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EDUCATIONAL OBJECTIVES IN SOIL MORPHOLOGY

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One of the primary functions of college education is to teach students to think effectively. Students face a variety of employment opportunities beyond college, and each job has unique responsibilities and problems that can change from year to year. It is unrealistic for colleges to attempt to train people for specific niches in society when technology is changing so rapidly. The knowledge that is attained in college must therefore be based on fundamental concepts that can be applied in diverse situations. The ideal program in soil science should have basic courses in soil science, physics, chemistry, and mathematics in addition to upper level classes that stress methods of application to diverse situations in the world. Each course in soil science should be designed with objectives for the students to think at higher levels. This is what we attempt in soil morphology at the University of Nebraska-Lincoln.

The course begins with the fundamentals of soil morphology, and the system of soil classification in the United States (Soil Survey Staff, 1975). This portion of the course uses the knowledge level in the cognitive domain that is described in Taxonomy of Educational Objectives (Bloom et al., 1956). The higher levels are engaged later in the course. Analysis occurs when the students study soils from different areas and learn that each soil has unique properties. Synthesis is used when individual soil properties are compiled to derive a soil classification. Evaluation is important when the students observe soils in the field and then must decide how to delineate them on a map.

The students can also utilize higher levels in other domains. Valuing in the affective domain (Krathwohl et al., 1964) is important when students learn that soil morphology has practical applications in the world (e.g. land use planning, land value assessment, environmental studies etc.) Organization becomes important when the students incorporate various aspects of soil morphology into their respective disciplines. Psychomotor skills (Bilodeau, 1969) are also important because some aspects of soil morphology can only be learned from "hands-on" experience. Soil texturing is such a skill, and requires the students to estimate sand, silt, and clay for soils in the laboratory and field. Proficiency is developed only by practice with known soil textures.

Another important objective is to give the students a working knowledge of the interrelations of soil properties to climate, vegetation, topography, parent material, and time (Birkeland, 1984). The ability of students to grasp these concepts enables them to represent soil patterns on aerial photographs (i.e. make soil maps). Good soil scientists must therefore combine higher levels of thinking with basic knowledge of soils to predict and map the locations of soils on a section of land.

The aforementioned objectives are not unreasonable. Most of the students in soil morphology are upperclass and graduate students, and are therefore probably in relativism or commitment èforms of intellectual and ethical development as proposed by Perry (1970).

Soil morphology is somewhat of a "terminal course" in that students need lower level classes to take the course, but soil morphology is itself required only for soil genesis (Agronomy 977). This gives an instructor some freedom when designing the course. It is always important to stress the fundamentals of soil morphology, but some variations can be used in laboratory and field exercises according to the needs of the students and the objectives of the class. One class may emphasize the process of description and sampling of soils, whereas another may need more study on factors of soil formation. A good adaptive mechanism in the course is a "special problem" where students propose a "land use activity", and then evaluate the suitability of a section of land for that activity.

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