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## **ENVIRONMENTAL LITERACY OF THE SLOVAK UNIVERSITY OF TECHNOLOGY STUDENTS**

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**Abstract:** The paper addresses the level of environmental and ecological literacy of the students of Slovak University of Technology in Bratislava. The authors deal with literacy in stated area in three synergetic dimensions: cognitive, emotional and conative. In the cognitive level are mapped the general knowledge of students regardless of the technical field of their studies. They analyze students' views on teaching at the Technical University from the viewpoint of the need for clarity and acceptability of the effect of technology on the environment not only "here and now", but with a time lag of several years or decades. By the Semantic differential method, they try to find the answer to the question about the quality of students' attitudes to the issue of development and environmental protection. They identify explicit and implicit factors (family, society, training and education process or teacher-student interaction, issues of pattern) which are dominant in the formation of positive and negative attitudes of students of university of technology to the creation and protection of the environment. Conative dimension corresponds to measure of subjective activities of students in this area and refers to the relationship between power factor, evaluation factor and the activity factor in the semantic differential.

**Keywords:** Environmental education, ecological literacy, cognitive dimension, emotional dimension

### **Introduction**

Any meaningful human effort is determined by close link between past and future. This bond has distinct contours in many, if not in all, aspects of human action. The close link between past and future gives the clear sense to the life of man. The sense of being in the process of realization, which is always transformed externally into a consistent effort delivering the intended results. The life is no longer only finding of ready or fitting items? but in the sense of this continuity it is especially creating of desirable and needed items? In no area of human effort and endeavour, it has no desirable or necessary such clear and bright contours as in the field of environmental creation and protection.

The state of the environment nowadays is no longer allowing the possibility of choice or conscious postponing of problem solving to later. Needed becomes necessary, it is *modus vivendi* of human existence. While the past was giving the wide range of possibilities and procedures to man and society, nowadays the only alternative of human behaviour is the model of "homo ecologicus".

F. Fukuyama, in seeking the roots of human nature, and in the process of finding the answers to the question of the re-establishment of social order, states that one of the most important sources of social capital in present societies is the educational system. Educational system should not only provide students with knowledge and skills. It is intended to develop specific behavioural patterns and models of such existence of each individual that are the result of the so called instrumental and terminal values. Instrumental values are related to professional and ethical dimension of a man and to the suitability of his actions (be honest or be logical).

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Terminal values determine current and future goals of personality, there are the ideals determined by the status of social acceptance reflected to the individual goals, conditioned by personal hierarchy. If we have previously stated, the necessity of "homo ecologicus": it is up to schools to reflect this requirement to the maximum extent. Abstracted from geographical or historical conditionality, the dominant efforts of each school system should be to incorporate young people into society so as to be able to understand "their" time and focus their individual professional efforts not only on the subjective benefit but also on the benefit of the society and especially to the benefit of the Earth.

## **Methods**

In the article we present the results of the research carried out at the Department of Supplementary Pedagogical Education at the Institute of Management of the Slovak University of technology in Bratislava. The main objective of the research was to find out how future graduates of University of Technology perceive the state of the environment, how they identify themselves with environmental load or with possible technological threats. We have tried to find the answers to the question of how the knowledge about the environmental burden are elaborated by students and how are they reflected into their attitudes and reasoned actions in terms of persuasive action.

For research purposes, we used the questionnaire method and the masked semantic differential method to measure the connotative meaning of concepts, the valence of the cognitive and emotional component of attitude. Authors analyze students' views on teaching at the Technical University from the viewpoint of the need for clarity and acceptability of the effect of technology on the environment not only "here and now", but with a time lag of several years or decades. By the Semantic differential method, they try to find the answer to the question about the quality of students' attitudes to the issue of development and environmental protection. They identify explicit and implicit factors (family, society, training and education process or teacher-student interaction, issues of pattern) which are dominant in the formation of positive and negative attitudes of students of university of technology to the creation and protection of the environment. Conative dimension corresponds to measure of subjective activities of students in this area and refers to the relationship between power factor, evaluation factor and the activity factor in the semantic differential.

Respondents were students of all faculties of the Slovak University of Technology – Faculty of Mechanical Engineering, Faculty of Materials Science and technology, Faculty of Electrical Engineering, Faculty of Architecture, Faculty of Civil Engineering, Faculty of Informatics and Information Technologies and Faculty of Chemical and Food Technology.

## **Results and Findings**

Krech understands the attitudes as "knowledge, emotional and tendentious action in relation to the various subjects that are organized into the systems during the individual's development". Attitudes are open, dynamic complexes of feelings, knowledge and tendencies to act; they form the psychic reality of individuals. They are the source and regulator of an individual's social activity and they influence the social interaction.

As can be seen from the above, the attitudes have these three components:

- the cognitive component expresses the views of the individual on the subject; its core is the assessment of the opinions, assessing the favourable or unfavourable characteristics of the subject;
- the emotional component contains emotions that bind to the subject;
- the tendency to act component represents the behavioural readiness or tendency in the direction of attitude.

