THE SCIENTISTS WILL SAVE THE WORLD:
Environment Education in An Alienated Society

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INTRODUCTION

The attention paid towards environment education has mushroomed during the past five to ten years. It is time for some reflection upon environment education itself, and upon related issues. Environment education has become a 'buzz-word', starting to lead its own life. What is the 'Environment' in environment education and what is the 'Education?' Is environment education going to give us the answers to environmental problems? These and other problems will be discussed here. But first of all: is it the input from science and scientists that will deliver the goods?[1]

TWO MYTHS CONCERNING SCIENCE AND PROGRESS

At present, one of the main concerns of nations is the state of the environment. Disquiet about environmental degradation exists generally, and it is mostly the scientists who are called upon to indicate how to clear up the(ir) mess. It seems that there is a move away from the positivistic sentiment that scientists simply provide desirable progress. A scientist's role now appears to have changed from provider of progress to that of moralist: eg. to give society dietary guidance, describe the desired gene content of life forms and to prescribe the correct use of natural resources. This fits in well with society's need to have a priest-figure that will take care of the continued and growing well-being of society. However, in most societies this well-being is synonymous with continued progress in the sense of an ever increasing scale of production and consumption. This after all is again a positivistic sentiment: if scientists get their act together, then we will progress as before. There is, in the final analysis, no

fundamental change as to how science and scientists are regarded: they will provide desirable development. Such a general positivistic sentiment about science is strongly embedded in most societies.

However, there is reason for regarding science and its products in a favourable way. In making processes more efficient through scientific knowledge, industrial and agricultural production have been raised to high levels and have generated wealth for many. In industrial nations there is no food-shortage. In these nations the priority of food supply has been effectively catered for. Science makes one rich.

The myth is that science - because of what it is; its methods and approaches - *always* ensures (desirable) progress. This myth has played an important role for several hundreds of years, in western nations to begin with, but now quite generally. Only recently have people come to realise the negative effects of science, especially in the form of ever more efficient means of warfare, the growing pollution and the escalating energy needs through expanding production and consumption. Indirectly, science has created many social and political problems.

The fallacy has been that science basically does - and needs to - work from the paradigm in which only phenomena of a physical nature can be studied. These phenomena are sought to be described in terms of underlying physical principles. These reductionist principles of, and consequential specialisations in, science have led to the construction of a large body of knowledge, but of a very detailed and confined nature. Social considerations, and even scientific disciplines not directly related to the particular phenomenon studied, are

not and (for reasons of generalisability) should not be considered. Furthermore, the paradigm used will mostly include the basic assumption that the present road (of progress) taken is alright; it just needs to be taken with a little more caution than was envisaged. The more cautious and clever scientists are, the better we will be able to walk along the (platonic) road which is there for us to 'discover'.

The problem here is twofold. Firstly, as already indicated, this is too narrow an approach to problems. Social, cultural, historical and political aspects are often not considered, or at best given only token attention. This results in recommendations and actions that are not appropriate and which will simply highlight the next (social) problem. Consider, for instance, the many attempts in Southern Africa to use solar energy for cooking. In this case, science presents an alternative source of energy for cooking. From a pure physics perspective this source seems ideal. However, the social function of cooking, and the type of food (and the consequent cooking process required) are not considered. Many solar cookers have been distributed and introduced but they have hardly received any recognition or success. The reasons for this are of a social nature, and mostly not related to pure physics.

The kind of knowledge that is required in these kind of situations (such as the use of solar energy for cooking) is of a much more 'fuzzy' nature than most present-day scientists would be happy with. It goes against most of their maxims for the generating and validating of scientific knowledge. The type of knowledge required is often not general, it is very specific and validation is of an integrated kind rather than from external sources. It will therefore not always be very popular with scientists. Apart from this, there is an urgent need to realise that any knowledge created, whether by 'scientists' or others, is not of an absolute nature, but is paradigm-dependent.

Secondly, scientists - the individuals themselves - are often too focused on their own limited area of work and do not give enough attention to the fundamental query about the limits to growth and development imposed by the availability of various necessary inputs. The world has become much smaller in the last 50 years. Previously, the scale and scope of development was local or at most national. The enormous rest of the world was perceived to still be 'out there' and natural resources (see also the section on Natural Resources below) were therefore perceived as always sufficient, if not unlimited. The world was big enough for everyone to be able to find supplies of resources 'somewhere else' if necessary. Nowadays, development has a global status and the realisation has come that the world is much more finite than it was thought to be. 'Somewhere else' does not exist any more, the world has become one small whole. Serious consideration is needed to establish what state of production, development, population size etc. the earth's total resources can provide and sustain. This is the most difficult problem. It will need a global approach both in scientific and socio-political terms. Given the continuing presence of opposing interests between nations and different parts of the world, and the inability of international bodies like the UN to effectively act in situations of strife and tension, this is something that will not be resolved in the near future.

