

## **Multidisciplinary Nature of Environmental Problems: Critical Implications for Environmental Education**

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### **Abstract**

*Science courses have traditionally been discipline-centred, with little attention paid to the way in which the natural sciences are influenced by sociology, economics and politics. Understanding these influences is essential for developing and implementing long-term solutions to environmental problems. This paper goes into the question of the roots of the environmental crisis, and thereof advances prospects for environmental education. It is an inquiry into the philosophical background to environmental education. It questions the philosophical framework of modern science that produces the environmental crisis and prospects for a framework for environmental education cultivated from the perspective of multidisciplinary nature of environmental research for teacher training review, curriculum renewal, teaching methods and evaluation in environmental education. The paper concludes that these prospects for environmental education constitute the environmentalist Manifesto to the crucial environmental change of behaviour on which the survival of human civilization as we know it today stands precariously.*

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**Keywords:** *Environmental problems; Environmental crisis; Environmental change; Environmental issues; Environmental Education*

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## Introduction

While technological innovation and economic growth in the twentieth century have led to significant improvement of human welfare, they also have caused unprecedented environmental problems generally dubbed the environmental crisis. The environmental crisis is perhaps the greatest threat to human civilization and survival in all of recorded history. It is the sickness of the Earth. Some have described its seriousness in terms of the Earth catching Aids, implying its immune system has been compromised, with the organism crashing progressively. The threats include a catastrophic change in the chemistry of the globe's atmosphere, distortions of the lithosphere and disruptions in the biosphere. Elements of the environmental crisis include the disaster of global warming and the looming prospects of climate change, degradation and exhaustion of natural resources, loss of biodiversity and the denial of inhabitable environment to future generations, etc. Environmental problems are complex because it relates not only to technical/physical issues but also social issues.

The solution to any sickness is usually not possible apart from a diagnosis as to the causes of the malady. As Lynn white (1967) observes, determining "the roots of our trouble" has a huge role to play in prospecting for "the remedy". Environmental education has been earmarked as the centrifugal point among the prospects of remedy for the environmental crisis. Shocked at the extent of havoc done by man to the environment, of which he is but a part, resolution was made by the United Nations that the United Nations Educational, Scientific and Cultural Organization and other international agencies concerned should establish promote an international program in environmental education (United Nations, 1972). Such was the first global recognition of environmental education as a strategy for the protection and improvement of the environment and its quality (Santra, 2001). By 1990, UNESCO-UNEP declared teacher preparation to teach environmental and sustainability education as the "the priority of priorities" (UNESCO-UNEP, 1990, p. 1). Subsequently, important initiatives have been taken for teacher education, which include the UNESCO Chair on Reorienting Teacher Education for Sustainable Development, the UN DESD, and the GAP. UNESCO has supported the integration of ESD/EfS in initial teacher education through Priority Action Area 3: Building capacities of educators and trainers (UNESCO, 2017b). For environmental education in Nigeria, a keynote can be found in the *Environmental Assessment of Ogoniland* undertaken by United Nations Environment Program (2011), where, in connection with bunkering, artisanal refining and other hazardous oil business activities, call was made for an "awareness campaign", a kind of informal education, on "the disproportionate nature of the short-term financial gain set against the medium to long-term health consequences, both to the individual and the broader community". According to Akanji (2019), environmental education empowers individuals, groups and institutions to properly explore environmental issues along thoughts and activities for environmental sustainability.

Though some strands of environmentalism has made its way into various academic departments of the average university today, it is questionable if an effective environmental education program has so far been outlined. The case today does not seem much different from the scenario of which Aldo Leopold decried, namely, that the universities have "courses bearing ecological labels", "but whatever the label, ecological training is scarce" (1948, 262). He criticized even the conservation science of his day as moving at a snail pace, making one step forward and two steps backwards. And the reason he proffered for this shortcoming "lies in the fact that philosophy ...has not yet heard of it. In our attempt to make conservation easy,

we have made it trivial” (264). The seriousness of Leopold’s observation rests in the fact that, as Hagrove (1989) puts it, “philosophy is the primary source of most western ideas”, and the foundation of all changes in human understanding and civilization. It is from this background that a philosophical review of the roots of contemporary environmental crisis is hereby considered to be of critical significance to environmental education today.

