Differing Approach in Design of Teaching Learning Material on Soil for Students with Different Backgrounds

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This paper presents a comparison of resources developed on the same theme, 'Soil', as a part of two different projects/studies namely, *Vigyan Pratibha (VP)* and *Culturally Responsive Science Teaching (CReST)* catering to audiences with distinct backgrounds. VP reaches students from mostly urban backgrounds while CReST to students from remote tribal regions. In this we discuss the distinction in student's day-to-day experiences based on their socio-cultural background and rationale behind the design of the resource materials developed. Also emphasizing on the need for contextualising classroom discourse based on students' cultural capital, making even the science classrooms relevant and responsive.

Keywords: Comparative Study, Local Context, Responsive Approach

Introduction

Soil is present everywhere on earth, but there can be significant differences in the experiences the students have with soil, based on their background. In this paper we will discuss the tales of two modules developed on the same topic, 'Soil', as a part of different projects/studies, one catering to a broad group of students (spanning urban and rural backgrounds) while other catering to students from remote tribal regions. It will highlight the differences in the students' experiences and bring out the contrasts in the approach in module designing.

Sampling, Research Method and Data Collection

For this study we consider two projects which cater to students from different socio-cultural background;

A. The Vigyan Pratibha (VP) project was introduced for secondary school students, to nurture their talent in science and mathematics (Gupta A., 2018). Many of the schools involved cater to students from urban backgrounds who might not have direct experience with soil. Even some of the rural school students today are found to have very little experience of playing/working with soil.

B. Culturally responsive science teaching (CReST) studies carried out with the aim to bridge the divide between students' day-to-day experience and the classroom discourse for secondary class. Here we focussed on students from tribal regions who are well connected to nature (Redij A. et al., n.d.). They have a close connection with soil.

The data for VP included observation notes and students' written responses of VP Learning Unit, from two Kendriya Vidyalaya schools in Mumbai and Mumbai Suburbs. The data for

CReST included observation notes taken during the school visits to understand the student's culture and audio recordings of student interaction during classroom trials of the module in two tribal schools in Gadchiroli district. Comparative studies carried out with a Socio-constructivistic worldview using qualitative analysis methods.

Findings

Comparing students' connect to 'soil'

The students reached by two projects showed different engagement with soil based on their socio-cultural background. Differences from students' responses are highlighted in Table 1.

VP (Urban) students	**CReST (tribal) students**
1. Students' connection with soil was limited to playing outdoor games such as cricket, kabaddi and football. 2. Known use of soil was chuna for painting walls, and geru for rangoli. 3. The majority of them are not familiar with soil related activities such as farming, gardening and construction. 4. Colours of soils seen are red, black and grey.	1. Soil is used to make articles, toys and equipment to catch birds. 2. Soil used to plaster mud walls and painting. 3. Use of soil for medicinal purposes. 4. Most of them have close familiarity with farming and some in brick making. 5. Colours of soil seen are red, yellow, white, black and gray.

Table1. Table below list the responses related to student's connection with soil collected through students' responses and fieldnotes from classroom observations.

Reviewing design of the modules for different audience

The students from tribal regions have direct engagement with activities related to soil while for other group it's tertiary mostly through books or media. The design, approach and learning outcome of the modules differ based on the student's background as highlighted in Table 2.

Project: Module	**VP: No soil, no us; know soil, know us!**	**CReST: Soil, plant and us**
Aim	Explore diversity of soil in locality, its physical and chemical properties, and usage through observation, tests, classroom discussion and interaction with elders.	To detect the presence of iron in soil and its transfer to plants and humans (elemental cycle) through activities such as observation, thinking, discussions, hands on experiments, role play etc.
Approach	1. Deficit-based approach providing missing experiences, using open ended questions for students to think about the use and properties of soil	1. Asset-based approach integrating prior knowledge. Connecting the daily life experience of soil with the classroom curriculum.

	and routes for re- construction of soil. 2. Tasks developed to recognise the importance of discoveries for social and economic reasons.	2. Learning process of scientific inquiry by comparing iron in soil samples with blank test and control samples.
Learning Outcome	Cover multiple properties of soil giving exposure to the missing experiences related to soil. Learning through inquiry and discussion, less details of underlying chemistry (to limit the module length and to maintain consistency with national curricula).	Discussing the funds of knowledge students possess. Focus on the theme of transfer of micronutrients at different biotic levels and their role at each level. Underlying chemistry is taught explicitly.

Table 2. Highlights of the similarities and differences in aim, approach, outcome of the two modules on soil.

Conclusion

The design of the modules took cognisance of the students' background and their experiential capital. For urban students it acts as a scaffold to give them the missing experience, building their connection to nature. For students from tribal regions with close connection to nature and thus the soil, it serves to connect their experiences to the classroom discourse and appreciate its relevance in their day-to-day life.

References

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