

In Quest of New Transdisciplinary Concepts of "Environment" in Education and Culture*

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Without proper moisture and soil, seeds cannot germinate. without proper nutrition, organisms cannot grow. In order to cultivate the physical and mental capabilities of a parson, what sort of environmental ground should we provide as an optimal condition? Concerning this issue, pedagogy from its begining has been asking- which aspects of environmental factors we should select, protect and enrich for our educatinal pursuit in order to let our individual latent potentials to bloom most fully in a given time and space through physical and cultural environmental impacts.

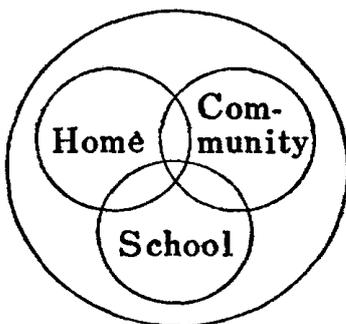
More than a half century ago, Luis Stern, a German psychologist, defined environmental factors as "the sum total of world events which influence one from outside to make changes in his personality and character", and classified them into three categories. They are *natural* such as air, light, nutrition, plants and animals, *interpersonal* such as family, peers, superiors and subordinates, teachers and students, and *cultural* such as the nation, laws, arts, sciences, trades and economy, classes and duties, and so on.

In this modern society with a most highly developed technology, however, we are deeply concerned that every aspect of the educational environment mentioned above might be in the stage of deterioration or near complete collapse. Like insecticides, organic

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mercury or air- and water-pollutions destroying our health, heavy mental stress or cultural poverty becomes an immediate or chronic etiology to our personality. For example, rapid urbanization results in greater population density in some areas and extreme scarcity in other areas, and both cut off personal relationships and endanger mental security, which consequently facilitate further community dissolution and social pathology such as juvenile delinquency or neurosis. No matter how brightly we try to project our future images, no one can deny the facts which point to the disintegration of the natural world, and, consequently, the enlightenment and dignity of humanity are under the shadow of devastation. Therefore, We are strongly urged to identify, define and analyze the causal factors of the educational environment, in the hope that we can protect and improve them on the bases of our best scientific approaches. The main thesis of this paper, therefore, rests upon the following proposition that, since any educational environment is a product of human acts, or an *artificial* operation conducted on *natural* settings, it can and should be restructured if it is still not beyond the limits of irreversibility.

Following after A. Busemann, some educational sociologists specify the home, community and school as the three basic spheres of the educational environment, and place all three in an economic-cultural background of society in which an individual lives, which envelopes his entire environmental experience, as shown in Figure 1. It should be broadly interpreted that the latter includes all historical conditions and ethos of the group. It would be also worth noting



that the home and community are more or less given settings for the person concerned, whereas the school is characterized by its intentional and institutional feature.