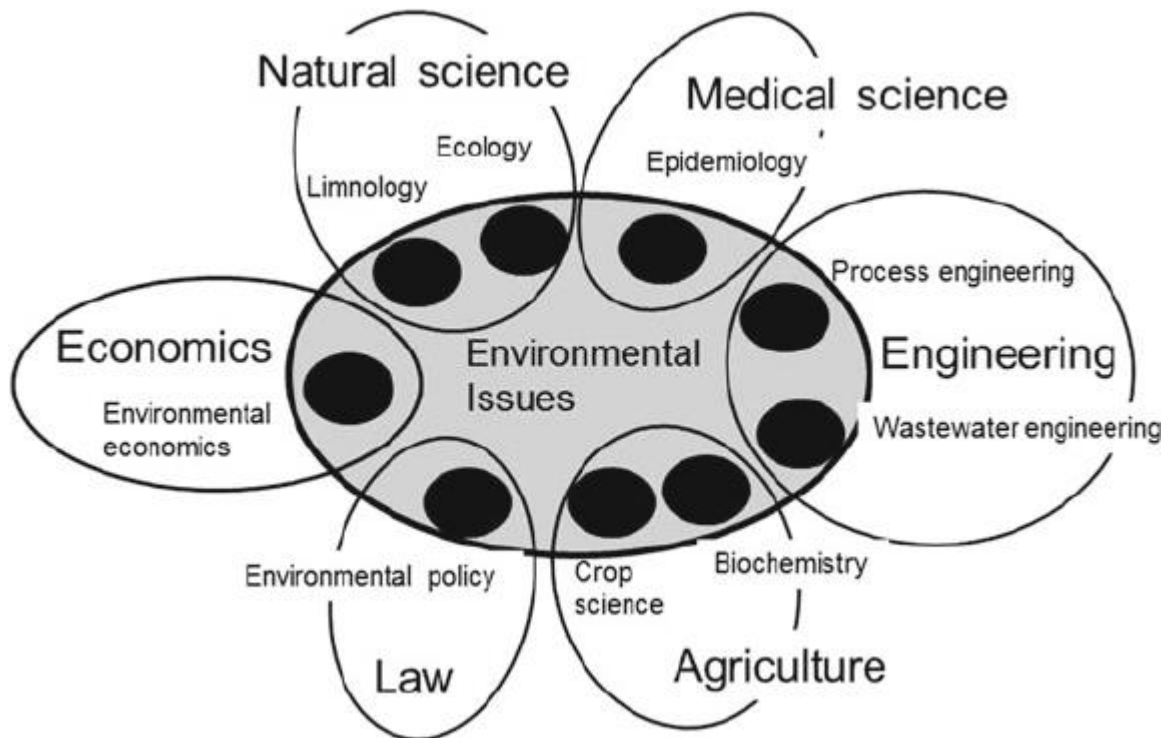
### **Statement of Problem**

This study is intrigued by the question of the roots of the environmental crisis and what prospects this might hold for an effective environmental education. It is an inquiry into the philosophical background to environmental education. It questions the theoretical framework of modern science that produces the environmental crisis and prospects for a framework for environmental education cultivated from the same background.

### **Multidisciplinary Nature of Environmental Problems**

From the above excursus we see that the roots of today’s global environmental crisis are multidisciplinary in nature. The authors each tend to focused on a part of the problem and apparently presume the part for the whole. Religion is no doubt a serious area of crucial significance in environmental studies. There is no denying that religion has perhaps the strongest influence on most human cultures. Marx Weber’s argument about the Protestant Ethic and the spirit of capitalism makes a deep cut into the matter. Karl Marx’s contention that religion can in some cases have a sedative effect on whole populations also highlights the strong force that religion is as an element of culture. So White cannot be dismissed wholly, even if parts of his argument are defective. Pope Francis rightly makes concessions on some misinterpretations of Genesis and the doctrine of human superiority to other forms of nature. Moncrief’s focus on a diversity of cultural roots therefore seem more arguable. The analyses offered by environmental economist Rees and philosopher Hargrove are also piercingly profound.

As the roots of environmental problems are multidisciplinary so are the problems themselves. Much insight about the interdisciplinary nature of environmental problems and solutions have been advanced by the Asian Program for Incubation of Environmental Leaders (APIEL), an educational program developed by The University of Tokyo that aims to foster environmental leaders, who have wide knowledge base, critical perspective, and a strong ethical stance. Those environmental leaders are expected to contribute to building environment-friendly and sustainable societies in the future in Asian countries. In addition, APIEL intends to create a collaborative network of higher education institutions in Asia with a view to tackling environmental issues by developing environmental leadership capacity. Akiyama et al (2013) illustrate the scenario as follows:



The point is that all the sciences and disciplines can be studied in closer connection rather than mutual isolation. Leopold calls for a review of academic disciplines and what Whitehead had likewise called “bifurcation” of the sciences, the destructive emphasis on their separateness and autonomy. He decries the fragmentation of the sciences and their isolation from philosophy and the humanities, from poetry, music, literature, and art, thus making science destructive. A good scientist, he insists, must be sensitive to the wider emotional, evaluative, and philosophical implications of scientific investigation and discovery.

