

Towards realization of international guidelines for soil education

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[Background] The importance of the continuous dissemination of soil education and the rationale for working towards international guidelines for soil education

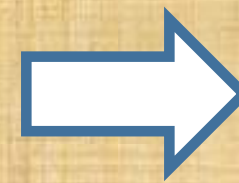
- **United nations (2014) A/RES/68/232**
Soils are key to sustaining life on earth
Setting up the International Year of Soil and World Soil Day (12/5)
- **FAO (2015) Revised World Soil Charter**
Soils are fundamental to life on earth
- **United nations (2015) Sustainable Development Goals (SDGs)**
- **IUSS (2015) International Decade of Soils 2015-2024 (IDS)**



2015
International
Year of Soils



International
Decade of Soils
2015-2024



Collaboration with IUSS-EC with Division 4 and Commission 4.4

1) Short-range task (2019)

Analyzing current situation and finding problems

EGU-joint session (April), ESAFS-joint session (November),
IUSS Book Series “Soil Education” (December), etc.

2) Mid-range task (2020)

Setting targets, building-up methods (contents, materials, media, etc.)

EGU (April), IUSS-InterCongress Meeting Symposium (summer?)

3) Long-range task (2021-24)

Commencing test trials, feedback and evaluation, revising

WCSS Symposium (2022), EGU (2021-24), ESAFS (2021, 2023), etc.

Publishing (disseminating) products

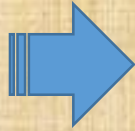
IUSS Centennial Conference (2024, end of IDS), etc.

The Session “Soil education for pre- and elementary-school children:
Current issues towards setting an international standard ”

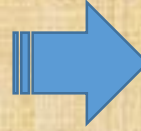
Conveners: Hideaki Hirai (hirai@cc.utsunomiya-u.ac.jp), Masanori Saito and Takashi Kosaki



Let's dig and touch it!



Take it!



Crush to the pieces !



Do experiments !

★Contents★ In this session, we would like to share our experiences know-how, and teaching materials or tools for pre- and elementary-school kids. The ultimate aim is towards developing an international standard for soil education at elementary level. Whilst there will be national differences in curriculum, culture and teaching approaches it is beneficial to collate them to identify a common direction for the development of international standard in soil education at elementary level. We also welcome contributions from system, strategy, and philosophy of soil education to facilitate a mutual understanding for the realization of an international standard.

Taipei, Taiwan, November 3-7, 2019

Important Date : 2019.03.01 Abstract Submission (2nd Announcement) ,
6.01 Open for Early-bird Registration, 06.30 Deadline for Abstract Submission

Taiwan's case for soil education in elementary and secondary schools (Huang and Hseu, 2020)

There is **no regular teaching of soil science in the elementary and secondary schools** (including junior and senior levels) in Taiwan (Huang and Hseu, 2020). However, little knowledge of soil has been included in the regular courses of biology and earth science in secondary school under 12 grades with the exception of the geography course for the past 15 years.

According to past experiences, the effectiveness of teaching soil concepts were poorly satisfied with teachers and students because of the following two reasons: **Firstly, the teaching materials for soil concepts were not edited by soil expertise** to cause over-simplification, incorrect terms, and obsolete pedogenesis theories and classification system. **The second reason is insufficient soil training for teachers who have not taken any soil course from university** (Huang et al. 2014, 2015).

Wen-Shu Huang developed the soil course as a teaching example and then practiced the course for the 10-11th grade students. **The Soil Quality Test Kit Guide modified by USDA (1999) was the main teaching source.** The soil curriculum was listed as follows (Huang and Hseu, 2020)

IUSS Book Series: Soil Sciences Education: Global Concepts and Teaching (2020, **in printing**)

1	Framework of soil science education	
1	Framing Soil Science Education	Damien J Field
	Tenets in Soil Science Education:	
2	Using Soil Science Education as an Integrator for Environmental Education for K-12 Curricula	Rattan Lal
3	Guidelines for introducing essence of soil science in pre and primary school children	Keiko Mori, Hideaki Hirai, Takashi Kosaki
4	Guidelines for under- and post-graduate students	Eric C. Brevik, Maja Krzic, Danny Itkin, Yoshi Uchida, Henry W. Chau
5	Educating to build a citizen preservation culture	Laura Bertha Reyes Sánchez
2	Good practice in soil Science education	
6	Good practices in Africa and Asia	
7	Good practices in Europe	
8	Good practices in the Americas	
9	Good practices in Oceania	
3	10 Guiding the Future of Soil Science Education: informed by global experiences.	Damien J Field, Cristine Muggler, Hideaki Hirai, Eric Brevik

Background for setting curricula for soil education for K-12 from Lal (2020)

Including the soil science into K-12 curricula is pertinent to SDG #4, and to other SDGs addressing hunger, water, climate, and land.

