Bio Ethics and Scientific Learning in Rural States with HBCUs as Natural Living-Learning Laboratories: Contemporary Dubois-Washington Thinking For Social Justice in Modern Times

Dawn Bishop McLin, Ph.D.
Associate Professor
Department of Psychology
Jackson State University
P.O. Box 17750, Jackson MS 39217, USA.

Joseph Martin Stevenson, Ph.D.
Chief Academic Officer
The Chicago School of Professional Psychology
STEM Consultant, University of the West Indies, Mona Campus
325 N Wells St, Chicago, IL 60654, USA.

Carrine H. Bishop, Ph.D.
Associate Professor of Higher Education
Executive Ph.D. Program
Jackson State University
1230 Raymond Road
P. O. Box 17209, Jackson, MS 39204, USA.

Anthony V. Junior, Ph.D.
Principal
Strategic Consulting Network, Inc.
International Square Building
1875 I Street, NW, 5th Floor
Washington, DC 2006, USA.

Abstract

This commentary poses and discusses such questions as: How can historically Black Colleges and Universities (HCBUs) in rural states serve as leading living-learning laboratories for their communities, their regions, and the outer academic world? How can bioethics topics help teach students what is morally right? How can bioethics topics help teach students about healthy living, scientific thinking, and the development of a life philosophy? How can bioethics help teach students about the interdependent relationships between physiological, mental and physical worlds? And, How can bioethics help teach students about the trans-disciplinary relations between social science, health ethics and medical science? HBCUs with the research mission and continued commitment to social justice must be both responsive and responsible for setting the national agenda for human life and physiological reproduction in the African American community. Learning laboratories and the living landscape in rural America are formative and instructive venues to continue this commitment to social justice and can respond, with human ingenuity, through science education at the pre-collegiate and collegiate levels and in rural settings. Bioethics has impactful implications and social relevance to self-reliance and scientific research, especially in rural environments that are often sociologically poor but agriculturally rich.

Keywords: Bio-ethic; HBCUs; Learning Laboratories; Social Justice

1. Introduction Trans-Disciplinary Contexts and Early Exposure to Bio Ethics

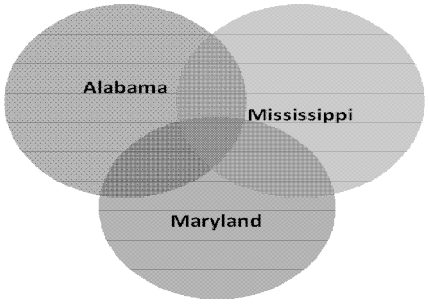
Nearly five decades ago, the Graduate School of Education at Harvard University produced a series of interdisciplinary essays entitled, *On the Biology of Learning*, concerning the neurophysiology and biochemistry of learning. In this book, published in 1969, the work drew academic debate about the relationships between cognitive development, cerebral hemisphere, and social behavior. In 2011, another set of interdisciplinary work in *Future Science: Essays from the Cutting Edge*, was more recently published by young innovative scientists concerning ocean exploration, DNA, social group dynamics, morality, genetics and other topics on the intersecting worlds of natural, physical, social and biological science. Most recently, Beauchamp and others (2014) in *Contemporary Issues in Bio Ethics* also addressed an array of related topics, themes, and trends.

