Editorial

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The second issue of 2018 brings together authors from Turkey, Germany, Brazil, Mexico, Nigeria, United States of America, and New Zealand. These seven papers investigate issues concerning science education of 9th grade biology students cognitive structures; 15-year-old environmental literacy (EL); Biology pre-service teachers' perceptions; pre-service Biology teachers' understanding of ethnobiology; development of chemistry laboratory skills in high school; high school students current and projection performance in STEM subjects; and, finally professional development of primary/elementary teachers. Murat Özarsln and Gülcan Çetin from Turkey investigated 9th grade biology students' cognitive structures about living organisms. Volkan Hasan Kaya and Doris Elster of Germany sought to determine the factors that affect the EL of 15-year-old students. Yusuf Ziya Olpak and Huseyin Ates examined Turkish pre-service science teachers' perceptions of their biology laboratories. Geilsa Costa Santos Baptista discusses the impacts of Brazilian pre-service biology teachers undertaking training in ethnobiology. Adolfo V. Obaya assessed the chemistry laboratory skills development in Mexican high school students. Peter Abayomi Onanuga and Adewale O. Saka investigated the performance trends of high school students in STEM subjects in Ogun, Nigeria. The final article by Shawn E. Bell and Steven S. Sexton sought to examine how elementary teachers in Arkansas in the United States of America and primary teachers in New Zealand experienced their professional development in science education.

In the first article, Özarsln and Çetin highlight some of the most important improvements in science education are the idea that knowledge is constructed in mind and how this knowledge is constructed. A person's meaningful learning results in more complex knowledge networks in his or her cognitive structures and as a result more connections between concepts. Therefore, a student's answer to a concept reveals the connections of the concept in their cognitive structure and may reveal lexical proximity. Using a Word Association Test and Questionnaire of Writing Sentence, Özarsln and Çetin explored 50 Turkish 9th grade students conceptual relationship in biology. The basic points of these techniques make it possible to determine whether students' cognitive structures, their relations with concepts, and the association between these concepts are adequate. For students to learn meaningfully instead of memorizing, they need to relate new knowledge to their prior knowledge. Özarsln and Çetin's results highlight how cooperative learning, concept maps, education based on problems, research-informed education, and teaching based on experiments that incorporate various methods and techniques are effective for student learning.

The focus of Volkan Hasan Kaya and Doris Elster's paper was determining the factors that affect the EL of 15-year-old German students. Kaya and Elster used the 2015 Programme for International Student Assessment German data from the participating 6,504 students. Specifically, they sought to determine the relationships between environmental optimism, socioeconomic characteristics of the students, teaching characteristics, and EL. Kaya and Elster highlight the importance of student-teacher relationship and as a result the importance of raising the educational standards of teachers. To improve the quality of education requires the teaching process to be supported. Kaya and Elster' study supported existing research concerning the relationship between teachers' adaption of lessons to suit their students' needs and knowledge, changing the structure of the lesson, and providing help when necessary and EL. They noted that there was no meaningful relationship between teachers' lecturing and EL. They conclude that teachers should create an atmosphere where students are supported, concepts are explained, and lessons adapted to students' needs to increase students EL.

The third article from Turkey's Yusuf Ziya Olpak and Huseyin Ates examined pre-service science teachers' perceptions toward additional instructional strategies in biology laboratories. Olpak and Ates used a mixed-method sequential explanatory design model with 69 2nd year students studying to be science teachers using blended learning. This study combined academic achievement test scores, student feedback, semi-structured interviews, and additional instructional strategies to collect the study's data. Students were grouped into one of four groups. The students in Group 1 responded to the questions asked by the instructor about the topic each week using the blog on the online learning environment. The students in Group 2 received task assignments 3 times related to the subjects taught during the application period and received feedback about their responses to these task assignments. Students in Group 3 took three quizzes about the course and received feedback on their answers to these questions. Finally, the students in Group 4 wrote a reflection paper on the topic taught each week after the course and received feedback from their reflection papers. Olpak and Ates highlighted that using different instructional strategies influenced the students' academic achievement: Quizzes every 3 weeks and writing a reflection paper each week showed higher success than discussion groups and investigations related to course content.