A progress report of SDG #4 for 2019 showed that several hundreds of millions of students were not getting the required education and only the curricula of some schools in developed countries included soil science education in K-12 programs. Thus, there exists a vast scope for improvement.

Including soil science in education curricula of K-12 programs would also have positive impact on advancing Zero hunger, Gender Equality, Clean water, Climate Action, and Life on Land. However, including soil science curricula will necessitate some policy interventions at both state and the federal level.

Knowledge obtained from individual experiences by active involvement with soil (sensing soil) for any age. Indigenous and/or cultural knowledge on soil.

※Knowledge

1. Recognize uniqueness of soil
2. Recognize the role of soil (relevant to other disciplines and knowledge systems)

Pedagogical and/or scientific knowledge on soil. Systematic guidelines for soil education

※Learners focus

Different theoretical framework

1. Perception – Sensitization
2. Awareness (know-know of-aware of)
3. Engagement

※Practice

1. Aware of soil: pre-, primary
2. Know of soil: middle-high school
3. Know soil: course for soil experts

※Scholarship

1. Reflection and research on best practices on soil education
2. Research for the knowledge base needed and how that changes over time in IUSS and national soil societies.

An example towards realization of international guidelines for soil education by sensing soil and being aware of soil function (next slides)

Fig. Conceptual figure of “towards realization of international guidelines for soil education based on Field et al (2020): Four dimensions that can be used to guide the future thinking, practice, and successful outcomes of soil education.

An example towards realization of international guidelines for soil education by sensing soil and being aware of soil function



Active involvement with soil (sensing soil) under forest with cultural background by touching and taking deepens soil awareness.



Being aware of soil function of water holding through air space by doing scientific experiments in forest field.

Field engagement for sensing soil and being aware of soil functions of holding water through air space. It needs to assign these efforts to the grades to be studied, i.e. In case of infant, 1st to 2nd graders for sensing soil, while 4th to 6th graders for doing experiments by instruments to learn scientific way of thinking.

Another example for soil education using paddy field and staple food with cultural background



Actively engaging with the topsoil, rice plant, the area in a paddy field deepens soil awareness.



Being aware of soil function of topsoil to produce rice ball of staple food.

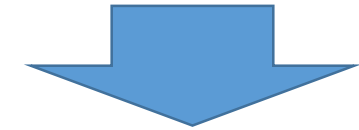


Fig. Field engagement for sensing soil and rice plant by planting seedlings in paddy field and calculating topsoil weight and area to produce one rice ball. It needs to assign these efforts to the grades to be studied, based on a guideline of elementary school.

Another example for soil education using shiny soil balls in room for children and students



Active involvement with soil in room through making soil balls for children at pre-school and 1st – 2nd graders in elementary school. Being aware of soil characteristics such as texture, soil particles, and soil color in 4th – 6th grade in room.



Making shiny soil balls is popular with children, but what kind of soil balls should we make to link to soil education? (Tanaka, H, et al. ESAFS, 2019)

Being aware of soil name and texture in elementary school, and then know of soil classification and distribution in space for students in junior to senior high schools by explaining utilization of soil order with cultural background.



Dorodango (shiny soil ball) with soil samples from representative Brazilian soil orders (photo by Hideaki Hirai)

Recognition of the importance on active involvement with soil (sensing soil) for any age (baby – youth – adult) (**perception – sensitization**)

Exchange of teaching practices for students in elementary to high schools with different sensing soil environment at IUSS, EGU, and ESAFS, national societies lead to international guidelines for soil education (**be aware of soil – know of soil**)

Consensus on fundamental knowledge and skills on soil for soil experts (**know soil**)

National and international accreditations for soil experts

Fig. Towards realization of international guidelines for soil education (future scope) based on Field et al. (2020)

Acknowledgement: This presentation was made with the help of the following people, Dr. Damien Field, Dr. Cristine Muggler, Dr. Eric Brevik, Dr. Keiko Mori, and Dr. Takashi Kosaki. I would like to express our deepest gratitude to them for their help.