In between these remarkable previous and recent publications, we recognize the 1991 powerful book by Janice Hale entitled, *Unbanked the Fire: Visions for the Education of African American Children*, which suggests, that "there is a distinctive African American culture and that culture should be considered in designing educational practice for children who are socialized in it." In this commentary, we advocate that this bold new journal, published by Tuskegee University, serve as a circular catalyst for change in producing similar transdisciplinary scholarly work concerning the intersecting social and scientific relationships of bioethics from cross sector collaboration teaching between K-12 and higher education, especially in rural settings. However, basic science education is first needed, and we have written about some rudimentary examples. We have symbolized our threaded themes through *circular* graphics in eight contextual sections. We believe the main focus of bioethics inquiry should be modern day health policy and contemporary human practice. We believe that, sooner rather than later in the academic pipeline, young African Americans should *fundamentally and elementarily* be engaged in the intellectual examination of social and scientific issues relevant to AIDS, artificial blood, behavioral disorders, cloning, creationism, embryos, fertility, hormones, transplants, osteoporosis or stem cells, and other *pro and con* issues of bio ethics in our modern and contemporary times, and in the spirit, scope and context of social justice. As students mature and matriculate in the academic pipeline and engage in the understanding of transdisciplinary relationships, they should study the societal roles of government rules and regulations, higher education teaching and research, hospitals and healthcare delivery systems, and business practices for corporate profit or financial gain.

1.1 Bio Ethic Parameters and Commentary Purpose

This commentary has three primary objectives, although we have touched on other compelling areas to stimulate transdisciplinary thought: First, to promote HBCUs and rural states as living-learning laboratories for teaching science, technology, engineering, and mathematics (STEM) and to provide some pedagogical examples for teaching. Second, to discuss the contemporary relevance of the historical debate and the early educational philosophies of the HBCU scholars, Booker T. Washington and W.E.B Dubois. Third, to recommend the area of bioethics for examination of some social and scientific phenomena related to health policy and human practice in the modern African American community. As amplified by the recent "federal government shutdown," our country is ideologically placed in the middle of intense interdisciplinary, local, regional, national and global debates about healthcare policy, related bioethics and human practices with inherent impacts on social justice, as well as profound scientific implications. Since much of the literature is concerned with health disparity in urban settings, we are focusing on rural education. As higher educators in Alabama, Maryland and Mississippi, we have been passionate observers of scientific research purposes, policy and practices in rural and urban communities for at least three decades.

Fig. 1



We know the potential, the promise, and the progress for scientific wonderment among young African Americans and the value of teaching critical thinking, science, and social relevance earlier than later in the academic pipeline. Some parameters for inquiry by students and teachers might include questions such as: How can bioethics topics help teach students what is morally right? How can bioethics topics help teach students about living healthy, thinking scientifically and developing a life philosophy? How can bioethics help teach students about the interdependent relationships between physiological, mental and physical worlds? How can bioethics help teach students about the transdisciplinary relationships between social science, health ethics and medical science? How can HBCUs in rural states serve as living-learning leading laboratories for their communities, their regions, and the outer academic world? We will attempt to address some of these questions in this commentary but leave some for others to ponder through transdisciplinary teaching, motivated student learning, and future publications in this journal. Alabama, Mississippi, rural Maryland, and other states are natural learning venues for studying the social, physical, and natural scientific topics pertinent to modern bioethics. All three states have Historically Black Universities (HBCUs) with the surrounding environmental landscapes and rural terrains that provide genesis for studying bioethics related topics in science, engineering, technology, and mathematics. Much can learned about these rural states from interdisciplinary geospatial information technologies and interpretative mapping analysis.

1.2 The Washington and Dubois Disputation

This commentary builds on the early HBCU rooted academic philosophies of W.E.B Dubois and Booker T. Washington. Washington was raised in the rural country while Dubois was raised in a city environment. Although they differed in their educational philosophies, Tuskegee's Booker T. Washington and Fisk's W.E.B Dubois would probably find themselves in agreement today for two very different but interdependent reasons: one from a *practical* perspective and the other from an *academic* perspective. This commentary is a timely oscillation from the past to the future as a duality in cognition. Perhaps nowhere in HBCU history is this duality metaphysically and metaphorically more relevant than in the famous debate between Washington and Dubois about the purpose, the mission, and the relevance of higher education. In general, these two heroic men had dramatically different educational philosophies that relate to the bioethics of our contemporary times. Washington strongly believed in self-reliance, practical education and applied skill development for industrial occupation. He believed that ultimately this developed economic power in the African American community and would advance the lives, livelihoods, and conditions of African Americans.

