

# Significant Characteristics for Environmental Science Education

## An attempt of definition

Dr. Joachim Borner

Kolleg für Management und Gestaltung nachhaltiger Entwicklung gGmbH, Germany

(This paper is to be based on works for curricular concepts for environmental science studies of different universities and the experimental test of postgraduate studies for Environmental Management and Design)

1. Environmental Science Education is per se interdisciplinary. This results from the fact that the educational contents derive from the social problems in the human nature relationship, which are horizontal to the scientific disciplines. In the ideal case, the formulation of the question derives transdisciplinary, which means, it formulates a holistic and transdisciplinary (solution for an) existing problem as an educational tasks. It differs itself, therefore, from environmental related education, which integrates tangential environmental issues into the traditional canon of the disciplinary education. The last is a necessary condition for the social ability of discourse, nevertheless it should not be defined as environmental scientific education.
2. Purpose of environmental science education is the development of design competence. It achieves its legitimacy, if it moves from environmental area (and environmental protection) into the whole metabolic process of human-nature and defines itself as education for sustainability. That is, if it removes from the restrictive function of environmental protection and accepts innovative and design functions in the strategy of modernisation for sustainability.
3. For the creation of design competences (especially in complex, interdependent, and processual situations) there is a need for (1) specific knowledges, (2) compatible learning patterns and (3) organisational principles.
  - (1) As specific kind of knowledge for sustainable development is inevitable to generate:
    - Systemic knowledge (explanation of existing realities)
    - Goal oriented knowledge (models of new realities)
    - Transformation knowledge (formulation of new realities) )
  - (2) Learning patterns relating to levels of learning and design abilities.
    - The adapted learning (learning of the first order) consists of learning from the past experience with similar situations (The rules remain unchanged as the solution and management tools are refined.)
    - The reflective learning (learning of the second order) transforms the experiences and defines at the same time the rules, from which the problems did derive and where the solution normally will be seeked. The learning answers seems to be possible out of the rules and has to learn the changes of the rules too.
    - „Learning to learn“ (learning of the third order) is based on the permanent reflection on the own learning context and the own „theories in use“.While the learning of the first order represents the typical learning pattern, learning guidance and curricula „production“ must be developed for the learning of the second and third order.
  - (3) Organisational principles describe the goal-adequate organisation of the study. These are
    - participative learning, project learning
    - interdependent learning, iterative learning
    - foresighted thinking /modelling, simulating learning approaches
    - competence for transcultural understanding (learning location and learning situation)

Out of the described characteristics it is obvious that environmental science education aims first at the conditioning of the student as a stakeholder in the modernisation process of sustainable development.