In discussing science and progress, it is perhaps better to talk about 'change' rather than 'progress'. Progress is too linear a concept to realistically reflect our history. The term 'progress' implies that we all know where we are going to, we have started somewhere back there, and we are progressing to somewhere in front of us. This actually does not really reflect our daily experience. It is not enough to say that because we are too close to present times, we cannot see the direction of progress and therefore we only think that there is no direction. Progress also implies a - mostly

moral evaluation; criteria for comparing a previous state with a new one. These criteria are dependent on the historical moment in which, and the people by whom, they are formulated. Catholicism grew greatly in the late Middle Ages, and was seen as progress by the Church. Now (some aspects of) this progress (such as the later Inquisition) are debated. The identification of progress is dependent on subjective standpoints and thus has no absolute foundation. The term 'change' might be more suitable. This is less direction-dependent. Although it also might be argued that change does not occur (in such basic social terms as 'human nature'), at least on some levels change can be discerned (general wealth, urban development etc.).

It seems that there is a growing feeling that science is not at all the road to take to engender desirable change. In disregarding science as a means to change, we are in danger of saddling ourselves up with the next myth: that science does not provide desirable progress (change) of any kind. Science does generate a body of knowledge. Whether this knowledge is seen as realistic, idealistic, constructionist or whatever, is not of prime importance. We have this body of knowledge and it can or needs to be used. The problem is not that the knowledge is false. Epistemologically seen, it is not possible to make any sensible statement of so general a nature. The problem is that the paradigms from or within which the knowledge has been generated are flawed, mainly in the sense that the knowledge generated is too confined for most practical purposes, as has been explained above.

To be clear: to consider that (the idea of a fuzzy) science *per se* cannot be of help is creating another myth that will severely hamper the generating of strategies to deal with the present environmental problems. Equally, to think that science in its present state will be of definite and fully resolving help is choosing to sustain the myth that Scientists (as we know them now) will Save the World.

TWO MYTHS ABOUT EDUCATION

If science will not make a nation rich and help it to progress, education certainly will. This prevalent myth has been proven, especially in Africa, to be exactly that: a myth. Another myth, related to the first but mostly not recognised, is that education is something in itself, that it is neutral and that it can be used or consumed by whoever wants to. Education has become 'reified'. Education has become a thing that can be sold and bought ·between 'owners' and 'clients'. The problems facing educators in Southern Africa relate to both myths.

The first myth implies that education is often seen - by governments, teachers, children and parents - to be the way to creating wealth for individuals. What is not seen is just where this wealth that can be tapped by educated people will come from.

In Zimbabwe in particular, it appears largely for understandable historical and political reasons, that on the one hand the idea is that everyone should be highly qualified in order to function in a well-paid white collar job in the managing sector of industry. How, on the other hand, this to-be-managed industry itself is created and sustained through the employment of an appropriately trained work force for the actual production activity, is not considered. Huge frustration is the result. Graduates cannot find appropriate employment, and the little industry that there is cannot find the appropriate work force due to inappropriately trained people.

In Africa in general, the curriculum provided for primary, secondary and in cases also tertiary education often has too little relevance to the nation's problems and needs. In discussion with student-teachers at the University of Zimbabwe it transpired that the development of school curricula for Zimbabwe was (in most cases correctly, alas) perceived largely as copying from existing (western) curricula. But also discussing the more original development of school curricula in the last century and the

beginning of this century in an European country as for instance The Netherlands, student-teachers assumed this development to have happened through the copying of curricula form one country (Britain) by another. There appears to be little perception that curricula in Europe were mostly developed completely new and original, without copying by individual nations. These curricula were designed partly to satisfy a nation's individual and increasing need for educated people to sustain industrial development. In Africa, there is a strong perception that education is something that has been constructed by others and can now be consumed by everyone.