Dubois believed that political power and public policy were paramount to the advancement of African Americans through the development of academic, intellectual, and other epistemological experiences. In both cases, the philosophies of these two HBCU American scholars were transformative and conflicting, but not mutually exclusive for our modern era, contemporary times, and the future environment in social-scientific research. With regard to health, modern African American students, families, communities need both economic-political power and educational-academic prowess.

Fig. 2

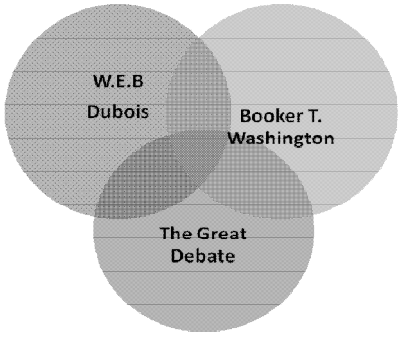


Fig. 3

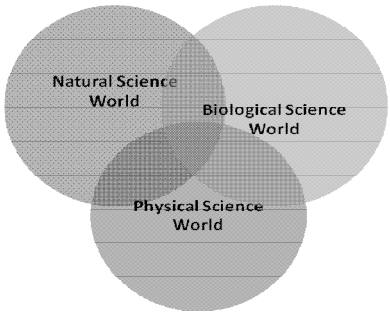
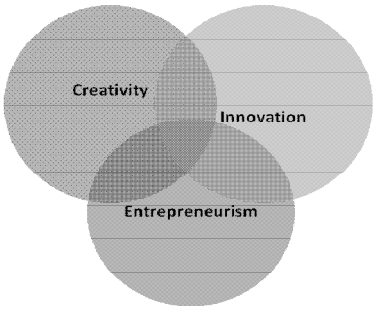


Fig. 4



Both academicians would likely agree that bioethics employs the tenets of self-reliance and scientific epistemology. They would suggest that bioethics is a matter of social, educational and environmental justice, given that many non African Americans and non African American organizations and institutions in the South still continue to profit from African American consumer purchasing with businesses, student enrollment revenue in higher education, patient participation in hospitals and healthcare facilities, and workers in the agricultural and farming related industries. Among the many lessons we have learned from the historical Washington-Dubois debate, in our contemporary context, is the realistic relevance to modern bioethics policy relative to the duality of social-behavioral practice and scientific-academic advancement. We no have many challenges in bioethics (defined as the study, the philosophy, and the application of moral ethics in the advancement, development, and progress of biological, medical and health related science) particularly in modern healthcare delivery amid growing health care disparity and other economic divergence that impacts many African Americans. As another HBCU graduate, Dr. Martin Luther King, once remarked, "Of all the forms of inequality, injustice in healthcare is the most shocking and inhumane."

2. HBCUs, Bioethics, and Intellectual Stimulation

HBCUs with the research mission and continued commitment to social justice must be both responsive and responsible for setting the national agenda for human life and physiological reproduction in the African American community. HBCU faculty and their students have the intellectual capital and cerebral currency to examine many bioethics factors through scientific, social, cultural, behavioral, etiological, and theoretical as well as practical lens for application to African American health and the modern bioethics policy that impacts rural poverty. To develop an intellectual foundation and cognitive fundamentals for examining issues or challenges, we encourage college students and their professors to focus on the following points relative to transdisciplinary bioethics:

a. differentiating between fact and fiction concerning bioethics press, publication and media;
b. recognizing and evaluating racial bias and rhetoric from bioethics press, publication and media;
c. determining accuracy, completeness and trustworthiness of information about bioethics health policy and human practices;
d. recognizing logical fallacies, faulty reasoning and contradictions in bioethics health policy;
e. comparing and contrasting points of view about bioethics integrity, credibility, morality, choices and values;
f. making judgments and drawing logical conclusions about public health policy; and,
g. integrating and synthesizing social, behavioral and scientific information

2.1 Rural America as a Living-Learning Lab for Science

The learning laboratory and the living landscape in rural America is a formative and instructive venue to continue this commitment for social justice and respond through human ingenuity to: (a) science education at the pre collegiate and collegiate levels; and (b) in rural settings around Tuskegee, rural settings like the Mississippi Delta, and other rural settings in the Northeast where there are marginalized populations with high levels of health disparity and population poverty.

