Proposal to apply the concept of Knowledge, Learner focus, Practice, and Scholarship to realize an international guideline for soil education

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(Background) At the International Soil Science Congress (IUSS) held in Brazil in 2018, the goal of “Standardization of contents with a variety of levels, languages and media” was set at the IUSS EC meeting for the year 2024, the goal of the International Decade of Soil Science. In response to this, in the meeting at EGU (European Geoscience Union) in April 2019, a systematic soil education was proposed in consistence with the actual situation of soil education in Japanese elementary schools and the Courses of Study (Mori, et al., 2019). A mini symposium was held in Shizuoka, Japan in September 2019 with aim of disseminating practices and research related to soil education to contribute to an international guideline for soil education. In addition, a session on “Soil education for pre- and elementary school children: current issues towards setting an international standard” was held at the ESAFS (East and Southeast Asia Federation of Soil Science) in Taipei in November 2019. Later, at the inter-congress meeting of IUSS held in November 2020, the philosophy of an international guideline and the contents of soil education for pre- and elementary school children were introduced under the title “Towards realization of international guidelines for soil education” (http://jssspn.jp/edu/activity/info/iuss2020.html, See also IUSS Bulletin 138, pp. 63-69: https://www.iuss.org/media/iuss-bulletin138_final_vollbildmodus.pdf). The conceptual diagram to show the philosophy there is drawn on the idea that it is important to guide the future soil science education based on the concept of four dimensions of **Knowledge**, **Practice**, **Learner Focus**, and **Scholarship** in education (cited from Field et al. 2020).

(Objective) Rattan Lal (2018) in the forward of the book of Soils and Sustainable Development Goals stated that whereas the term “soil” is not explicitly mentioned, numerous SDGs and targets can only be achieved through restoration and sustainable management of soil health. Also, he suggested that including soil science in education curricula (SDG #4) of K-12 programs would also have positive impact on advancing SDG #2 (Zero hunger), #5 (Gender Equality), #6 (Clean Water and Sanitation), #13 (Climate Action), and #15 (Life on Land) (Lal, 2020). Also, he indicated that 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 (Lal 2020).Thus, the sustainability of human society depends on the soil health and hence it is necessary soil science education is introduced into the curricula of K-12 programs. It is, therefore, essential to deepen the understanding of soil among future leaders and educators who develop them to create a sustainable society, we propose an “International Guideline for Soil Education" for the international community to contribute to the development of human resources to facilitate a sustainable society. As objectives, first we examine the contents of the philosophy supporting an international guideline for soil education based on four dimensions of Knowledge, Practice, Learner Focus, and Scholarship in education. Secondly, we try to improve the conceptual diagram composed of four dimensions to have many people share the purpose of the guideline over countries. That is because the way in which people interact with soil and the nature of education and learning systems vary from country to country and region to region. Finally, we show that a region (country) unique " teaching and learning system based on this guideline induces a more intimate understanding of the soil, in other words, understanding that soil is indispensable for one’s lives and society.

(Abstract) It is pointed out that the concept of four dimensions of **Knowledge**, **Practice**, **Learner Focus**, and **Scholarship** in education is important to guide the future soil science education (cited from Field et al. 2020). In the conference of the Japanese society of soil science and plant nutrition, the contents of four dimensions have been discussed to establish systematic soil education from pre- and elementary school level through high school level in harmony with the Courses of study in Japan (curriculum standard set by government).As a result, the soil scientists recognized the importance of **the concept of “perception – sensitization – be aware of – know of – know” based on four dimensions for establishing stepwise learning program in formal and/or informal way pre-empted by sensing soil under each cultural and/or environmental condition.** If we could develop such learning program, attendees could know the uniqueness, roles, and functions of soil, resulting in understanding that soil is indispensable for their life and society.

Finally, their attitude of active engagement with soil created by such understanding might lead to sustainable development in their surrounding region. If this trend would be widespread over the countries, it would promote realization of SDGs in national and/or international society. Hence, soil education based on the said scheme would result in growing human resource to engage actively with sustainable development. **We therefore propose the improved concept of “Four dimensions → Understanding that soil is indispensable for one’s lives and society”.** This would be an international guideline for soil education.