From this it strangely appears that education is a part of the heritage from the colonial period which is often not queried. Education brought the children of the colonisers good jobs and money and can therefore only be seen as good. The education, however, was designed for a small elite with specific needs not reflecting the general needs of the whole country. This is often not sufficiently understood. In Zimbabwe, secondary education is almost solely geared towards academic studies, the type of education available almost to whites only before independence. The realisation that Zimbabwe in particular, and Africa in general, needs its individually designed education seems to be taking a long time to come about.

The second myth, related to the first, concerns the perception that education is an object, represented by teaching materials and syllabi. It is not sufficiently seen to be a process. The process called 'Education' is mainly generated through interaction between groups of people often labelled 'teachers' and 'learners'. However, as professionals, 'teachers' need feedback and they also need to develop, they need to understand the 'learners' ideas and conceptual problems. 'Learners' have a responsibility to inform their 'teachers' of their ideas, problems and needs. 'Teachers'

and 'learners' teach and learn from each other. In practice, teachers will of course take a lead in this process. But their role should be more a facilitating one, than that of provider and authority concerning a body of knowledge.

'Facilitating' here means that the teacher will set up situations from which learners can construct useful and relevant knowledge for themselves. This facilitation is partly mediated by educational materials such as teacher and student books and syllabi. The problem coming to the surface here is that these materials are often seen as representing the whole of an educational system. This *pars pro toto* is erroneous. This perspective lends an absolute ontology to education which it does not have. It legitimises the idea that education is an exchangeable object for use by different groups of people, nations or cultures.

The status of exchangeability given to education and its materials creates further alienation in the intended learners. In Africa especially, most people are alienated from the country's general policies, changes and developments. Education, through its curricular materials, also often presents them with a body of knowledge which is alien to them. It is then difficult for people to see any (need for) relevance in the contents of the curricula.

However, mostly in an unconscious way, people do influence the contents of what they learn. They will only assimilate ideas in a way which is intelligible and useful for them. They will not acquire the body of knowledge as undistorted as might be expected. Constructivism holds that people acquire new knowledge in an active way, using their existing ideas and knowledge to make sense of what is presented to them. This means that a learner's initial knowledge is influential when building up new knowledge. Not only the individual is important, however. The interaction with other learners is also important. Knowledge is constructed in an active and often social

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way. Social aspects such as peer-influence, perceived (expert) authority, confidence and home-background all play a role in this constructing of knowledge. All this means that what is eventually learnt can be, and often is, rather different form what was intended to be learnt. It is important to keep in mind that education is not simply a transference of materials to learners, but that it is an active process in which there are many variables which influence what is learnt.

THE MYTHS ABOUT ENVIRONMENT EDUCATION

Environment education is about peoples' environment, and therefore guarantees relevance of curricula and active learning. The learning takes place in, with and for the environment. This is the most treacherous myth we have to face at the moment.

In Zimbabwe, there is a new primary syllabus, named Environmental Science. This syllabus was first designed in 1982 (then named Environmental and Agricultural Science) and recently reviewed and given its new name: Environmental Science. The syllabus heavily stresses science learning and gives little attention to social, historical and cultural aspects. There are however other subjects such as Social Studies, Religious and Moral Education that might address some of these issues. But if they do, it is done in a disjointed way: no integrative approach exists. Many people see the Environment Science syllabus as 'The' environmental education needed for primary schools. However, it has been taught since 1982 and there is as yet little evidence of change in people's behaviour and the environmental degradation being kept in check.

At secondary level in Zimbabwe, various subjects deal with some concepts related to environmental education, but these attempts are fragmented. Most teachers in both primary and secondary schools do not know how to teach the syllabi. They have not been trained adequately in general aspects of teaching, let alone in environmental education. They have only seen role models where 'lecturing' was considered the highest type of 'real' teaching. There are efforts to import (with adaptions) foreign-produced teaching materials. These materials will be only an addition to the already heavily loaded curriculum.

Various donor-funded projects try independently to address aspects of this problematic situation. Zimbabwe has no clear policy on environmental education with which these independent efforts might be streamlined and integrated. Other countries in Africa face similar problems of overloaded syllabi, insufficiently trained teachers and lack of teaching resources. The basis provided by the existing educational system, its infra-structure and its teachers, lecturers, educational officers etc. is often not strong enough to carry the implementation of environmental education activities. Alas, this is often too easily overlooked. There is a danger that - an often misconstrued - environment education takes the place of existing science syllabi as the provider of final solutions to environmental problems. As for science, environment education is a much more 'fuzzy' *process* than people often realise.