Bio ethics has impactful implications and social relevance to self- reliance and scientific research, especially in rural environments that are often *sociologically poor but agriculturally rich.* Teaching young African Americans to understand (a) the relationship between the natural, physical and biological worlds; (b) the relationship between individual behavior and institutional socialization; and (c) the relationship between ethics, values, philosophy and morality is central to the human advancement and social elevation in the future African American community. Given the importance of bioethics and science education in both urban and rural communities, and the role of HBCUs in both venues, perhaps it is time to recognize the wisdom of Booker T. Washington and W.E.B. Dubois. Linking social relevance to scientific research through topics in bioethics could ignite much needed engagement of young African Americans in the STEM pipeline to create new generations of Washington and Dubois for the rural America of Mississippi, Alabama, and Maryland. About 60 million people (about 22% of the American population) live in rural areas (2,288 counties). Rural America consists of about 3,444,930 square miles of open land mass. About 95% of this land is considered rural open space. The land, the water, the sky, the people and the culture of rural America provide limitless opportunities for this region to serve as a laboratory for the investigation of social issues surrounding bio ethics, the intersections of the natural, biological and physical science worlds, and the exploration of science, technology, engineering, and mathematics. The confluences of three scientific worlds converge in rural environments -- perfect for the contextual, social and behavioral examination of bioethics. As Harvard Professor Howard Gardner teaches us, “the purpose of education is to help us understand our various worlds – the physical, biological, social, and personal.”

The land in rural America possesses marvelous soil that is rich in nutrient and agricultural composition. The waterways, lakes and magnificent rivers possess the fundamental mysteries behind historical transportation and irrigation systems that have contributed to the agricultural development of America today. The mystic colors that overlook the land and water from the sky provide our children and youth with the ability to imagine and create images of possibilities beyond their neighborhoods and their schools. Hence, as Marie Curie once said, “I am among those who think that science has great beauty. A scientist in his laboratory is not only a technician; he is also a child placed before natural phenomena which impress him like a fairytale.” Rigorous but reachable learning outcomes in the rural laboratory should be identified at the very outset of instructional planning, and the prescriptive lesson plans should accompany in-class and out-of-class activities to help students transfer their knowledge from bioethics theory and real-life application to health practice.

2.2 The Mississippi Delta as Microcosm

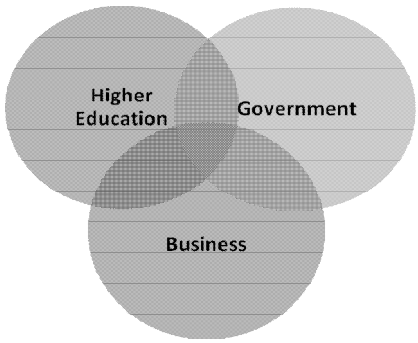
The rural Mississippi Delta, for example, has been widely recognized and celebrated for its literary contributions, its rich history, its agricultural marvels, and its unique sociological culture. It is very seldom referenced as a learning laboratory or as the basis for scientific discovery in the river-region’s schools. Delta schools can engage students and teachers in scientific learning within the subject matters of science, technology, and mathematics as the basis for understanding the very *general* principles of bioethics. Comparing modern day bioethics to historical bioethics in the Delta can be quite illuminating, revealing, and enlightening for students through social and scientific inquiry. For example, the Knights and Daughters of Tabor were organized in Mississippi in 1889, more than fifty-three years ago. As the result of floods, wars and economic setbacks, many difficulties were encountered. By persistent faith and determination, Tabor prevailed through difficult economic times. The Taborian Hospital of Mound Bayou in the Delta was sponsored by the Knights and Daughters of Tabor, a fraternal order of purely *Negro* origin. The hospital provided primary health care, played a significant role in the civil rights movement, and served as a training ground for health professionals from HBCU Meharry Medical College, Howard University and other institutions. Tabor is the name of a biblical mountain in Galilee and the story of its significance can be found in the fourth chapter of the Book of Judges. This Tabor organization was specifically racial in its membership but also American in its mission. It was founded upon principles of democracy and advocacy for a spiritual way of life.

