," "How Much Is Left Over?," "Solar Power Experiments," "Water Detectives," "Animal Adaptation Research," "Local Endangered Species Research Project/Protection Poster," "Who Needs Soil?," "Energy Audit," "Water Testing," and "Making Greenhouses". However, after considering the metrics from the Development Metrics Chart, the activities available for Kindergarten are "Outside/Secret Spots/Nature Journals," "Cycle Games," "Model Sewage Treatment," "Bird Watching,"

"Saving Resources: Design Challenges," "Indicator Species," "Who Needs Soil?," "Water Testing," and "Making Greenhouses"; of these activities, "Outside/Secret Spots/Nature Journals," "Cycle Games," "Bird Watching," "Indicator Species," "Water Testing," and "Making Greenhouses" are all outdoors, making these six the best possible practices overall for Kindergarten Science.

6.2.4. Science: 1st Grade. In Figure 8, the activities listed in the 1st Grade column that rank above 50% or above are (in descending order) "Outside/Secret Spot/Nature Journals," "How Many Trees Does It Take to Build a House?," "Indicator Species," "Design a Zoo," "Water Detectives," "Cycle Games," "Energy Audit," "Climate VS Weather," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "How Much Is Left Over?," "Who Needs Soil?," "Racing for Soil Game?," "Saving Resources: Design Challenges," "Solar Power Experiments," "Water Testing," "Model Sewage Treatment," and "Making Greenhouses". However, after considering the metrics from the Development Metrics Chart, the activities best applicable to 1st Grade are "Outside/Secret Spot/Nature Journals," "Indicator Species," "Cycle Games," "Who Needs Soil?," "Racing for Soil Game," "Saving Resources: Design Challenges," "Water Testing," "Model Sewage Treatment" and "Making Greenhouses"; of these activities, "Outside/Secret Spot/Nature Journals," "Indicator Species," "Cycle Games," "Racing for Soil Game," "Water Testing," "Model Sewage Treatment," and "Making Greenhouses" are all outdoors, making these seven the best possible practices overall for 1st Grade Science.

6.2.5. Science: 2nd Grade. In Figure 8, the activities listed in the 2nd Grade column that rank 50% or above are (in descending order) "Outside/Secret Spot/Nature Journals," "Cycle Games," "Making Oxygen," "Making Carbon Dioxide," "Water Detectives," "Indicator Species," "Design a Zoo," "Saving Resources: Design Challenges," "Solar Power Experiments," "Water Testing," and "Making Greenhouses". However, after considering the metrics from the Development Metrics Chart, the activities best suited for 2nd Grade are "Outside/Secret Spot/Nature Journals," "Cycle Games," "Indicators Species," "Saving Resources: Design Challenges," and "Making Greenhouses". I chose these five activities because the other six involve reading or writing skills, require adult supervision, or involve an environmental issue which may not yet be appropriate for all 2nd Grade children. Of the five activities chosen, "Outside/Secret Spot/Nature Journals," "Cycle Games," "Indicator Species," and "Making Greenhouses" are all outdoors, making these four the best possible practices overall for 2nd Grade Science.

6.2.6. Science: 3rd Grade. In Figure 8, the activities listed in the 3rd Grade column that rank 50% or above are (in descending order) "Outside/Secret Spot/Nature Journals," "Mining Chocolate Chips/How Much Do We Take?," "Water Detectives," "Indicator Species," and "Design a Zoo"; of these activities, "Outside/Secret Spot/Nature Journals" and "Indicator Species" are both outdoors, making these two the best possible practices overall for 3rd Grade Science.

6.2.7. Science: 4th Grade. In Figure 8, the activities listed in the 4th Grade column that rank 50% or above are (in descending order) "Outside/Secret Spot/Nature

Journals" and "Indicator Species". Both activities are outdoors, making them the best possible practices overall for 4th Grade Science.

6.2.8. Science: 5th Grade. In Figure 8, the activities listed in the 5th Grade column that rank 50% or above are (in descending order) "Water Testing," "Water Detectives," "Saving Resources: Design Challenges," "Solar Power Experiments," "Erosion, Weathering, and Soil," "Electrical Generation," "Making Greenhouses," "Watershed History Lesson," and "Indicator Species"; of these activities, "Water Testing," "Solar Power Experiments," "Erosion, Weathering, and Soil," "Making Greenhouses," and "Indicator Species" are all outdoors, making these five activities the best possible practices overall for 5th Grade Science.

6.2.9. Social Studies: Best Across the Board. In Figure 9, none of the activities in the 5th Grade column scored 50% or above due to the objectives revolving around Native American History. The two most prevalent activities, ranking across K-4, were "Watershed History Lesson" and "How Many Trees Does It Take to Build a House?"; however, due to the nature of these activities, both are not applicable until the 4th Grade because "Watershed History Lesson" involves an "environmental tragedy" and "How Many Trees Does It Take to Build a House?" involves 4th Grade-level math skills. The second most prevalent activities, ranking across Kindergarten, 2nd, 3rd, and 4th Grade were "Overconsumption (Fish Game)," "Mining Chocolate Chips/How Much Do We Take?," "Food Waste," and "Local Endangered Species Project/Protection Poster" while "Acid Rain Game" ranked across Kindergarten, 1st, 2nd, and 4th Grade. However, when applying the metrics from the Development Metrics Chart,

"Overconsumption (Fish Game)" and "Acid Rain Game" both involve "environmental tragedies" and "Food Waste" and "Local Endangered Species Project/Protection Poster" involve math and reading/writing skills respectively. After eliminating these four using the development metrics, "Mining Chocolate Chips/How Much Do We Take?" stood as the overall best possible practice across the most grades (Kindergarten, 2nd, 3rd, and 4th Grade) for Social Studies.

6.2.10. Social Studies: Kindergarten. In Figure 9, the activities listed in the Kindergarten column that rank 50% or above are (in descending order) "Bird Watching," "Outside/Secret Spot/Nature Journals," "Counting Plants," "Green Space Survey," "Design a Zoo," "How Many Trees Does It Take to Build a House?," "Energy Audit," "Saving Resources: Design Challenges," "Electrical Generation," "Watershed History Lesson," "Climate VS Weather," "Cycle Games," "Overconsumption (Fish Game)," "Acid Rain Game," "Water Detectives," "Understanding Pollution: Wonderful Water," "How Much Is Left Over?," "Bioaccumulation Game," "Mining Chocolate Chips/How Much Do We Take?," "Oil Spills," "Model Sewage Treatment," "Food Waste," "Solar Power Experiments," "Local Endangered Species Research Project/Protection Poster," "Water Testing," "Indicator Species," and "Who Needs Soils?". However, after considering the metrics from the Development Metrics Chart, the activities best applicable to Kindergarten are "Bird Watching," "Outside/Secret Spot/Nature Journals," "Saving Resources: Design Challenges," "Electrical Generation," "Cycle Games," "Mining Chocolate Chips/How Much Do We Take?," "Model Sewage Treatment," "Water Testing," "Indicator Species," and "Who Needs

Soils?"; of these activities, "Bird Watching," "Outside/Secret Spot/Nature Journals," "Cycle Games," "Water Testing," and "Indicator Species" are all outdoors, making these five activities the best possible practices overall for Kindergarten Social Studies.

6.2.11. Social Studies: 1st Grade. In Figure 9, the activities listed in the 1st Grade column that rank 50% or above are (in descending order) "Oil Spills," "Electrical Generation," "Watershed History Lesson," "Acid Rain Game," "Climate VS Weather," "Green Space Survey," "Water Detectives," "How Many Trees Does It Take to Build a House?," "How Much Is Left Over?," "Energy Audit," "Saving Resources: Design Challenges," "Solar Power Experiments," "Understanding Pollution: Wonderful Water," and "Making Greenhouses". However, after considering the metrics from the Development Metric Chart, the activities best applicable to 1st Grade are "Electrical Generation," "Saving Resources: Design Challenges," and "Making Greenhouses"; of these activities, "Making Greenhouses" is the only outdoor activity, making it the best possible practice overall for 1st Grade Social Studies.

6.2.12. Social Studies: 2nd Grade. In Figure 9, the activities listed in the 2nd Grade column that rank 50% or above are (in descending order) "Watershed History Lesson," "Oil Spills," "Water Detectives," "Climate VS Weather," "Bioaccumulation Game," "Green Space Survey," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "How Many Trees Does It Take to Build a House?," "How Much Is Left Over?," "Making Oxygen," "Making Carbon Dioxide," "Overconsumption (Fish Game)," "Mining Chocolate Chips/How Much Do We Take?," "Pollution Indicators," "Water Testing," "Model Sewage Treatment," "Making Greenhouses,"

"Food Waste," "Acid Rain Game," "Energy Audit," "Understanding Pollution: Wonderful Water," and "Electrical Generation". However, after considering the metrics from the Development Metric Chart, the activities best applicable to 2nd Grade are "Climate VS Weather," "Green Space Survey," "How Much Is Left Over?," "Mining Chocolate Chips/How Much Do We Take?," "Pollution Indicators," "Water Testing," "Model Sewage Treatment," "Making Greenhouses," "Food Waste," and "Electrical Generation"; of these activities, "Water Testing," "Making Greenhouses," and "Pollution Indicators" are all outdoors, making these three activities the best possible practices overall for 2nd Grade Social Studies.

6.2.13. Social Studies: 3rd Grade. In Figure 9, the activities listed in the 3rd Grade column that rank 50% or above are (in descending order) "Success Stories," "Local Endangered Species Research Project/Protection Poster," "How Much Is Left Over?," "Water Detectives," "Mining Chocolate Chips/How Much Do We Take?," "Food Waste," "Watershed History Lesson," "Oil Spills," "Water Testing," "Bioaccumulation Game," "Overconsumption (Fish Game)," "How Many Trees Does It Take to Build a House?," "Understanding Pollution: Wonderful Water," "Green Space Survey," "Model Sewage Treatment," and "Bird Watching". However, after considering the metrics from the Development Metrics Chart, the activities best applicable to 3rd Grade are "Success Stories," "Local Endangered Species Research Project/Protection Poster," "How Much Is Left Over?," "Water Detectives," "Water Testing," "Green Space Survey," "Model Sewage Treatment," and "Bird Watching"; of these activities, "Water

Testing" and "Bird Watching" are both outdoors, making them the best possible practices overall for 3rd Grade Social Studies.

6.2.14. Social Studies: 4th Grade. In Figure 9, the activities listed in the 4th Grade column that rank 50% or above are (in descending order) "Watershed History Lesson," "Erosion, Weathering, and Soil," "Overconsumption (Fish Game)," "How Many Trees Does It Take to Build a House?," "Who Needs Soil?," "Racing for Soil Game," "Mining Chocolate Chips/How Much Do We Take?," "Food Waste," "Success Stories," "Local Endangered Species Research Project/Protection Poster," and "Acid Rain Game"; of these activities, "Erosion, Weathering, and Soil," "How Many Trees Does It Take to Build a House?," "Racing for Soil Game," and "Acid Rain Game" are all outdoors, making these four the best possible practices overall for 4th Grade.

6.3 – Possible Best Practices for Science and Social Studies Discussion

6.3.1. Science Possible Best Practices: Kindergarten. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "Bird Watching," and "Indicator Species", of which all are outdoors, making these three the best possible practices for the Inquiry content strand for Kindergarten. The only activity listed under the Life Science and Earth and Space Science content strands that met all objectives and that is developmentally appropriate is "Outside/Secret Spot/Nature Journals", of which is outdoors, making it the best possible practice for the Life Science and Earth

and Space Science content strands for Kindergarten. The Physical Science content strand had no activities that met all objectives.

6.3.2. Science Possible Best Practices: 1st Grade. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals" and "Indicator Species", of which are both outdoors, making these two the best possible practices for the Inquiry content strand for 1st Grade. The only activity listed under the Life Science content strand that met all objectives and is developmentally appropriate is "Outside/Secret Spot/Nature Journals", of which is outdoors, making it the best possible practice for the Life Science content strand for 1st Grade. The Physical Science and Earth and Space Science content strands had no activities that met all objectives.

6.3.3. Science Possible Best Practices: 2nd Grade. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "How Much Is Left Over?," "Indicator Species" and "Making Greenhouses", of which "Outside/Secret Spot/Nature Journals," "Indicator Species," and "Making Greenhouses" are all outdoors, making these three activities the best possible practice for the Inquiry content strand for 2nd Grade. The activities listed under the Life Science content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "Cycle Games," and "Fox/Rabbit/Grass Game", of which all are outside, making these three activities the best possible practices for the Life Science content

strand for 2nd Grade. The Physical Science and Earth and Space Science content strands had no activities that met all objectives.

6.3.4. Science Possible Best Practices: 3rd Grade. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "Bird Watching," "Counting Plants," "Green Space Survey," "How Much Is Left Over?," "Food Waste," "Solar Power Experiments," "Making Oxygen," "Making Carbon Dioxide," "Water Detectives," "Water Testing," "Indicator Species," and "Climate VS Weather", of which "Outside/Secret Spot/Nature Journals," "Bird Watching," "Counting Plants," "Solar Power Experiments," "Water Testing" and "Indicator Species" are all outdoors, making these six activities the best possible practices for the Inquiry content strand for 3rd Grade. The activities listed under the Life Science content strand that met all objectives and are developmentally appropriate are "Success Stories" and "Local Endangered Species Research Project/Protection Poster," of which neither are outdoors, meaning that these two may be considered the best possible practices for the Life Science content strand for 3rd Grade, but without an outdoor component. The Physical Science and Earth and Space Science content strands had no activities that met all objectives.

6.3.5. Science Possible Best Practices: 4th Grade. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Green Space Survey," "Watching the School's Wild Animals," "How Many Trees Does It Take to Build a House?," "How Much Is Left Over?," "Food Waste," "Solar Power Experiments," "Making Oxygen," "Making Carbon Dioxide,"

"Water Detectives," of which "Watching the School's Wild Animals," "How Many Trees Does It Take to Build a House?," and "Solar Power Experiments" are all outdoors, making these three activities the best possible practices for the Inquiry Content Strand for 4th Grade. The Physical Science, Life Science, and Earth and Space Science content strands had no activities that met all objectives.

6.3.6. Science Possible Best Practices: 5th Grade. In Figure 10, the activities listed under the Inquiry content strand that met all objectives and are developmentally appropriate are "Saving Resources: Design Challenges," "Solar Power Experiments," "Water Detectives," "Water Testing," and "Making Greenhouses", of which "Solar Power Experiments," "Water Testing," and "Making Greenhouses" are all outdoors, making these three activities the best possible practices for the Inquiry content strand for 5th Grade. The Physical Science, Life Science, and Earth and Space Science had no activities that met all objectives.

6.3.7. Social Studies Possible Best Practices: Kindergarten. In Figure 11, the activities listed under the Global/International Affairs content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals" and "Bird Watching", of which both are outdoors, making both activities the best possible practice for the Global/International Affairs content strand for Kindergarten. The activities listed under the Civil Rights/Human Rights content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "Cycle Games," "Fox/Rabbit/Grass Game," "Bird Watching," "Mining Chocolate Chips/How Much Do We Take?," "Who Needs Soil?," "Racing for

Soil Game," "Erosion, Weathering, and Soil," "Saving Resources: Design Challenges," "Electrical Generation," "Pollution Indicators," "Indicator Species," "Model Sewage Treatment" and "Making Greenhouses", of which "Outside/Secret Spot/Nature Journals," "Cycle Games," "Fox/Rabbit/Grass Game," "Bird Watching," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Pollution Indicators," "Indicator Species," and "Making Greenhouses" are all outdoors, making these nine activities the best possible practices for the Civil Rights/Human Rights content strand for Kindergarten. The Domestic Affairs, Economics, and Culture content strands had no activities that met all objectives.

6.3.8. Social Studies Possible Best Practices: 1st Grade. In Figure 11, the activities listed under the Global/International Affairs content strand that met all objectives were not developmentally appropriate. The activities listed under the Civil Rights/Human Rights content strand that met all objectives and are developmentally appropriate are "Outside/Secret Spot/Nature Journals," "Cycle Games," "Fox/Rabbit/Grass Game," "Bird Watching," "Mining Chocolate Chips/How Much Do We Take?," "Who Needs Soil?," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Saving Resources: Design Challenges," "Electrical Generation," "Pollution Indicators," "Indicator Species," "Model Sewage Treatment," and "Making Greenhouses", of which "Outside/Secret Spot/Nature Journals," "Cycle Games," "Fox/Rabbit/Grass Game," "Bird Watching," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Pollution Indicators," "Indicator Species," and "Making Greenhouses" are all outdoors, making these nine activities the best possible practices

for Civil Rights/Human Rights content strand for 1st Grade. The Domestic Affairs, Economics, and Culture content strands had no activities that met all objectives.

6.3.9. Social Studies Possible Best Practices: 2nd Grade. In Figure 11, the activities that are listed under the Domestic Affairs content strand that met all objectives and are developmentally appropriate are "Green Space Survey," "Mining Chocolate Chips/How Much Do We Take?," "How Much Is Left Over?," "Food Waste," "Pollution Indicators," "Water Testing," "Model Sewage Treatment," "Making Greenhouses," and "Climate VS Weather", of which "Pollution Indicators," "Water Testing," and "Making Greenhouses" are all outdoors, making these three activities the best possible practices for the Domestic Affairs content strand for 2nd Grade. The activities listed under the Global/International Affairs content strand that met all objectives are not developmentally appropriate. The activities listed under the Economics content strand that met all objectives and are developmentally appropriate are "Cycle Games," "Mining Chocolate Chips/How Much Do We Take?," "How Much Is Left Over?," "Who Needs Soil?," "Food Waste," "Saving Resources: Design Challenges," "Electrical Generation," "Pollution Indicators," "Water Testing," "Indicator Species," "Model Sewage Treatment," "Making Greenhouses," and "Climate VS Weather", of which "Cycle Games," "Pollution Indicators," "Water Testing," "Indicator Species," and "Making Greenhouses" are all outside, making these five activities the best possible practice for the Economics content strand for 2nd Grade. The Civil Rights/Human Rights and Culture content strands had no activities that met all objectives.

6.3.10. Social Studies Possible Best Practices: 3rd Grade. In Figure 11, the activities listed under the Domestic Affairs content strand that met all objectives and are developmentally appropriate are "Mining Chocolate Chips/How Much Do We Take?" and "How Much Is Left Over?", neither of which are outdoors, meaning that these two may be considered the best possible practices for the Domestic Affairs content strand for the 3rd Grade, but without an outdoor component. The activities listed under the Global/International Affairs content strand that met all objectives and are developmentally appropriate are "Green Space Survey," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "Design a Zoo," "Mining Chocolate Chips/How Much Do We Take?," "How Much Is Left Over?," "Water Detectives," and "Climate VS Weather", none of which are outdoors, meaning that these activities may be considered the best possible practices for the Global/International Affairs content strand for the 3rd Grade, but without an outdoor component. The activities listed under the Civil Rights/Human Rights content strand that met all objectives and are developmentally appropriate are "Animal Adaptation Research," "Bird Watching," "Green Space Survey," "Success Stories," "Local Endangered Species Research Project/Protection Poster," "Mining Chocolate Chips/How Much Do We Take?," "How Much Is Left Over?," "Food Waste," "Water Detectives," "Water Testing," "Indicator Species," "Model Sewage Treatment," and "Making Greenhouses", of which "Bird Watching," "Water Testing," "Indicator Species," and "Making Greenhouses" are all outdoors, making these four activities the best possible practice for the Civil Rights/Human Rights content strand for 3rd Grade.

The activities listed under the Economics content strand that met all objectives and are developmentally appropriate are “How Much Is Left Over?,” “Food Waste,” “Solar Power Experiments,” “Water Detectives,” and “Model Sewage Treatment”, of which “Solar Power Experiments” is the only activity outdoors, making it the best possible practice for the Economics content strand for 3rd Grade. The Culture content strand had no activities that met all objectives.

6.3.11. Social Studies Possible Best Practices: 4th Grade. In Figure 11, the activities under the Domestic Affairs content strand that met all objectives and are developmentally appropriate are “Bioaccumulation Game,” “Overconsumption (Fish Game),” “Success Stories,” “Local Endangered Species Research Project/Protection Poster,” “Mining Chocolate Chips/How Much Do We Take?,” “How Many Trees Does It Take to Build a House?,” “Who Needs Soil?,” “Racing for Soil Game,” “Erosion, Weathering, and Soil,” “Food Waste,” “Saving Resources: Design Challenges,” “Solar Power Experiments,” “Understanding Pollution: Wonderful Water,” “Making Oxygen,” “Making Carbon Dioxide,” “Electrical Generation,” “Watershed History Lesson,” “Oil Spills,” “Acid Rain Game,” “Pollution Indicators,” “Water Detectives,” “Water Testing,” “Indicator Species,” “Model Sewage Treatment,” and “Climate VS Weather”, of which “Bioaccumulation Game,” “Overconsumption (Fish Game),” “How Many Trees Does It Take to Build a House?,” “Racing for Soil Game,” “Erosion, Weathering, and Soil,” “Solar Power Experiments,” “Acid Rain Game,” “Pollution Indicators,” “Water Testing,” and “Indicator Species” were all outdoors, making these ten activities the best possible practices for the Domestic Affairs content strand for 4th Grade. The

activities listed under the Global/International Affairs that met all objectives and are developmentally appropriate are "How Many Trees Does It Take to Build a House?," "Who Needs Soil?," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Watershed History Lesson," and "Acid Rain Game", of which "How Many Trees Does It Take to Build a House?," "Racing for Soil Game," "Erosion, Weathering, and Soil," and "Acid Rain Game" are all outdoors, making these four activities the best possible practices for the Global/International Affairs content strand for 4th Grade. The activities listed under the Economics content strand that met all objectives and are developmentally appropriate are "Cycle Games," "Overconsumption (Fish Game)," "Mining Chocolate Chip/How Much Do We Take?," "How Many Trees Does It Take to Build a House?," "Erosion, Weathering, and Soil," "Energy Audit," "Saving Resources: Design Challenges," and "Watershed History Lesson", of which "Cycle Games," "Overconsumption (Fish Game)," "How Many Trees Does It Take to Build a House?," and "Erosion, Weathering, and soil" are all outdoors, making these four activities the best possible practices for the Economics content strand for 4th Grade. The Domestic Affairs (1b.), Civil Rights/Human Rights, and Culture content strands had no activities that met all objectives.

6.3.12. Social Studies Possible Best Practices: 5th Grade. In Figure 11, no activities in any content stands met all objectives.

6.4 – Further Discussion

While many of the activities incorporate children being in the outdoors such as "Cycle Games," "Overconsumption (Fish Game)," "Acid Rain Game,"

"Bioaccumulation Game," and "Fox/Rabbit/Grass Game", the only activities that truly incorporate using the natural world as a context for learning are "Outside/Secret Spot/Nature Journals," "Bird Watching," "Counting Plants," "How Many Trees Does It Take to Build a House?," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Solar Power Experiments," "Pollution Indicators," "Water Testing," and "Indicator Species" which narrows the best possible practices. In addition, while a clear majority of the activities did not meet *all* the objectives, many did meet over half of the objectives (Figures 10 and Figures 11). Furthermore, the activities listed in the figures mentioned contain their age-appropriateness and whether they entail an environmental tragedy and can thus be used appropriately by teachers to facilitate many of the learning objectives for Science and Social Studies. A teacher may also refer to the Development Metrics Chart (Figure 4) to better select activities and tailor them to their specific classroom learning needs (i.e., being outdoors, a game, reading/writing skills, math skills, creativity and drawing, or discussing environmental issues). As mentioned in the last paragraph of Chapter Four, Section 3, Step 1, it is the primary responsibility of the teacher to facilitate the connections between the activities and the objectives that the activities are claimed to meet by this thesis. This thesis was not only designed to evaluate the feasibility of incorporating these activities into the MDE Frameworks for Science and Social Studies, but to act as a practical guide for teachers to integrate these activities into the MDE Frameworks for Science and Social Studies.