Earlier on, some basic problems as to the development and perceived goals of curricula were highlighted. These basic problems are of course relevant to environment education as well. Also of great importance is the particular question as to *whose* 'environment' is used in environment education. The concept of 'environment' presents us with another myth. 'Environment' is a concept that lives mainly in people's heads. The outside phenomena such as trees, rivers, soil, erosion and pollution are only the representations of the mental frameworks that people have constructed. These mental frameworks are used as conceptual glasses. The designers of educational materials look at the 'environment' and see degradation,

inappropriate land-use, the cutting down of trees. The people living in that 'same' 'environmen' see gold to pan for a living, arid soils from which to have to wrench a crop, wood for cooking one's daily needed food. There is an enormous perceptual discrepancy at play here. The children of the people in this last 'environment' are being taught about something which their parents and they themselves do not see. The taught 'environment' is not there, and so does not exist for these children.

As mentioned above, most people in Africa are in an 'alienated' situation. This is not, as was the case in Europe in the 1960's, because people choose to feel alienated or to actively alienate themselves from the main thrust of society. Many people in Africa are by force of circumstance alienated from the thrust of change. They do not participate on a higher social or political level, because they are largely and in a practical sense excluded from this. Education needs to take this into account. To think of designs for (environmental) education suitable for a society in a post-modern condition would be irrelevant. Most people in Africa do not, as in Europe, or in certain small groups in Africa, have wide choices. They do not have a feel of freedom to choose this education or that, to buy this educational course or that. They mostly have very little choice, and therefore do not live in a post-modern condition. For educational materials to present people now with choices of how to grow crops, how to cook, what to cook, what to plant and how to pan gold is like talking in a foreign language. Environmental education with its paradigms of 'alternatives' stemming often from western type cultures, falls on deaf ears. The paradigms of the people it addresses are not based on an alternatives' thinking. It is based on a paradigm of 'necessity'.

Western cultures have the luxury to debate alternatives. People in these cultures can decide for example that the packaging of products is too elaborate and has to be minimized. They can decide to use a bit less

water for a bath, to take the bus instead of the car once a week. This all creates the post-modern condition of freedom of choice. If *you* want to do *this*, that is fine, *I* will do *that*, and that is fine too. There is a continuous awareness of alternatives. This does not appear to be the case in most African countries. People do not live in a situation where they have the opportunity to think in alternatives, simply because there are none.

The point is the environment education is not about something as relatively neutral as teaching the three laws of Newton (although these laws too, and especially the scientific system they are situated in, have cultural overtones). Environment education is more complex and culture-dependent than pure physics. It therefore has to be very sensitive to the context in which it functions. It needs to show an awareness of the general perspective from which people operate, and to place its products and processes firmly in this perspective.

Will those children and others that have been involved in formal or informal environment education, solve the existing environmental problems? This question and the immediate negative response that most will feel to it show the danger of giving environment education too much value in the search for strategies to solve environmental problems.

In the case of formal education, the perception of most teachers, students and parents is that education provides a piece of paper with which a well-paid job can be found. Education is not for learning. This perceptual discrepancy concerning the roles of education held by educators on the one hand and learners on the other is very fundamental. It permeates the daily school situation and the whole process of education. Unless this discrepancy is minimised there can be no great strides expected in dealing with environmental problems.

In the case of informal or adult education, other problems play a role. Environmental education for adults, largely has a controlling and negative perspective. 'Do not cut down trees'. 'Do not cause erosion'. 'Do not plant those crops but those'. It has been, and often still is, too prescriptive. This does not create understanding in the people involved, but rather resentment. Typically, in Zimbabwe shortly after independence, many took to the fields and destroyed contour ridges, because these had been imposed by people with a controlling and negative approach to environmental education. There is now a move towards the use of Indigenous Knowledge Systems for environmental management. Although laudable in itself, it does help to sustain the idea in the reviving people that those agricultural extension workers do not really understand what they themselves are doing. First, the traditional ways were wrong, now it appears that everyone had been right in the first place, and all the new fancy scientific agricultural knowledge is not appropriate after all. The people need to feel that their existing knowledge is enhanced and used. They need to feel that they are getting something positive and relevant to their own knowledge and situation out of all this environmental education.

