

Characterization of high school students' system thinking skills in the context of earth systems

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Abstract

The current study deals with the characterization of systems thinking in the context of earth systems among high school students who major in earth science.

The study addressed the following research questions: (a) what are the system thinking skills of earth science students in the beginning of the learning process? (b) Do earth science students improve their system thinking skills during the learning process? (c) What are the factors influence the developing of system thinking skills among earth science students?

The research combined qualitative and quantitative methods. The collected data included pre/post-instructional questionnaires of system thinking skills, student-generated artifacts and the teachers' perspectives.

The population included 74 high school students from a single prestigious high school, divided into three cohorts during the '05-'07 academic years.

Most of the students began with poor systems thinking skills. Following instruction of an earth science curriculum, these skills developed significantly in many, but not all students, due to the following factors: the initial cognitive ability of the students, the outdoor learning experiences, knowledge integration activities, the teachers' mediation and guidance, the students' level of involvement, and the students' perception of the learning process. Students develop systems thinking skills only when all these factors are synergistic.