Using Soils Education and Outreach as a Viable Tool for STEM through all School Ages

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Introduction

STEM is an educational program developed to prepare primary and secondary students for college and graduate study in the fields of science, technology, engineering, and mathematics (STEM). STEM aims to foster inquiring minds, logical reasoning, and collaboration skills. STEM is therefore "an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply STEM in contexts ------ to compete in the new economy (Tsupros et al., 2009)." STEM focuses on finding a solution to a real-world problem and tends to emphasize project-based learning while using an applied approach that is coupled with hands-on, problem-based learning.

However, many students avoid involvement in STEM because they are uncomfortable due to perceived difficulty of the natural sciences that constitute STEM. Soil Science is an applied science that directly connects with different aspects of the natural sciences and as an environmental interface (Fig I) (Fortuna, 2012), can convey knowledge related to environmental issues and other matters of global importance. When Soil Science was used as a feature of STEM, students came to a realization that STEM could be fascinating and can offer opportunities for their careers in future.

Objective

To assess the efficacy of Soil Science Education and Outreach as a Viable Tool for STEM through all School Ages (K-12).

Methodology

An annual gathering of students from elementary schools in Southeast and Central regions of Virginia as well as Summer Enrichment Programs for high school students provided opportunities to deliver soil related information and education. Through hands-on participations, and classroom instructions in an outreach setting, students within the K-12 group received educational information on various soil properties, functions, processes and other attributes which directly relate to Biology, Chemistry, Physics, Engineering, Mathematics and Technology (Fig 2) and (Fig 3).

Results and Conclusion

The student's hands–on participations, applications and problem solving in Soil Science enhanced their understanding and familiarity with the natural sciences, providing an awareness of their environment as well as the need for stewardship. The experience also provided a realization that STEM could be fascinating and can offer opportunities for their careers in future.

Soil Science effectively provided the tools that expose students K-12 to STEM as well as the appreciation of scientists and their role in the society.

When students take on the role of scientist, they come to understand the very nature of scientific inquiry. They begin to acquire the thinking skills important in everyday life, and may even set on a course toward pursuing careers in science (National Research Council, 2000).

Instead of learning about science, they learn by doing science.

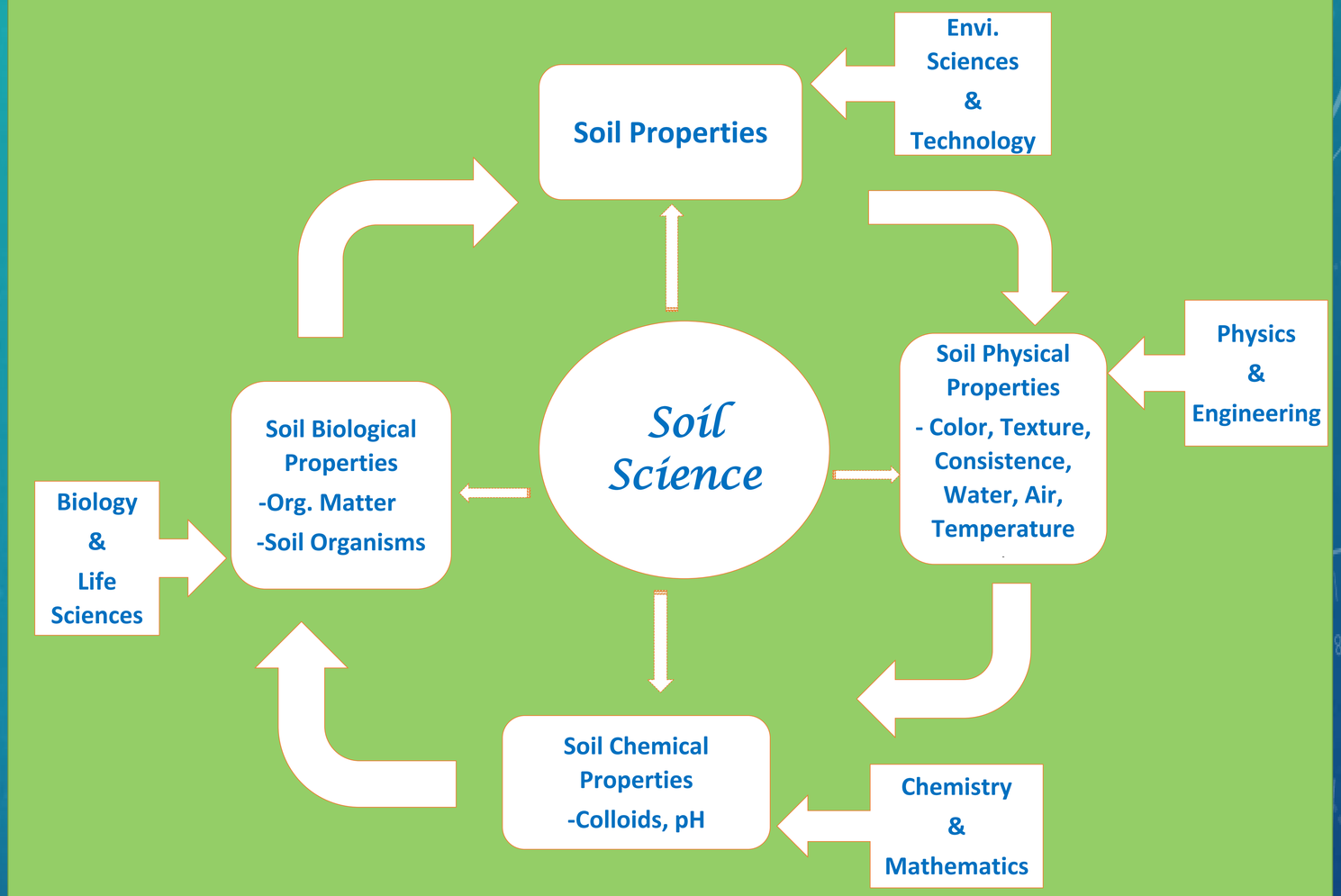

Figure 2: Schematic Diagram showing the relationship between Soil Science and STEM

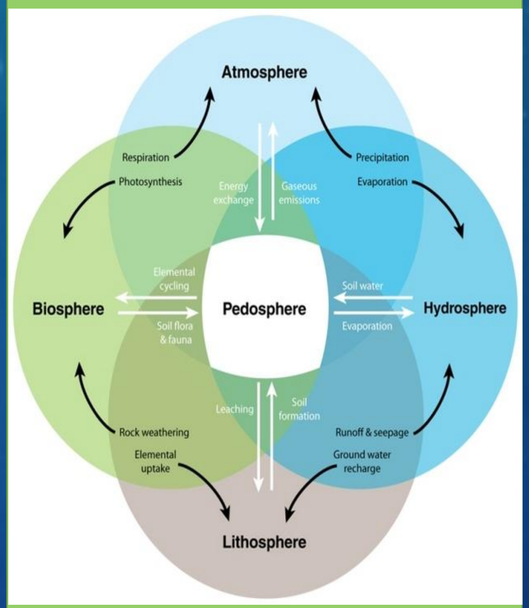

Figure 1: Soil as an Interface

Figure 3: Students at various Activities

Selected References

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