MYTHS CONCERNING NATURAL RESOURCES

Everything, nowadays, is seen as a resource. There are human resources, natural resources, energy resources, monetary resources. Among a nation's resources are: people, soil, minerals, air, water, plants, animals and so on. This means that 'resources' do in fact comprise everything. There is therefore no meaning in the term. It does not distinguish between what is and what is not an example of category of objects or ideas falling under its meaning. Another problem is that a 'resource' is often seen as something which can be used or exchanged at will. Resources are perceived as neutral, disconnected objects usable in a bargaining position. This is a myth.

Resources are what people make of them. Similar to the concept of 'environment', the concept of 'resource paradigm' within which they have been constructed. Without atomic physics and nuclear reactors, uranium would not be perceived as a resource at all. If there is no industry needing fossil fuels, a country's fossil energy resource does not exist. A resource exists only by the grace of its necessity for some specific use. This specific use is determined by, for example, the existing level of industrialisation, the type of agriculture; people's perceptions of their life-situation and their views of change. This means that the concept of a resource is contingent. With change, new resources might be identified and existing ones might cease to exist. The labelling of physical objects in a country as resources can therefore never be definite and has no absolute status.

There is a further danger in linking the concept of resource with the notion of 'exchange value', which is typical of the thinking in a post-modern society. Since everything is perceived to be a resource, the exchange will be one where one resource is given for another. The problem here is that, as explained above, resources are not neutral disconnected objects. True, there is a growing realisation that resources are not totally disconnected. For instance, coal as a provider of energy is more and more seen as being linked to: specific human health risks in mining it, acid rain caused by burning it and the depletion of an energy resource. But this is not all. There is a more fundamental link. The question as to whether coal needs to be used at all is mostly not asked. This touches upon what here is called the 'resources paradigm'. This paradigm which defines resources is not queried. As in science, there is a positivistic tendency to think that simply a more careful 'harvesting' and 'use' of resources will be the answer. We just need to be a bit more clever. The basic (platonic) road has been found; just try harder to stay right in the middle of it.

However, the effects which the depletion of one particular resource (if such a thing

exists) might have on another, or others, is not really known or understood. Nor is it understood how this depletion affects the existing resource paradigm linked to the resource: the scientific, social, historical and political consequences of depletion and a need for other resources. The generating of this kind of understanding necessitates the construction of new kinds of knowledge and awarenesses. If a shift in the resource paradigm is necessary, can this shift be predicted or described? Can a more holistic risk and action analysis be made? What kind of research (paradigm) is needed here?

REFLECTIONS

It might seem that what has been said before presents a rather gloomy picture. But this is not really the case. The aim of the above is to deconstruct some set ways of thinking. It is easy to land up in rigid modes of though and approaches to problems. This paper tries to re-shape some basic ideas and create some room and freedom for new views to develop.

Basically, those who approach problems need to be more open-minded. For environmental education this means in practice that theories, ideas, materials and so on need to be developed with input from a greater variety of sources than was mostly done before. Participatory action research principles, where representatives of all groups concerned in the process of environment education are actively involved, might be a good way to set about developing theories, ideas and materials. But everyone needs to start with an open mind. The urge for people to quickly 'explain how things really are and what really is the case' needs to be controlled. People first of all need to learn to understand each other. This is a matter of a language game. The same words have different meanings for different people. Perhaps most of the task is to work towards a common understanding. This implicitly carries with it work on all the rest of the issues. Once people have constructed

common rules of the language game, the rest is just the actual playing of the game.

The term 'game' might seem somewhat disparaging. But it nevertheless is a useful term: it keeps in perspective what has been done and indicates that new rules of the game might have to be devised when new conditions are encountered. This will help to prevent a feeling of absoluteness of product to develop: what has been done depended on the paradigm used. If the paradigm is found to need change, than what has been produced also will have to change accordingly.

In general there is a need to better understand the nature of knowledge, ideas and materials created. These are all dependent on paradigms used by the people that created them, but also those used by the people that consume and work with the knowledge, ideas and materials. A rich understanding of these paradigms is essential. Environmental education has to be done within the consumers' paradigm.

Furthermore, it is of course not a bad thing to remind ourselves that our collective efforts should be of help to 'Teacher Moyo' in arranging a useful lesson at her Zenzgeza 3 High School on Monday morning the second period with her mix of high-density and rural students (something this article perhaps appears to fall short of).

BIBLIOGRAPHY

Bennet, D. 1990. Wrapping up postmodernism: The subject of consumption versus the subject of cognition. In Milner, A., Thomson, P. & Worth, C. (Eds). *Postmodern Conditions*. Berg Publishers, New York.