For instance, meteorology is studied to show how natural conditions occur such as the development of the prairie peninsula. Both climate and weather patterns are eventually tied to economic conditions such as housing, travel, agriculture, mining, fishing, logging, tourism, etc. Some of these economic activities are studied over the recent history of human occupation. Also tie the economic and political institutions to issues such as the construction of internal improvements and the politicizing of land ownership and the development (or removal) of the "commons." Emphasis is made on the distinction between boundaries and edges as defined in natural geography versus political geography. For example, the development of paper mill towns coinciding with land speculation during the development of internal improvements such as the canals, railroads, highways, drainage districts, etc. This is studied along with the competition between river towns and upland or prairie towns. Discussion also occurs about the mistreatment of the river by towns and distant economic interests. Chicago's use of the Illinois river as a sewage canal is one example. Use of African nations as dumpgrounds for biological wastes by Western industrial nations also feature here.

In an environmental economics class, the professor would integrate experiential learning to help discuss the flow of resources between the environment and economy. Field trips to view nature areas would be a regular feature of these courses. On these trips, emphasis is given to

alternative uses of resources and the problems associated with commonly owned resources. This course is also taught from the perspective that humans are an integral part of the environment. As a part of the environment, humans use resources from the environment. From an economic perspective, resources have both a use and an existence value. That is, resources not only have value because of how humans can use the resources to produce goods and services, but they also have value to humans simply because they exist. As such, economists explain resource flows in terms of the costs and benefits the resources impart to humans. Human use of the environment also results in returning residuals (pollution) to the environment. This residual flow of resources can, in excess, result in environmental degradation to not only privately owned resources but to 'common' resources as well. In the environmental economics course, special emphasis has to be given to the degradation of the 'commons' such as air, water and fisheries with emphasis given to the inadequately defined property rights. And much more.

Acknowledging these microeconomic incentives, students in environmental economics then study the transboundary nature of environmental degradation and the resulting implications for designing government regulations to help resolve the issues. To do so requires a broad interdisciplinary approach to environmental research. Environmental research is an interdisciplinary program that examines humanitarian, economic, political, social, cultural, and ecological issues from a global perspective, with highlights on the contributions that history, geography, anthropology, political science and the natural sciences promise.

### **Implications for environmental Education**

The reason educational reform is taken seriously by many countries is that they believe education to be the driving force of political, economic, cultural, and social development (Schultz, 1980). Many countries push education reform for national development and continuously increase investment in education based on the optimistic assumption that an educated population contributes to the socio-economic development of the society as a whole and contributes to the well-being of individuals within the society. The argument holds similarly for environmental education in particular, and this time for the survival of humankind as a whole. As the UN acknowledged at Stockholm (1972), for the survival of the human race it is important to find solutions to current environmental problems by investing in environmental education. It has been argued that education reform must start from the premise of how to expand educational opportunities and guarantee equality of education for all individuals by responding to their educational needs (Yun, 1990). For Idiong(2023) effort should be made in bringing about positive change and contributions to the overall progress of the nation. Environmental education is case in point.

To be sure, educational system and its institutions have always functioned as revolutionary, reformationary, and conservationary. This perhaps informed the world wide conviction that environmental education is vital for achieving success in the domain of environmental conservation and sustainability (Michaelis,1980;Duguet,1992;Emeh,2002;UNESCO,2003). Environmental education also emerged as a cultural response to international awareness that human beings were having negative impact on their environments and causing serious ecological disorder with attendant social and cultural crises.

Aside from the creation of awareness about environmental problems among all citizens of society, environmental education seeks to raise environmental leaders. It is also important to develop human resources who hold a holistic view. This is where some critical implications for environmental education surface. Environmental leaders should be able to identify the problems within the global context based on universal knowledge, as well as understand and analyze the problems within the local context. They must be able to think clearly about cultural and social factors, local ecological and geographical characteristics, and interactions among the neighboring regions/communities, and to propose environment-friendly solutions and sustainable systems from a holistic point of view. But everyone who takes any form of education today should as well take a measure of environmental education.