More can be learned about this Delta medical marvel, which has historical impact to bioethics, at the Mississippi Preservation website for articles relating to the Mound Bayou Hospital: http://misspreservation.com/?s=Taborian&x=0&y=0. The primary mission of the Tabor was to meet the needs of the under-privileged by bringing relief to the sick, the struggling and the suffering, heal the distressed within the African American community, and teach the community about the precepts, tenets and principles of Christian faith. It could be argued that the Tabor's hospital was an example of the type pioneering creativity, innovation and entrepreneurism we need today based on the earlier academic philosophies of Dubois and Washington concerning self reliance, social relevance, and community empowerment. How can teaching about the social and scientific confluences of bioethics empower the next generation of pioneers?

This will require teachers to exercise a much needed creativity, innovation, and entrepreneurial spirit to propel the Mississippi Delta and others like the Delta in rural America. School districts from the rural counties might consider developing bioethics topics and other scientific themed field experiences based on the rich regional laboratory that surrounds their schools. Certainly selected interdisciplinary topics associated with social, scientific, ethical and clinical issues should be appropriate for youthful education at the middle school and high school levels. Collaboration between social studies teachers and science teachers would facilitate both left and right brain thinking and promote an understanding of elementary level bioethics. Most high schools, many middle schools, and all universities are equipped with science and technological labs for integrated study of muscular, skeletal, nervous systems and histological study related to the human body and its behavior, not to mention the vast amount of instructional resources on the Internet. Students may also work on topics that intersect biodiversity, human genomics, cultural diversity, and the social justice within the environment of rural indigenous living and ecological conservation. Bioethics is at the forefront of national dialogue and debate.

The Hastings Center Report and the Presidential Commission for the Study of Bioethical Issues have planned a program to address contemporary topics in bioethics education. Lead scholars include Mildred Solomon, president and CEO of The Hastings Center, and Lisa M. Lee, executive director of the Presidential Commission for the Study of Bioethical Issues. Readers of this commentary can learn more about this forum at http://www.thehastingscenter.org/Publications/HCR/

Fig. 5



If carefully taught at the age-appropriate and learning grade level, there is no reason young people from rural environments can't engage in intellectual examination of behavioral and social scientific relevance to AIDS, artificial blood, behavioral disorders, cloning, creationism, eating disorders, embryos, hormones, transplants, osteoporosis or stem cells and the ideological-political-policy roles of government rules and regulations, higher education teaching and research, hospitals and healthcare systems, and business practices and corporate profit. K-12 teachers might pair up with local colleges and university professors who represent the social and behavioral sciences in liberal arts, and with other professors in the natural, physical, biological and life sciences. The key to bioethics education is to think through transdisciplinary lens, concepts, and frameworks. Through marine scientific inquiry of the waterways, students can examine emerging technologies like robotics and wind energy devices, as well as systems that strengthen Delta levees in rural areas. The irrigation systems and other farming and flooding issues can provide lively discussions for conceptualizing the purpose of engineering. The universal language of mathematics could be taught in ways to help our youth understand the principles behind percentages, fractions, predictability, and probability. The alluvial soil around the Delta has enormous opportunity to study earth science.