Chapter Seven: Conclusion

As seen in Chapter Two of this thesis, a reoccurring theme throughout history is human's connection, or lack of, to the natural world. Long understood by century-old philosophers, humans learn primarily through their experiences with and in the natural world. However, education has shifted to disregard the natural world as a place for learning. Education is primarily held inside a classroom environment learning *about* the natural world using a textbook or worksheet rather than in the outside environment learning *in* the natural world using the senses and first-hand experience. To achieve sustainable development and "meet the needs of the present without compromising the ability of future generations to meet their own needs," the first priority should be reconnecting children with the natural world as children are the "future generations" we speak of when discussing sustainable development. Unless children are exposed to the natural world and the surrounding community, how are they to understand the complexities and interconnectedness of climate change and sustainable development? As Sobel writes:

> If we allow children to shape their own small worlds in childhood, then they will grow up knowing and feeling that they can participate in shaping the big world tomorrow.[161]

If children are to have a voice in the "dialogue of values" of sustainable development and are to develop "a sense of wonder, and a desire and capacity to learn" to create

[161] Sobel, David. *Children's Special Places: Exploring the Role of Forts, Dens, and Bush Houses in Middle Childhood.* (Tucson: Zephyr Press, 1993), 161

"concrete examples of sustainable development"[162] in order to meet their future needs, then they must be afforded time to connect and experience the natural world and their surrounding community to nurture a relationship and an affinity to the natural world and the surrounding community. Simply, children must experience a strong sense of place. Henceforth, the primary purpose of this thesis was not only to evaluate the feasibility of incorporating place-based environmental education activities from *Think Green, Take Action* into the MDE Frameworks for Science and Social Studies, but in hopes of doing so, to provide a practical guide and possible best practices for teachers to use to best achieve learning objectives in Science and Social Studies by connecting learning with and in natural world.

In evaluating the activities from *Think Green, Take Action* by David Kriesberg, the activities that incorporate the natural world as a context for learning were "Outdoors/Secret Spot/Nature Journals," "Bird Watching," "Counting Plants," "How Many Trees Does It Take to Build a House?," "Racing for Soil Game," "Erosion, Weathering, and Soil," "Solar Power Experiments," "Pollution Indicators," "Water Testing," and "Indicator Species". Among these ten, the activity that stood above the rest was "Outdoors/Secret Spot/Nature Journals" because it not only consistently met all or nearly all the objectives from K-5 for Science, but it truly immerses children in the natural world, relies on their senses to describe and experience observations about the natural world, and allows a child to keep a written record of their experiences in the

[162] See Chapter 1. Blewitt, John. *Understanding Sustainable Development* 2nd ed. New York, NY: Routledge, 2015.

natural world; thus, it highly raises the possibility of a child developing a strong sense of place.

Although a clear majority of the activities did not meet all the learning objectives, many did meet over half (Figures 10 and Figures 11). In the mentioned figures, activities are color-coded to denote whether they meet all objectives, all but 1 objective, all but 2 objectives, and all but 3 objectives. Furthermore, the activities are coded to denote whether they are age-appropriate. Therefore, the activities listed in the mentioned figures can be used to best achieve learning objectives for Science and Social Studies. In addition, a teacher may also refer to the Development Metrics Chart (Figure 4) to better select activities and tailor them to their specific classroom learning needs (i.e., being outdoors, a game, reading/writing skills, math skills, creativity and drawing, or discussing environmental issues).

However, even though many of the activities evaluated in this thesis met the objectives for Science and Social studies and incorporated environmental themes such as climate change, natural resource depletion, pollution, and species loss, and can thus be incorporated to learn about and combat sustainable development issues, many of the activities did not involve going outdoors. Thus, while it is the primary purpose of this thesis to prompt educators to bring their children into the natural world for learning, more activities or pedagogies that involve immersing children in the natural world should be established. To which it is, again, the idea of David Sobel that place-based environmental education should tailor its curriculum to learning about and in the local

place[163]. He suggests a school district should bring local educators, school administration, school staff, government, community organizations, businesses, parents, and environmental learning centers together to build a collaborative team to shape the new curricula[164]. After reviewing these activities, not only is it possible to implement place-based environmental education activities, or more specifically, pedagogies centered around learning *in* and *about* the local place, into Mississippi schools by fulfilling the objectives set out by the MDE Frameworks for Science and Social Studies, but in doing so, place-based pedagogies also fulfill a child's need for the outdoors—a realization that they do exist in a living and tangible world.

[163] Sobel, David. *Place-Based Education: Connecting Classrooms and Communities,* 2nd ed. Great Barrington, MA: The Orion Society, 2013.
[164] Ibid.

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Figures

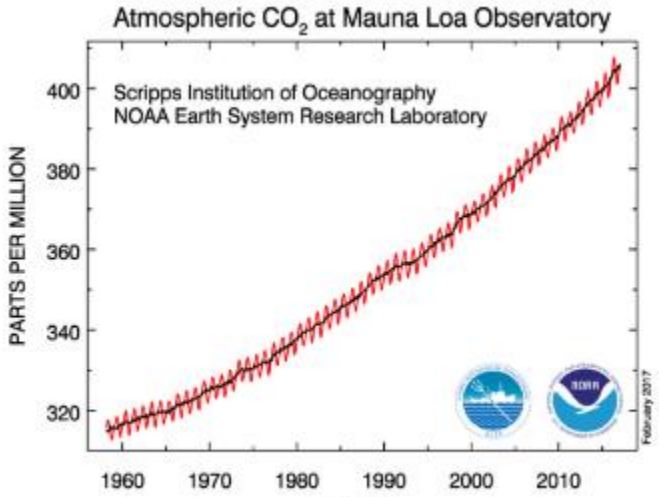

Figure 1: Atmospheric CO2 at Mauna Loa Observatory. Scripps Institution of Oceanography, NOAA Earth System Research Laboratory. Accessed from https://www.esrl.noaa.gov/gmd/webdata/ccgg/trends/co2_data_m

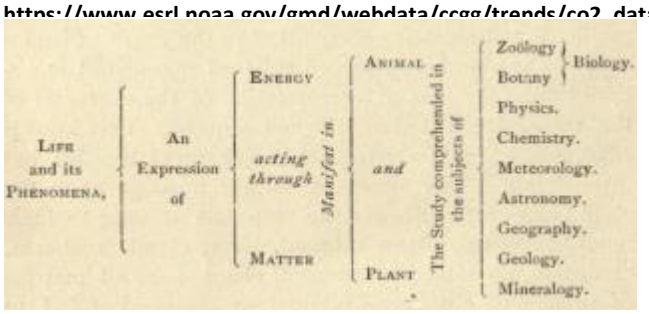

Figure 3: Diagram outlining Jackson's idea of education through experience. Wilbur, Jackman S. *Nature Study for the Commons Schools*. New York, NY: H. Holt & Co., 1894, iv.

Figure 2: *Earthrise.* Picture taken by the Apollo 8 spacecraft of Earth as seen from the moon. NASA. Accessed from https://www.nasa.gov/multimedia/imagegallery/image_feature_1249.html.

Piaget's and Erikson's Development Metrics

Think Green, Take Action: Books and Activities for Kids	Piaget's Preoperational Stage: Intuitive Thought Substage (ITS) and Games (G)		Piaget's Concrete Operational Stage: Concrete (C), Seriation (S), and Transivity (T)				Erikson's Initiative VS Guilt: Initiative/Exploration (I) and Play (P)		Erikson's Industry VS Inferiority Stage: Encouragement in Creating or Solving (ECS)				Considerations
	Kindergarten (age 5-6)	1st Grade (age 6-7)	2nd Grade (age 7-8)	3rd Grade (age 8-9)	4th Grade (age 9-10)	5th Grade (age 10-11)	Kindergarten (age 5-6)	1st Grade (age 6-7)	2nd Grade (age 7-8)	3rd Grade (age 8-9)	4th Grade (age 9-10)	5th Grade (age 10-11)	
Outside/Secret Spot/Nature Journals	ITS		C,S,T				I		ECS				**[Outdoors]** - May require reading/writing skills
Cycle Games	ITS, G		C,S,T				I,P						**Outdoors**
Fox/Rabbit/Grass Game	ITS, G		C,S,T				I,P						**Outdoors**
Animal Adaptation Research	ITS		S,T				I		ECS				Requires reading/writing skills
Bird Watching	ITS		C,S,T				I		ECS				**[Outdoors]** - May require reading/writing skills
Counting Plants	ITS		C,S,T				I		ECS				**[Outdoors]** - Requires math skills
Bioaccumulation Game	ITS, G		C,S,T				I,P						**[Outdoors]** - Environmental issue
Overconsumption (Fish Game)	ITS, G		C,S,T				I,P						**[Outdoors]** - Environmental issue
Green Space Survey	ITS		S,T				I		ECS				Drawing
Watching the School's Wild Animals	ITS		C,S,T				I		ECS				**[Outdoors]** - Requires reading/writing skills
Success Stories	ITS		S,T				I		ECS				Requires reading/writing skills
Local Endangered Species Research Project/Protection Poster	ITS		S,T				I		ECS				Requires reading/writing skills
Design a Zoo	ITS		S,T				I		ECS				Requires reading/writing skills
Mining Chocolate Chips/How Much Do We Take?	ITS		C,S,T				I		ECS				**[Related to]** Environmental issue
How Many Trees Does It Take to Build a House?	ITS		C,S,T				I		ECS				**[Outdoors]** - Requires math skills
How Much Is Left Over?	ITS		C,S,T				I		ECS				Requires math skills
Who Needs Soil?	ITS		S,T				I		ECS				Drawing
Racing for Soil Game	ITS,G		C,S,T				I,P						**Outdoors**
Erosion, Weathering, and Soil	ITS		C,T				I		ECS				**Outdoors**
Food Waste	ITS		C,S,T				I		ECS				Requires math skills
Energy Audit	ITS		C,S,T				I		ECS				Requires reading/writing skills
Saving Resources Design Challenges	ITS		C,S,T				I		ECS				Creativity
Solar Power Experiments	ITS		C,S,T				I		ECS				**[Outdoors]** - Requires reading/writing skills
Understanding Pollution Wonderful Water	ITS		C,T				I		ECS				Environmental issue
Making Oxygen	ITS		C,S,T				I		ECS				Requires adult supervision **[Related to]** Environmental issue
Making Carbon Dioxide	ITS		C,S,T				I		ECS				Requires adult supervision **[Related to]** Environmental issue
Electrical Generation	ITS		C,T				I		ECS				Requires adult supervision **[Related to]** Environmental issue
Watershed History Lesson	ITS		C,S,T				I		ECS				Environmental issue
Oil Spills	ITS		C,T				I		ECS				Environmental issue
Acid Rain Game	ITS,G		C,S,T				I,P						**[Outdoors]** - Environmental issue
Pollution Indicators	ITS		C,S,T				I		ECS				**[Outdoors]** - **[Related to]** Environmental issue
Water Detectives	ITS		C,S,T				I		ECS				Requires adult supervision **[Related to]** Environmental issue
Water Testing	ITS		C,S,T				I		ECS				**[Outdoors]** Requires adult supervision **[Related to]** Environmental issue
Indicator Species	ITS		C,S,T				I		ECS				**[Outdoors]** - **[Related to]** Environmental issue
Model Sewage Treatment	ITS		C,S,T				I		ECS				**[Related to]** Environmental issue
Making Greenhouses	ITS		C,S,T				I		ECS				**[Outdoors]** - **[Related to]** Environmental issue
Climate VS Weather	ITS		S,T				I		ECS				Requires reading/writing skills

Figure 4: Piaget's and Erikson's Development Metrics and Considerations Chart

	2010 Mississippi Science Framework: Content Strands and Objectives [1. Inquiry] [2. Physical Science] [3. Life Science] [4. Earth and Space Science]											
Think Green, Take Action: Books and Activities for Kids	Kindergarten		1st Grade		2nd Grade		3rd Grade		4th Grade		5th Grade	
Outside/Secret Spot/Nature Journals	1. a,b,c,d,e,f 3. a,b,c,d,e	2. a,b,c 4. a,b,c,d,e,f	1. a,b,c,d,e,f 3. a,b,c,d,e,f	2. a,b,c,e,f,g 4. a,b,c,d,e,f,g	1. a,b,c,d,e,f 3. a,b,c,d,e	2. c,e,f,g 4. a,c,d,e,f	1. a,b,c,d,e,f 3. b,c,d,e	2. b,e 4. a,b,c,d,e,f	1. a,b,c,d,e,g 3. a,b,c,d,e	2. a,b,c,d,e,g 4. b,c,d,e,f	1. N/A 3. a,d,e	2. N/A 4. a,c
Cycle Games	1. a,d,e,f 3. a,b,c,e	2. a,b,c 4. b,d,e	1. a,e,f 3. b,c,e,f	2. a,b,c,f, 4. b,d,e	1. a,e,f 3. a,b,c,d,e	2. a,b,f 4. a,c,d	1. a,b,d,f 3. e,f	2. b,e 4. b,d,g	1. d,e 3. c,d,e,f	2. a,b,c 4. d,g	1. d,e,g 3. e	2. a,b 4. a,b,c
Fox/Rabbit/Grass Game	1. a,d,e,f 3. a,b,c	2. a,c 4. e	1. a,b,e,f 3. a,b,c,e	2. N/A 4. a,e	1. a,e,f 3. a,b,c,d,e	2. N/A 4. d	1. a,d,f 3. c,e	2. N/A 4. d	1. d,e 3. c,d	2. c 4. d	1. d,e,g 3. e	2. N/A 4. N/A
Animal Adaptation Research	1. a,b,d,e,f 3. a,b,c,d	2. N/A 4. b,e	1. a,b,e,f 3. a,b,c,d,e,f	2. N/A 4. b,d	1. a,b,e,f 3. a,b,c,d,e	2. N/A 4. N/A	1. a,b,d,e,f 3. a,c,d,e	2. N/A 4. d	1. a,b,d,e,f,g 3. a,c	2. N/A 4. d	1. d,e 3. a,d,e	2. g 4. N/A
Bird Watching	1. a,b,c,d,e,f 3. a,b,c,d	2. c 4. b,e	1. a,b,c,e,f 3. a,b,c,d,e	2. N/A 4. N/A	1. a,b,c,e,f 3. a,b,c,e	2. N/A 4. d	1. a,b,c,d,e,f 3. a,c,d,e	2. N/A 4. N/A	1. a,b,d,e 3. a,c,d,e	2. c 4. d	1. b,d,e,g,h 3. a,e	2. N/A 4. N/A
Counting Plants	1. a,b,c,d,e,f 3. a	2. a 4. b,e	1. a,b,c,e,f 3. a,c,e,f	2. N/A 4. a,e	1. a,b,c,d,e 3. a,c,e	2. N/A 4. d	1. a,b,c,d,e,f 3. c,e	2. N/A 4. d	1. a,b,c,d,e,g 3. c,d,e	2. N/A 4. d	1. b,c,d,e,g,h 3. a,d,e	2. N/A 4. N/A
Bioaccumulation Game	1. a,b,d,e,f 3. c,e	2. a 4. N/A	1. a,e,f 3. a,c,e	2. N/A 4. d,e	1. a,f 3. a,c,e	2. N/A 4. d	1. a,d,f 3. e,f	2. N/A 4. d	1. d,e,f,g 3. c,e,f	2. a 4. d	1. b,d,e,f,h 3. d,e	2. b 4. d
Overconsumption (Fish Game)	1. a,d,e,f 3. c,e	2. a 4. N/A	1. a,e,f 3. a,c,e	2. N/A 4. b	1. a,f 3. a,e	2. N/A 4. d	1. N/A 3. e	2. N/A 4. N/A	1. d,e,f,g 3. c	2. N/A 4. d	1. b,d,e,g,h 3. e	2. N/A 4. d,g
Green Space Survery	1. a,b,c,d,e,f 3. N/A	2. a 4. d	1. a,c,e,f 3. N/A	2. a, 4. b,d	1. b,c,f 3. N/A	2. N/A 4. d	1. a,b,c,d,e,f 3. e	2. N/A 4. d	1. a,b,c,d,e,f,g 3. c	2. N/A 4. b,d	1. b,c,d,e,f,g,h 3. N/A	2. N/A 4. d,g
Watching the School's Wild Animals	1. a,b,c,d,e,f 3. a,b,c,d,e	2. a 4. e	1. a,c,e,f 3. a,c,e,f	2. a,c 4. N/A	1. c,f 3. a,b,c,d,e	2. N/A 4. d	1. b,c,d,f 3. b,c,d,e	2. N/A 4. N/A	1. a,b,c,d,e,f,g 3. c,d,e	2. a,c 4. N/A	1. b,d,e,g,h 3. a,b,d,e	2. N/A 4. N/A
Success Stories	1. a,b,d,e,f 3. a,b,c,d	2. N/A 4. N/A	1. a,b,e,f 3. a,b,c,d,e,f	2. N/A 4. b,d,e	1. a,b,e,f 3. a,b,c,d,e	2. N/A 4. d	1. a,b,d,e,f 3. a,b,c,d,e,f	2. N/A 4. d	1. a,b,d,e,f,g 3. a,b,c,d,e	2. a 4. d	1. b,d,e,f,g,h 3. a,b,d,e	2. N/A 4. d,g
Local Endangered Species Research Project/Protection Poster	1. a,b,d,e,f 3. a,b,c,d	2. N/A 4. b,e	1. a,b,e,f 3. a,b,c,d,e,f	2. N/A 4. b,d,e	1. a,b,e,f 3. a,b,c,d,e	2. N/A 4. d	1. a,b,d,e,f 3. a,b,c,d,e,f	2. N/A 4. d	1. a,b,d,e,f,g 3. a,b,c,d,e	2. a 4. d	1. b,d,e,f,g,h 3. a,b,d,e	2. N/A 4. d,g
Design a Zoo	1. a,b,d,e,f 3. a,b,c,d,e	2. N/A 4. a,b,e,f	1. a,b,d,e,f 3. a,b,c,d,e	2. a 4. a,b,d,e	1. a,b,d,e,f 3. a,b,c,d,e	2. N/A 4. a,d	1. a,b,d,e,f 3. a,b,c,d,e	2. e 4. a,d	1. a,b,d,e,f,g 3. a,b,c,e	2. d,g 4. d	1. d,e,f,g,h 3. e,g,e	2. g 4. a,d,g
Mining Chocolate Chips/How Much Do We Take?	1. a,b,d,e,f 3. b,c	2. a 4. a,b	1. a,b,e,f 3. b,c	2. a,b,c,f 4. a,d	1. a,b,e,f 3. b	2. b,f 4. a,b,d	1. a,b,d,e,f 3. b	2. a,b,c,d,g 4. a,b,d,g	1. a,b,d,e,f,g 3. N/A	2. a,b,c 4. b,d,g	1. b,d,e,f,g,h 3. N/A	2. b 4. a,b,d,g
How Many Trees Does It Take to Build a House?	1. a,b,c,d,e,f 3. b,e	2. a,c 4. b,e,f	1. a,b,c,d,e,f 3. b	2. a,b,c,e,g 4. a,d,e,g	1. a,b,c,d,e,f 3. b	2. b,g 4. a,d	1. a,b,c,d,e,f 3. N/A	2. a,c,d 4. a,d	1. a,b,c,d,e,f,g 3. e	2. c,f 4. d	1. b,c,d,e,f,g,h 3. N/A	2. a,e,g 4. a,d,g
How Much Is Left Over?	1. a,b,c,d,e,f 3. b,c,e	2. a 4. b,e	1. a,b,c,d,e,f 3. b,c	2. a,b,f 4. d,e	1. a,b,c,d,e,f 3. b	2. b,f 4. a,d	1. a,b,c,d,e,f 3. b	2. a 4. a,d	1. a,b,c,d,e,f,g 3. e	2. N/A 4. d	1. b,c,d,e,f,g,h 3. N/A	2. N/A 4. a,d,g
Who Needs Soil?	1. a,b,d,e,f 3. b,c	2. a 4. a,b,f	1. a,b,e,f 3. b,c,e	2. a,b,f 4. a,d,e	1. a,b,f 3. b,c,e	2. b,f 4. a,d	1. a,b,d,e,f 3. b,f	2. b 4. a,b,d	1. a,d,e,f,g 3. e	2. a,b,c 4. d	1. d,e,f,g,h 3. e	2. N/A 4. a,b,d,g
Racing for Soil Game	1. a,b,d,f 3. b,e	2. a 4. a,b,e	1. a,b,f 3. b,c,e,f	2. a,b,f 4. a,d,e	1. b,f 3. b,c,e	2. b,f 4. a,d	1. b,d,e,f 3. b,f	2. a 4. a,b,d	1. b,d,e,g 3. e,f	2. a,b,c 4. b,d,g	1. e 3. e	2. a 4. a,b,d,g
Erosion, Weathering, and Soil	1. a,b,d,e,f 3. e	2. a,c 4. a,b	1. a,e,f 3. N/A	2. a,b,c,f 4. a,b,d	1. a,b,f 3. c,e	2. b,c,f 4. a,d	1. a,b,d,e,f 3. N/A	2. d 4. a,b,d	1. a,b,d,e,g 3. N/A	2. a,b,c 4. b,d	1. a,b,e,f,g,h 3. N/A	2. a,b,c,d,f 4. a,b,d,g
Food Waste	1. a,b,c,d,e,f 3. b,c,e	2. a 4. N/A	1. a,b,c,e,f 3. b,c	2. a,c,f 4. d	1. a,b,c,e,f 3. N/A	2. N/A 4. d	1. a,b,c,d,e,f 3. N/A	2. a 4. d	1. a,b,c,d,e,f,g 3. e	2. N/A 4. d	1. b,c,d,e,f,g,h 3. e	2. N/A 4. d,g
Energy Audit	1. a,b,d,e,f 3. b,e	2. a,c 4. d,f	1. a,b,d,e,f 3. N/A	2. a,c,e,f,g 4. d,e,f,g	1. a,b,d,e,f 3. N/A	2. d,e,f,g 4. d	1. a,b,d,e,f 3. N/A	2. c,d,e 4. d	1. a,b,d,e,f,g 3. N/A	2. c,d,e,g 4. d,e,g	1. d,e,f,g,h 3. N/A	2. a,d,e,g 4. d,g
Saving Resources: Design Challenges	1. a,b,d,e,f 3. e	2. a,b,c 4. b,d,e,f	1. a,b,d,e,f 3. N/A	2. a,b,c,f 4. a,b,d,e,	1. a,b,d,e,f 3. N/A	2. a,b,c,e,f 4. a,d	1. a,b,d,e,f 3. N/A	2. a,b,c,d,e,g 4. d	1. a,b,d,e,f,g 3. N/A	2. c,d,e,g 4. d	1. a,b,c,d,e,f,g,h 3. N/A	2. a,c,d,e,g 4. a,b,d,g
Solar Power Experiments	1. a,b,c,d,e,f 3. e	2. a 4. a,b,e,f	1. a,b,c,d,e,f 3. N/A	2. b,e,f 4. a,e,f	1. a,b,c,d,e,f 3. N/A	2. a,b,e 4. a,e,f	1. a,b,c,d,e,f 3. N/A	2. b,e,g 4. a	1. a,b,c,d,e,f,g 3. N/A	2. a,b,e,g 4. e	1. a,b,c,d,e,f,g,h 3. N/A	2. a,b,e,f,g 4. a,c,d,g
Understanding Pollution: Wonderful Water	1. a,b,d,e,f 3. e	2. a,b 4. b,d	1. a,b,e,f 3. e	2. a,b,f 4. b,d	1. a,f 3. N/A	2. a,b,c,f 4. d	1. a,b,d,f 3. N/A	2. a,b 4. d	1. b,d,e,f,g 3. N/A	2. a,b,g 4. d	1. b,e 3. d	2. a,b,f,g 4. a,d,g
Making Oxygen	1. a,c,d,e,f 3. e	2. a,c 4. b	1. a,b,c,e,f 3. b,e	2. a,b,f 4. d	1. a,b,c,d,e,f 3. a,b,c,d	2. b,f 4. a,d	1. a,b,c,d,e,f 3. b,f	2. b 4. a,d	1. a,b,c,d,e,f,g 3. b,c,f	2. a,b 4. d	1. a,b,c,d,e 3. b,d,e	2. a,b 4. a,d,g
Making Carbon Dioxide	1. a,c,d,e,f 3. e	2. a,c 4. b	1. a,b,c,e,f 3. b,e	2. a,b,f 4. d	1. a,b,c,d,e,f 3. a,b,c,d	2. b,f 4. a,d	1. a,b,c,d,e,f 3. f	2. b 4. a,d	1. a,b,c,d,e,f,g 3. b,c	2. a,b 4. d,g	1. a,b,c,d,e 3. b,d,e	2. a,b 4. a,d,g
Electrical Generation	1. a,d,e,f 3. e	2. a,c,d 4. b	1. a,b,d,e,f 3. N/A	2. a,b,c,d 4. a,d	1. a,b,d,e,f 3. N/A	2. b,c,e 4. a,d	1. a,b,d,e,f 3. N/A	2. b,c,e 4. a,b,d,g	1. a,b,d,e,f,g 3. N/A	2. b,c,d 4. d,g	1. a,b,d,e,f,g,h 3. N/A	2. a,b,c,d,g 4. a,d,g
Watershed History Lesson	1. a,b,d,e,f 3. e	2. a 4. a,b,d	1. a,b,e,f 3. N/A	2. a,b,f 4. a,b,d	1. a,b,e,f 3. N/A	2. b,f 4. a,d	1. a,b,d,e,f 3. e,f	2. b 4. a,b,d	1. a,b,d,e,f,g 3. c	2. a,b 4. b,d,g	1. a,b,d,e,g,h 3. e	2. a,b,f 4. a,b,d,g
Oil Spills	1. a,b,d,e,f 3. a,e	2. a 4. b,d	1. a,b,e,f 3. a	2. a,b,f 4. b,d	1. a,b,f 3. a,c,e	2. b,c,f 4. a,d	1. a,b,d,e,f 3. e,f	2. N/A 4. d	1. a,b,d,e,f,g 3. c	2. a,b 4. d,g	1. a,b,e,f,g,h 3. N/A	2. a,b,g 4. a,d,g
Acid Rain Game	1. a,d,e,f 3. b,c,e	2. a 4. b,d	1. a,b,e,f 3. a	2. a,b,f 4. b,d	1. a,b,f 3. c,e	2. b,f 4. a,d	1. a,d,e,f 3. e,f	2. b 4. a,d	1. a,d,e,f,g 3. c	2. a,b 4. d,g	1. b,e,f,g,h 3. e	2. a,b,f 4. a,d,g
Pollution Indicators	1. a,d,e,f 3. b,e	2. N/A 4. b	1. a,b,d,e,f 3. b,e	2. a,b,f 4. b,d	1. a,b,d,e,f 3. b,c	2. b,f 4. a,d	1. a,b,d,e,f 3. f	2. N/A 4. d	1. a,b,d,e,f,g 3. N/A	2. a,b 4. d,g	1. a,b,d,e,f,g,h 3. N/A	2. a 4. d,g
Water Detectives	1. a,b,c,d,e,f 3. b,e	2. a,c 4. b,d	1. a,b,c,d,e,f 3. b,e	2. a,b,c,f 4. a,b,d	1. a,b,c,d,e,f 3. b,c,e	2. b,e,f 4. a,d	1. a,b,c,d,e,f 3. b,c,e,f	2. b 4. a,b,d	1. a,b,c,d,e,f,g 3. N/A	2. a,b,c,e 4. b,d	1. a,b,c,d,e,f,g,h 3. e	2. a,b,d,e,f 4. a,b,d,g
Water Testing	1. a,c,d,e,f 3. e	2. a,b,c 4. b,d	1. a,b,c,d,e,f 3. e	2. a,b,c,f 4. b,d	1. a,b,c,e,f 3. c,e	2. b,e,f 4. a,d	1. a,b,c,d,e,f 3. N/A	2. e 4. b,d	1. b,c,d,e,f,g 3. N/A	2. a,b,c,e 4. b,d	1. a,b,c,d,e,f,g,h 3. e	2. a,b,c,d,e,f 4. a,b,c,d,g
Indicator Species	1. a,b,c,d,e,f 3. a,e	2. a,c 4. a,b,e	1. a,b,c,d,e,f 3. a,c,e	2. a,c,f 4. a,b,d,e	1. a,b,c,d,e,f 3. a,c,e	2. c,e,f 4. a,d	1. a,b,c,d,e,f 3. a,c,e,f	2. e 4. a,b,d	1. a,b,d,e,f,g 3. a,c,e,f	2. a,e 4. b,d	1. b,c,d,e,g,h 3. a,b,d,e	2. e 4. a,b,d,g
Model Sewage Treatment	1. a,b,d,e,f 3. a,b,e	2. a,b,c 4. a,b,d	1. a,b,d,e,f 3. e	2. a,b,c,f 4. a,b,d	1. b,d,f 3. c	2. b,c,e,f 4. a,d	1. a,b,d,e,f 3. e,f	2. b,d,e 4. a,d	1. a,b,d,e,f,g 3. N/A	2. a,b,c 4. a,d	1. a,b,e,f,g,h 3. N/A	2. a,b,d,f 4. a,d,g
Making Greenhouses	1. a,c,d,e,f 3. b,e	2. a 4. b,e,f	1. a,c,d,e,f 3. e	2. a,b,e,f 4. b,d,e	1. a,b,c,d,e,f 3. N/A	2. b,e,f 4. a,d,e	1. a,c,d,e,f 3. N/A	2. b,e 4. d	1. b,c,d,e,f,g 3. N/A	2. a,e,g 4. b,d	1. a,b,c,d,e,f,g,h 3. N/A	2. a,b,g 4. a,b,d,g
Climate VS Weather	1. a,b,c,d,e,f 3. b	2. c 4. b,c,d,e,f	1. a,b,c,d,e,f 3. N/A	2. a,b,c,f 4. b,c,d,g	1. c,e,f 3. c	2. a,b,f 4. a,c,d,e	1. a,b,c,d,e,f 3. N/A	2. b 4. b,c,d	1. b,c,d,e,f,g 3. N/A	2. c 4. b,c,d,e,g	1. b,c,d,e,g,h 3. N/A	2. c 4. a,b,c,d,g