Crucial implications of multidisciplinary for environmental education touch on the critical areas of curriculum renewal, teacher training renewal and reconsideration of teaching methods. Just as the environmental crisis challenges humankind to undertake a fundamental review of lifestyle, culture and civilization, so also, in the educational domain, fundamental reviews in the educational sector are indispensable. We shall now consider these implications of the multidisciplinary nature of environmental education in some specific details.

### **Curriculum Renewal**

The curriculum is the most important aspect of any educational enterprise (Achuonye and Ajoku, 2013). A school system without a curriculum is like a ship at sea without a compass. And yet the curriculum is continually enriched by the findings of society. As Dewey (1900) has argued successfully, the methods and curriculum employed in learning and teaching is a “product of the changed social situations”, and therefore, must be adapted to “meet the needs of the new society.

Logically, therefore, a key step to be taken for environmental education in light of the multidisciplinary nature of environmental problems is what Santra (2012, 989) has called “the environmentalisation of school curriculum”. This implies not just the sprinkling of the curriculum with environmental course titles but a fundamental reframing of the curriculum of each department to have a strong capacity to implement critical environmental educational objectives. What Aldo Leopold wrote about the middle of the twentieth century seems very relevant today:

...much higher education seems deliberately to avoid ecological concepts. An understanding of ecology does not necessarily originate in courses bearing ecological labels; it is quite as likely to be labelled geography, botany, agronomy, history, or economics. This is as it should be, but whatever the label, ecological training is scarce (1949, 262).

The multidisciplinary context of environmental problems implies that curriculum renewal in favor of environmental education be undertaken in all faculties and departments of higher learning. To undertake an effective curriculum renewal process in light environmental education, an earlier task is to determine critical environmental education objectives in various specialties. While this is ongoing there is the need to infuse into existing curricula certain topics and concepts proper to general environmental education.

The curriculum review and renewal thus required amounts to a “greening” of all the arts and sciences. In all disciplines of learning curriculum content that belong to the scientific

worldview and civilizational perspective which produced today's environmental woes have to be reviewed and replaced by those in tune with the prescriptions of environmental ethics and the logic of sustainable development. The result should be the emergence of green physics, green chemistry, green theology, green architecture, green economics, green agriculture, green engineering, etc. Pope Francis made the call for a green theology *Laudato Si* (2015). White had earlier called for greening of religion. Rees and others have called for a green economics. Every department of learning needs greening and the resources for this renewal are latent in the untapped potentials of every discipline. What is perhaps not commonplace and must be cultivated first is the recognition of environmental sustainability as the new, overriding ethical framework for all types and levels of education.

Curriculum review for the implementation of environmental education objectives have to run through all levels of education such that one does not have to specialise in any field of environmental studies to have basic environmental education. For those specializing in environmental ethics and management there must be an intentional integration of the disciplines of economics, biology, chemistry, geography, geology, psychology, sociology, and political science throughout the course. Special emphasis is given to the topics of global warming and sustainable development including a study of renewable energies. UNESCO-UNEP (1997) indicated that the choice of a particular approach in curriculum development involves a consideration of the following aspects; ease of implementation, teacher competencies and training demand or curriculum load, ease of curriculum development and evaluation.

The intergovernmental conference on Environmental Education convened by UNESCO in cooperation with United Nation Environmental Programme [UNEP] in Tbilisi, in 1977 recommended the development of school curriculum in Environmental Education with the following three goals:

- a. foster clear awareness of and concern about economic, social, political and ecological interdependence in urban and rural areas;
- b. provide every person with opportunities, to acquire the knowledge, values, attitudes, to improve the environment; and
- c. create new patterns of behaviour of individuals, groups and societies as a whole towards the environment

### **Teacher Training Review**

The teacher naturally occupies a focal space in educational administration. The teacher is the implementation agent for the actualisation of educational objectives. It has been observed that it is the teacher who makes the curriculum function (Santra, 2012). Hence for the multidisciplinary nature of environmental problems to be met with a multidisciplinary environmental research, teachers have to be prepared for the task through pre-service and in-service programs. Such teacher training is important for the formulation and development of environmental education compliant curriculum. In-service training is crucial because it offers the capacity to meet the urgent demand for environmental educators. If urgent steps are not

taken to meet teacher training renewal there would arise a manpower gap in the sense of lack of drivers for the implementation of upcoming environmental education curriculum.