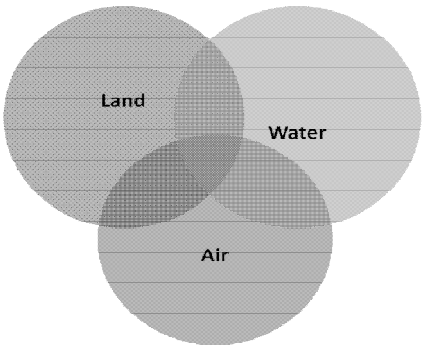
The Delta's conservation, wildlife, hunting, environment, and entomology can be studied as life science. Physical science can be explored through the Delta's aviation system for pesticide control as well as the fundamental physics behind the machines that farm the Delta and are controlled by satellite mechanisms. Geographic information systems (GIS) could serve as excellent visual instructional tools for comprehending populations and communities in surrounding school districts from a helicopter or bird's eye view of the Delta. Jacques Cousteau once asked, "What is a scientist after all? It is a curious man looking through a keyhole, the keyhole of nature, trying to know what's going on." What will be critical is to teach in ways that make the subject matter relevant to real-life surroundings in the Mississippi Delta and other rural or remote settings in Alabama and Maryland.

3. Precocious Precognition, Rural Environs, and Pedagogy

Academic and scientific inquiry must be applied to daily decision-making concerning adolescent life, and drive youthful problem solving based on scientific stimulation. We know from research that the human mind is a sponge. We also know that young people have the propensity to absorb the world around them. Bertrand Russell reminds us that, "science may set limits to knowledge, but should not set limits to imagination." From kindergarten to the senior level of high school, students can learn how to identify problems, collect data about them, analyze the complied data, and propose alternative solutions based on the data. Some resources to consider include: *Precocious Precognition: Targeting Tomorrow's University's Researchers in Today's Middle Schools* by Stevenson (2000), *Teaching Middle School Students to be Active Researchers* by Zorfass (1998) and *Middle Grades Social Studies: Teaching and Learning for Active and Responsible Citizenship*by Allen and Stevens (1998). These important works are timeless and relevant to our advocacy in this commentary. If taught with imagination and enthusiasm science, technology, engineering, and mathematical topics can anchor the kind of curiosity and excitement we desperately need our young people to experience so that they can avoid other habits, dispositions, attitudes and behaviors that derail their human development; particularly now as America faces compelling public health issues surrounding health disparities, healthcare, genetic and behavioral, disease, environmental justice, global climate, and other international challenges. The U.S. Department of Education has also reported that fewer students are enrolling and earning degrees in science, technology, engineering, and mathematics, while rural countries like India and China are doing quite well. We must begin science education early in the systemic academic pipeline to provide upward pathways to careers in scientific fields.

Science curriculum planning that is relevant and true to life, should apply the principles of bioethics to ignite intrigue and excite engagement. Good science education also connects science to society, and our youth must connect relevance to maintain interest in any educational endeavor. The land, water and sky in rural America provides the environment for good critical teaching and thinking in science education, requiring interpreting information, data and analytics, defining interrelationships, framing logic, differentiating between fact and fiction, and drawing general and specific conclusions based on the evidence after analyzing alternatives. To this end, we recommend reading the above referenced, *Future Science*.

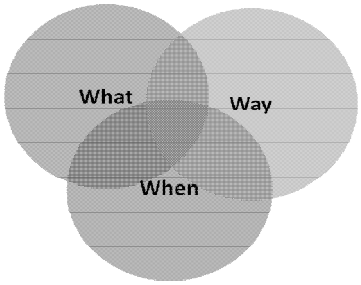
Fig. 6



The rural and remote regions in Alabama, Maryland, and Mississippi are positioned to be living-learning-leading laboratories for rural America. What we place in water, plant on land, and put in our lungs has much do with how we live, how we learn, and how we lead in rural America. This microcosm and manifestation of school-based science educational innovation may draw more resources and much needed attention to rural America.