Figure 5: *2010 Mississippi Science Framework*: Content Strands and Objectives Chart

Think Green, Take Action: Books and Activities for Kids	Kindergarten			1st Grade			2nd Grade			3rd Grade			4th Grade			5th Grade		
	2011 Mississippi Social Studies Framework: Content Strands and Objectives [1. Domestic Affairs] [2. Global/International Affairs] [3. Civil Rights/Human Rights] [4. Economics] [5. Culture]																	
Outside/Secret Spot/Nature Journals	1. a	2. a,b,c	3. a,b,c,d	1. N/A	2. b,d	3. a,b,c,d,e	1. N/A	2. b,c	3. a,b,c,d	1. N/A	2. a	3. N/A	1. N/A	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. N/A	5. N/A		4. N/A	5. a,b		4. N/A	5. N/A		3. a	4. N/A	5. N/A	4. N/A	5. N/A	
Cycle Games	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. c,d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. N/A	1. N/A	1b. N/A	2. a,b	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. N/A		4. N/A	5. N/A		4. a,b,c	5. N/A		4. a,d	5. N/A		3. N/A	4. a,b,c,d,e,f	5. N/A	4. N/A	5. N/A	
Fox/Rabbit/Grass Game	1. a	2. a,c	3. a,b,c,d	1. N/A	2. N/A	3. a,b,c,d,e	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. a	3. N/A	1. N/A	1b. N/A	2. b	1. N/A	2. d	3. N/A
	4. a	5. N/A		4. N/A	5. N/A		4. c	5. N/A		4. a,c,d	5. N/A		3. N/A	4. a,c,f	5. N/A	4. N/A	5. N/A	
Animal Adaptation Research	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. N/A	2. a	3. a,b,c	1. N/A	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. N/A	5. N/A		4. N/A	5. N/A		4. N/A	5. N/A		4. a,c,d	5. a		3. N/A	4. N/A	5. N/A	4. N/A	5. N/A	
Bird Watching	1. a	2. a,b,c	3. a,b,c,d	1. N/A	2. a,b,d	3. a,b,c,d,e	1. N/A	2. a,b,d	3. a,b,c,d	1. e	2. a	3. a,b,c	1. d	1b. N/A	2. a,b	1. N/A	2. N/A	3. N/A
	4. a,d	5. a,c		4. N/A	5. c		4. N/A	5. c		4. a,c,d	5. a		3. a	4. a,c,e,f	5. b	4. N/A	5. N/A	
Counting Plants	1. N/A	2. a,b,c	3. a,b,c,d	1. N/A	2. b,d	3. a,b,c,d,e	1. N/A	2. c	3. a,b,c,d	1. e	2. a	3. N/A	1. d	1b. N/A	2. a,b	1. N/A	2. d	3. N/A
	4. d	5. a,c		4. N/A	5. N/A		4. N/A	5. N/A		4. a,c,d	5. a		3. a	4. a,c,e,f	5. c	4. N/A	5. N/A	
Bioaccumulation Game	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. N/A	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. b,c,e	2. a	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. c		4. a,b,c	5. c		4. a,b,c	5. c		4. a,c,d	5. c		3. a	4. a,b,c,e	5. N/A	4. N/A	5. N/A	
Overconsumption (Fish Game)	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. N/A	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. b,c,d,e	2. a	3. a,b,c	1. a,b,c,d	1b. N/A	2. a,c	1. d	2. d	3. b
	4. a,b,c,d	5. a		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,c,d	5. N/A		3. a	4. a,b,c,d,e,f	5. a,c	4. a,c	5. b,c	
Green Space Survey	1. a	2. a,b,c	3. a,b,c,d	1. N/A	2. a,b,d	3. a,b,c,d,e	1. a,b,c,d	2. b,c,d	3. a,b,c,d	1. e	2. a,b	3. a,b,c	1. a,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. d	5. N/A		4. a,b,c	5. N/A		4. b	5. b		4. a,c,d	5. a		3. N/A	4. a,c	5. b	4. N/A	5. b,c	
Watching the School's Wild Animals	1. a	2. a,c	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. a,b	1. d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. N/A	5. N/A		4. N/A	5. N/A		4. N/A	5. N/A		4. e	5. N/A		3. a,c	4. N/A	5. N/A	4. N/A	5. N/A	
Success Stories	1. d	2. N/A	3. a,b,c,d	1. a	2. a	3. a,b,c,d,e	1. a,b,c,d	2. a,e	3. a,b,c,d	1. a,b,c,e	2. a,b	3. a,b,c	1. a,b,c,d	1b. N/A	2. a,b	1. N/A	2. N/A	3. N/A
	4. N/A	5. a,c		4. N/A	5. c		4. b,c	5. c		4. a,b,c,d	5. a,c		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Local Endangered Species Research Project/Protection Poster	1. a	2. N/A	3. a,b,c,d	1. N/A	2. a	3. a,b,c,d,e	1. a,b,c,d	2. a,c	3. a,b,c,d	1. a,b,c,e	2. a,b	3. a,b,c	1. a,b,c,d	1b. N/A	2. a,b	1. N/A	2. N/A	3. N/A
	4. d	5. a,c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d	5. a,e		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Design a Zoo	1. a	2. a,b,c	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. N/A	2. b,d	3. a,b,c,d	1. e	2. a,b	3. a,b	1. e	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,d	5. a		3. a	4. c,f	5. N/A	4. N/A	5. N/A	
Mining Chocolate Chips/How Much Do We Take?	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. c	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. a,b,c,d,e	2. a,b	3. a,b,c	1. a,b,c,d	1b. N/A	2. b,c	1. d	2. d	3. b
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,c,d,e	5. N/A		3. a	4. a,b,c,d,e,f	5. N/A	4. a,c	5. b,c	
How Many Trees Does It Take to Build a House?	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. c,d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. a,b,c,d,e	2. a,b	3. N/A	1. a,b,c,d	1b. N/A	2. a,b,c	1. d	2. d	3. b
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,c,d,e	5. N/A		3. a	4. a,b,c,d,e,f	5. a	4. a,c	5. b,c	
How Much Is Left Over?	1. N/A	2. a	3. a,b,c,d	1. N/A	2. c,d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. a,b,c,d,e	2. a,b	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,b,c,d,e	5. N/A		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Who Needs Soil?	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. c	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. a	1. a,b,c,d	1b. a	2. a,b,c	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d	5. N/A		3. a	4. a,c,e,f	5. a,c	4. N/A	5. N/A	
Racing for Soil Game	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. N/A	3. a,b,c,d,e	1. N/A	2. N/A	3. a,b,c,d	1. e	2. N/A	3. N/A	1. a,b,c,d	1b. a	2. a,b,c	1. N/A	2. N/A	3. N/A
	4. a	5. N/A		4. N/A	5. N/A		4. N/A	5. N/A		4. a,c,d	5. N/A		3. a	4. a,c,e,f	5. a,c	4. N/A	5. N/A	
Erosion, Weathering, and Soil	1. N/A	2. a	3. a,b,c,d	1. N/A	2. N/A	3. a,b,c,d,e	1. N/A	2. N/A	3. a,b,c,d	1. e	2. N/A	3. N/A	1. a,b,c,d	1b. N/A	2. a,b,c	1. N/A	2. d	3. N/A
	4. N/A	5. N/A		4. N/A	5. N/A		4. N/A	5. N/A		4. a,c,d	5. N/A		3. a	4. a,b,c,d,e,f	5. a,c	4. N/A	5. b,c	
Food Waste	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. c	3. a,b,c,d,e	1. a,b,c,d	2. N/A	3. a,b,c,d	1. b,c,d,e	2. a	3. a,b,c	1. a,b,c,d	1b. a	2. a	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d,e	5. N/A		3. a	4. a,b,c,e,f	5. a	4. N/A	5. N/A	
Energy Audit	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. b,d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. N/A	3. N/A	1. a,b,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. b,c		4. a,c,d	5. c		3. a	4. a,b,c,d,e,f	5. N/A	4. N/A	5. N/A	
Saving Resources: Design Challenges	1. N/A	2. a	3. a,b,c,d	1. N/A	2. c	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. N/A	1. a,b,c,d	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. a,c		4. a,b,c	5. c		4. a,b,c	5. b		4. a,c,d,e	5. N/A		3. a	4. a,b,c,d,e,f	5. N/A	4. N/A	5. N/A	
Solar Power Experiments	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. b,d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. N/A	1. a,b,c,e	1b. N/A	2. a,c	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d,e	5. N/A		3. a	4. a,b,c	5. N/A	4. N/A	5. N/A	
Understanding Pollution: Wonderful Water	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. d	2. d	3. a,b,c,d	1. b,c,d,e	2. N/A	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. a,c		4. a,b,c	5. c		4. a,b,c	5. b		4. a,c,d	5. N/A		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Making Oxygen	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. e	2. N/A	3. c	1. a,b,c,e	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,b,c	5. N/A		3. a	3. a,b,c,d	5. N/A	4. N/A	5. N/A	
Making Carbon Dioxide	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. c	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. e	2. N/A	3. a	1. a,b,c,d	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,b,c,e	5. N/A		3. a	2. a,b,c,d	5. N/A	4. N/A	5. N/A	
Electrical Generation	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. b,c,d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. N/A	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. a		4. a,b,c	5. c		4. a,b,c	5. b,c		4. a,b,c,d	5. c		3. a	4. a,b,c,e	5. N/A	4. N/A	5. N/A	
Watershed History Lesson	1. N/A	2. a	3. a,b,c,d	1. N/A	2. a,b,c,d	3. a,b,c,d,e	1. a,b,c,d	2. a,b,c,d	3. a,b,c,d	1. a,b,c,d,e	2. N/A	3. a,b,c	1. a,b,c,d	1b. a	2. a,b,c	1. N/A	2. d	3. N/A
	4. a,c,d	5. a,c		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,c,d	5. a		3. a	4. a,b,c,d,e,f	5. a,c	4. a,c	5. b,c	
Oil Spills	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. a,b,c,d	3. a,b,c,d,e	1. a,b,c,d	2. a,b,c,d	3. a,b,c,d	1. a,b,c,d,e	2. N/A	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. a,c		4. a,b,c	5. c		4. a,b,c	5. b		4. a,b,c,d	5. N/A		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Acid Rain Game	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. a,b,c,d	3. a,b,c,d,e	1. N/A	2. a,b,d	3. a,b,c,d	1. c,e	2. N/A	3. a,b,c	1. a,b,c,d	1b. N/A	2. a,b,c	1. N/A	2. N/A	3. N/A
	4. a,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. b		4. a,c,d	5. N/A		3. a	4. a,b,c,e	5. N/A	4. N/A	5. N/A	
Pollution Indicators	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. e	2. N/A	3. N/A	1. a,b,c,d	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. a		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d	5. N/A		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Water Detectives	1. N/A	2. a,b,c	3. a,b,c,d	1. N/A	2. a,b,d	3. a,b,c,d,e	1. a,b,c,d	2. b,c,d	3. a,b,c,d	1. a,b,c,d,e	2. a,b	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d,e	5. N/A		3. a	4. a,b,c	5. N/A	4. N/A	5. N/A	
Water Testing	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. a,b,c,d,e	2. N/A	3. a,b,c	1. a,b,c,d	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,c,d,e	5. N/A		3. a	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	
Indicator Species	1. N/A	2. a,c	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. N/A	2. d	3. a,b,c,d	1. e	2. a	3. a,b,c	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,c,d	5. N/A		3. a	4. a,b,c	5. N/A	4. N/A	5. N/A	
Model Sewage Treatment	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. e	2. N/A	3. a,b,c	1. a,b,c,d	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,c,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d,e	5. N/A		3. a	4. a,b,c,f	5. N/A	4. N/A	5. N/A	
Making Greenhouses	1. N/A	2. N/A	3. a,b,c,d	1. N/A	2. c,d	3. a,b,c,d,e	1. a,b,c,d	2. d	3. a,b,c,d	1. e	2. N/A	3. a,b,c	1. e	1b. N/A	2. N/A	1. N/A	2. N/A	3. N/A
	4. a,d	5. N/A		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,b,c,d	5. N/A		3. N/A	4. a,b,c,f	5. N/A	4. N/A	5. N/A	
Climate VS Weather	1. N/A	2. a,b,c	3. a,b,c,d	1. N/A	2. a,b,c,d	3. a,b,c,d,e	1. a,b,c,d	2. a,b,d	3. a,b,c,d	1. e	2. a,b	3. N/A	1. a,b,c,d	1b. N/A	2. a	1. N/A	2. N/A	3. N/A
	4. a,d	5. c		4. a,b,c	5. N/A		4. a,b,c	5. N/A		4. a,c	5. N/A		3. N/A	4. a,b,c,e,f	5. N/A	4. N/A	5. N/A	

Figure 6: ***2011 Mississippi Social Studies Framework:*** **Content Strands and Objectives Chart**

Think Green, Take Action: Books and Activities for Kids	Kindergarten						
	Science		Total:	Social Studies			Total:
Outside/Secret Spot/Nature Journals	1. 6/6 (100%)	2. 3/4 (75%)	20/21 (95.2%)	1. 1/2 (50%)	2. 3/3 (100%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 5/5 (100%)	4. 6/6 (100%)		4. 2/4 (50%)	5. 0/3 (0%)		
Cycle Games	1. 4/6 (66.7%)	2. 3/4 (75%)	14/21 (66.7%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 4/5 (80%)	4. 3/6 (50%)		4. 3/4 (75%)	5. 0/3 (0%)		
Fox/Rabbit/Grass Game	1. 4/6 (66.7%)	2. 2/4 (50%)	10/21 (47.6%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	7/16 (43.8%)
	3. 3/5 (60%)	4. 1/6 (16.7%)		4. 1/4 (25%)	5. 0/3 (0%)		
Animal Adaptation Research	1. 5/6 (83.3%)	2. 0/4 (0%)	11/21 (52.4%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	4/16 (25%)
	3. 4/5 (80%)	4. 2/6 (33.3%)		4. 0/4 (0%)	5. 0/3 (0%)		
Bird Watching	1. 6/6 (100%)	2. 1/4 (25%)	13/21 (61.9%)	1. 0/2 (0%)	2. 3/3 (100%)	3. 4/4 (100%)	11/16 (68.8%)
	3. 4/5 (80%)	4. 2/6 (33.3%)		4. 2/4 (50%)	5. 2/3 (66.7%)		
Counting Plants	1. 6/6 (100%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 3/3 (100%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 1/5 (20%)	4. 2/6 (33.3%)		4. 1/4 (25%)	5. 2/3 (66.7%)		
Bioaccumulation Game	1. 5/6 (83.3%)	2. 1/4 (25%)	8/21 (38.1%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 2/5 (40%)	4. 0/6 (0%)		4. 2/4 (50%)	5. 1/3 (33.3%)		
Overconsumption (Fish Game)	1. 4/6 (66.7%)	2. 1/4 (25%)	7/21 (33.3%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 2/5 (40%)	4. 0/6 (0%)		4. 2/4 (50%)	5. 1/3 (33.3%)		
Green Space Survery	1. 6/6 (100%)	2. 1/4 (25%)	8/21 (38.1%)	1. 1/2 (50%)	2. 3/3 (100%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 0/5 (0%)	4. 1/6 (16.7%)		4. 1/4 (25%)	5. 1/3 (33.3%)		
Watching the School's Wild Animals	1. 6/6 (100%)	2. 1/4 (25%)	13/21 (61.9%)	1. 1/2 (50%)	2. 2/3 (66.7%)	3. 4/4 (100%)	7/16 (43.8%)
	3. 5/5 (100%)	4. 1/6 (16.7%)		4. 0/4 (0%)	5. 0/3 (0%)		
Success Stories	1. 5/6 (83.3%)	2. 0/4 (0%)	9/21 (42.9%)	1. 1/2 (50%)	2. 0/3 (0%)	3. 4/4 (100%)	7/16 (43.8%)
	3. 4/5 (80%)	4. 0/6 (0%)		4. 0/4 (0%)	5. 2/3 (66.7%)		
Local Endangered Species Research Project/Protection Poster	1. 5/6 (83.3%)	2. 0/4 (0%)	11/21 (52.4%)	1. 1/2 (50%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 4/5 (80%)	4. 2/6 (33.3%)		4. 1/4 (25%)	5. 2/3 (66.7%)		
Design a Zoo	1. 5/6 (83.3%)	2. 0/4 (0%)	14/21 (66.7%)	1. 1/2 (50%)	2. 3/3 (100%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 5/5 (100%)	4. 4/6 (66.7%)		4. 2/4 (50%)	5. 0/3 (0%)		
Mining Chocolate Chips/How Much Do We Take?	1. 5/6 (83.3%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 2/5 (40%)	4. 2/6 (33.3%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
How Many Trees Does It Take to Build a House?	1. 6/6 (100%)	2. 2/4 (50%)	13/21 (61.9%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 2/5 (40%)	4. 3/6 (50%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
How Much Is Left Over?	1. 6/6 (100%)	2. 1/4 (25%)	12/21 (57.1%)	1. 0/2 (0%)	2. 1/3 (33.3%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 3/5 (60%)	4. 2/6 (33.3%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Who Needs Soil?	1. 5/6 (83.3%)	2. 1/4 (25%)	11/21 (52.4%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 2/5 (40%)	4. 3/6 (50%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Racing for Soil Game	1. 4/6 (66.7%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	7/16 (43.8%)
	3. 2/5 (40%)	4. 3/6 (50%)		4. 1/4 (25%)	5. 0/3 (0%)		
Erosion, Weathering, and Soil	1. 5/6 (83.3%)	2. 2/4 (50%)	10/21 (47.6%)	1. 0/2 (0%)	2. 1/3 (33.3%)	3. 4/4 (100%)	5/16 (31.3%)
	3. 1/5 (20%)	4. 2/6 (33.3%)		4. 0/4 (0%)	5. 0/3 (0%)		
Food Waste	1. 6/6 (100%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 3/5 (60%)	4. 0/6 (0%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Energy Audit	1. 5/6 (83.3%)	2. 2/4 (50%)	11/21 (52.4%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 2/5 (40%)	4. 2/6 (33.3%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Saving Resources: Design Challenges	1. 5/6 (83.3%)	2. 3/4 (75%)	13/21 (61.9%)	1. 0/2 (0%)	2. 1/3 (33.3%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 1/5 (20%)	4. 4/6 (66.7%)		4. 3/4 (75%)	5. 2/3 (66.7%)		
Solar Power Experiments	1. 6/6 (100%)	2. 1/4 (25%)	12/21 (57.1%)	1. 0/2 (0%)	2. 1/3 (33.3%)	3. 4/4 (100%)	8/16 (50%)
	3. 1/5 (20%)	4. 4/6 (66.7%)		4. 3/4 (75%)	5. 0/3 (0%)		
Understanding Pollution: Wonderful Water	1. 5/6 (83.3%)	2. 2/4 (50%)	10/21 (47.6%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 1/5 (20%)	4. 2/6 (33.3%)		4. 3/4 (75%)	5. 2/3 (66.7%)		
Making Oxygen	1. 5/6 (83.3%)	2. 2/4 (50%)	9/21 (42.9%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	6/16 (37.5%)
	3. 1/5 (20%)	4. 1/6 (16.7%)		4. 2/4 (50%)	5. 0/3 (0%)		
Making Carbon Dioxide	1. 5/6 (83.3%)	2. 2/4 (50%)	9/21 (42.9%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	6/16 (37.5%)
	3. 1/5 (20%)	4. 1/6 (16.7%)		4. 2/4 (50%)	5. 0/3 (0%)		
Electrical Generation	1. 4/6 (66.7%)	2. 3/4 (75%)	9/21 (42.9%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 1/5 (20%)	4. 1/6 (16.7%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Watershed History Lesson	1. 5/6 (83.3%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 1/3 (33.3%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 1/5 (20%)	4. 3/6 (50%)		4. 3/4 (75%)	5. 2/3 (66.7%)		
Oil Spills	1. 5/6 (83.3%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 2/5 (40%)	4. 2/6 (33.3%)		4. 2/4 (50%)	5. 2/3 (66.7%)		
Acid Rain Game	1. 4/6 (66.7%)	2. 1/4 (25%)	10/21 (47.6%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 3/5 (60%)	4. 2/6 (33.3%)		4. 2/4 (50%)	5. 1/3 (33.3%)		
Pollution Indicators	1. 4/6 (66.7%)	2. 0/4 (0%)	7/21 (33.3%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	7/16 (43.8%)
	3. 2/5 (40%)	4. 1/6 (33.3%)		4. 2/4 (50%)	5. 1/3 (33.3%)		
Water Detectives	1. 6/6 (100%)	2. 2/4 (50%)	12/21 (57.1%)	1. 0/2 (0%)	2. 3/3 (100%)	3. 4/4 (100%)	9/16 (56.3%)
	3. 2/5 (40%)	4. 2/6 (33.3%)		4. 2/4 (50%)	5. 0/3 (0%)		
Water Testing	1. 5/6 (83.3%)	2. 3/4 (75%)	11/21 (52.4%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	8/16 (50%)
	3. 1/5 (20%)	4. 2/6 (33.3%)		4. 2/4 (50%)	5. 0/3 (0%)		
Indicator Species	1. 6/6 (100%)	2. 2/4 (50%)	13/21 (61.9%)	1. 0/2 (0%)	2. 2/3 (66.7%)	3. 4/4 (100%)	8/16 (50%)
	3. 2/5 (40%)	4. 3/6 (50%)		4. 2/4 (50%)	5. 0/3 (0%)		
Model Sewage Treatment	1. 5/6 (83.3%)	2. 3/4 (75%)	14/21 (66.7%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	8/16 (50%)
	3. 3/5 (60%)	4. 3/6 (50%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
Making Greenhouses	1. 5/6 (83.3%)	2. 1/4 (25%)	11/21 (52.4%)	1. 0/2 (0%)	2. 0/3 (0%)	3. 4/4 (100%)	6/16 (37.5%)
	3. 2/5 (40%)	4. 3/6 (50%)		4. 2/4 (50%)	5. 0/3 (0%)		
Climate VS Weather	1. 6/6 (100%)	2. 1/4 (25%)	13/21 (61.9%)	1. 0/2 (0%)	2. 3/3 (100%)	3. 4/4 (100%)	10/16 (62.5%)
	3. 1/5 (20%)	4. 5/6 (83.3%)		4. 2/4 (50%)	5. 1/3 (33.3%)		