The attitude as such may develop in a very heterogeneous form in each component due to valence, versatility and intensity of attitude. In the socio-pedagogical-psychological literature the issue of attitudes is a topic discussed with a constant mild tension between the behavioural and mentalist concept of the interpretation of human behaviour. One group of authors emphasizes cognition; another group emphasizes rather the state of readiness to act in a certain way. Behaviourist-oriented authors consider as the base of attitudes the affective and constitutive elements of attitude and emphasize the role of activation and motivation factors, while the mentalist approaches emphasize at the formation of attitudes, the exploration of information and ways in which the information received are modified, i.e. the cognitive components of attitude.

The issue of ecologisation or environmentalisation lies in the dynamic context of qualitative changes at one of the leading places of education process at the STU. At all faculties, environmental education has been

introduced, the objectives of which are clearly aimed at the qualitative shift of the environmental consciousness of (MSc-engineers-technicians) graduates of University of technology (MSc-technicians).

Students evaluated seven notions, typical for the issue of creation and protection of the environment. The notions were judged by eighteen pairs of bipolar adjectives, confirmed by factor analysis as relevant for the appropriate assessment factor, force factor and activity factor, with a seven-point evaluation period (-3 ... 0 ... +3). Considered concepts or statements were: harmony, mother, environmental protection, pollution of the environment, ozone hole, environmentalism (as a teaching subject), technique or technology, human in the environment.

The following adjectives were used in the rating factor, which is the attitude of the person and describes the focus on the object: cold - hot, unhappy - happy, lifeless - lively, dark - light, unpleasant - pleasant, brutal-kind. The force factor is consistent with the feelings of severity, hardness, generalized as tension or release. Adjectives: Rare - frequent, blurry - clear, shallow - deep, weak - strong, small - big, powerless - powerful. The activity factor shows the dynamics and variability in the time which is required in the interaction with the object. Adjectives: quiet - noisy, jerky - fluent, pale - fresh, blunt - sharp, peaceful - excited, balanced - passionate. If we proceed from the premise that the positive attitude of human is determined by his inner harmony and love, and at the same time the goal of being is harmony and love, then the notions of harmony and mother were understood as a standard against which we compare the degree of quality of attitudes to other notions. Judging from the polarization profile, the attitudes of respondents to these notions are highly positive - these notions characterize the adjectives alive, happy, pleasant, loving, strong, quiet, and balanced. From gender polarization profiles, women's emotionality is more readable.

The adjectives - unhappy, brutal, unpleasant, but also frequent, big, strong – express the negative attitudes of respondents to ozone hole. The subject of environmental education induces positive attitudes in respondents, characterized in particular by adjectives alive, pleasant, loving. The force factor has the minimum in the dimension of helpless - which is a warning, but in the present situation unfortunately the true signal.

The quality of attitude to pollution of environment is negative. It may be characterized by adjectives -unpleasant, unfortunate, in the factor of force adjectives- frequent, deep, helpless, in the factor of activity - excited. Similarly, negative are the attitudes to the statement - man in the environment while we state the high degree of similarity of polarization profiles.

We examined the quality of attitudes in relation to three pairs of bipolar adjectives: blurred - clear, powerless - powerful, peaceful - excited. Protection of the environmental may be characterized as "poorly" visible, the dimensions helpless-powerful, peaceful-excited are the reflection of more or less neutral attitude, with a minimal shift in the positive direction. Attitudes to the protection of environment are highly positive.

## **Conclusion**

It is shown that in creating the environmental consciousness of technicians, its integrity and complexity guarantee not only rational arguments and facts but the enforcement of a qualitatively new system of values. This system takes care of moral redevelopment of students with well-developed eco-ethics and self-reflection. It is precisely the aspect of homogeneity that we consider to be positive in terms of the perspective of solving the environmental problems of technicians. The homogeneity of the polarization profiles encourages us to believe that the connotative meaning of terms is an absolute degree of agreement among students. On the part of us, the teachers, this is a homogeneous field of attitudes and the development of such targeted activities, which will be reflected in the current behaviour of technicians in the future. It is about developing effective programs, while we understand efficiency in particular as a high degree of acceptability and clarity with the aim of qualitative changes in consciousness of students, with subsequent modification of everyday, not just professional, behaviour and action.

Part of the core curriculum of engineer-technician must be a quality-defined ecological or environmental profile. The dynamics of environmental phenomena cannot be mastered without adequate knowledge, skills and desirable attitudes. The professional preparedness is not enough just as enthusiasm and sacrifice is not enough. The common denominator for success is to link professional preparedness and personal involvement with a feeling of responsibility. Responsibility towards our self and our surroundings, responsibility towards the profession, responsibility towards future generations, and, last but not least, responsibility towards the Earth as the bearer of life.

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