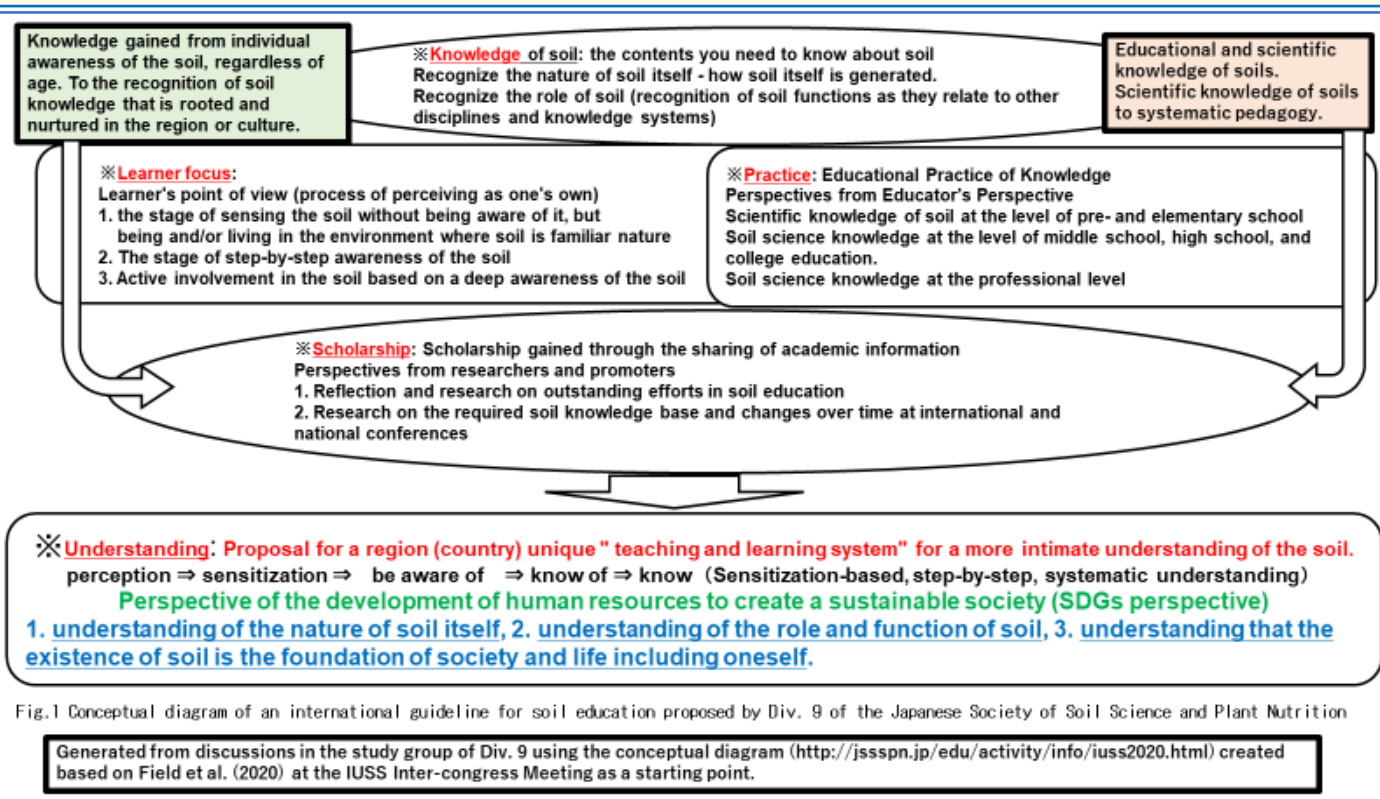

Fig.1 Conceptual diagram of an international guideline for soil education proposed by Div. 9 of the Japanese Society of Soil Science and Plant Nutrition

Generated from discussions in the study group of Div. 9 using the conceptual diagram (http://jssspn.jp/edu/activity/info/iuss2020.html) created based on Field et al. (2020) at the IUSS Inter-congress Meeting as a starting point.

（**References**）Damien Field, Eric Brevik, Hideaki Hirai, Cristine Muggler (2020) Guiding the future of soil (science) education: informed by global experiences, In soil science education: global concepts and teaching (eds. Takashi Kosaki, Rattan Lal, Laura Bertha Reyes Sanchez), 191-198, Catena, Stuttgart.
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