These resources could include financial contributions from philanthropic organizations and other governmental sources that have been established to promote the future development of science, technology, engineering, and mathematics. There will be skeptics who will suggest that the children and youth of the Delta must first master the fundamentals of reading and writing before advancing to bioethics related areas, amid challenging internal classroom management and external family and environmental issues. However, it may not be *what* the subject matter is as it is the *way* we teach to our youth, and *when* we teach our youth about bioethics.

Fig. 7



Pedagogical creativity and innovation is paramount. Moreover, these subject matters are not mutually exclusive; rather they are interdependent in a well articulated horizontal and vertically organized curriculum centered in imagination. Perhaps igniting intellectual wonderment and intrigue through scientific discovery -- from bioethics related topics-- could augment the fundamental areas of reading and writing when learning outcomes are identified before the traditional curriculum and instructional aims are implemented. At the end of any day in rural America, we must admit that whatever we have been doing in the conventional and traditional sense has not been working and we are losing our youth every day. We may also be losing some of our best teachers to urban, suburban and more metropolitan areas. Incentivizing teachers to stay in rural states and teach innovatively, and igniting our students to stay in rural school and learn creatively, will ultimately enhance regional economic development, scientific advancement, and expansion of out-of-box thinking within the rural regions – thus building healthy communities. The first step is to embrace natural curiosity, explore scientific inquiry, energize human potential, and empower cognitive creativity associated with science education and related bioethics within the minds, hearts and spirits of our students and teachers. What we teach in bioethics, when we teach about bioethics, and the way we teach bioethics may be the answer for regenerating a new generation of HBCU scholars for scientific and social inquiry like Washington and Dubois and as precedence by other scholars between the recent *Future Science* and the earlier *On the Biology of Learning.*

4. Impactful Implications

We offer the following brief suggestions to readers of this journal in response to the questions we posed earlier, and we challenge other academicians, practitioners and others to address them more broadly:

4.1 Bioethics and Morality

How can bioethics topics help teach students what is morally right? Although cloning, stem cells and osteoporosis are very complex issues, we believe these topics can serve as a catalyst for discussing morality and the different dimensions of perceived right and wrong with young students. It will require teaching at the lowest common dominator of basic understanding first, then working through the development of reachable and realistic student learning outcomes. Connecting the social implications of morality with person choices and public policy concerning these controversial areas is fundamental to critical thinking and character development. Perhaps it is a good place to begin discussions about personal proclivity, social risks and returns, and public policy.

4.2 Bioethics and Philosophy

How can bioethics topics help teach students how to live healthy, think scientifically and develop a life philosophy? The inner wilderness of the human body is an excellent lab for teaching healthy lifestyle through an examination of the mechanics of how the body works, and will be useful in assisting graduates to maintain a healthy life style in the outer wilderness of life, where there are many choices to make. We believe topics about nutrition, exercise, and wellness provides the introduction for anchoring a life philosophy with long-term impact and lifelong learning. Showing students how to compile and analyze data concerning lifestyle can also be instructive for framing positive behavior.

Can mistreating the human body, a living organism, be considered a breach of bioethics? This question can also help teach students about the interdependent relationships between physiological, mental, and physical worlds, as well as teach students about the transdisciplinary phenomena between social science, health ethics and medical science. Discussion about the policy role of higher education, government, and business should be central to this dialogue because all students are future consumers, customers, and constituents.