Geilsa Costa Santos Baptista discusses the purpose of ethnobiology in a Brazilian biology teachers' training course. Ethnobiology is the study of the complex relationships that exist between living beings and cultural systems. As such, it is important for teachers to identify their students' cultural

knowledge. Specifically for science teachers, teachers should elaborate and implement teaching strategies, which include and consider the knowledge belonging to the students' sociocultural means through dialogue with the scientific knowledge. Baptista's study included nine teachers who experienced research on ethnobiology to investigate their students' traditional knowledge in schools where the participating teachers' work, production of teaching materials and teaching strategies containing students' traditional knowledge and relations of similarities and differences with the biological scientific knowledge, and interventions in biology teaching in schools where teachers work is based on cultural dialogue. Baptista concludes ethnobiology contributes to science teaching providing the teachers with the opportunity of epistemological reflections involving the different knowledge systems that are present in classrooms, including the science being taught and the students' cultural knowledge.

The fifth article by Lucila Giammatteo and Adolfo V. Obaya assessed Mexican high school students' chemistry laboratory skills. Obaya's highlights in current evaluations of students' skills and competencies: There is a gap between theoretical knowledge and practical skills; students' individuality is lost in the process; and, focus on quantitative grades leading students to focus on numbers, rather than on acquiring knowledge or skills. Their study included 24 high school students aged approximately 16-year-old who completed seven chemistry laboratory practicals. The students' specific competencies were evaluated individually and as a team with the following instruments: Individual previous questionnaire, individual lab work, and a lab report per team. This study supports the development of students' competencies of formulating a hypothesis; systematizing information; applying security norms of laboratory safety; contrasting results; and communicating conclusions. Giammatteo and Obaya concluded the purpose of evaluation should be to provide the learners with authentic feedback that leads to autonomy and self-regulation so that they are active participants of the learning process.

Onanuga and Saka investigated the trend of high school students' performance in the Ogun State of Nigeria. They note the Federal Government of Nigeria has promised that education shall be tuition-free, universal, compulsory and that the STEM subjects of science, technology, and mathematics shall be taught to enable Nigerian students to acquire the necessary knowledge and skills to be members of society. Using an ex-post facto methodology, Onanuga and Saka analyzed all students' who sat the Ogun state basic science, basic technology and mathematics exams for current and projected performances. Their results highlight how the number of students sitting these exams has increased year on year. Most importantly, they identified how students were performing over the time period 2011–2015 as well as projections as to how they will continue to perform from 2016 to 2020. Onanuga and Saka concluded their article with two recommendations resulting from their study.

The seventh and final article of this issue is from Shawn E. Bell (Arkansas, United States of America) and Steven S. Sexton (New Zealand). Bell and Sexton present the first phase of a study into how two educational systems are approaching the science professional development of practicing teachers who are adopting new curriculum guidelines. Specifically, this paper is about the exploratory and illuminatory phase into how in-service primary/elementary teachers (teachers of students aged 5–11 years old) are experiencing the intersection of science content, mandated educational policies, and effective classroom practice. Bell and Sexton highlight teachers need to understand not only the content that they are presenting to their students but also the pedagogy behind how their students learn. Therefore, science education PD for teachers must facilitate them in delivering relevant, useful, and meaningful science into very crowded, complex, and contested classrooms. Bell and Sexton conclude how participating teachers in both Arkansas and New Zealand are now talking about how they build on what their students' know and have experienced. These prior experiences are now part of how teachers connect students' new learning not only in science but also across learning areas to make students' learning meaningful. As these teachers have learned the importance of knowing both what they are teaching and why they are teaching this, their students are now able to better understand what they are learning, why they are learning about this, and how this is meaningful to their lives.

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