Figure 7a: Kindergarten Section of the Calculated Objectives and Totals Chart

1st Grade						
Science		Total:	Social Studies			Total:
1. 6/6 (100%)	2. 6/7 (85.7%)	25/26 (96.2%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	7/19 (36.8%)
3. 6/6 (100%)	4. 7/7 (100%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 4/7 (57.1%)	14/26 (53.8%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	7/19 (36.8%)
3. 4/6 (66.7%)	4. 3/7 (42.9%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	10/26 (38.5%)	1. 0/3 (0%)	2. 0/4 (0%)	3. 5/5 (100%)	5/19 (26.3%)
3. 4/6 (66.7%)	4. 2/7 (28.6%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	12/26 (46.2%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	6/19 (31.6%)
3. 6/6 (100%)	4. 2/7 (28.6%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	10/26 (38.5%)	1. 0/3 (0%)	2. 3/4 (75%)	3. 5/5 (100%)	9/19 (47.4%)
3. 5/6 (83.3%)	4. 0/7 (0%)		4. 0/4 (0%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	11/26 (42.3%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	7/19 (36.8%)
3. 4/6 (66.7%)	4. 2/7 (28.6%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 0/7 (0%)	8/26 (30.8%)	1. 0/3 (0%)	2. 0/4 (0%)	3. 5/5 (100%)	9/19 (47.4%)
3. 3/6 (50%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
1. 3/6 (50%)	2. 0/7 (0%)	7/26 (26.9%)	1. 0/3 (0%)	2. 0/4 (0%)	3. 5/5 (100%)	8/19 (42.1%)
3. 3/6 (50%)	4. 1/7 (14.3%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 1/7 (14.3%)	7/26 (26.9%)	1. 0/3 (0%)	2. 3/4 (75%)	3. 5/5 (100%)	11/19 (57.9%)
3. 0/6 (0%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 2/7 (28.6%)	10/26 (38.5%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	6/19 (31.6%)
3. 4/6 (66.7%)	4. 0/7 (0%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	13/26 (50%)	1. 1/3 (33.3%)	2. 1/4 (25%)	3. 5/5 (100%)	8/19 (42.1%)
3. 6/6 (100%)	4. 3/7 (42.9%)		4. 0/4 (0%)	5. 1/3 (33.3%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	13/26 (50%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 6/6 (100%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 1/7 (14.3%)	15/26 (57.7%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 5/6 (83.3%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 4/7 (57.1%)	12/26 (46.2%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 5/7 (71.4%)	16/26 (61.5%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	10/19 (52.6%)
3. 1/6 (16.7%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	13/26 (50%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	10/19 (52.6%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 3/7 (42.9%)	13/26 (50%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 3/6 (50%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 3/7 (42.9%)	13/26 (50%)	1. 0/3 (0%)	2. 0/4 (0%)	3. 5/5 (100%)	5/19 (26.3%)
3. 4/6 (66.7%)	4. 3/7 (42.9%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 4/7 (57.1%)	10/26 (38.5%)	1. 0/3 (0%)	2. 0/4 (0%)	3. 5/5 (100%)	5/19 (26.3%)
3. 0/6 (0%)	4. 3/7 (42.9%)		4. 0/4 (0%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	11/26 (42.3%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 5/7 (71.4%)	14/26 (53.8%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	10/19 (52.6%)
3. 0/6 (0%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 4/7 (57.1%)	13/26 (50%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	10/19 (52.6%)
3. 0/6 (0%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	13/26 (50%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	10/19 (52.6%)
3. 0/6 (0%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3		
1. 4/6 (66.7%)	2. 3/7 (42.9%)	10/26 (38.5%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	10/19 (52.6%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	11/26 (42.3%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	11/26 (42.3%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 4/7 (57.1%)	11/26 (42.3%)	1. 0/3 (0%)	2. 3/4 (75%)	3. 5/5 (100%)	12/19 (63.2%)
3. 0/6 (0%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
1. 4/6 (66.7%)	2. 3/7 (42.9%)	10/26 (38.5%)	1. 0/3 (0%)	2. 4/4 (100%)	3. 5/5 (100%)	12/19 (63.2%)
3. 0/6 (0%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 3/7 (42.9%)	10/26 (38.5%)	1. 0/3 (0%)	2. 4/4 (100%)	3. 5/5 (100%)	13/19 (68.4%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 1/3 (33.3%)		
1. 4/6 (66.7%)	2. 3/7 (42.9%)	10/26 (38.5%)	1. 0/3 (0%)	2. 4/4 (100%)	3. 5/5 (100%)	12/19 (63.2%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	12/26 (46.2%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 4/7 (57.1%)	15/26 (57.7%)	1. 0/3 (0%)	2. 3/4 (75%)	3. 5/5 (100%)	11/19 (57.9%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 4/7 (57.1%)	13/26 (50%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	16/26 (61.5%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 3/6 (50%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 4/7 (57.1%)	13/26 (50%)	1. 0/3 (0%)	2. 1/4 (25%)	3. 5/5 (100%)	9/19 (47.4%)
3. 1/6 (16.7%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 4/7 (57.1%)	13/26 (50%)	1. 0/3 (0%)	2. 2/4 (50%)	3. 5/5 (100%)	10/19 (52.6%)
3. 1/6 (16.7%)	4. 3/7 (42.9%)		4. 3/4 (75%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 4/7 (57.1%)	14/26 (53.8%)	1. 0/3 (0%)	2. 4/4 (100%)	3. 5/5 (100%)	12/19 (63.2%)
3. 0/6 (0%)	4. 4/7 (57.1%)		4. 3/4 (75%)	5. 0/3 (0%)		

Figure 7b: 1st Grade Section of the Calculated Objectives and Totals Chart

2nd Grade						
Science		Total:	Social Studies			Total:
1. 6/6 (100%)	2. 4/7 (57.1%)	20/24 (83.3%)	1. 0/4 (0%)	2. 2/4 (50%)	3. 4/5 (80%)	8/19 (42.1%)
3. 5/5 (100%)	4. 5/6 (83.3%)		4. 0/3 (0%)	5. 2/3 (66.7%)		
1. 3/6 (50%)	2. 3/7 (42.9%)	14/24 (58.3%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	8/19 (42.1%)
3. 5/5 (100%)	4. 3/6 (50%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 0/7 (0%)	9/24 (37.5%)	1. 0/4 (0%)	2. 0/4 (0%)	3. 4/5 (80%)	5/19 (26.3%)
3. 5/5 (100%)	4. 1/6 (16.7%)		4. 1/3 (33.3%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	9/24 (37.5%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	5/19 (26.3%)
3. 5/5 (100%)	4. 0/6 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	10/24 (41.6%)	1. 0/4 (0%)	2. 3/4 (75%)	3. 4/5 (80%)	8/19 (42.1%)
3. 4/5 (80%)	4. 1/6 (16.7%)		4. 0/3 (0%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	9/24 (37.5%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	5/19 (26.3%)
3. 3/5 (60%)	4. 1/6 (16.7%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 2/6 (33.3%)	2. 0/7 (0%)	6/24 (25%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	13/19 (68.4%)
3. 3/5 (60%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 2/6 (33.3%)	2. 0/7 (0%)	5/24 (20.8%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 2/5 (40%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 0/7 (0%)	4/24 (16.7%)	1. 4/4 (100%)	2. 3/4 (75%)	3. 4/5 (80%)	13/19 (68.4%)
3. 0/5 (0%)	4. 1/6 (16.7%)		4. 1/3 (33.3%)	5. 1/3 (33.3%)		
1. 2/6 (33.3%)	2. 0/7 (0%)	8/24 (33.3%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	5/19 (26.3%)
3. 5/5 (100%)	4. 1/6 (16.7%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	10/24 (41.6%)	1. 4/4 (100%)	2. 2/4 (50%)	3. 4/5 (80%)	13/19 (68.4%)
3. 5/5 (100%)	4. 1/6 (16.7%)		4. 2/3 (66.7%)	5. 1/3 (33.3%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	10/24 (41.6%)	1. 4/4 (100%)	2. 2/4 (50%)	3. 4/5 (80%)	13/19 (68.4%)
3. 5/5 (100%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	12/24 (50%)	1. 0/4 (0%)	2. 2/4 (50%)	3. 4/5 (80%)	9/19 (47.4%)
3. 5/5 (100%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 2/7 (28.6%)	10/24 (41.6%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 1/5 (20%)	4. 3/6 (50%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 2/7 (28.6%)	11/24 (45.8%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	13/19 (68.4%)
3. 1/5 (20%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 2/7 (28.6%)	11/24 (45.8%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	13/19 (68.4%)
3. 1/5 (20%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 3/6 (50%)	2. 2/7 (28.6%)	10/24 (41.6%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	8/19 (42.1%)
3. 3/5 (60%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 2/6 (33.3%)	2. 2/7 (28.6%)	11/24 (45.8%)	1. 0/4 (0%)	2. 0/4 (0%)	3. 4/5 (80%)	4/19 (21.1%)
3. 3/5 (60%)	4. 2/6 (33.3%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 3/7 (42.9%)	10/24 (41.6%)	1. 0/4 (0%)	2. 0/4 (0%)	3. 4/5 (80%)	4/19 (21.1%)
3. 2/5 (40%)	4. 2/6 (33.3%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	6/24 (25%)	1. 4/4 (100%)	2. 0/4 (50%)	3. 4/5 (80%)	11/19 (57.9%)
3. 0/5 (0%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 4/7 (57.1%)	10/24 (41.6%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	10/19 (52.6%)
3. 0/5 (0%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 2/3 (66.7%)		
1. 5/6 (83.3%)	2. 5/7 (71.4%)	12/24 (50%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	9/19 (47.4%)
3. 0/5 (0%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	12/24 (50%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	8/19 (42.1%)
3. 0/5 (0%)	4. 3/6 (50%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 2/6 (33.3%)	2. 4/7 (57.1%)	7/24 (29.2%)	1. 1/4 (25%)	2. 1/4 (25%)	3. 4/5 (80%)	10/19 (52.6%)
3. 0/5 (0%)	4. 1/6 (16.7%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 2/7 (28.6%)	14/24 (58.3%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	13/19 (68.4%)
3. 4/5 (80%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 2/7 (28.6%)	14/24 (58.3%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	13/19 (68.4%)
3. 4/5 (80%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	10/24 (41.6%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	10/19 (52.6%)
3. 0/5 (0%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 2/3 (66.7%)		
1. 4/6 (66.7%)	2. 2/7 (28.6%)	8/24 (33.3%)	1. 4/4 (100%)	2. 4/4 (100%)	3. 4/5 (80%)	16/19 (84.2%)
3. 0/5 (0%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 3/6 (50%)	2. 3/7 (42.9%)	11/24 (45.8%)	1. 4/4 (100%)	2. 4/4 (100%)	3. 4/5 (80%)	16/19 (84.2%)
3. 3/5 (60%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 3/6 (50%)	2. 2/7 (28.6%)	9/24 (37.5%)	1. 0/4 (0%)	2. 3/4 (75%)	3. 4/5 (80%)	11/19 (57.9%)
3. 2/5 (40%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 2/7 (28.6%)	11/24 (45.8%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 2/5 (40%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	14/24 (58.3%)	1. 4/4 (100%)	2. 3/4 (75%)	3. 4/5 (80%)	14/19 (73.7%)
3. 3/5 (60%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.9%)	12/24 (50%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 2/5 (40%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	14/24 (58.3%)	1. 0/4 (0%)	2. 1/4 (25%)	3. 4/5 (80%)	8/19 (42.1%)
3. 3/5 (60%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 4/7 (57.1%)	10/24 (41.6%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 1/5 (20%)	4. 2/6 (33.3%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.9%)	12/24 (50%)	1. 4/4 (100%)	2. 1/4 (25%)	3. 4/5 (80%)	12/19 (63.2%)
3. 0/5 (0%)	4. 3/6 (50%)		4. 3/3 (100%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 3/7 (42.9%)	11/24 (45.8%)	1. 4/4 (100%)	2. 3/4 (75%)	3. 4/5 (80%)	14/19 (73.7%)
3. 1/5 (20%)	4. 4/6 (66.7%)		4. 3/3 (100%)	5. 0/3 (0%)		

Figure 7c: 2nd Grade Section of the Calculated Objectives and Totals Chart

3rd Grade						
Science		Total:	Social Studies			Total:
1. 6/6 (100%)	2. 2/7 (28.6%)	18/26 (69.2%)	1. 0/5 (0%)	2. 1/2 (50%)	3. 0/3 (0%)	1/18 (5.6%)
3. 4/6 (66.7%)	4. 6/7 (85.7%)		4. 0/5 (0%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 2/7 (28.6%)	11/26 (42.3%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 0/3 (0%)	4/18 (22.2%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		4. 2/5 (40%)	5. 0/3 (0%)		
1. 3/6 (50%)	2. 0/7 (0%)	6/26 (23.1%)	1. 0/5 (0%)	2. 1/2 (50%)	3. 0/3 (0%)	4/18 (22.2%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	10/26 (38.5%)	1. 0/5 (0%)	2. 1/2 (50%)	3. 3/3 (100%)	8/18 (44.4%)
3. 4/6 (66.7%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 0/7 (0%)	10/26 (38.5%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 3/3 (100%)	9/18 (50%)
3. 4/6 (66.7%)	4. 0/7 (0%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 6/6 (100%)	2. 0/7 (0%)	9/26 (34.6%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 0/3 (0%)	6/18 (33.3%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 3/6 (50%)	2. 0/7 (0%)	6/26 (23.1%)	1. 3/5 (60%)	2. 1/2 (50%)	3. 3/3 (100%)	11/18 (61.1%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 0/6 (0%)	2. 0/7 (0%)	1/26 (3.8%)	1. 4/5 (80%)	2. 1/2 (50%)	3. 3/3 (100%)	11/18 (61.1%)
3. 1/6 (16.7%)	4. 0/7 (0%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 0/7 (0%)	8/26 (30.8%)	1. 1/5 (20%)	2. 2/2 (100%)	3. 3/3 (100%)	10/18 (55.5%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 4/6 (66.7%)	2. 0/7 (0%)	8/26 (30.8%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 2/3 (66.7%)	5/18 (27.8%)
3. 4/6 (66.7%)	4. 0/7 (0%)		4. 1/5 (20%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	12/26 (46.2%)	1. 4/5 (80%)	2. 2/2 (100%)	3. 3/3 (100%)	15/18 (83.3%)
3. 6/6 (100%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 2/3 (66.7%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	12/26 (46.2%)	1. 4/5 (80%)	2. 2/2 (100%)	3. 3/3 (100%)	15/18 (83.3%)
3. 6/6 (100%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 2/3 (66.7%)		
1. 5/6 (83.3%)	2. 1/7 (14.3%)	13/26 (50%)	1. 1/5 (20%)	2. 2/2 (100%)	3. 2/3 (66.7%)	8/18 (44.4%)
3. 5/6 (83.3%)	4. 2/7 (28.6%)		4. 2/5 (40%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 5/7 (71.4%)	15/26 (57.7%)	1. 5/5 (100%)	2. 2/2 (100%)	3. 3/3 (100%)	14/18 (77.8%)
3. 1/6 (16.7%)	4. 4/7 (57.1%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.6%)	11/26 (42.3%)	1. 5/5 (100%)	2. 2/2 (100%)	3. 0/3 (0%)	11/18 (61.1%)
3. 0/6 (0%)	4. 2/7 (28.6%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	10/26 (38.5%)	1. 5/5 (100%)	2. 2/2 (100%)	3. 3/3 (100%)	15/18 (83.3%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 5/5 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 1/7 (14.3%)	11/26 (42.3%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 1/3 (33.3%)	7/18 (38.9%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 1/7 (14.3%)	10/26 (38.5%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 0/3 (0%)	4/18 (22.2%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 1/7 (14.3%)	9/26 (34.6%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 0/3 (0%)	4/18 (22.2%)
3. 0/6 (0%)	4. 3/7 (42.9%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	8/26 (30.8%)	1. 4/5 (80%)	2. 1/2 (50%)	3. 3/3 (100%)	13/18 (72.2%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 5/5 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.6%)	9/26 (34.6%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 0/3 (0%)	5/18 (27.8%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 6/7 (85.7%)	12/26 (46.2%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 0/3 (0%)	6/18 (33.3%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 3/7 (42.6%)	10/26 (38.5%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 0/3 (0%)	7/18 (38.9%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 5/5 (100%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 2/7 (28.6%)	7/26 (26.9%)	1. 4/5 (80%)	2. 0/2 (0%)	3. 3/3 (100%)	10/18 (55.5%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	11/26 (42.3%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 1/3 (33.3%)	5/18 (27.8%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	10/26 (38.5%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 1/3 (33.3%)	6/18 (33.3%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.6%)	12/26 (46.2%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 0/3 (0%)	7/18 (38.9%)
3. 0/6 (0%)	4. 4/7 (57.1%)		4. 4/5 (80%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 1/7 (14.3%)	11/26 (42.3%)	1. 5/5 (100%)	2. 0/2 (0%)	3. 3/3 (100%)	12/18 (66.7%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		4. 3/5 (60%)	5. 1/3 (33.3%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	8/26 (30.8%)	1. 5/5 (100%)	2. 0/2 (0%)	3. 3/3 (100%)	12/18 (66.7%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 4/6 (66.7%)	2. 1/7 (14.3%)	9/26 (34.6%)	1. 2/5 (40%)	2. 0/2 (0%)	3. 3/3 (100%)	8/18 (44.4%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 0/7 (0%)	7/26 (26.9%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 0/3 (0%)	5/18 (27.8%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	14/26 (53.8%)	1. 5/5 (100%)	2. 2/2 (100%)	3. 3/3 (100%)	15/18 (83.3%)
3. 4/6 (66.7%)	4. 3/7 (42.9%)		4. 5/5 (100%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	9/26 (34.6%)	1. 5/5 (100%)	2. 0/2 (0%)	3. 3/3 (100%)	12/18 (66.7%)
3. 0/6 (0%)	4. 2/7 (28.6%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	14/26 (53.8%)	1. 1/5 (20%)	2. 1/2 (50%)	3. 3/3 (100%)	8/18 (44.4%)
3. 4/6 (66.7%)	4. 3/7 (42.9%)		4. 3/5 (60%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 3/7 (42.6%)	12/26 (46.2%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 3/3 (100%)	9/18 (50%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		4. 5/5 (100%)	5. 0/3 (0%)		
1. 5/6 (83.3%)	2. 2/7 (28.6%)	8/26 (30.8%)	1. 1/5 (20%)	2. 0/2 (0%)	3. 3/3 (100%)	8/18 (44.4%)
3. 0/6 (0%)	4. 1/7 (14.3%)		4. 4/5 (80%)	5. 0/3 (0%)		
1. 6/6 (100%)	2. 1/7 (14.3%)	10/26 (38.5%)	1. 1/5 (20%)	2. 2/2 (100%)	3. 0/3 (0%)	5/18 (27.8%)
3. 0/6 (0%)	4. 3/7 (42.9%)		4. 2/5 (40%)	5. 0/3 (0%)		