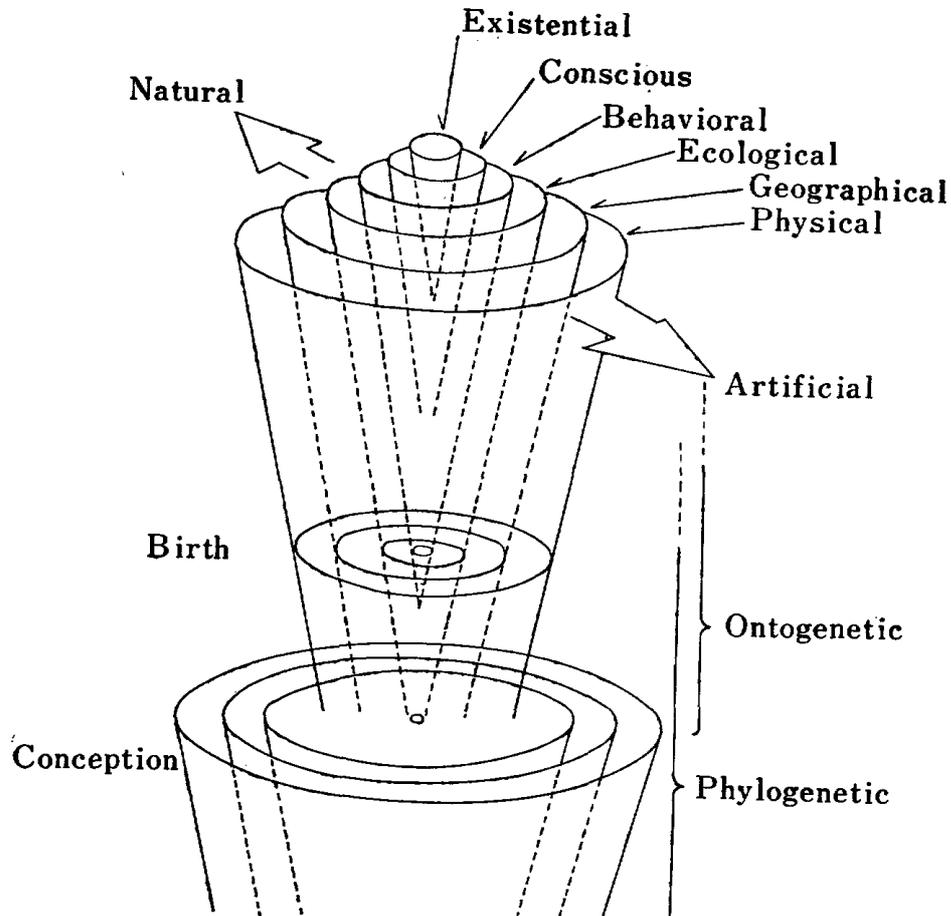
This educational environment, as we confront it today, seems to be much more complex and structured than at the time of

Busemann, and it is consequently much more fragile. It also has momentum because all educational activities are developmental and value-loaded at the same time. That is to say, a given culture imposes certain directions and particular behavioral manners upon individuals, and each individual also seeks out some sets of values and beliefs for his own integrity. Furthermore, a person never stops expanding his psychological horizon as ascertaining his behavioral patterns, either intentionally or unintentionally, through pluralistic value selections. This is a maturational process of a personality from one point of view, and of an acculturation from another point of view.

Therefore, I would like to attempt to clarify our thoughts on this dynamism basically from a standpoint of an educational neuropsychologist as I am, though probably in a very sketchy and methodological fashion, but hopefully with a wider scope of multi- and inter-disciplinary approaches, so that any comments or criticisms from this audience can be of great contribution to our later discussions. So, let me explore first various approaches for the study of interaction among environmental factors, then an expanded scheme of environmental concepts with some seemingly useful theories and hypothetical constructs, and finally the role of higher education for the promotion of the environmental sciences to protect the educational and cultural environments.

Our first lesson in general psychology customarily starts with the phenomenon of discrepancy between the physical environment and its psychological presentations, a favorite subject for Gestalt psychologists. And yet, at the same time, no one doubts that human behavior is always the subject of *physical* and *geographical* as well as *biological* and *social* influences in both *natural* and *artificial* manifestations. Therefore, an environment for a person at a given time must be conceived as a set of multidimensional, but cohesively conjunct at any moment, and externally as well as internally directed forces. To illustrate this, let me present the

second diagram.



The outermost segment is designated as the *physical* environment, consisting of all inorganic and organic substances and energy sources which have staged the eternal drama of transformation. Next, the *geographic* environment includes a total matrix of variables reflecting all regional specificities extracted by the geographic approaches, and the *ecological* environment means a total system of interplays between plants, animals and human beings in the above two environmental grounds. These regions were initially *natural*, but they have been contaminated by artifacts ever since man invented the tool. Today, many of our tragedies can be traced to the predominance of the *artificial* environment over the *natural*, or deprivations from the former and extraordinary impact from the latter. The terms of *behavioral*, *conscious* and *existential*

environments correspond to three main approaches practiced in psychology; namely, operationistic, psychoanalytic and phenomenological approaches, respectively.

The *behavioral* environment is almost a synonym to the psychological constructs employed in the behavioral sciences, such as both micro- and macro-behaviorism. The dimension of *consciousness* is also a continuum, including dynamisms of both the so-called life-space of cognitive theory as well as theories of unconsciousness in analytic sense. The most central and most structured core of the inner environment is designated as the *existential* sector, where foci of his self-realization are implicated.