4.3 Living-Learning Labs

How can HBCUs in rural states serve as living-learning leading laboratories for their communities, their regions, and the world? Again, this will require teachers to exercise a much needed creativity, innovation, and entrepreneurial spirit. Rural regions are surrounded by broad biodiversity, rich history, agricultural marvels, and a unique sociological culture. Schools should consider developing bioethics and other scientific themes across the curriculum based on the rich regional laboratory that surrounds their schools. Certainly interdisciplinary topics associated with social, scientific, ethical, and clinical issues are appropriate for youthful education at the middle school and high school levels. Teaming teachers from different disciplines could facilitate the development of left and right brain thinking to understand elementary bioethics topics with social and scientific relevance. The land, the water, the sky, the people and the culture in rural America provide limitless opportunities for the region to serve as a laboratory for the investigation of social issues surrounding bioethics, the intersections of the natural, biological and physical science worlds, and the exploration of science, technology, engineering, and mathematics. Again, bioethics has impactful implications and relevance to self-reliance and scientific research, especially in rural environments and former tenant farming communities that are currently sociologically poor but agriculturally rich.

4.4 The Journal of Healthcare, Science and the Humanities and Health Bioethics

Perhaps the *Journal of Healthcare, Science, and the Humanities*, published by the National Center for Bioethics in Research and Healthcare and located at Tuskegee University, can focus on the transdisciplinary social-scientific relationships in bioethics and the related environmental justice implications and impacts in the rural African American community. These include:

a. educating about scientific philosophy and health policy through bioethics
b. eliminating health vulnerability and marginalization in rural environments
c. optimizing healthy lifestyle from mental-moral to physical-physiological
d. optimizing healthy lifestyle from social-behavioral to policy-practical
e. promoting intergenerational research and development of new STEM scholars
f. maximizing and optimizing the positive impact of health policy and practice
g. eradicating health disparity, inequity and social justice associated bio ethics

This timely journal, published at Tuskegee University must augment and add to: (a) the body of work and knowledge base about the past and the present importance HBCU research, teaching and service; (b) the academic disciplines related to social and scientific inquiry in bioethics; (c) the literature on relationships between natural, physical and biological worlds; (d) studies about intergenerational differences and perceptions about self reliance and social relevance of higher education purpose; (e) gaps in research about minority public health policy and higher education research linkages; (f) growing national conversations about the widening gap between poor and wealthy communities, with health as the core center; and (g) sparking and igniting interest among young African Americans and others to become STEM scholars in the new global academy and conduct research and scholarly studies about rural areas throughout the U.S.

6. Conclusion

In conclusion, this commentary sought to fulfill three objectives: First, to promote HBCUs and rural states as living-learning laboratories for teaching about science, technology, engineering and mathematics (STEM) and provide some pedagogical examples for teaching. Second, to discuss the contemporary relevance of the historical debate and the early educational philosophies of HBCU scholars, Booker T. Washington, and W.E.B Dubois. Third, to recommend the area of bioethics for examining some social and scientific phenomena relative to health policy and human practice in the modern African American community. HBCUs with the research mission and continued commitment to social justice must be both responsive and responsible for setting the national agenda for human life and physiological reproduction in the African American community.

The learning laboratory and the living landscape in rural America are formative and instructive venues to continue this commitment to social justice.

7. References

Allen, M.G, & Stevens, R. L. (1998) *Middle school Social Studies: Teaching and Learning for Active and Responsible Citizenship*. Boston: Allyn and Bacon.

Beauchamp, T. (2014) *Contemporary Issues in Bioethics*. Boston: Wadsworth Cengage Learning.

Brockman, J. (2011) *Future Science: Essays from the Cutting Edge*. New York: Vintage.

Hale, J.E. (1994) *Unbank the Fire: Visions for the Education of African American Children.* Baltimore: Johns Hopkins.

Hyden, H., Lorenz, K., Magoun, H., W., Penfield, W. & Pribram. (1969) *On the Biology of Learning.* New York: Harcourt, Brace, and World.

Stevenson, J.M. (2000) Precocious Precognition: Targeting Tomorrow's University Researchers in Today's Middle Schools. *Journal of Instructional Psychology*. Vol. 27, No. 4.

Zorfass, J.M. (1998) *Teaching Middle School Students to be Researchers*. Alexandria: Association for Supervision and Curriculum Development.