Figure 7d: 3rd Grade Section of the Calculated Objectives and Totals Chart

4th Grade						
Science		Total:	Social Studies			Total:
1. 6/7 (85.7%)	2. 6/7 (85.7%)	22/27 (81.5%)	1. 0/4 (0%)	1b. 0/4 (0%)	2. 0/3 (0%)	1/23 (4.3%)
3. 5/6 (83.3%)	4. 5/7 (71.4%)		3. 1/3 (33.3%)	4. 0/6 (0%)	5. 0/3 (0%)	
1. 2/7 (28.6%)	2. 3/7 (42.9%)	11/27 (40.7%)	1. 0/4 (0%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	8/23 (34.8%)
3. 4/6 (66.7%)	4. 2/7 (28.6%)		3. 0/3 (0%)	4. 6/6 (100%)	5. 0/3 (0%)	
1. 2/7 (28.6%)	2. 1/7 (14.3%)	6/27 (22.2%)	1. 0/4 (0%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	4/23 (17.4%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		3. 0/3 (0%)	4. 3/6 (50%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 0/7 (0%)	9/27 (33.3%)	1. 0/4 (0%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	1/23 (4.3%)
3. 2/6 (33.3%)	4. 1/7 (14.3%)		3. 0/3 (0%)	4. 0/6 (0%)	5. 0/3 (0%)	
1. 4/7 (57.1%)	2. 1/7 (14.3%)	10/27 (37%)	1. 1/4 (25%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	9/23 (39.1%)
3. 4/6 (66.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 1/3 (33.3%)	
1. 6/7 (85.7%)	2. 0/7 (0%)	10/27 (37%)	1. 1/4 (25%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	9/23 (39.1%)
3. 3/6 (50%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 1/3 (33.3%)	
1. 4/7 (57.1%)	2. 1/7 (14.3%)	9/27 (33.3%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	10/23 (43.5%)
3. 3/6 (50%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 4/7 (57.1%)	2. 0/7 (0%)	6/27 (22.2%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	15/23 (65.2%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 2/3 (66.7%)	
1. 7/7 (100%)	2. 0/7 (0%)	10/27 (37%)	1. 2/4 (50%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	6/23 (26.1%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		3. 0/3 (0%)	4. 2/6 (33.3%)	5. 1/3 (33.3%)	
1. 7/7 (100%)	2. 2/7 (28.6%)	12/27 (44.4%)	1. 1/4 (25%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	4/23 (17.4%)
3. 3/6 (50%)	4. 0/7 (0%)		3. 2/3 (66.7%)	4. 0/6 (0%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 1/7 (14.3%)	13/27 (48.1%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	12/23 (52.2%)
3. 5/6 (83.3%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 1/7 (14.3%)	13/27 (48.1%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	12/23 (52.2%)
3. 5/6 (83.3%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	13/27 (48.1%)	1. 1/4 (25%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	5/23 (21.7%)
3. 4/6 (66.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 2/6 (33.3%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	13/23 (56.5%)
3. 0/6 (0%)	4. 3/7 (42.9%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 0/3 (0%)	
1. 7/7 (100%)	2. 2/7 (28.6%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 3/3 (100%)	15/23 (65.2%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 1/3 (33.3%)	
1. 7/7 (100%)	2. 0/7 (0%)	9/27 (33.3%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	11/23 (47.8%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 5/7 (71.4%)	2. 3/7 (42.9%)	10/27 (37%)	1. 4/4 (100%)	1b. 1/4 (25%)	2. 3/3 (100%)	15/23 (65.2%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 2/3 (66.7%)	
1. 4/7 (57.1%)	2. 3/7 (42.9%)	12/27 (44.4%)	1. 4/4 (100%)	1b. 1/4 (25%)	2. 3/3 (100%)	15/23 (65.2%)
3. 2/6 (33.3%)	4. 3/7 (42.9%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 2/3 (66.7%)	
1. 5/7 (71.4%)	2. 3/7 (42.9%)	10/27 (37%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 3/3 (100%)	16/23 (69.6%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 2/3 (66.7%)	
1. 7/7 (100%)	2. 0/7 (0%)	9/27 (33.3%)	1. 4/4 (100%)	1b. 1/4 (25%)	2. 1/3 (33.3%)	13/23 (56.5%)
3. 1/6 (16.7%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 1/3 (33.3%)	
1. 6/7 (85.7%)	2. 4/7 (57.1%)	13/27 (48.1%)	1. 3/4 (75%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	11/23 (47.8%)
3. 0/6 (0%)	4. 3/7 (42.9%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 4/7 (57.1%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	11/23 (47.8%)
3. 0/6 (0%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 0/3 (0%)	
1. 7/7 (100%)	2. 4/7 (57.1%)	12/27 (44.4%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 2/3 (66.7%)	10/23 (43.5%)
3. 0/6 (0%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 3/6 (50%)	5. 0/3 (0%)	
1. 5/7 (71.4%)	2. 3/7 (42.9%)	9/27 (33.3%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	11/23 (47.8%)
3. 0/6 (0%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 7/7 (100%)	2. 2/7 (28.6%)	13/27 (48.1%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	9/23 (39.1%)
3. 3/6 (50%)	4. 1/7 (14.3%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 7/7 (100%)	2. 2/7 (28.6%)	13/27 (48.1%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	9/23 (39.1%)
3. 2/6 (33.3%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 3/7 (42.9%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	10/23 (43.5%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	12/27 (44.4%)	1. 4/4 (100%)	1b. 1/4 (25%)	2. 3/3 (100%)	17/23 (73.9%)
3. 1/6 (16.7%)	4. 3/7 (42.9%)		3. 1/3 (33.3%)	4. 6/6 (100%)	5. 2/3 (66.7%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	11/23 (47.8%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 5/7 (71.4%)	2. 2/7 (28.6%)	10/27 (37%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 3/3 (100%)	12/23 (52.2%)
3. 1/6 (16.7%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	10/27 (37%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	10/23 (43.5%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 7/7 (100%)	2. 4/7 (57.1%)	13/27 (48.1%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	9/23 (39.1%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 3/6 (50%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 4/7 (57.1%)	12/27 (44.4%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	10/23 (43.5%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 5/6 (83.3%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 2/7 (28.6%)	14/27 (57%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	9/23 (39.1%)
3. 4/6 (66.7%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 3/6 (50%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 3/7 (42.9%)	11/27 (40.7%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 0/3 (0%)	9/23 (39.1%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 1/3 (33.3%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 3/7 (42.9%)	11/27 (40.7%)	1. 1/4 (25%)	1b. 0/4 (0%)	2. 0/3 (0%)	5/23 (21.7%)
3. 0/6 (0%)	4. 2/7 (28.6%)		3. 0/3 (0%)	4. 4/6 (66.7%)	5. 0/3 (0%)	
1. 6/7 (85.7%)	2. 1/7 (14.3%)	12/27 (44.4%)	1. 4/4 (100%)	1b. 0/4 (0%)	2. 1/3 (33.3%)	10/23 (43.5%)
3. 0/6 (0%)	4. 5/7 (71.4%)		3. 0/3 (0%)	4. 5/6 (83.3%)	5. 0/3 (0%)	

Figure 7e: 4th Grade Section of the Calculated Objectives and Totals Chart

5th Grade						
Science		Total:	Social Studies			Total:
1. 0/8 (0%)	2. 0/7 (0%)	5/27 (18.5%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 3/5 (60%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 3/8 (37.5%)	2. 2/7 (28.6%)	9/27 (33.3%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 3/8 (37.5%)	2. 0/7 (0%)	4/27 (14.8%)	1. 0/5 (0%)	2. 1/4 (25%)	3. 0/4 (0%)	1/19 (5.3%)
3. 1/5 (20%)	4. 0/7 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 2/8 (25%)	2. 1/7 (14.3%)	6/27 (22.2%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 3/5 (60%)	4. 0/7 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 0/7 (0%)	7/27 (25.9%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 2/5 (40%)	4. 0/7 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 0/7 (0%)	9/27 (33.3%)	1. 0/5 (0%)	2. 1/4 (25%)	3. 0/4 (0%)	1/19 (5.3%)
3. 3/5 (60%)	4. 0/7 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 1/7 (14.3%)	9/27 (33.3%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 2/5 (40%)	4. 1/7 (14.3%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 0/7 (0%)	8/27 (29.6%)	1. 1/5 (20%)	2. 1/4 (25%)	3. 1/4 (25%)	7/19 (36.8%)
3. 1/5 (20%)	4. 2/7 (28.6%)		4. 2/3 (66.7%)	5. 2/3 (66.7%)		
1. 7/8 (87.5%)	2. 0/7 (0%)	9/27 (33.3%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	2/19 (10.5%)
3. 0/5 (0%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 2/3 (66.7%)		
1. 5/8 (62.5%)	2. 0/7 (0%)	9/27 (33.3%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 4/5 (80%)	4. 0/7 (0%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 0/7 (0%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 4/5 (80%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 0/7 (0%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 4/5 (80%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 1/7 (14.3%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 3/5 (60%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 1/7 (14.3%)	11/27 (40.7%)	1. 1/5 (20%)	2. 1/4 (25%)	3. 1/4 (25%)	7/19 (36.8%)
3. 0/5 (0%)	4. 4/7 (57.1%)		4. 2/3 (66.7%)	5. 2/3 (66.7%)		
1. 7/8 (87.5%)	2. 3/7 (42.9%)	13/27 (48.1%)	1. 1/5 (20%)	2. 1/4 (25%)	3. 1/4 (25%)	7/19 (36.8%)
3. 0/5 (0%)	4. 3/7 (42.9%)		4. 2/3 (66.7%)	5. 2/3 (66.7%)		
1. 7/8 (87.5%)	2. 0/7 (0%)	10/27 (37%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 0/7 (0%)	10/27 (37%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 1/8 (12.5%)	2. 1/7 (14.3%)	7/27 (25.9%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 5/7 (71.4%)	15/27 (55.6%)	1. 0/5 (0%)	2. 1/4 (25%)	3. 0/4 (0%)	3/19 (15.8%)
3. 0/5 (0%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 2/3 (66.7%)		
1. 7/8 (87.5%)	2. 0/7 (0%)	10/27 (37%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 4/7 (57.1%)	11/27 (40.7%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 8/8 (100%)	2. 5/7 (71.4%)	17/27 (63%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 8/8 (100%)	2. 5/7 (71.4%)	17/27 (63%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 2/8 (25%)	2. 4/7 (57.1%)	10/27 (37%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 2/7 (28.6%)	13/27 (48.1%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 3/5 (60%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 2/7 (28.6%)	13/27 (48.1%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 3/5 (60%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 7/8 (87.5%)	2. 5/7 (71.4%)	15/27 (55.6%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 3/7 (42.9%)	14/27 (51.9%)	1. 0/5 (0%)	2. 1/4 (25%)	3. 0/4 (0%)	5/19 (26.3%)
3. 1/5 (20%)	4. 4/7 (57.1%)		4. 2/3 (66.7%)	5. 2/3 (66.7%)		
1. 6/8 (75%)	2. 3/7 (42.9%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 3/7 (42.9%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 7/8 (87.5%)	2. 1/7 (14.3%)	10/27 (37%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 2/7 (28.6%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 8/8 (100%)	2. 5/7 (71.4%)	18/27 (66.7%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 8/8 (100%)	2. 6/7 (85.7%)	20/27 (74.1%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 1/5 (20%)	4. 5/7 (71.4%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 5/8 (62.5%)	2. 1/7 (14.3%)	14/27 (51.9%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 4/5 (80%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 4/7 (57.1%)	13/27 (48.1%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 3/7 (42.9%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 8/8 (100%)	2. 3/7 (42.9%)	15/27 (55.6%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 4/7 (57.1%)		4. 0/3 (0%)	5. 0/3 (0%)		
1. 6/8 (75%)	2. 1/7 (14.3%)	12/27 (44.4%)	1. 0/5 (0%)	2. 0/4 (0%)	3. 0/4 (0%)	0/19 (0%)
3. 0/5 (0%)	4. 5/7 (71.4%)		4. 0/3 (0%)	5. 0/3 (0%)		

Figure 7f: 5th Grade Section of the Calculated Objectives and Totals Chart

Science: Most to Least Objectives met

Kindergarten: Most to Least Objectives met		1st Grade: Most to Least Objectives met		2nd Grade: Most to Least Objectives met		3rd Grade: Most to Least Objectives met		4th Grade: Most to Least Objectives met		5th Grade: Most to Least Objectives met	
Outside/Secret Spot/Nature Journals	95.20%	Outside/Secret Spot/Nature Journals	96.20%	Outside/Secret Spot/Nature Journals	83.30%	Outside/Secret Spot/Nature Journals	69.20%	Outside/Secret Spot/Nature Journals	81.50%	Water Testing	74.10%
Cycle Games	66.70%	How Many Trees Does It Take to Build a House?	61.50%	Cycle Games	58.30%	Mining Chocolate Chips/How Much Do We Take?	57.70%	Indicator Species	57%	Water Detectives	66.70%
Design a Zoo	66.70%	Indicator Species	61.50%	Making Oxygen	58.30%	Water Detectives	53.80%	Success Stories	48.10%	Saving Resources: Design Challenges	63%
Model Sewage Treatment	66.70%	Design a Zoo	57.70%	Making Carbon Dioxide	58.30%	Indicator Species	53.80%	Local Endangered Species Research Project/Protection Poster	48.10%	Solar Power Experiments	63%
Bird Watching	61.90%	Water Detectives	57.70%	Water Detectives	58.30%	Design a Zoo	50%	Design a Zoo	48.10%	Erosion, Weathering, and Soil	55.60%
Watching the School's Wild Animals	61.90%	Cycle Games	53.80%	Indicator Species	58.30%	Success Stories	46.20%	Energy Audit	48.10%	Electrical Generation	55.60%
How Many Trees Does It Take to Build a House?	61.90%	Energy Audit	53.80%	Design a Zoo	50%	Local Endangered Species Research Project/Protection Poster	46.20%	Making Oxygen	48.10%	Making Greenhouses	55.60%
Saving Resources: Design Challenges	61.90%	Climate VS Weather	53.80%	Saving Resources: Design Challenges	50%	Saving Resources: Design Challenges	46.20%	Making Carbon Dioxide	48.10%	Watershed History Lesson	51.90%
Indicator Species	61.90%	Success Stories	50%	Solar Power Experiments	50%	Electrical Generation	46.20%	Water Detectives	48.10%	Indicator Species	51.90%
Climate VS Weather	61.90%	Local Endangered Species Research Project/Protection Poster	50%	Water Testing	50%	Model Sewage Treatment	46.20%	Watching the School's Wild Animals	44.40%	How Many Trees Does It Take to Build a House?	48.10%
How Much Is Left Over?	57.10%	How Much Is Left Over?	50%	Making Greenhouses	50%	Cycle Games	42.30%	Racing for Soil Game	44.40%	Making Oxygen	48.10%
Solar Power Experiments	57.10%	Who Needs Soil?	50%	How Many Trees Does It Take to Build a House?	45.80%	How Many Trees Does It Take to Build a House?	42.30%	Solar Power Experiments	44.40%	Making Carbon Dioxide	48.10%
Water Detectives	57.10%	Racing for Soil Game	50%	How Much Is Left Over?	45.80%	Who Needs Soil?	42.30%	Watershed History Lesson	44.40%	Model Sewage Treatment	48.10%
Animal Adaptation Research	52.40%	Saving Resources: Design Challenges	50%	Racing for Soil Game	45.80%	Making Oxygen	42.30%	Water Testing	44.40%	Success Stories	44.40%
Local Endangered Species Research Project/Protection Poster	52.40%	Solar Power Experiments	50%	Oil Spills	45.80%	Watershed History Lesson	42.30%	Climate VS Weather	44.40%	Local Endangered Species Research Project/Protection Poster	44.40%
Who Needs Soil?	52.40%	Water Testing	50%	Pollution Indicators	45.80%	Animal Adaptation Research	38.50%	Cycle Games	40.70%	Design a Zoo	44.40%
Energy Audit	52.40%	Model Sewage Treatment	50%	Climate VS Weather	45.80%	Bird Watching	38.50%	Mining Chocolate Chips/How Much Do We Take?	40.70%	Oil Spills	44.40%
Water Testing	52.40%	Making Greenhouses	50%	Bird Watching	41.60%	How Much Is Left Over?	38.50%	How Many Trees Does It Take to Build a House?	40.70%	Acid Rain Game	44.40%
Making Greenhouses	52.40%	Animal Adaptation Research	46.20%	Success Stories	41.60%	Racing for Soil Game	38.50%	Saving Resources: Design Challenges	40.70%	Climate VS Weather	44.40%
Fox/Rabbit/Grass Game	47.60%	Mining Chocolate Chips/How Much Do We Take?	46.20%	Local Endangered Species Research Project/Protection Poster	41.60%	Solar Power Experiments	38.50%	Electrical Generation	40.70%	Mining Chocolate Chips/How Much Do We Take?	40.70%
Counting Plants	47.60%	Pollution Indicators	46.20%	Mining Chocolate Chips/How Much Do We Take?	41.60%	Making Carbon Dioxide	38.50%	Oil Spills	40.70%	Energy Audit	40.70%
Mining Chocolate Chips/How Much Do We Take?	47.60%	Counting Plants	42.30%	Who Needs Soil?	41.60%	Climate VS Weather	38.50%	Model Sewage Treatment	40.70%	How Much Is Left Over?	37%
Racing for Soil Game	47.60%	Food Waste	42.30%	Erosion, Weathering, and Soil	41.60%	Counting Plants	34.60%	Making Greenhouses	40.70%	Who Needs Soil?	37%
Erosion, Weathering, and Soil	47.60%	Making Oxygen	42.30%	Energy Audit	41.60%	Erosion, Weathering, and Soil	34.60%	Bird Watching	37%	Food Waste	37%
Food Waste	47.60%	Making Carbon Dioxide	42.30%	Electrical Generation	41.60%	Energy Audit	34.60%	Counting Plants	37%	Understanding Pollution: Wonderful Water	37%
Understanding Pollution: Wonderful Water	47.60%	Electrical Generation	42.30%	Model Sewage Treatment	41.60%	Acid Rain Game	34.60%	Green Space Survey	37%	Pollution Indicators	37%
Watershed History Lesson	47.60%	Fox/Rabbit/Grass Game	38.50%	Fox/Rabbit/Grass Game	37.50%	Water Testing	34.60%	Who Needs Soil?	37%	Cycle Games	33.30%
Oil Spills	47.60%	Bird Watching	38.50%	Animal Adaptation Research	37.50%	Green Space Survey	30.80%	Erosion, Weathering, and Soil	37%	Counting Plants	33.30%
Acid Rain Game	47.60%	Watching the School's Wild Animals	38.50%	Counting Plants	37.50%	Watching the School's Wild Animals	30.80%	Acid Rain Game	37%	Bioaccumulation Game	33.30%
Success Stories	42.90%	Erosion, Weathering, and Soil	38.50%	Acid Rain Game	37.50%	Food Waste	30.80%	Pollution Indicators	37%	Green Space Survey	33.30%
Making Oxygen	42.90%	Understanding Pollution: Wonderful Water	38.50%	Watching the School's Wild Animals	33.30%	Oil Spills	30.80%	Animal Adaptation Research	33.30%	Watching the School's Wild Animals	33.30%
Making Carbon Dioxide	42.90%	Watershed History Lesson	38.50%	Watershed History Lesson	33.30%	Making Greenhouses	30.80%	Bioaccumulation Game	33.30%	Overconsumption (Fish Game)	29.60%
Electrical Generation	42.90%	Oil Spills	38.50%	Understanding Pollution: Wonderful Water	29.20%	Understanding Pollution: Wonderful Water	26.90%	How Much Is Left Over?	33.30%	Bird Watching	25.90%
Bioaccumulation Game	38.10%	Acid Rain Game	38.50%	Bioaccumulation Game	25%	Pollution Indicators	26.90%	Food Waste	33.30%	Racing for Soil Game	25.90%
Green Space Survey	38.10%	Bioaccumulation Game	30.80%	Food Waste	25%	Fox/Rabbit/Grass Game	23.10%	Understanding Pollution: Wonderful Water	33.30%	Animal Adaptation Research	22.20%
Overconsumption (Fish Game)	33.30%	Overconsumption (Fish Game)	26.90%	Overconsumption (Fish Game)	20.80%	Bioaccumulation Game	23.10%	Fox/Rabbit/Grass Game	22.20%	Outside/Secret Spot/Nature Journals	18.50%
Pollution Indicators	33.30%	Green Space Survey	26.90%	Green Space Survey	16.70%	Overconsumption (Fish Game)	3.80%	Overconsumption (Fish Game)	22.20%	Fox/Rabbit/Grass Game	14.80%

Figure 8: [Science] Most to Least Objectives met Overall Chart

Social Studies: Most to Least Objectives met

Kindergarten: Most to Least Objectives met		1st Grade: Most to Least Objectives met		2nd Grade: Most to Least Objectives met		3rd Grade: Most to Least Objectives met		4th Grade: Most to Least Objectives met		5th Grade: Most to Least Objectives met	
Bird Watching	68.75%	Oil Spills	68.40%	Watershed History Lesson	84.20%	Success Stories	83.30%	Watershed History Lesson	73.90%	Overconsumption (Fish Game)	36.80%
Outside/Secret Spot/Nature Journals	62.50%	Electrical Generation	63.20%	Oil Spills	84.20%	Local Endangered Species Research Project/Protection Poster	83.30%	Erosion, Weathering, and Soil	69.60%	Mining Chocolate Chips/How Much Do We Take?	36.80%
Counting Plants	62.50%	Watershed History Lesson	63.20%	Water Detectives	73.70%	How Much Is Left Over?	83.30%	Overconsumption (Fish Game)	65.20%	How Many Trees Does It Take to Build a House?	36.80%
Green Space Survery	62.50%	Acid Rain Game	63.20%	Climate VS Weather	73.70%	Water Detectives	83.30%	How Many Trees Does It Take to Build a House?	65.20%	Watershed History Lesson	26.30%
Design a Zoo	62.50%	Climate VS Weather	63.20%	Bioaccumulation Game	68.40%	Mining Chocolate Chips/How Much Do We Take?	77.80%	Who Needs Soil?	65.20%	Erosion, Weathering, and Soil	15.80%
How Many Trees Does It Take to Build a House?	62.50%	Green Space Survery	57.90%	Green Space Survery	68.40%	Food Waste	72.20%	Racing for Soil Game	65.20%	Green Space Survery	10.50%
Energy Audit	62.50%	Water Detectives	57.90%	Success Stories	68.40%	Watershed History Lesson	66.70%	Mining Chocolate Chips/How Much Do We Take?	56.50%	Fox/Rabbit/Grass Game	5.30%
Saving Resources: Design Challenges	62.50%	How Many Trees Does It Take to Build a House?	52.60%	Local Endangered Species Research Project/Protection Poster	68.40%	Oil Spills	66.70%	Food Waste	56.50%	Counting Plants	5.30%
Electrical Generation	62.50%	How Much Is Left Over?	52.60%	How Many Trees Does It Take to Build a House?	68.40%	Water Testing	66.70%	Success Stories	52.20%	Outside/Secret Spot/Nature Journals	0%
Watershed History Lesson	62.50%	Energy Audit	52.60%	How Much Is Left Over?	68.40%	Bioaccumulation Game	61.10%	Local Endangered Species Research Project/Protection Poster	52.20%	Cycle Games	0%
Climate VS Weather	62.50%	Saving Resources: Design Challenges	52.60%	Making Oxygen	68.40%	Overconsumption (Fish Game)	61.10%	Acid Rain Game	52.20%	Animal Adaptation Research	0%
Cycle Games	56.30%	Solar Power Experiments	52.60%	Making Carbon Dioxide	68.40%	How Many Trees Does It Take to Build a House?	61.10%	How Much Is Left Over?	47.80%	Bird Watching	0%
Overconsumption (Fish Game)	56.30%	Understanding Pollution: Wonderful Water	52.60%	Overconsumption (Fish Game)	63.20%	Understanding Pollution: Wonderful Water	55.50%	Energy Audit	47.80%	Bioaccumulation Game	0%
Acid Rain Game	56.30%	Making Greenhouses	52.60%	Mining Chocolate Chips/How Much Do We Take?	63.20%	Green Space Survery	55.50%	Saving Resources: Design Challenges	47.80%	Watching the School's Wild Animals	0%
Water Detectives	56.30%	Bird Watching	47.40%	Pollution Indicators	63.20%	Model Sewage Treatment	50%	Understanding Pollution: Wonderful Water	47.80%	Success Stories	0%
Understanding Pollution: Wonderful Water	56.30%	Bioaccumulation Game	47.40%	Water Testing	63.20%	Bird Watching	50%	Oil Spills	47.80%	Local Endangered Species Research Project/Protection Poster	0%
How Much Is Left Over?	56.30%	Local Endangered Species Research Project/Protection Poster	47.40%	Model Sewage Treatment	63.20%	Acid Rain Game	44.40%	Bioaccumulation Game	43.50%	Design a Zoo	0%
Bioaccumulation Game	56.30%	Design a Zoo	47.40%	Making Greenhouses	63.20%	Indicator Species	44.40%	Solar Power Experiments	43.50%	How Much Is Left Over?	0%
Mining Chocolate Chips/How Much Do We Take?	50%	Mining Chocolate Chips/How Much Do We Take?	47.40%	Food Waste	57.90%	Making Greenhouses	44.40%	Pollution Indicators	43.50%	Who Needs Soil?	0%
Oil Spills	50%	Who Needs Soil?	47.40%	Acid Rain Game	57.90%	Animal Adaptation Research	44.40%	Water Testing	43.50%	Racing for Soil Game	0%
Model Sewage Treatment	50%	Food Waste	47.40%	Energy Audit	52.60%	Design a Zoo	44.40%	Climate VS Weather	43.50%	Food Waste	0%
Food Waste	50%	Making Oxygen	47.40%	Understanding Pollution: Wonderful Water	52.60%	Electrical Generation	38.90%	Electrical Generation	43.50%	Energy Audit	0%
Solar Power Experiments	50%	Making Carbon Dioxide	47.40%	Electrical Generation	52.60%	Who Needs Soil?	38.90%	Bird Watching	39.10%	Saving Resources: Design Challenges	0%
Local Endangered Species Research Project/Protection Poster	50%	Pollution Indicators	47.40%	Design a Zoo	47.40%	Solar Power Experiments	38.90%	Counting Plants	39.10%	Solar Power Experiments	0%
Water Testing	50%	Water Testing	47.40%	Saving Resources: Design Challenges	47.40%	Making Carbon Dioxide	33.30%	Water Detectives	39.10%	Understanding Pollution: Wonderful Water	0%
Indicator Species	50%	Indicator Species	47.40%	Outside/Secret Spot/Nature Journals	42.10%	Counting Plants	33.30%	Indicator Species	39.10%	Making Oxygen	0%
Who Needs Soil?	50%	Model Sewage Treatment	47.40%	Cycle Games	42.10%	Saving Resources: Design Challenges	33.30%	Model Sewage Treatment	39.10%	Making Carbon Dioxide	0%
Fox/Rabbit/Grass Game	43.80%	Overconsumption (Fish Game)	42.10%	Bird Watching	42.10%	Making Oxygen	27.80%	Making Oxygen	39.10%	Electrical Generation	0%
Racing for Soil Game	43.80%	Success Stories	42.10%	Who Needs Soil?	42.10%	Pollution Indicators	27.80%	Making Carbon Dioxide	39.10%	Oil Spills	0%
Success Stories	43.80%	Outside/Secret Spot/Nature Journals	36.80%	Solar Power Experiments	42.10%	Watching the School's Wild Animals	27.80%	Cycle Games	34.80%	Acid Rain Game	0%
Watching the School's Wild Animals	43.80%	Cycle Games	36.80%	Indicator Species	42.10%	Energy Audit	27.80%	Green Space Survery	26.10%	Pollution Indicators	0%
Pollution Indicators	43.80%	Counting Plants	36.80%	Fox/Rabbit/Grass Game	26.30%	Climate VS Weather	27.80%	Making Greenhouses	21.70%	Water Detectives	0%
Making Oxygen	37.50%	Animal Adaptation Research	31.60%	Animal Adaptation Research	26.30%	Cycle Games	22.20%	Design a Zoo	21.70%	Water Testing	0%
Making Greenhouses	37.50%	Watching the School's Wild Animals	31.60%	Counting Plants	26.30%	Fox/Rabbit/Grass Game	22.20%	Fox/Rabbit/Grass Game	17.40%	Indicator Species	0%
Making Carbon Dioxide	37.50%	Fox/Rabbit/Grass Game	26.30%	Watching the School's Wild Animals	26.30%	Racing for Soil Game	22.20%	Watching the School's Wild Animals	17.40%	Model Sewage Treatment	0%
Erosion, Weathering, and Soil	31.30%	Racing for Soil Game	26.30%	Racing for Soil Game	21.10%	Erosion, Weathering, and Soil	22.20%	Outside/Secret Spot/Nature Journals	4.30%	Making Greenhouses	0%
Animal Adaptation Research	25%	Erosion, Weathering, and Soil	26.30%	Erosion, Weathering, and Soil	21.10%	Outside/Secret Spot/Nature Journals	5.60%	Animal Adaptation Research	4.30%	Climate VS Weather	0%