As you might recognize, these environmental sectors are stratified rather than sectioned on a plane, and each one could also be thought of as a new dimensional axis, emerging from the others amidst one's personal growth. The order of genesis may not be uniform. It allows some direct contacts between a core sector and peripheral ones. Such cross-sectional concepts like "socio-cultural environment" or "educational environment" include all strata across the planes. Therefore, this diagram serves us, at this point, to provide a way to seek appropriate strategies for a given environmental problem. Both the recognition of methodological differences and the identification of the basic communality among the various approaches, with fully respect to the specificity of each discipline, are essential for any interdisciplinary studies.

In this regard, I may just add, several important concepts which attempt to describe the processes of internalizing external environmental factors within one dimension or between neighbouring dimensions. They are homeostasis, perceptual constancy, feedback system in cybanetics, cognitive balance or dissonance, defense mechanism and functional autonomy, to name only a few.

The same diagram also leads our attention to the temporal axis of this dynamic factor. Perhaps any lengthy explanation would be unnecessary to mention that man has come to exist with the

present patterns of living during the past two billion or more years in the history of life, going through various physical conditons and interplays with other organisms on earth.

Many valuable suggestions are available from both *phylogenetic* and *ontogenetic* studies. For example, there are evolutionary views of paleontology and archaeology and developmental views of behavioral genetics, emblyology, perinatal physiology and developmental psychology; all of which provide theories of one sort or another for the understanding of the impetus manifested in those transformations. Besides ordinary theories of genetics, present *phylogenetic* views include theories of social evolution (Spencer, 1855), evolutions of life and inner time (Bergson, 1963), the evolutionary transcendancy of physico-organic-cultural dimensions (Dobzhansky, 1967) and a moment of evolution in terms of accident and necessity (Monod, 1973). In the *ontogenetic* phase, Piaget (1967) is still championing his genetic epistemology.

Lastly, should be added the old recapitulation theory of Haeckel (1868) as a hypothetical but still very useful proposition, which bridges ontogenesis and phylogenesis. According to B. Russel (1935), it is indeed a significant that the science of evolution started, contrary to our expectations, from astronomy to earth science, then plants and animals, and finally it reached human mind just today. V. P. Potter (1971) designated the last for "bioethics", urgently requesting new land-ethics, wild-life-ethics, population-ethics, consumption-ethics, urban-ethics, international-ethics and geriatric-ethics.

As described above, we tried to conceive our environment as multidimensionally collective systems of dynamic interaction in time and space. Although much more precise definitions for each area and its functions should be necessary, ambiguity seems even greater at their boundaries. Here, we should admit that we know practically nothing about the mechanisms of transformation from one dimension to another. After all, we have to touch upon the

problem of relationships between physical world and mental world. In other words, the environmental sciences seems to me are synonymous with the mind-and-body problem. If we avoid responding to this question, we can never claim that we are honestly dealing with any environmental problem in education and culture, or elsewhere.

As a go-between of philosophy and natural sciences, psychology has challenged this difficult issue for many centuries. For example, psychophysics attempted to formulate quantitative laws between physical stimuli and psychological sensation, psychoanalysis pursued the mechanisms of energy transformation from biological into the psychic dimension, modeling itself after hydrodynamics in physics. Functionalists, also borrowing the idea from biology, conceived human behavior as a series of never-ending adaptive processes or the transaction of organisms toward the outer stimulus world. Isomorphism of Gestalt psychologists and reflexology of dialectic materialism are also the products of the similar attempts. In spite of these great efforts, the issue does not seem to be clarified at all.

The deadlock of this mind-and-body problem, and, therefore, the present stagnation of environmental sciences seems to be due mostly to our persistently dualistic thoughts and the loosely defined hypothetical constructs of our mental sciences. Plainly speaking, the key notion to the problem does not exist in a search for the formula of cross-dimensional transformation, but rather in an examination of the undoing of chains of dualism and watching the interaction itself with a more comprehensive framework. Therefore, our advancement of environmental sciences truly depends upon the possibility of innovation for an interdisciplinary translatable and opened system !

Needless to say, I am not proclaiming simple reductionism or physicalism. What I would like to emphasize is that, since any theoretical validity, either physical or psychological, is subject to the operations employed, there must be many optimal levels of

approach and alteranate ways of understanding with relevant strategies.