### **Review of Teaching Methods**

Teaching method refers to the general principles, pedagogy and management strategies used for classroom instruction (USC Rossier, 2014). It is any technique or strategy a teacher employs to make the learner learn his lesson (Ochoma, 2015). To be effective, a teaching method has to be chosen in consideration of the curriculum content as well as the domain of learning, which could be cognitive, affective or psychomotor. The multidisciplinary character of environmental studies naturally implies a diversity of teaching methods for an effective environmental education.

Teaching methods that may be used in environmental education are lecture, demonstration, discussion, field trips, projects, games, simulation, debates, case studies, competitions, exercises and laboratory work. Choice of these would vary from field to discipline and to domain of learning. Field trips to view nature areas must be considered a non-negotiable teaching method in environmental education. Environmental education cannot be a chalk board business. Environmental education also calls for the use of the environment as a living laboratory in the teaching/learning process at all levels of education. This approach has its unique place in education if learning by doing is opted for as a teaching method and strategy (Santra, 1990).

Research and experimentation in environmental issues at various departments of learning will also facilitate and motivate learning. This should include problem identification, observation, exploration, data collection and interpretation, formulating solutions and reaching conclusions. These should be applied to environmental issues like the holistic nature of the environment, the interdependencies of the different elements of the ecosystem, etc, as it applies in the physical, chemical and biological fields.

### **Evaluation**

Evaluation is feedback on the process of implementation of the curriculum. In the case of environmental education evaluation is the process of finding out if environmental education objectives are being fulfilled. Santra (p.991) has argued for the necessity that evaluation instruments in general education be revised and renewed to accommodate environmental questions based on the objectives and contents of environmental education,

The multidisciplinary nature of environmental studies calls for a diversity of evaluation instruments as applicable to the domain of learning in question. Fieldwork lessons cannot be evaluated in the same way as laboratory experiments. Evaluation in the natural sciences would not be the same as evaluation in the social science disciplines. Evaluation in environmental education must be very practical and not theory laden. Evaluation of knowledge and skills may be done satisfactorily through essays, objective tests, true or false questions, short answer questions, project assessment, laboratory work and report, survey, case studies, etc.

Moreover, the diversity of environmental learning across disciplines bother ultimately on affective learning. Though knowledge and skill are pertinent, the inculcation of sound environmental attitudes and environmentally civic behaviour are the fundamental goal of



environmental education. A crucial challenge here is that there are no standardised evaluation instruments that could measure affective learning. It therefore of high priority in the development of environmental education to urgently develop effective instruments for evaluating this type of affective achievement.

### **Possible Recommendations**

**(I) School curricula should prioritize Environmental Education.**

**(ii) Ample opportunities should be provided for Students to engage in hands-**

**On learning and experience nature.**

**(iii) Environmental Education should be promoted through**

**Public awareness campaigns.**

**(iv) Government should provide funding for Environmental Education**

**Programs and research**

**(V) Partnership between schools, Governments and Environmental**

**Organizations should be established.**

### **Conclusion**

The multidisciplinary character of environmental problems and solutions imply a dynamic and ever changing curriculum content despite a unified educational objective. The knowledge-base of environmental education, following its multidisciplinary traits, is decisively complex and highly value-laden, cutting across the aesthetic, spiritual, social, political and economic dimensions, alongside the purely scientific dimensions. This characteristic presents a host of difficulties. The same characteristics that afford flexibility and adaptability, can also pose as weaknesses that can undermine programs' perceived legitimacy both within and beyond their host institutions. The lack of a clear identity, definition of core competencies, and prescriptions for interdisciplinary pedagogy can create confusion among program stakeholders and skepticism among institutional administrators.

The multidisciplinary context of environmental problems and their possible solutions fall in line with the philosophy of science which contends as Whitehead has done that modern science is largely trapped in the fallacy of "misplaced concreteness", by which he understands "mistaking an abstraction for concrete reality, or, more generally, the part for the whole". Related to this is the false dichotomy of man and nature as well as the "bifurcation" of the sciences, separating them from one another. It is because the sciences are "bifurcated" with a false sense of certainty that they mutually release deadly environmental excreta without seeing each other's mutual destructiveness. This separation of the sciences in the guise of specializations, or controlled systems, translate to environmental failure through the problem of uncertainty. Fjeiland illustrates the scenario as follows:

A factory is a typical example of a controlled system. However, the control is normally far from perfect. First, the production process itself is full of risks, for example the risks of explosions and chemical hazards. Second, there is the area around the factory. Traditionally this was heavily polluted. Although

regulations have reduced local pollution, the problem is often moved to other places. In particular, heavily polluting production is often moved from the rich countries to third world countries, where regulations are absent or less strict. Third, we have the uses of the product and the disposal of the worn-out products, and so on. Therefore, when an area is subject to technical control, there is always a large area that escapes control.