Figure 9: [Social Studies] Most to Least Objectives met Overall Chart

Legend: ***Dark Green*** = All objectives met, ***Light Green*** = All but 1 objective met, ***Yellow*** = All but 2 objectives met, ***Dark Yellow*** = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

Kindergarten			
1. Inquiry (0/6)	2. Physical Science (0/4)	3. Life Science (0/5)	4. Earth and Space Science (0/6)
Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals
Bird Watching	Cycle Games	Watching the School's Wild Animals*	Climate VS Weather*
Counting Plants*	Saving Resources: Design Challenges	Design a Zoo*	Design a Zoo
Green Space Survey*	Electrical Generation	Cycle Games	Saving Resources:Design Challenges
Watching the School's Wild Animals*	Water Testing*	Animal Adaptation Research*	Solar Power Experiments*
How Many Trees Does It Take to Build a House?*	Model Sewage Treatment	Bird Watching	How Many Trees Does It Take to Build a House?*
How Much Is Left Over?*	Fox/Rabbit/Grass Game	Success Stories*	Who Needs Soil?
Food Waste*	How Many Trees Does It Take to Build a House?*	Local Endangered Species Research Project/Protection Poster*	Racing for Soil Game
Solar Power Experiments*	Erosion, Weathering, Soil	Fox/Rabbit/Grass Game	Watershed History Lesson**
Water Detectives*	Energy Audit*	How Much Is Left Over?*	Indicator Species
Indicator Species	Understanding Pollution: Wonderful Water**	Food Waste*	Model Sewage Treatment
Climate VS Weather*	Making Oxygen*	Acid Rain Game*	Making Greenhouses
Animal Adaptation Research*	Making Carbon Dioxide*	Model Sewage Treatment	
Bioaccumulation Game**	Water Detectives*		
Success Stories*	Indicator Species		
Local Endangered Species Research Project/Project Poster*			
Design a Zoo*			
Mining Chocolate Chips/How Much Do We Take?			
Who Needs Soil?			
Erosion, Weathering, and Soil			
Energy Audit*			
Saving Resources: Design Challenges			
Understanding Pollution: Wonderful Water**			
Making Oxygen*			
Making Carbon Dioxide*			
Watershed History Lesson**			
Oil Spills**			
Water Testing*			
Model Sewage Treatment			
Making Greenhouses			
Cycle Games			
Fox/Rabbit/Grass Game			
Overconsumption (Fish Game)**			
Racing for Soil Game			
Acid Rain Game**			
Pollution Indicators			
Electrical Generation			

Figure 10a: [Science] Kindergarten Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

1st Grade

1. Inquiry (0/6)	2. Physical Science (0/7)	3. Life Science (0/6)	4. Earth and Space Science (0/7)
Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals
How Many Trees Does It Take to Build a House?*	How Many Trees Does It Take to Build a House?*	Animal Adaptation Research*	Design a Zoo*
How Much Is Left Over?*	Energy Audit*	Success Stories*	How Many Trees Does It Take to Build a House?*
Solar Power Experiments*	Cycle Games	Local Endangered Species Research Project/Protection Poster*	Energy Audit*
Water Detectives*	Mmig Chocolate Chips/How Much Do We Take?	Bird Watching	Saving Resources: Design Challenges
Water Testing*	Erosion, Weathering, and Soil	Design a Zoo*	Solar Power Experiments*
Indicator Species	Saving Resources: Design Challenges	Cycle Games	Indicator Species
Climate VS Weather*	Electical Generation	Fox/Rabbit/Grass Game	Climate VS Weather*
Bird Watching	Water Detectives*	Counting Plants*	
Counting Plants*	Water Testing*	Watching the School's Wild Animals*	
Design a Zoo*	Model Sewage Treatment	Racing for Soil Game	
Food Waste*	Making Greenhouses	Bioaccumulation Game**	
Energy Audit*	Climate VS Weather*	Overconsumption (Fish Game)**	
Saving Resources: Design Challenges		Who Needs Soil?	
Making Oxygen*		Indicator Species	
Making Carbon Dioxide*			
Electrical Generation			
Pollution Indicators			
Model Sewage Treatment			
Making Greenhouses			
Fox/Rabbit/Grass Game			
Animal Adaptation Research*			
Green Space Survey*			
Watching the School's Wild Animals*			
Success Stories*			
Local Endangered Species Research Project/Protection Poster*			
Mining Chocolate Chips/How Much Do We Take?			
Who Needs Soil?			
Understanding Pollution: Wonderful Water**			
Water History Lesson**			
Oil Spills**			
Acid Rain Game**			
Cycle Games			
Bioaccumulation Game**			
Overconsumption (Fish Game)**			
Racing for Soil Game			
Erosion, Weathering, and Soil			

Figure 10b: [Science] 1st Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

2nd Grade			
1. Inquiry (0/6)	2. Physical Science (0/7)	3. Life Science (0/5)	4. Earth and Space Science (0/6)
Outside/Secret Spot/Nature Journals	Saving Resources: Design Challenges	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals
How Many Trees Does It Take to Build a House?*	Outside/Secret Spot/Nature Journal	Cycle Games	Climate VS Weather
How Much Is Left Over?	Energy Audit*	Fox/Rabbit/Grass Game	Cycle Games
Solar Power Experiments*	Understanding Pollution: Wonderful Water**	Animal Adaptation Research*	Mining Chocolate Chips/How Much Do We Take?
Making Oxygen*	Model Sewage Treatment	Watching the School's Wild Animals*	Solar Power Experiments*
Making Carbon Dioxide*		Success Stories*	Making Greenhouses
Water Detectives*		Local Endangered Species Research Project/Protection Poster*	
Indicator Species		Design a Zoo*	
Making Greenhouses		Bird Watching	
Bird Watching		Making Oxygen*	
Counting Plants*		Making Carbon Dioxide*	
Design a Zoo*		Counting Plants*	
Food Waste		Bioaccumulation Game**	
Energy Audit*		Who Needs Soil?	
Saving Resources: Design Challenges		Oil Spills**	
Electrical Generation		Water Detectives*	
Pollution Indicators		Indicator Species	
Water Testing			
Animal Adaptation Research*			
Success Stories*			
Local Endangered Species Research Project/Protection Poster*			
Mining Chocolate Chips/How Much Do We Take?			
Watershed History Lesson**			
Cycle Games			
Fox/Rabbit/Grass Game			
Green Space Survey			
Who Needs Soil?			
Erosion, Weathering, Soil			
Oil Spills**			
Acid Rain Game**			
Model Sewage Treatment			
Climate VS Weather			

Figure 10c: [Science] 2nd Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

3rd Grade			
1. Inquiry (0/6)	2. Physical Science (0/7)	3. Life Science (0/6)	4. Earth and Space Science (0/7)
Outside/Secret Spot/Nature Journals	Saving Resources: Design Challenges	Success Stories	Outside/Secret Spot/Nature Journals
Bird Watching	Mining Chocolate Chips/How Much Do We Take?	Local Endangered Species Research Project/Protection Poster	Mining Chocolate Chips/How Much Do We Take?
Counting Plants		Design a Zoo	Electrical Generation
Green Space Survey		Outside/Secret Spot/Nature Journals	
How Many Trees Does It Take to Build a House?*		Animal Adaptation Research	
How Much Is Left Over?		Bird Watching	
Food Waste		Watching the School's Wild Animals	
Solar Power Experiments		Water Detectives	
Making Oxygen		Indicator Species	
Making Carbon Dioxide			
Water Detectives			
Water Testing			
Indicator Species			
Climate VS Weather			
Animal Adaption Research			
Success Stories			
Local Endangered Species Research Project/Protection Poster			
Design a Zoo			
Mining Chocolate Chips/How Much Do We Take?			
Who Needs Soil?			
Erosion, Weathering, and Soil			
Energy Audit			
Saving Resources: Design Challenges			
Electrical Generation			
Watershed History Lesson**			
Oil Spills**			
Pollution Indicators			
Model Sewage Treatment			
Making Greenhouses			
Cycle Games			
Watching the School's Wild Animals			
Racing for Soil Game			
Understanding Pollution: Wonderful Water**			
Acid Rain Game**			
Fox/Rabbit/Grass Game			
Bioaccumulation Game**			

Figure 10d: [Science] 3rd Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

4th Grade			
1. Inquiry (0/7)	2. Physical Science (0/7)	3. Life Science (0/6)	4. Earth and Space Science (0/7)
Green Space Survey	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spots/Nature Journals
Watching the School's Wild Animals	Energy Audit	Success Stories	Climate VS Weather
How Many Trees Does It Take to Build a House?	Saving Resources: Design Challenges	Local Endangered Species Research Project/Protection Poster	
How Much Is Left Over?	Solar Power Experiments	Cycle Games	
Food Waste	Water Detectives	Bird Watching	
Solar Power Experiments	Water Testing	Design a Zoo	
Making Oxygen		Indicator Species	
Making Carbon Dioxide		Counting Plants	
Water Detectives		Bioaccumulation	
Outside/Secret Spots/Nature Journals		Watching the School's Wild Animals	
Animal Adaptation Research		Making Oxygen	
Counting Plants			
Success Stories			
Local Endangered Species Research Project/Protection Poster			
Design a Zoo			
Mining Chocolate Chips/How Much Do We Take?			
Energy Audit			
Saving Resources: Design Challenges			
Electrical Generation			
Watershed History Lesson			
Oil Spills			
Pollution Indicators			
Water Testing			
Indicator Species			
Model Sewage Treatment			
Making Greenhouses			
Climate VS Weather			
Who Needs Soil?			
Erosion, Weathering, Soil			
Understanding Pollution: Wonderful Water			
Acid Rain Game			
Bird Watching			
Bioaccumulation Game			
Overconsumption (Fish Game)			
Racing for Soil Game			

Figure 10e: [Science] 4th Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

5th Grade

1. Inquiry (0/8)	2. Physical Science (0/7)	3. Life Science (0/5)	4. Earth and Space Science (0/7)
Saving Resources: Design Challenges	Water Testing	Watching the School's Wild Animals	Water Testing
Solar Power Experiments	Erosion, Weathering, Soil	Success Stories	Climate VS Weather
Water Detectives	Saving Resources: Design Challenges	Local Endangered Species Research Project/Protection Poster	Mining Chocolate Chip/How Much Do We Take?
Water Testing	Solar Power Experiments	Indicator Species	Who Needs Soil?
Making Greenhouses	Electrical Generation	Outside/Secret Spot/Nature Journal	Racing for Soil Game
Green Space Survey	Water Detectives	Animal Adaptation Research	Erosion, Weathering, Soil
How Many Trees Does It Take to Build a House?	Energy Audit	Counting Plants	Saving Resources: Design Challenges
How Much Is Left Over?	Understanding Pollution: Wonderful Water	Design a Zoo	Solar Power Experiments
Food Waste	Model Sewage Treatment	Making Oxygen	Watershed History Lesson
Electrical Generation		Making Carbon Dioxide	Water Detectives
Pollution Indicators			Indicator Species
Counting Plants			Making Greenhouses
Success Stories			
Local Endangered Species Research Project/Protection Poster			
Mining Chocolate Chips/How Much Do We Take?			
Erosion, Weathering, Soil			
Watershed History Lesson			
Oil Spills			
Model Sewage Treatment			
Climate VS Weather			
Bird Watching			
Bioaccumulation Game			
Overconsumption (Fish Game)			
Watching the School's Wild Animals			
Design a Zoo			
Who Needs Soil?			
Energy Audit			
Making Oxygen			
Making Carbon Dioxide			
Acid Rain Game			
Indicator Species			

Figure 10f: [Science] 5th Grade Section of Possible Best Practices Chart

Legend: ***Dark Green*** = All objectives met, ***Light Green*** = All but 1 objective met,
Yellow = All but 2 objectives met, ***Dark Yellow*** = All but 3 objectives,
* = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

Kindergarten				
1. Domestic Affairs (0/2)	2. Global/International Affairs (0/3)	3. Civil Rights/Human Rights (0/4)	4. Economics (0/4)	5. Culture (0/3)
Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Outside/Secret Spot/Nature Journals	Cycle Games	Bird Watching
Green Space Survey*	Bird Watching	Cycle Games	Mining Chocolate Chips/How Much Do We Take?	Counting Plants*
Watching the School's Wild Animals*	Counting Plants*	Fox/Rabbit/Grass Game	How Many Trees Does It Take to Build a House?*	Success Stories*
Success Stories*	Green Space Survey*	Animal Adaptation Research*	How Much Is Left Over?*	Local Endangered Species Research Project/Protection Poster*
Local Endangered Species Research Project/Protection Poster*	Design a Zoo*	Bird Watching	Who Needs Soil?	Saving Resources: Design Challenges
Design a Zoo*	Water Detectives*	Counting Plants*	Food Waste*	Understanding Pollution: Wonderful Water**
	Climate VS Weather*	Bioaccumulation Game**	Energy Audit*	Watershed History Lesson**
	Cycle Games	Overconsumption (Fish Game)**	Saving Resources: Design Challenges	Oil Spills**
	Fox/Rabbit/Grass Game	Green Space Survey*	Solar Power Experiments*	
	Bioaccumulation Game**	Watching the School's Wild Animals*	Understanding Pollution: Wonderful Water**	
	Overconsumption (Fish Game)**	Success Stories*	Electrical Generation	
	Watching the School's Wild Animals*	Local Endangered Species Research Project/Protection Poster*	Watershed History Lesson**	
	How Many Trees Does It Take to Build a House?*	Design a Zoo*	Model Sewage Treatment	
	Racing for Soil Game	Mining Chocolate Chips/How Much Do We Take?	Outside/Secret Spot/Nature Journals	
	Energy Audit*	How Many Trees Does It Take to Build a House?*	Bird Watching	
	Electrical Generation	How Much Is Left Over?*	Bioaccumulation Game**	
	Acid Rain Game**	Who Needs Soil?	Overconsumption (Fish Game)**	
	Water Testing	Racing for Soil Game	Design a Zoo*	
	Indicator Species	Erosion, Weathering, and Soil	Making Oxygen*	
		Food Waste*	Making Carbon Dioxide*	
		Energy Audit*	Oil Spills**	
		Saving Resources: Design Challenges	Acid Rain Game**	
		Solar Power Experiments*	Pollution Indicators	
		Understanding Pollution: Wonderful Water**	Water Detectives*	
		Making Oxygen*	Water Testing*	
		Making Carbon Dioxide*	Indicator Species	
		Electrical Generation	Making Greenhouses	
		Watershed History Lesson**	Climate VS Weather*	
		Oil Spills**		
		Acid Rain Game**		
		Pollution Indicators		
		Water Detectives*		
		Water Testing*		
		Indicator Species		
		Model Sewage Treatment		
		Making Greenhouses		
		Climate VS Weather*		

Figure 11a: [Social Studies] Kindergarten Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

1st Grade				
1. Domestic Affairs (0/3)	2. Global/International Affairs (0/4)	3. Civil Rights/Human Rights (0/5)	4. Economics (0/4)	5. Culture (0/3)
	Watershed History Lesson**	Outside/Secret Spot/Nature Journals	Bioaccumulation Game**	
	Oil Spills**	Cycle Games	Overconsumption (Fish Game)**	
	Acid Rain Game**	Fox/Rabbit/Grass Game	Green Space Survey*	
	Climate VS Weather*	Animal Adaptation Research*	Local Endangered Species Research Project/Protection Poster*	
	Bird Watching	Bird Watching	Design a Zoo*	
	Green Space Survey*	Counting Plants*	Mining Chocolate Chips/How Much Do We Take?	
	Electrical Generation	Bioaccumulation Game**	How Many Trees Does It Take to Build a House?*	
	Water Detectives*	Overconsumption (Fish Game)**	How Much Is Left Over?*	
	Outside/Secret Spot/Nature Journals	Green Space Survey*	Who Needs Soil?	
	Cycle Games	Watching the School's Wild Animals*	Food Waste*	
	Counting Plants*	Success Stories*	Energy Audit*	
	How Many Trees Does It Take to Build a House?*	Local Endangered Species Research Project/Protection Poster*	Saving Resources: Design Challenges	
	How Much Is Left Over?*	Design a Zoo*	Understanding Pollution: Wonderful Water**	
	Energy Audit*	Mining Chocolate Chips/How Much Do We Take?	Making Oxygen*	
	Solar Power Experiments*	How Many Trees Does It Take to Build a House?*	Making Carbon Dioxide*	
	Making Greenhouses	How Much Is Left Over?*	Electrical Generation	
		Who Needs Soil?	Watershed History Lesson**	
		Racing for Soil Game	Oil Spills**	
		Erosion, Weathering, and Soil	Acid Rain Game**	
		Food Waste*	Pollution Indicators	
		Energy Audit*	Water Detectives*	
		Saving Resources: Design Challenges	Water Testing*	
		Solar Power Experiments*	Indicator Species	
		Understanding Pollution: Wonderful Water**	Model Sewage Treatment	
		Making Oxygen*	Making Greenhouses	
		Making Carbon Dioxide*	Climate VS Weather*	
		Electrical Generation		
		Watershed History Lesson**		
		Oil Spills**		
		Acid Rain Game**		
		Pollution Indicators		
		Water Detectives**		
		Water Testing*		
		Indicator Species		
		Model Sewage Treatment		
		Making Greenhouses		
		Climate VS Weather*		

Figure 11b: [Social Studies] 1st Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met, *Yellow* = All but 2 objectives met, *Dark Yellow* = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

2nd Grade				
1. Domestic Affairs (0/3)	2. Global/International Affairs (0/4)	3. Civil Rights/Human Rights (0/5)	4. Economics (0/4)	5. Culture (0/3)
Bioaccumulation Game**	Watershed History Lesson**	Outside/Secret Spot/Nature Journals	Cycle Games	Outside/Secret Spot/Nature Journals
Overconsumption (Fish Game)**	Oil Spills**	Cycle Games	Bioaccumulation Game**	Energy Audit*
Green Space Survey	Bird Watching	Fox/Rabbit/Grass Game	Overconsumption (Fish Game)**	Electrical Generation
Success Stories*	Green Space Survey	Animal Adaptation Research*	Local Endangered Species Research Project/Protection Poster*	
Local Endangered Species Research Project/Protection Poster*	Acid Rain Game**	Bird Watching	Design a Zoo*	
Mining Chocolate Chips/How Much Do We Take?	Water Detectives*	Counting Plants*	Mining Chocolate Chips/How Much Do We Take?	
How Many Trees Does It Take to Build a House?*	Climate VS Weather	Bioaccumulation Game**	How Many Trees Does It Take to Build a House?*	
How Much Is Left Over?	Outside/Secret Spot/Nature Journals	Overconsumption (Fish Game)**	How Much Is Left Over?	
Food Waste	Success Stories*	Green Space Survery	Who Needs Soil?	
Making Oxygen*	Local Endangered Species Research Project/Protection Poster*	Watching the School's Wild Animals*	Food Waste	
Making Carbon Dioxide*	Design a Zoo*	Success Stories*	Energy Audit*	
Watershed History Lesson**		Local Endangered Species Research Project/Protection Poster*	Saving Resources: Design Challenges	
Oil Spills**		Design a Zoo*	Solar Power Experiments*	
Pollution Indicators		Mining Chocolate Chips/How Much Do We Take?	Understanding Pollution: Wonderful Water**	
Water Detectives*		How Many Trees Does It Take to Build a House?*	Making Oxygen*	
Water Testing		How Much Is Left Over?	Making Carbon Dioxide*	
Model Sewage Treatment		Who Needs Soil?	Electrical Generation	
Making Greenhouses		Racing for Soil Game	Watershed History Lesson**	
Climate VS Weather		Erosion, Weathering, and Soil	Oil Spills**	
		Food Waste	Acid Rain Game**	
		Energy Audit*	Pollution Indicators	
		Saving Resources: Design Challenges	Water Detectives*	
		Solar Power Experiments*	Water Testing	
		Understanding Pollution: Wonderful Water**	Indicator Species	
		Making Oxygen*	Model Sewage Treatment	
		Making Carbon Dioxide*	Making Greenhouses	
		Electrical Generation	Climate VS Weather	
		Watershed History Lesson**		
		Oil Spills**		
		Acid Rain Game**		
		Pollution Indicators		
		Water Detectives*		
		Water Testing		
		Indicator Species		
		Model Sewage Treatment		
		Making Greenhouses		
		Climate VS Weather		

Figure 11c: [Social Studies] 2nd Grade Section of Possible Best Practices Chart

Legend: ***Dark Green*** = All objectives met, ***Light Green*** = All but 1 objective met, ***Yellow*** = All but 2 objectives met, ***Dark Yellow*** = All but 3 objectives, * = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

3rd Grade				
1. Domestic Affairs (0/5)	2. Global/International Affairs (0/2)	3. Civil Rights/Human Rights (0/3)	4. Economics (0/5)	5. Culture (0/3)
Mining Chocolate Chips/How Much Do We Take?	Green Space Survey	Animal Adaptation Research	How Much Is Left Over?	Success Stories
How Many Trees Does It Take to Build a House?*	Success Stories	Bird Watching	Food Waste	Local Endangered Species Research Project/Protection Poster
How Much Is Left Over?	Local Endangered Species Research Project/Protection Poster	Bioaccumulation Game**	Solar Power Experiments	
Watershed History Lesson**	Design a Zoo	Overconsumption (Fish Game)**	Water Detectives	
Oil Spills**	Mining Chocolate Chips/How Much Do We Take?	Green Space Survey	Model Sewage Treatment	
Overconsumption (Fish Game)**	How Many Trees Does It Take to Build a House?*	Success Stories	Success Stories	
Success Stories	How Much Is Left Over?	Local Endangered Species Research Project/Protection Poster	Local Endangered Species Research Project/Protection Poster	
Local Endangered Species Research Project/Protection Poster	Water Detectives	Mining Chocolate Chips/How Much Do We Take?	Mining Chocolate Chips/How Much Do We Take?	
Food Waste	Climate VS Weather	How Much Is Left Over?	How Many Trees Does It Take to Build a House?*	
Understanding Pollution: Wonderful Water**	Outside/Secret Spots/Nature Journals	Food Waste	Who Needs Soil?	
Bioaccumulation Game**	Cycle Games	Understanding Pollution: Wonderful Water**	Saving Resources: Design Challenges	
	Fox/Rabbit/Grass Game	Watershed History Lesson**	Making Carbon Dioxide	
	Animal Adaptation Research	Oil Spills**	Electrical Generation	
	Bird Watching	Acid Rain Game**	Oil Spills**	
	Counting Plants	Water Detectives	Pollution Indicators	
	Bioaccumulation Game**	Water Testing	Water Testing	
	Overconsumption (Fish Game)**	Indicator Species	Making Greenhouses	
	Watching the School's Wild Animals	Model Sewage Treatment	Fox/Rabbit/Grass Game	
	Who Needs Soil?	Making Greenhouses	Animal Adaptation Research	
	Food Waste	Watching the School's Wild Animals	Bird Watching	
	Saving Resources: Design Challenges	Design a Zoo	Counting Plants	
	Solar Power Experiments		Bioaccumulation Game**	
	Electrical Generation		Overconsumption (Fish Game)**	
	Indicator Species		Green Space Survey	
			Racing for Soil Game	
			Erosion, Weathering, Soil	
			Energy Audit	
			Understanding Pollution: Wonderful Water**	
			Making Oxygen	
			Watershed History Lesson**	
			Acid Rain Game**	
			Indicator Species	