Since it is a sort of truism, I should not like to spend any more time on it, except for mentioning a few examples of trials in this line. Probably, no one can speak on the environment without referring to the von Uexkull's (1921) farreaching concept of *Umwelt* consisting of a functional circle of *Merkwelt* and *Wirkwelt*. The topological field of K. Lewin (1936) has been called the psychic ecology. Recently, ethology led by Lorenz (1973) and Tinbergen (1951) has been gaining much of popularity. And, the much discussed "third world" of objective knowledges, proposed by a philosopher, K. R. Popper(1972), is augmented by the neurological interpretation of Eccles (1973), who talks of the evolution of consciousness and free will in his electrophysiological model.

Intererstingly enough, all of the above mentioned theories treated the process of consciousness in physico-biological terms, and moreover, they all appeal to the necessity of the revolutionary concept, which is not to seek the principles for complementing physico-chemical process of the brain and consciousness, but something similar to the theory of relativity in physics. In other words, if we explain life phenomena by the usual cause-and-effect analyses, there come so many difficulties that, consequently and inescapably, some principles such as teleonomy, designated by Pittendrigh to the initial role of functional organization in living organisms might be called for. In this regard, all of Eccles, Lorenz and Kiniji Imanishi (1970) in Japan agree. Therefore, this concept must be further entertained and scrutinized thoroughly in our environmental science, especially when we think about the extent of educability in us in our present environment.

As all of you would agree, the role of the modern university is threefold ; research, instruction and community service. Beginning

with the research area, let me make a brief survey of the environmental sciences in Japanese higher education, with the help of the so-called "White Paper of Japanese Sciences" published by the Ministry of Education this summer.

Among the research grants provided by the Ministry, a category of environmental problems appeared in 1964 at the first, with the budget of 50 million yen or 1.5% of the total of 3,342 million yen subsidized for all fields of science that year. The amount, and its proportion of the total funds, gradually increased, and all of a sudden it became six times greater than the previous year, thus obtaining the highest percentage, in the year before the Stockholm Conference of 1971. About 360 million yen or 5.2% of the total were offered to various projects in this field. The amount has been almost doubled since then, but the relative proportion to all other areas declined slightly to 4.1% of the total governmental support last year. However, how heavily or lightly the Ministry is considering this area, which may depend on your personal views, can be guessed from the fact that still 5 fields in environmental studies were chosen from among 22 fields specified with the provision of special funds.

Nevertheless, the next series of statistics would terrify the hearts of those who are deeply concerned with the future of our environmental studies. There are only 7 graduate schools which provide MA courses for a total of 89 students in this field, and only 5 doctorate programs permitting altogether 33 students to study for their Ph. D.s in the entire environmental science spectrum. Adding the two, only 122 graduate students or less than .3% of the 47,000 graduate students in Japan would obtain their advanced degrees in this field.

The figure seems even further desperate for undergraduates. Among 1039 college divisions of over 400 universities in Japan, we can find only 19 departments which devote time to environmental studies. These departments have a total registration of only

844 students, or only .04% of the total of 2 million college population in Japan !

So much for the statistics, let us move on to our curriculum at college education. As you might expect again, we find practically no courses in environmental sciences as such. A very few universities have provided some comprehensive courses, where multidisciplinary presentations of environmental affairs were attempted under course titles of pollution, ecological problems or urbanization. A small number of general education courses, such as "Man and Nature", have dealt with this problem. However, a very few, if none at all, have yet systematically and thoroughly treated the educational and cultural environments.

Recently, some academic societies and associations in Japan have begun to take this matter rather seriously. For example, the Japanese Association of Educational Philosophy opened a symposium on the "Educational Environment" last year. The Japanese Association of Psychology also sponsored a symposium on "Problems in Environmental Psychology" last summer. On both occasions, however, participants were much troubled and deeply distressed by the difficulty of communicating their own conceptual frames and terminologies to other members even within the same research field and discipline.