In all, we can point to absence of interdisciplinary cooperation as among the roots of modern environmental problems and the need to mitigate such “bifurcation” of the sciences and develop interdisciplinary frameworks as essential tool for environmental education policy. This prospects for environmental education constitute the environmentalist Manifesto to the crucial environmental change of behaviour on which the survival of human civilization as we know it today stands precariously.

### References

- Achuonye, K. and Ajoku, L (2013) Foundations of Curriculum Development and Implementation, Port Harcourt, Pearl Publishers.
- Akiyama T, Li J, Onuki M (2012) Integral leadership education for sustainable development. *J Integral Theory Pract* 7:72–86
- Basu M, Xavier S (2016) Fundamentals of environmental studies. Cambridge University Press, New Delhi
- Dewey, John (1900) *The School and the Society*, Chicago, University of Chicago Press
- Edwards G.I. (2019) Multidisciplinary Approach to Environmental Problems and Sustainability. In: Leal Filho W. (eds) *Encyclopedia of Sustainability in Higher Education*. Springer, Cham. [https://doi.org/10.1007/978-3-030-11352-0\\_241](https://doi.org/10.1007/978-3-030-11352-0_241)
- Sumner A, Tribe M (2008) Development studies and cross-disciplinarity: research at the social science–physical science interface. *J Int Dev J Dev Stud Assoc* 20(6):751–767
- Hargrove, E. (1989) *Foundations of Environmental Ethics*. New Jersey, Prentice Hall/
- Hoy, W. K., & Miskel, C. G. (2001). *Educational administration: Theory, research, and practice* (6th ed.). New York: McGraw-Hill.
- Hughes, J. D. (2014) *Environmental Problems of the Greeks and Romans: Ecology in the Ancient Mediterranean*. John Hopkins University Press, Baltimore.
- Idiong, S.P. (2023) John Dewey's Pragmatic Education: A Veritable Tool for Nation Building in Nigeria. *International Journal of Education and Evaluation (IJEE)*

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www.iiardjournals.org.

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- Klein, K (2004). Environmental Studies: An Interdisciplinary Approach, Berlin Conference on the Human Dimensions of Global Environmental Change “Greening of Policies – Interlinkages and Policy Integration” 3-4 December
- Leopold, A. (1949) “The Land Ethic” in A Sound County Almanac. New York. Oxford University Press.
- Moncrief, L. W. (1970) “Cultural Basis of our Environmental Crisis”, in *Science*, vol 170: 508-512
- Motamedi, V., & Sumrall, W. J. (2000). Mastery learning and contemporary issues in education. *Action in Teacher Education*,22(1), 32-42.
- Myers, D. A. (1973). Teacher power: Professionalization and collective bargaining. Washington, D. C.: Heath and Company.
- Ochoma, M. (2015) Handbook on Teaching Skills, Methods and Practices, Port Harcourt: Crystal Publishers
- Ragner Fjeiland (2003) “Facing the Problem of Uncertainty” in Environmental Ethics: Divergence and Convergence, eds. Armstrong, S. and Botzler, R. Boston, Mc Graw Hill
- Rees, W. (1988) “Sustainable Development: Economic Myths and Ecological Realities”, *Trumpeter*, vol 5, 4.
- Schultz, T. W. (1980). Nobel lecture: The economics of being poor. *Journal of Political Economy*, 88(4), 639-652.
- Vincent, S., Focht, W. (2011) Interdisciplinary environmental education: elements of field identity and curriculum design. *Journal of Environmental Studies and Sciences* 1, 14–35. <https://doi.org/10.1007/s13412-011-0007-2>
- World Commission on Environment and Development (WCED) (1987) Our common future. Oxford University Press, Oxford
- Weiler, K., & Maher, F. (2002). Teacher education and social justice. *Radical Teacher*, 64, 2-4.
- Yun, C. I. (1990). Educational welfare policy toward the 21st century. *The SNU Journal of Educational Studies*, 5(1), 121-146.
- White, L (1967). “The Historical Roots of the Ecologic Crisis”, *Science*, 155:12203-1207