Bhunhu, N. 1992. Teaching and learning in environmental and agricultural science: Case studies of sixteen primary schools in Zimbabwe. In *DSE*. Harare, Zimbabwe.

Buseri, J.C. 1987. The influence of culture on pupils' questioning habits in Nigerian secondary

schools. *European Journal of Science Education,* 9(5), 579-584.

Driver, R. 1989. Changing conceptions. In Adey, P. (Ed.). *Adolescent Development and School Science.* Falmer Press, London.

Driver, R. & Erickson, G. 1983. Theories-in-action: Some theoretical and empirical issues in the study of students' conceptual frameworks in science. *Studies in Science Education,*10, 37-60.

During, S. 1990. Postmodernism or post-colonialism today. In Milner, A., Thomson, P. & Worth, C. (Eds). *Postmodern Conditions.* Berg Publishers, New York.

Easthope, A. 1988. *British Post-Structuralism Since 1968.* Routledge, London.

Heinemann, F. 1958. *Existentialism and the Modern Predicament.* Harper Torchbooks, New York.

Heller, A. 1990. Existentialism, alienation, postmodernism: Cultural movements as vehicles of change in the patterns of everyday life. In Milner, A., Thomson, P. & Worth, C. (Eds). *Postmodern Conditions.* Berg Publishers, New York.

Huxley, A. 1963. *Literature and Science.* Chatto & Windus, London.

Jedede, O. 1991. The relationship between African traditional cosmology and students' acquisition of a science skill. *International Journal of Science Education,* 13(1), 37-47.

Katerere, Y., Pmande, R. & Nhira, K. 1993. Impact of indigenous knowledge and traditional coping strategies on the prevention or mitigation of land degradation and the desertification process in Afric: The mixed production systems of southern Africa. *INDEGI,* November 22.

Kuhn, T. 1970. *The Structure of Scientific Revolutions.* University of Chicago Press, Chicago.

Kuiper, J. 1994. Student ideas of science concepts: Alternative frameworks? *International Journal of Science Education,* 16 (3), 279-292.

Kuiper, J. 1994. A survey of environment education in Zimbabwe's formal educational system. *IDRC,* Nairobi.

Kuiper, J. 1990. Can environment education help schools? *Herald,* October 27, Zimbabwe.

Lakatos, I. 1972. *The Methodology of Scientific Research Programmes.* Cambridge University Press, Cambridge.

Maddock, M.N. 1981. Science education: An anthropological viewpoint. *Studies in Science Education,* 8, 1-26.

Mtetwa, D. 1994. A review of Zimbabwe's national action plans and policies relating to environmental education following the Rio Summit. *IDRC,* Nairobi.

Ogguniyi, M.B. 1986. Two decades of science education in Africa. *Science Education,* 70 (2), 111-122.

Popper, K. 1972. *Conjectures and Refutations: The Growth of Scientific Knowledge.* Routledge, London.

Prophet, B. 1990. Rhetoric and reality in science curriculum development in Botswana. *International Journal of Science Education,* 12(1), 13-23.

Snow, C.P. 1959. *The Two Cultures.* Oxford University Press, London.

Snow, C.P. 1962. *A Postscript to Science and Government.* Oxford University Press, London.

Stiles, K. 1994 A review of status of environmental education in the Zimbabwe non-formal sector. *IDRC,* Nairobi.

Toulmin, S.E. 1953. *The Philosophy of Science: An Introduction.* Hutchinson, London.

Vygotsky, L. 1986. *Thought and Language.* M.I.T. Press, Cambridge.

W'Okot-Uma, R. & Wereko-Brobby, C. 1985. Environmental education: The African dimension. *The Environmentalist,* 52, 137-142.

Wakefield, N. 1990. *Postmodernism, the Twilight of the Real.* Pluto Press, London.

Walker, M. 1993. Theory and practice of action research: A South African case. *Educational Action Research,* 11, 95-109.

NOTES

[1]   Due to the character of the present paper - one in which prevalent ideas and concepts are to be deconstructed - there are no direct references in the text. Presenting the arguments without references might be of help in creating a fresh outlook. References in the text would call up established concepts, ideas and language which would cloud the reader's thought-processes rather than refresh them. However, the literature list at the end gives information for further reading and sources of information dealt with in the paper.