On the other hand, enthusiasm is much greater at some informal public lectures in so-called *kokai-daigaku*, or opened universities. Because of the clear goals of sponsoring groups or organizers, it is not so rare that they end up with severe accusations or indictments, sometimes so one-sided that they often scare away tenderminded citizens and scholars. I must add one more growing impetus to the promotion of environmental study in higher education. That is those research funds offered by nonprofit organizations, such as the Toyota Foundation and the Tobacco Research Center.

General education in college curriculum has been hoped to be the seedbed for future interdisciplinary studies. Despite some of

our efforts, general education in most colleges never has obtained high popularity either with students or the instructors involved. Since here is not the place to examine this matter itself, let me just remind you that a great deal of caution is needed for designing environmental studies in general education from now on.

It is, however, truly worth reading the interim report of the Educational Council of Curriculum Matters, an advisory committee for the Ministry of Education, which released just a month ago some general directions of their recommendation for the revision of curricula in primary and secondary schools. One of its emphases was to provide for the 10th graders some newly designed general courses in mathematics, Japanese, sciences and social studies, which would attempt to survey all the minimum essentials required for the citizens of today.

From the view of environmental education, this seems to be a golden opportunity to self-examine our present curricular organizations, contents and teaching methods, which may also give us some insights for why we have had such miserable results in general education in many colleges. More discussions on this issue will probably be carried out tomorrow. I would like to say again, this new attempt at the 10th grade in our system would become a turning point for the revitalization of liberal education in Japan. This leads us to our next topic of teacher training programs in regard to our environmental education.

No doubt, every one here would agree on that environmental studies should occupy an essential part of curricula for teacher training. No matter which grade or subject matter he is going to teach, every teacher must pay a great deal of attention to the selection of teaching materials and methods, in order that they would be relevant to the students he meets. Needless to say, this point becomes more critical as we go to lower grades, because children learn more or suffer more directly from their environmental settings. For pupils in upper classes, teachers have to guide them

to recognize our common responsibility for the harmonious coexistence of man and nature with the sense of global citizenship. In this regard, not only the knowledge of the actual environment in which he lives, but also a wider scientific perspective as well as his own ethical view would be called for from each teacher.

As the last point, I would like to call your special attention to the role of the university in recurrent education, or extramural education, which is probably the most neglected duty of higher education in Japan. From the viewpoint of environmental education, however, this is one of the most promising areas we can challenge. For students who attend these programs are those who already have had some experience in society and know by their skin, in the Japanese way of expression, the facts of environmental destruction. Furthermore, they have matured and have definite motives for studying; that is, they come back to school because they want to make their lives more meaningful. Our task would seem to be, therefore, to help them integrate their knowledge and experience into a broader scope, so that they can fulfil their needs to reevaluate and recreate new value orientations for their lives. This, in turn, gives us more hope of further leadership by mature citizens' participation with environmental assessments, community plannings and various activities for the protection of our cultural treasures. Thus, our environmental education ought to be done by matching philosophical thoughts and scientific methodologies with practical first-hand experience. In short, it is truly an art of cooperative pursuit through human encounters with nature and culture.

Today, the ever accelerating destruction of natural and social environments with a diminution of cultural heritages brings to focus the responsibility of educators. Since the mental environment inherits the same destiny of natural and cultural environments, there would be neither science nor philosophy, or the *raison detre*, of education

if we alienate humans from those environments. As we discussed this morning, it is mandatory to ask scientists to fully recognize their responsibility of value judgement in the planning of the protection and preservation of our environment from disaster. Therefore, we should humbly acknowledge the voices from the past and utilize our knowledge and wisdom for the welfare of coming generations. The basic question concerns what sorts of new environments we intend to create as a conclusion to the environmental investigations in which we are engaged.

As my concluding remarks, let me recapitulate some main views expressed in this paper. They are as follows ; respecting the unique methodology of each discipline, environmental concepts in education should be transdisciplinarily integrated. For this goal, today's education demands individuals with global mindeness based upon natural history and life science, keen interests in mind-and-body relations, and with the ability of ever more precise value judgements concerning the balance of technology and humanity.

I sincerely hope that this international congress will contribute to the accountability of scientists in the last quarter of the 20th century by reminding ourselves our mission to create a new global environment with a deep sense of admiration for the mystery of life as well as obedience to the severe decree of nature, and with the courage not only to innovate, but also to respect and protect the heritage and wisdom of mankind.

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