Figure 11d: [Social Studies] 3rd Grade Section of Possible Best Practices Chart

Legend: *Dark Green* = All objectives met, *Light Green* = All but 1 objective met,
Yellow = All but 2 objectives met, *Dark Yellow* = All but 3 objectives,
* = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

4th Grade					
1. Domestic Affairs (0/4)	1b. Domestic Affairs (0/4)	2. Global/International Affairs (0/3)	3. Civil Rights/Human Rights (0/3)	4. Economics (0/6)	5. Culture (0/3)
Bioaccumulation Game		How Many Trees Does It Take to Build a House?	Watching the School's Wild Animals	Cycle Games	Overconsumption (Fish Game)
Overconsumption (Fish Game)		Who Needs Soil?		Overconsumption (Fish Game)	Who Needs Soil?
Success Stories		Racing for Soil Game		Mining Chocolate Chips/How Much Do We Take?	Racing for Soil Game
Local Endangered Species Research Project/Protection Poster		Erosion, Weathering, Soil?		How Many Trees Does It Take to Build a House?	Erosion, Weathering, Soil
Mining Chocolate Chips/How Much Do We Take?		Watershed History Lesson		Erosion, Weathering, Soil	Watershed History Lesson
How Many Trees Does It Take to Build a House?		Acid Rain Game		Energy Audit	
Who Needs Soil?		Cycle Games		Saving Resources: Design Challenges	
Racing for Soil Game		Bird Watching		Watershed History Lesson	
Erosion, Weathering, Soil		Counting Plants		Success Stories	
Food Waste		Overconsumption (Fish Game)		Local Endangered Species Research Project/Protection Project	
Saving Resources: Design Challenges		Success Stories		How Much Is Left Over?	
Solar Power Experiments		Local Endangered Species Research Project/Protection Poster		Food Waste	
Understanding Pollution: Wonderful Water		Mining Chocolate Chip/How Much Do We Take?		Understanding Pollution: Wonderful Water	
Making Oxygen		Solar Power Experiments		Oil Spills	
Making Carbon Dioxide				Pollution Indicators	
Electrical Generation				Water Testing	
Watershed History Lesson				Climate VS Weather	
Oil Spills				Counting Plants	
Acid Rain Game				Bioaccumulation Game	
Pollution Indicators				Overconsumption (Fish Game)	
Water Detectives				Who Needs Soil?	
Water Testing				Racing for Soil Game	
Indicator Species				Making Oxygen	
Model Sewage Treatment				Making Carbon Dioxide	
Climate VS Weather				Electrical Generation	
Energy Audit				Acid Rain Game	
Green Space Survey				Model Sewage Treatment	
				Making Greenhouses	
				Fox/Rabbit/Grass Game	
				Solar Power Experiments	
				Water Detectives	
				Indicator Species	

Figure 11e: [Social Studies] 4th Grade Section of Possible Best Practices Chart

Legend: ***Dark Green*** = All objectives met, ***Light Green*** = All but 1 objective met,
Yellow = All but 2 objectives met, ***Dark Yellow*** = All but 3 objectives,
* = May not be age appropriate, ** = "Environmental tragedy until the fourth grade"

5th Grade				
1. Domestic Affairs (0/5)	2. Global/International Affairs (0/4)	3. Civil Rights/Human Rights (0/4)	4. Economics (0/3)	5. Culture (0/3)
			Overconsumption (Fish Game)	Overconsumption (Fish Game)
			Mining Chocolate Chips/How Much Do We Take?	Green Space Survey
			How Many Trees Does It Take to Build a House?	Mining Chocolate Chips/How Much Do We Take?
			Watershed History Lesson	How Many Trees Does It Take to Build a House?
				Erosion, Weathering, and Soil
				Watershed History Lesson

Figure 11f: [Social Studies] 5th Grade Section of Possible Best Practices Chart

Appendix A

The MDE Science Content Strands, Competencies, and Objectives for K-5

KINDERGARTEN

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Ask questions and find answers by scientific investigation.

a. Demonstrate an understanding of a simple investigation by asking questions. (DOK 2)
b. Compare, sort, and group objects according to size, shape, color, and texture. (DOK 2)
c. Identify simple tools (rulers, thermometers, scales, and hand lenses) used to gather information. (DOK 1)
d. Recognize that people have always had questions about their world and identify science as one way of answering questions and explaining the natural world. (DOK 1)
e. Describe ideas using drawings and oral expression. (DOK 2)
f. Recognize that when a science investigation is done the way it was done before, very similar results are expected. (DOK 1)

PHYSICAL SCIENCE

2. Identify properties of objects and materials, position and motion of objects, and properties of magnetism.

a. Classify properties of objects and materials according to their observable characteristics. (DOK 2)
   - Materials (e.g., wood, paper, plastic, metal)
   - Matter (solid or liquid)
   - Objects that sink or float in water
b. Differentiate what happens to water left in an open container (disappears) and water left in a closed container (remains). (DOK 1)

c. Compare types of forces and motion. (DOK 1)

- External motion of objects (e.g., straight-line, circular, back-and-forth, rotational)
- Internal motion of objects (e.g., bending, stretching)

d. Compare the interaction between two magnets and the interaction between magnets and other objects (e.g., iron, other metals, wood, water). (DOK 1)

LIFE SCIENCE

3. Understand characteristics, structures, life cycles, and environments of organisms.

a. Group animals and plants by their physical features (e.g., size, appearance, color). (DOK 2)

b. Compare and contrast physical characteristics of humans. (DOK1)

- The five senses (sight, smell, touch, taste, hearing) and corresponding body parts
- The six major body organs (brain, skin, heart, lungs, stomach, intestines).

c. Classify parts of the human body that help it seek, find, and take in food when it feels hunger. (DOK 1)

- Eyes and nose for detecting food
- Legs to get it
- Arms to carry it away
- Mouth to eat it

d. Identify offspring that resemble their parents. (DOK 1)

e. Recognize and compare the differences between living organisms and non-living materials. (DOK 2)

EARTH AND SPACE SCIENCE

4. Understand properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Sort, separate, and classify Earth materials (e.g.,clay, silt, sand, pebbles, gravel) using various strategies.(DOK 2)

b. Identify and describe properties of Earth materials (soil, rocks, water, and air). (DOK 1)

c. Collect and display local weather data. (DOK 2)

d. Describe ways to conserve water. (DOK 2)

e. Describe the effects of the sun on living and non-living things. (DOK 1)

- Warms the land, air, and water
- Helps plants grow

f. Identify the sun as Earth's source of light and heat and describe changes in shadows over time. (DOK 2)

FIRST GRADE

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Understand how to plan and carry out a simple scientific investigation.

a. Demonstrate an understanding of a simple investigation by asking appropriate questions about objects, organisms, and events. (DOK 2)
b. Compare, sort, and group objects according to their attributes. (DOK 2)
c. Use simple tools (e.g., rulers, scales, hand lenses, thermometers, microscopes) to gather information. (DOK 1)
   - Length, using nonstandard units (e.g., paper clips, Unifix cubes, etc.) and standard units (inches, centimeters)
   - Weight, using a balance scale with and without nonstandard units
   - Capacity, using nonstandard units

d. Match a simple problem to a technological solution related to the problem (e.g., dull pencil – sharpener, bright light – sunglasses, hot room – fan, cold head – hat, heavy baby – stroller). (DOK 1)
e. Use diagrams and written and oral expression to describe ideas or data. (DOK 2)
f. Predict the results of an investigation if it is repeated. (DOK 2)

PHYSICAL SCIENCE

2. Develop an understanding of properties of objects and materials, position and motion of objects, and properties of heat and magnetism.

a. Recognize that most things are made of parts. (DOK 1)

b. Describe properties and changes of objects and materials. (DOK 1)

- Processes of melting and freezing
- How water evaporates and disappears into the atmosphere
- How water condenses onto cold surfaces

c. Describe the effects of various forms of motion and of forces on objects. (DOK 2)

- Different forms of motion (sliding, rolling, straight line, circular, back-and-forth)
- Effects that motion can produce (spilling, breaking, bending)

d. Differentiate between interactions of two magnets and the interaction of a magnet with objects made of iron, other metals, and nonmetals. (DOK 1)

e. Describe changes in shadows over time and predict how a shadow will look as the light source moves. (DOK 2)

f. Compare and classify solids and liquids. (DOK 2)

g. Identify vibrating objects that produce sound and classify sounds (e.g., high or low pitched, loud or soft). (DOK 1)

LIFE SCIENCE

3. Develop an understanding of the characteristics, structures, life cycles, interactions, and environments of organisms.

a. Classify animals and plants by observable features (e.g., size, appearance, color, motion, habitat). (DOK 2)

b. Describe the primary function of the major body organs (brain, skin, heart, lungs, stomach, intestines, bones, and muscles). (DOK 2)

c. Communicate the importance of food and explain how the body utilizes food. (DOK 2)

d. Chart and compare the growth and changes of animals from birth to adulthood. (DOK 2)

e. Identify the basic needs of plants and animals and recognize that plants and animals both need to take in water, animals need food, and plants need light. (DOK 1)

f. Identify and label the parts of a plant. (DOK 2)

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Compare and classify Earth materials. (DOK 1)

- Physical attributes of rocks (e.g., large/small, heavy/light, smooth/rough, hard/crumbly, dark/light, etc.)
- Physical attributes of soil (e.g., smell, texture, color, etc.)

b. Identify Earth landforms and bodies of water (e.g., continents, islands, peninsulas, oceans, rivers, lakes, ponds, creeks).(DOK 1)
c. Observe, identify, record, and graph daily weather conditions. (DOK 3)
d. Categorize types of actions that cause water, air, or land pollution. (DOK 2)
e. Collect, categorize, and display various ways energy from the sun is used. (DOK 2)
f. Identify relationships between lights and shadows and illustrate how the shape of the moon changes over time. (DOK 1)
g. Distinguish characteristics of each season and describe how each season merges into the next. (DOK 1)

SECOND GRADE

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Develop abilities necessary to conduct scientific investigations.

a. Formulate questions about objects and organisms and predict outcomes in order to conduct a simple investigation. (DOK 2)
b. Compare, sort, and group objects according to two or more attributes. (DOK 2)
c. Use simple tools (e.g., rulers, thermometers, scales, hand lenses, microscopes, balances, clocks) to gather information. (DOK 1)

- Length, to the nearest inch, foot, yard, centimeter, and meter
- Capacity, to the nearest ounce, cup, pint, quart, gallon, and liter
- Weight, to the nearest ounce, pound, gram, and kilogram
- Time, to the nearest hour, half-hour, quarter-hour, and five-minute intervals (using digital and analog clocks)

d. Collect and display technological products (e.g., zipper, coat hook, ceiling fan pull chain, can opener, bridge, apple peeler, wheel barrow, nut cracker, etc.) to determine their function. (DOK 1)

e. Create line graphs, bar graphs, and pictographs to communicate data. (DOK 2)
f. Infer that science investigations generally work the same way in different places. (DOK 2)

PHYSICAL SCIENCE

2. Apply an understanding of properties of objects and materials, position and motion of objects, and properties of magnetism.

a. Investigate to conclude that when water changes to ice and then melts, the amount of water is the same as it was before freezing. (DOK 2)
b. Investigate and describe properties and changes of matter. (DOK 2)
   - Unique properties of states of matter (Gases are easily compressed while solids and liquids are not; the shape of a solid is independent of its container; liquids and gases take the shape of their containers.)
   - Physical changes (e.g., boiling liquids, freezing ice, tearing paper)
   - Chemical changes (e.g., burning wood, making ice cream, cooking an egg)
c. Describe observable effects of forces, including buoyancy, gravity, and magnetism. (DOK1)
d. Classify materials that are or are not attracted to magnets and cite examples of useful magnetic tools in everyday living (e.g., can opener, compass, refrigerator door seal). (DOK 2)
e. Recognize that an object can be seen only if either light falls on it or it emits light, and that color is a property of light. (DOK 1)
f. Compare and classify solids, liquids, and gasses. (DOK 2)
g. Identify vibration as the source of sound and categorize different types of media (e.g., wood, plastic, water, air, metal, glass) according to how easily vibrations travel. (DOK 2)

LIFE SCIENCE

3. Develop and demonstrate an understanding of the characteristics, structures, life cycles, and environments of organisms.

a. Describe and categorize the characteristics of plants and animals. (DOK2)
   - Plant parts (leaves, stems, roots, and flowers)
   - Animals (vertebrates or invertebrates, cold-blooded or warm-blooded)

b. Describe the human body systems with their basic functions and major organs (e.g., brain-nervous, bones-skeletal, muscles-muscular). (DOK 1)

c. Identify the cause/effect relationships when basic needs of plants and animals are met and when they are not met. (DOK 1)
d. Compare the life cycles of plants and animals. (DOK 2)
e. Investigate and explain the interdependence of plants and animals. (DOK 2)
    - Herbivore, carnivore, or omnivore
    - Predator-prey relationships

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Categorize different types of Earth materials, (e.g., rocks, minerals, soils, water, atmospheric gases). (DOK 2)
b. Describe the three layers of the Earth. (DOK 1)
c. Collect, organize, and graph weather data obtained by using simple weather instruments (wind vane, rain gauge, thermometer) and explain the components of the water cycle. (DOK 2)
d. Distinguish how actions or events related to the Earth's environment may be harmful or helpful. (DOK 2)
e. Model and explain the concept of Earth's rotation as it relates to day and night and infer why it is usually cooler at night than in the day. (DOK 2)
f. Describe characteristics and effects of objects in the universe. (DOK 1)
    - Position of the sun in relation to a fixed object on Earth at various times (day and night)
    - The major characteristics of planets (revolution and rotation periods, size, number of moons)
    - Changes in the appearance of the moon

THIRD GRADE

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Apply concepts involved in a scientific investigation.

a. Identify questions and predict outcomes that can be examined through scientific investigations. (DOK 3)

b. Describe familiar objects and events using the senses to collect qualitative (e.g., color, size, shape) information. (DOK 1)

c. Select and use simple tools (e.g., rulers, thermometers, scales, hand lenses, microscopes, calculators, balances, clocks) to gather information. (DOK 1)
- Length, to the nearest half of an inch, foot, yard, centimeter, and meter
- Capacity and weight/mass, in English and metric systems
- Time, to the nearest minute
- Temperature, to the nearest degree

d. Draw conclusions and communicate the results of an investigation. (DOK 2)

e. Communicate data by creating diagrams, charts, tables, and graphs. (DOK 2)

f. Ask questions and seek answers to explain why different results sometimes occur in repeated investigations. (DOK 2)

PHYSICAL SCIENCE

2. Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

a. Investigate to conclude that the weight of an object is always the sum of its parts, regardless of how it is assembled, (e.g., Lego creation/separate blocks, bucket/cups of sand, roll/stacks of pennies, bag/individual potatoes, etc.). (DOK 2)

b. Explore and identify physical changes of matter, including melting, freezing, boiling, evaporation, and condensation. (DOK 2)

c. Investigate and describe forces affecting motion in simple machines (lever, wheel and axle, block and tackle, inclined plane, screw.). (DOK 2)

d. Differentiate between potential and kinetic energy and recognize their conversions. (DOK 2)
- Potential to kinetic (e.g., winding a clock/clock begins ticking)
- Kinetic to potential (e.g., roller coaster moving downward/upward to the top of the hill)

e. Explain how light waves travel (e.g., in a straight line until they strike an object, through transparent and translucent objects, from reflecting and refracting surfaces, at the surface of opaque objects).(DOK 1)

f. Differentiate the movement of vibrations in waves (e.g., sound and seismic waves), and cite examples to explain that vibrations move through different materials at different speeds. (DOK 1)

g. Cite evidence to explain why heating or cooling may change the properties of materials (e.g., boiling an egg, evaporating water, chilling gelatin, making ice cream, etc.). (DOK 2)

LIFE SCIENCE

3. Describe the characteristics, structures, life cycles, and environments of organisms.

a. Research and explain diverse life forms (including vertebrates and invertebrates) that live in different environments (e.g., deserts, tundras, forests, grasslands, taigas, wetlands) and the structures that serve different functions in their survival (e.g., methods of movement, defense, camouflage).(DOK 2)
b. Identify and describe the purpose of the digestive, nervous, skeletal, and muscular systems of the body. (DOK 1)
c. Investigate the relationships between the basic needs of different organisms and discern how adaptations enable an organism to survive in a particular environment. (DOK 2)
d. Illustrate how the adult animal will look, when given pictures of young animals (e.g., birds, fish, cats, frogs, caterpillars, etc.). (DOK 2)
e. Recall that organisms can survive only when in environments (deserts, tundras, forests, grasslands, taigas, wetlands) in which their needs are met and interpret the interdependency of plants and animals within a food chain, including producer, consumer, decomposer, herbivore, carnivore, omnivore, predator, and prey. (DOK 2)
f. Recognize that cells vary greatly in size, structure, and function, and that some cells and tiny organisms can be seen only with a microscope. (DOK 1)

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Recall that soil is made up of various materials (weathered rock, minerals, plant and animal remains, living organisms.). (DOK 1)
b. Compare and contrast changes in the Earth's surface that are due to slow processes (erosion, weathering, mountain building) and rapid processes (landslides, volcanic eruptions, earthquakes, floods, asteroid collisions). (DOK 2)
c. Gather and display local weather information such as temperature, precipitation, clouds, etc., on graphs and use graphs of weather patterns to predict weather conditions. (DOK 3)

- Instruments (wind vane, rain gauge, thermometers, anemometers, and barometers)
- Cloud types (cirrus, stratus, cumulus)
- Water cycle (evaporation, precipitation, condensation)

d. Identify the causes and effects of various types of air, land, and water pollution and infer ways to protect the environment. (DOK 3)
e. Identify patterns in the phases of the moon, describe their sequence, and predict the next phase viewed in the night sky. (DOK 1)
f. Describe the different components of the solar system (sun, planets, moon, asteroids, comets.). (DOK 1)
   - Gravitational attraction of the sun
   - Phases of the moon
   - Constellations

g. Explain how fossil records are used to learn about the past, identify characteristics of selected fossils, and describe why they may be found in many places. (DOK 2)
   - The Earth Science Museum at the Petrified Forest in Flora, MS
   - The Natural Science Museum in Jackson, MS

FOURTH GRADE

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Explain and use skills necessary to conduct scientific inquiry.

a. Form hypotheses and predict outcomes of problems to be investigated. (DOK 3)
b. Use the senses and simple tools to gather qualitative information about objects or events (size, shape, color, texture, sound, position, change). (DOK 1)
c. Demonstrate the accurate use of simple tools to gather and compare information (DOK 1)

   - Tools (English rulers [to the nearest eighth of an inch], metric rulers [to the nearest centimeter], thermometers, scales, hand lenses, microscopes, balances, clocks, calculators, anemometers, rain gauges)
   - Types of data (height, mass/weight, temperature, length, distance, volume, area, perimeter)

d. Use simple sketches, diagrams, tables, charts, and writing to draw conclusions and communicate data results. (DOK 2)
e. Interpret and describe patterns of data using drawings, diagrams, charts, tables, graphs, and maps. (DOK 2)

f. Explain why scientists and engineers often work in teams with different individuals doing different things that contribute to the results. (DOK 2)
g. Draw conclusions about important steps (e.g., making observations, asking questions, trying to solve a problem, etc.) that led to inventions and discoveries. (DOK 3)

PHYSICAL SCIENCE

2. Use the properties of objects and materials, position and motion of objects, and transfer of energy to develop an understanding of physical science concepts.

a. Recognize that materials may be composed of parts that are too small to be seen without magnification. (DOK 1)
b. Distinguish between physical and chemical changes and between objects composed of a single substance from those composed of more than one substance. (DOK 2)
c. Determine the causes and effects of forces on motion. (DOK 2)

- Force exerted over a distance causes work to be done and that the result (work) is the product of force and distance
- Friction on moving objects and actions that increase or decrease friction
- Momentum and inertia

d. Explain how energy flowing through an electrical circuit can be converted from electrical energy to light, sound, or heat energy. (DOK1)

- Parts of an electric circuit and resulting actions when circuits are opened or closed
- Construction and uses of electromagnets
- Energy transferred through an electrical circuit to a bulb or bell to its surroundings as light, sound, and heat (thermal) energy

e. Describe how light behaves (travels in a straight line, is absorbed, reflected, refracted, or appears transparent or translucent).(DOK 1)
f. Investigate and draw conclusions about the relationship between the rate of vibrating objects and the pitch of the sound. (DOK 3)
g. Describe how heat flows from a warm object to a cold one and categorize examples of materials that may or may not be used as insulators. (DOK 2)

LIFE SCIENCE

3. Analyze the characteristics, structures, life cycles, and environments of organisms.

a. Describe the cause and effect relationships that explain the diversity and evolution of organisms over time. (DOK 2)
   - Observable traits due to inherited or environmental adaptations
   - Variations in environment (over time and from place to place)
   - Variations in species as exemplified by fossils
   - Extinction of a species due to insufficient adaptive capability in the face of environmental changes

b. Classify the organs and functions of the nervous, circulatory, and respiratory systems of the body. (DOK 1)

c. Compare characteristics of organisms, including growth and development, reproduction, acquisition and use of energy, and response to the environment. (DOK 2)
   - Life cycles of various animals to include complete and incomplete metamorphosis
   - Plant or animal structures that serve different functions in growth, adaptation, and survival
   - Photosynthesis

d. Distinguish the parts of plants as they relate to sexual reproduction and explain the effects of various actions on the pollination process (e.g., wind, water, insects, adaptations of flowering plants, negative impacts of pesticides). (DOK 2)

e. Analyze food webs to interpret how energy flows from the sun. (DOK 2)

f. Describe the structural and functional relationships among the cells of an organism. (DOK 2)
   - Benefit from cooperating
   - Vary greatly in appearance
   - Perform very different roles

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Classify sedimentary, metamorphic, and igneous rocks. (DOK 2)

b. Compare and contrast Earth's geological features and the changes caused by external forces. (DOK 2)
   - Bodies of water, beaches, ocean ridges, continental shelves, plateaus, faults, canyons, sand dunes, and ice caps
   - External forces including heat, wind, and water
   - Movement of continental plates

c. Investigate, record, analyze and predict weather by observing, measuring with simple weather instruments (thermometer, anemometer, wind vane, rain gauge, barometer and hygrometer), recording weather data (temperature, precipitation,

sky conditions, and weather events), and using past patterns to predict future patterns. (DOK 2)

d. Describe how human activities have decreased the capacity of the environment to support some life forms. (DOK 2)
   - Reducing the amount of forest cover
   - Increasing the amount of chemicals released into the atmosphere
   - Farming intensively

e. Compare and contrast the seasons and explain why seasons vary at different locations on Earth. (DOK 2)

f. Describe objects in the universe including their movement. (DOK 2)
   - Physical features of the moon (craters, plains, mountains)
   - Appearance and movement of Earth and its moon (e.g., waxing/waning of the moon and lunar/solar eclipses)
   - Why a planet can be seen in different constellations (locations) at different times

g. Summarize the process that results in deposits of fossil fuels and conclude why fossil fuels are classified as nonrenewable resources. (DOK 2)

FIFTH GRADE

CONTENT STRANDS:

Inquiry **Life Science**
Physical Science **Earth and Space Science**

COMPETENCIES AND OBJECTIVES:

INQUIRY

1. Develop and demonstrate an understanding of scientific inquiry using process skills.

a. Form a hypothesis, predict outcomes, and conduct a fair investigation that includes manipulating variables and using experimental controls. (DOK 3)

b. Distinguish between observations and inferences. (DOK 2)

c. Use precise measurement in conjunction with simple tools and technology to perform tests and collect data. (DOK 1)
   - Tools (English rulers [to the nearest one-sixteenth of an inch], metric rulers [to the nearest millimeter], thermometers, scales, hand lenses, microscopes,

balances, clocks, calculators, anemometers, rain gauges, barometers, hygrometers)

- Types of data (height, mass, volume, temperature, length, time, distance, volume, perimeter, area)

d. Organize and interpret data in tables and graphs to construct explanations and draw conclusions. (DOK 2)
e. Use drawings, tables, graphs, and written and oral language to describe objects and explain ideas and actions. (DOK 2)
f. Make and compare different proposals when designing a solution or product. (DOK 2)
g. Evaluate results of different data (whether trivial or significant). (DOK 2)
h. Infer and describe alternate explanations and predictions. (DOK 3)

PHYSICAL SCIENCE

2. Understand relationships of the properties of objects and materials, position and motion of objects, and transfer of energy to explain the physical world.

a. Determine how the properties of an object affect how it acts and interacts. (DOK 2)
b. Differentiate between elements, compounds, and mixtures and between chemical and physical changes (e.g., gas evolves, color, and/or temperature changes). (DOK 2)
c. Investigate the motion of an object in terms of its position, direction of motion, and speed. (DOK 2)

- The relative positions and movements of objects using points of reference (distance vs. time of moving objects)
- Force required to move an object using appropriate devices (e.g., spring scale)
- Variables that affect speed (e.g., ramp height/length/surface, mass of object)
- Effects of an unbalanced force on an object's motion in terms of speed and direction

d. Categorize examples of potential energy as gravitational (e.g., boulder on a hill, child on a slide), elastic (e.g., compressed spring, slingshot, rubber band), or chemical (e.g., unlit match, food).(DOK 2)
e. Differentiate between the properties of light as reflection, refraction, and absorption. (DOK 1)

- Image reflected by a plane mirror and a curved-surfaced mirror
- Light passing through air or water
- Optical tools such as prisms, lenses, mirrors, and eyeglasses

f. Describe physical properties of matter (e.g., mass, density, boiling point, freezing point) including mixtures and solutions. (DOK 1)

- Filtration, sifting, magnetism, evaporation, and flotation
- Mass, density, boiling point, and freezing point of matter
- Effects of temperature changes on the solubility of substances

g. Categorize materials as conductors or insulators and discuss their real life applications (e.g., building construction, clothing, animal covering). (DOK 2)

LIFE SCIENCE

3. Predict characteristics, structures, life cycles, environments, evolution, and diversity of organisms.

a. Compare and contrast the diversity of organisms due to adaptations to show how organisms have evolved as a result of environmental changes. (DOK 2)

- Diversity based on kingdoms, phyla, and classes (e.g., internal/external structure, body temperature, size, shape)
- Adaptations that increase an organism's chances to survive and reproduce in a particular habitat (e.g., cacti needles/leaves, fur/scales)
- Evidence of fossils as indicators of how life and environmental conditions have changed

b. Research and classify the organization of living things. (DOK 2)

- Differences between plant and animal cells
- Function of the major parts of body systems (nervous, circulatory, respiratory, digestive, skeletal, muscular) and the ways they support one another
- Examples of organisms as single-celled or multi-celled

c. Research and cite evidence of the work of scientists (e.g., Pasteur, Fleming, Salk) as it contributed to the discovery and prevention of disease. (DOK 3)

d. Distinguish between asexual and sexual reproduction. (DOK 1)

- Asexual reproduction processes in plants and fungi (e.g., vegetative propagation in stems, roots, and leaves of plants, budding in yeasts, fruiting bodies in fungi)
- Asexual cell division (mushroom spores produced/dispersed)
- Sexual reproduction (e.g., eggs, seeds, fruit)

e. Give examples of how consumers and producers (carnivores, herbivores, omnivores, and decomposers) are related in food chains and food webs. (DOK 1)

EARTH AND SPACE SCIENCE

4. Develop an understanding of the properties of Earth materials, objects in the sky, and changes in Earth and sky.

a. Categorize Earth's materials. (DOK 1)
   - Rocks, minerals, soils, water, and atmospheric gases
   - Layers of the atmosphere, hydrosphere, and lithosphere

b. Explain how surface features caused by constructive processes (e.g., depositions, volcanic eruptions, earthquakes) differ from destructive processes (e.g., erosion, weathering, impact of organisms). (DOK 2)

c. Summarize how weather changes. (DOK 2)

   - Weather changes from day to day and over the seasons
   - Tools by which weather is observed, recorded, and predicted

d. Describe changes caused by humans on the environment and natural resources and cite evidence from research of ways to conserve natural resources in the United States, including (but not limited to) Mississippi. Examples of Mississippi efforts include the following:(DOK 2)

   - Associated Physics of America, a private company located in Greenwood Mississippi, develops ways to convert a variety of agricultural products into efficient, environment-friendly and cost-effective energy sources.
   - The Natural Resource Enterprises (NRE) Program of the Department of Wildlife and Fisheries and the Cooperative Extension Service at MSU educate landowners in the Southeast about sustainable natural resource enterprises and compatible habitat management practices.
   - The Engineer Research and Development Center of the Vicksburg District of the U.S. Army Corps of Engineers provides quality engineering and other professional products and services to develop and manage the Nation's water resources, reduce flood damage, and protect the environment.

e. Predict the movement patterns of the sun, moon, and Earth over a specified time period. (DOK 1)

f. Compare and contrast the physical characteristics of the planets (e.g., mass, surface gravity, distance from the sun, surface characteristics, moons).(DOK 2)

g. Conclude that the supply of many Earth resources (e.g., fuels, metals, fresh water, farmland) is limited and critique a plan to extend the use of Earth's resources (e.g., recycling, reuse, renewal). (DOK 3)

Appendix B

The MDE Social Studies Content Strands, Competencies, and Objectives for K-5

KINDERGARTEN (SELF/HOME)

CONTENT STRANDS:

Domestic Affairs
Global Affairs
Civil Rights/Human Rights
Economics
Culture

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand that ideas are represented by symbols.

a. Identify school, community, state and national symbols (e.g., school mascot, community logo, Mississippi state flag, United States flag, American eagle, etc.). (DOK 1)
b. Identify the pledge of allegiance and patriotic songs as expressions of patriotism. (DOK 1)

Global/International Affairs

2. Understand self in relation to the location of people, places, and things.

a. Use terms related to location, direction, size, and distance (e.g., up, down, left, right, here, there, far, near, large, small, etc.). (DOK 2)
b. Identify representations of earth using technology, maps, and globes. (DOK 1)
c. Identify cardinal directions (i.e., north, south, east, west). (DOK 1)

Civil/Human Rights

3. Understand the concept of rights and responsibilities of a good citizen.

a. Define the terms “rights” and “responsibility.” (DOK 1)
b. Distinguish between rights and responsibilities of individuals in relation to different social groups including, family, peer group, and classmates (e.g., courteous public behavior, honesty, self-control, respect for the rights and property of others, fairness, etc.). (DOK 2)

c. Name figures of authority and their position in upholding human and civil rights (e.g., parents, teachers, principal). (DOK 1)
d. State the importance of classroom and school rules and the consequences of failing to obey them (e.g., raising hand before speaking to eliminate noise and allow every person to be heard; follow school/classroom rules to prevent accidents). (DOK 1)

Economics

4. Understand the importance of making appropriate economic choices.

a. Classify items as personal wants or needs. (DOK 2)
b. Identify differences between purchasing and bartering (e.g., purchasing a toy at the store, trading baseball cards for a toy). (DOK 1)
c. Discuss the importance of careful use of classroom and home resources to avoid waste. (DOK 1)
d. Identify a variety of jobs (e.g., scientists, teachers, plumbers, lawyers, electricians, store clerks etc.) and their purposes (e.g., earn money to meet individual needs and wants, take care of others, etc.). (DOK 1)

Culture

5. Understand and discuss the traditions of various groups of people.

a. Identify historical figures of various cultures (e.g., Pocahontas, George Washington,
Booker T. Washington, Daniel Boone, etc.). (DOK 1)
b. Describe ways people celebrate their diverse cultural heritages (e.g., literature, language, games, songs, dances, holidays, etc.). (DOK 1)
c. Name historically significant events as they relate to self and family (e.g., Independence
Day, Veterans Day, Memorial Day, Thanksgiving, Martin Luther King, Jr. Day, Black
History month, Presidents‘ Day, etc.). (DOK 1)

FIRST GRADE (FAMILY/SCHOOL)

CONTENT STRANDS:

Domestic Affairs
Global Affairs
Civil Rights/Human Rights
Economics
Culture

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand the symbols, icons, and traditions of community, state, and nation.

a. Identify and explain the meaning of state and national symbols, icons, and traditions
(e.g., the United States flag, bald eagle, Statue of Liberty, Uncle Sam, George Washington, Thanksgiving, saluting the flag, parades, etc.). (DOK 1)
b. Explain the general meaning of the pledge of allegiance. (DOK 1)
c. Identify and discuss songs that express the ideals of the United States of America. (DOK 1)

Global/International Affairs

2. Understand everyday life in different times and places around the world.

a. Use a map and/or globe to locate the local community, Mississippi, the United States, the seven continents, and the oceans. (DOK 1)
b. Identify and apply cardinal directions to maps (i.e., N, E, S, W). (DOK 2)
c. Identify past and present modes of transportation (air, land, and water) in places around the world (e.g., airplane, spacecraft, horse and buggy, walking, subway, train, etc.).
(DOK 1)
d. Describe how location, weather, and the physical environment affect personal lifestyles (e.g., food, clothing, shelter, transportation, and recreational activities). (DOK 2)

Civil/Human Rights

3. Understand the rights and individual responsibilities of members of families and schools.

a. Give examples of the terms “rights” and “responsibility.” (DOK 1)
b. Explain why all humans have rights and responsibilities. (DOK 1)
c. Demonstrate responsible behavior of individuals in different social groups including, family, peer group, and classmates (e.g., courteous public behavior, honesty, self-control, respect for the rights and property of others, fairness, etc.). (DOK 2)
d. Identify and discuss the roles of figures of authority in upholding human and civil rights (e.g., parents, teachers, principal). (DOK 1)
e. Explain the necessity of rules and laws and the consequences of failing to obey them (e.g., raising hand before speaking to eliminate noise and allow

every person to be heard; follow school/classroom rules to prevent accidents). (DOK 1)

Economics

4. Understand basic economic concepts and the role of individual choice in a free market economy.

a. Describe the concept of exchange and the use of money to purchase goods and services. (DOK 1)
b. Give examples of goods and services that people buy and use. (DOK 1)
c. Give examples of the choices people have to make about the goods and services they buy and sell and why they have to make choices. (DOK 2)
d. Identify the specialized roles and contributions of family members in the workplace (e.g., producing, transporting, and marketing goods and services). (DOK 1)

Culture

5. Understand the unique characteristics of a variety of families and cultures.

a. Discuss a variety of different religious, community, and family celebrations and customs.
(DOK 2)
b. Describe celebrations held by members of the class and their families. (DOK 1)
c. Identify historical figures in various cultures and their characteristics (e.g., Abraham Lincoln, Geronimo, Davy Crocket, George Washington Carver, etc.). (DOK 1)

SECOND GRADE (SCHOOL/NEIGHBORHOOD)

CONTENT STRANDS:

Domestic Affairs
Global Affairs
Civil Rights/Human Rights
Economics
Culture

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand the concept and development of government.

a. Define the terms “government” and “voting” (DOK 1)
b. Identify the positions and persons who hold local, state, and national offices (e.g.,
Mayor, Governor, and President). (DOK 1)
c. Explain the voting process and how results are used. (DOK 1)
d. Identify the services provided by the government (public schools, fire departments, police departments). (DOK 1)

Global/International Affairs

2. Understand the locations of people, places, and environments and describe their characteristics.

a. Use a map of the North American continent to locate countries, oceans, Great Lakes, and mountain ranges. (DOK 1)
b. Identify the essential map elements including title, legend, intermediate directional indicators (NE, SE, NW, and SW), scale, and date. (DOK 1)
c. Use a grid map to locate specific places and geographic features in the neighborhood or community. (DOK 1)
d. Compare and contrast the effects of location, weather, and physical environment on the way people live (e.g., food, clothing, shelter, transportation, recreation). (DOK 2)

Civil/Human Rights

3. Understand the importance of individual actions and character traits that contribute to advancing civil/human rights.

a. Compare and contrast the terms “rights” and “responsibilities.” (DOK 2)
b. Define and give examples of some of the rights students have in the school (e.g., students have the right to come to school, to ask questions, to vote in class elections).
(DOK 1)
c. Discuss the responsibilities of individuals in schools (e.g., respect for the rights and property of others, tolerance, honesty, self-control, compassion, participation in the democratic process, work for the common good, fairness, etc.). (DOK 2)
d. Explain the role of people in authority (e.g., police officers, city officials, community leaders) in upholding human and civil rights. (DOK 1)
e. Participate in the development of classroom rules and defining the consequences of failing to obey them. (DOK 2)

Economics

4. Understand how the production, distribution, and consumption of human-made resources and natural resources contribute to the community.

a. Describe production and consumption of human-made goods and services (e.g., food production involves farmers, processors, distributors, weather, land, and water resources; automobile industry involves designers, engineers, welders, robots, etc.).
(DOK 2)
b. Explain how limits on resources affect choices about production and consumption (e.g., farming vs. industrial production; relocating vs. commuting). (DOK 2)
c. Explain the roles of producers and consumers. (DOK 2)

Culture

5. Understand the unique characteristics of a variety of communities and cultures.

a. Identify and discuss expressions of culture evident in neighborhoods (e.g., art, music, literature, religion, food, dance, etc.). (DOK 2)
b. Compare and contrast neighborhoods to earlier generations in such areas as school, dress, manners, stories, games, and festivals drawing from biographies, oral histories, and folklore. (DOK 2)
c. Name historical figures of various cultures (e.g., Thomas Jefferson, Thomas Edison,
Frederick Douglas, Harriet Tubman, Susan B. Anthony, etc.). (DOK 1)

THIRD GRADE (COMMUNITY/LOCAL GOVERNMENT)

CONTENT STRANDS:

Domestic Affairs
Global Affairs
Civil Rights/Human Rights
Economics
Culture

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand the role of rules and laws in our daily lives and the basic structure of the government at the local level.

a. Describe the three branches of government at the local level. (DOK 1)

b. Explain how and why the local government makes laws, carries out laws, determines whether laws have been violated, and determines consequences for those who break the laws. (DOK 2)

c. Explain the purpose of rules and laws and why they are important to a community (e.g.
littering, noise, etc.). (DOK 2)

d. Identify services provided by local government. (DOK 1)

e. Discuss spatial and ecological perspectives in life situations (e.g., locating waste disposal in the community, organizing a recycling drive, measuring food disposal at the school, etc.). (DOK 2)

Global Affairs

2. Understand the interdependence of people, places, and environment that make up the local community.

a. Use social studies tools (e.g., time lines, maps, globes, compasses, graphs, grids, and technological resources, etc.) to describe the connections among the people, places, and environment of the community. (DOK 2)

b. Use maps and globes to find relative and absolute locations in regard to different communities (e.g., longitude, latitude, and spatial perspective). (DOK 1)

Civil Rights/Human Rights

3. Understand the historical circumstances and conditions of civil human rights struggles in local communities.

a. Identify important beliefs commonly held by Americans about themselves and their government (e.g., following individual rights and freedoms, common good, respect for law, importance of work, education, volunteerism, conflict resolutions, etc.). (DOK 1)

b. Explain why certain civic responsibilities (e.g., following civic protocol, celebrating historic figures, etc.) are important to individuals and to the community. (DOK 1)

c. Describe different ways people in a community can influence their local government. (e.g., voting, running for office, or participating in meetings). (DOK 1)

Economics

4. Understand basic economic concepts and their effects on our community.

a. Identify the ways in which a community depends upon other communities to provide for its wants and needs and goods and services. (DOK 2)

b. Define what a “tax” is and the purpose of paying taxes. (DOK 1)
c. Identify resources and scarcity of resources within the community. (DOK 1)
d. Describe opportunity costs of choices made in the community. (DOK 2)
e. Describe the division of labor within the community (e.g., interdependence of various jobs and careers). (DOK 2)

Culture

5. Understand how the diversity of people and customs affects the local community.

a. Explain how cultural artifacts represent cultures in local communities. (e.g., pictures, animals, and masks.). (DOK 1)
b. Compare and contrast celebrations of various groups within the local community.
(DOK 2)
c. Research and identify historical figures of various cultures (e.g., Martin Luther King, Jr., Betsy Ross, Franklin D. Roosevelt, Rosa Parks, etc.). (DOK 2)

FOURTH GRADE (MISSISSIPPI STUDIES/REGIONS)

CONTENT STRANDS:

Domestic Affairs
Global Affairs
Civil Rights/Human Rights
Economics
Culture

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand the purpose, roles, and responsibilities of state and federal government.

a. Distinguish among the three branches of government and their roles at local, county, state, and national levels. (DOK 2)
b. Explain how and why the state government makes, carries out, and enforces laws.
(DOK 1)
c. Explain the responsibilities of state government to protect, educate, and maintain the public welfare of its citizens (e.g., responding to natural disasters). (DOK 2)

d. Demonstrate and analyze spatial and ecological perspectives in life situations (e.g., locating waste disposal in the community, organizing a recycling drive, etc.). (DOK 2)

2. Understand how geography, history, and politics have influenced the development of Mississippi.

a. Identify the major Native American groups (Chickasaw, Choctaw, and Natchez) found living in Mississippi by the first European explorers in the region and discuss their governmental and economic systems. (DOK 2)
b. Describe the process by which the Mississippi territory was admitted to the United
States. (DOK 1)
c. Describe the development of slavery and opposition to slavery in Mississippi. (DOK 1)
d. Trace the events that led to the secession of Mississippi from the Union in 1861 and subsequently entering the Civil War. (DOK 1)

Global Affairs

3. Describe and illustrate geographic aspects of a region using fundamental geographic vocabulary.

a. Use social studies tools (e.g., time lines, maps, globes, compasses, graphs, grids, and technological resources, etc.) to describe the connections among the people, places, and environment of Mississippi and the southeastern region. (DOK 2)
b. Compare and contrast the ten geographical regions of Mississippi in terms of soil, landforms, etc. (DOK 2)
c. Discuss Mississippi‘s global trade activities (e.g., imports, exports, interdependence, etc.). (DOK 1)

Civil Rights/Human Rights

4. Understand the roles, rights, and responsibilities of Mississippi citizens.

a. Distinguish between acceptable and unacceptable behaviors of a responsible citizen (e.g., courteous public behavior, respect for the rights and property of others, tolerance, self-control, participation in the democratic process, and respect for the environment, etc.). (DOK 2)
b. Identify historical figures (e.g., Fannie Lou Hamer, Medgar Evers, and Martin Luther King Jr., etc.), circumstances (e.g., slavery, abolition, segregation and integration, etc.), and conditions (e.g., The Great Migration, Trail of Tears, Women‘s Suffrage, etc.) related to the struggle for civil/human rights in Mississippi and their impact on Mississippi‘s society. (DOK 2)

c. Compare and contrast the benefits and challenges of unity and diversity among citizens of Mississippi. (DOK 2)

Economics

5. Understand how geographic and environmental factors influence life and work.

a. Compare the resources and scarcity of resources in a local region to other regions of Mississippi (e.g., Delta‘s rich soil vs. coastal waters). (DOK 2)
b. Describe the division of labor within Mississippi (e.g., government, industry, and agriculture). (DOK 1)
c. Describe the opportunity cost of choices made within Mississippi (e.g., cotton farming vs. soy bean farming, pasture land vs. industrial development, beaches vs. casinos, landfills vs. parks, etc.). (DOK 2)
d. Explain the benefits and challenges of global trade for Mississippi. (DOK 2)
e. Explain the connections between Mississippi and other states (e.g., economic and political borders such as the Natchez Trace, the Mississippi River, Gulf of Mexico, etc.).
(DOK 2)
f. Describe the economic impact of natural disasters (e.g., hurricanes, tornadoes, earthquakes, etc.). (DOK 2)

Culture

6. Understand diversity in Mississippi.

a. Describe the history of people who first lived in Mississippi. (DOK 1)
b. Identify the Mississippi artists, musicians and writers who have an impact on the state, nation and world. (DOK 1)
c. Analyze the impact and interactions among all groups throughout the history of
Mississippi (e.g., European American, African American, Asian American, Native American, Hispanic, etc.). (DOK 3)

FIFTH GRADE (UNITED STATES HISTORY FROM PRE-COLUMBIAN ERA TO COLONIZATION)

CONTENT STRANDS:

Domestic Affairs	**Economics**
Global Affairs	**Culture**

Civil Rights/Human Rights

COMPETENCIES AND OBJECTIVES

Domestic Affairs

1. Understand the people, events, and types of government associated with the development of the United States.

a. Differentiate among pre-Columbian civilizations (e.g., cliff dwellers, Pueblo people of the desert Southwest, American Indians of the Pacific Northwest, nomadic nations of the Great Plains, and the Woodland Peoples east of the Mississippi River) regarding their location, religious practices, political structures, and use of slaves. (DOK 3)
b. Cite evidence of the earliest explorations of the Western Hemisphere by the Vikings, including locations and time frame of their explorations. (DOK 3)
c. Identify significant European supporters (e.g., King Ferdinand and Queen Isabella) and explorers (e.g., Cortez, Ponce de Leon, Hernando De Soto) and the settlements they established (e.g., Roanoke, Jamestown, Plymouth). (DOK 3)
d. Connect the reasons for the establishment of the early colonies to the major individuals and groups responsible for the founding of those settlements (e.g., John Smith, Virginia;
Roger Williams, Rhode Island; William Penn, Pennsylvania; Lord Baltimore, Maryland;
William Bradford, Plymouth; John Winthrop, Massachusetts). (DOK 3)
e. Discuss the structure of colonial governments (e.g., legislative bodies, town meetings, charters of individual freedoms and rights). (DOK 3)

Global/International Affairs

2. Understand global connections and explore issues, concerns, and possible solutions.

a. Locate physical features that influenced and impacted the migration, exploration and settlement in North America (e.g., continents, ocean currents, winds, forests, rivers, mountain regions). (DOK 3)
b. Describe the impact of geographic regions on Native American life and the ways in which Native American Nations interacted with one another. (DOK 3)
c. Locate on maps of North America and South America, land claimed by Spain, France,
England, Portugal, the Netherlands, Sweden, and Russia. (DOK 3)
d. Explain the cultural, ecological, and economic impact of the Columbian Exchange on Europe, the Americas, and West Africa (e.g., widespread

exchange of plants, animals, foods, human populations including enslaved people, communicable diseases, and ideas between the Eastern and Western hemispheres). (DOK 3)

Civil Rights/Human Rights

3. Understand how political, religious, and economic ideas and interests influenced the founding of the United States.

a. Explain how the need for religious, political, and economic freedom influenced the settlement of North America by Europeans. (DOK 2)
b. Analyze the relationship between early European settlers in America and the Native Americans they encountered in terms of conflict, cultural exchanges, property rights, and adoption of democratic ideas. (DOK 3)
c. Critique the development and impact of slavery in North America, including the causes, conditions, and effects on enslaved Africans in North America. (DOK 3)
d. Trace the development of democratic ideas that influenced the early colonies (e.g., Magna Carta and Mayflower Compact, etc.). (DOK 2)

Economics

4. Understand the impact of trade routes on emerging colonies in the Americas.

a. Describe economic activities within and among Native American cultures prior to contact with Europeans. (DOK 1)
b. Trace the North American and Atlantic trade routes that linked Africa, the West Indies, the North American colonies, and Europe and explain the economic impact of those routes. (DOK 1)
c. Use economic concepts (e.g., supply and demand, scarcity, interdependence, opportunity costs) to identify the economic motivations for European exploration and settlement in the Americas. (DOK 2)

Culture

5. Understand the contributions of the various cultures represented in pre-Columbian through colonial America.

a. Compare major Native American cultures in respect to geographic regions (e.g., Southeast, Northeast, Southwest, Pacific Northwest, and Plains), natural resources, government, economy, and religion. (DOK 2)
b. Explain the effect of colonization by Europeans on both European and Native American cultures. (DOK 2)

c. Draw conclusions about how cultures changed through cultural diffusion, invention, and innovation (e.g., navigational tools such as astrolabe and sextant, farming techniques, new agricultural products, holidays, religious beliefs and practices, government, weaponry, etc.). (DOK 3)