THE ROLE OF THOUGHT-OPERATIONS IN TEACHING IT

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At the beginning of the 21st century, schools have to face two different goals: providing up-to-date knowledge for their students and developing students' thinking skills at the same time. In many teachers' opinion, unfortunately, thinking skills are considered as a secondary product born of the teaching learning process, which are formed spontaneously. Improving students' problem-solving thinking must be given a decisive role in teacher training. For verifying this I want to highlight only three thought-development methods: acquisition of problem solving algorithms; learning the logical systems, connections, cognitive forms (inductive and deductive methods) implicit in the syllabus to be taught - all of them contribute to the formation of students' network of knowledge; emphatic application of thought operations (analysis, synthesis, analogy, etc.) during syllabus processing.

One field of the investigation of problem solving thinking throws light upon the role of analogous knowledge transfer. Gentner (1983) says that inter-structural analogous knowledge transfer as a process may be divided into three parts: recognition of analogies, selection of representation and its use. Further, he states that structure mapping may be selectively explained, since it first lifts then maps onto the destination structure those characteristics and relations of the source structure that are common. Halford (1987) distinguishes four levels of structure mapping by analogy: elementary and relational mapping, system and complex system mapping.

Examples of the latter two can be seen in problems of informatics, but these naturally include the former two as well, e.g. a file copying operation in a local operational system environment to the configuration of rights realised in a network environment. This transfer may be interpreted as the transfer of an operation-executing algorithm, within which the hierarchical system of local data storage has been mapped onto the hierarchical system of network data storage, compression process, so on.

My research results in the fact that Halford's levels may be completed by the transfer of operation-executing algorithms. The source algorithm may be explained as a procedure specimen, which can be transmitted to the solution of new, "algorithmable" problems, taking the appropriate elementary, relational and system mappings into consideration. As long as our students acquire these procedure specimens involuntarily and apply them, the development of their ability of thought is not promoted. The acquisition of algorithms develops critical thought, which results in the optimalisation of the given series of operations, however the objective of education is not only the acquisition and transfer of algorithms, but we also have to enable our students to create algorithms.