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EDITORIAL

Editorial

Welcome to the first issue of 2021 for *Science Education International.* This issue brings together nine papers from Turkey, The United States of America, Estonia, Sweden, and Nigeria. In the first article, Riza Salar and Umit Turgut investigate the effect of differentiated instruction and 5E learning cycle on academic achievement and self-efficacy of students in Physics in Turkey. The second article by Sara Hagenah reports on laughing and learning together the intersections of socioemotional activity with science talk in the USA. The third article from Turkey's Huriye Deniş Çeliker determined the prospective science teachers' biology self-efficacy and critical thinking tendency through problem-based scenarios. In the fourth article by Triin Rosin, Katrin Vaino, Regina Soobard, and Miia Rannikmäe look into Estonian science teacher beliefs about competence-based science e-testing. The fifth article from Sweden's Eva Davidsson and Pernilla Granklint-Enochson comments on teachers' ways of contextualizing the science content in lesson introductions. Turkey's Zeynel Kablan and Aslıhan Günen report on the relationship between students' reflective thinking skills and levels of solving routine and non-routine science problems in the sixth article. The seventh article is from Kamil Arif Kirkiç and Ömer Yahşi who investigated the characteristics of innovative Turkish teachers concerning the relationship between science teachers' views on student achievement and learning and teaching motivation. The eight article by Adam Channell, William Cobern, David Rudge, and Amy Bentz from the USA sought teacher and parent perspectives on Next Generation Science Standards (NGSS) alignment following teacher professional development (PD). The final article for this issue is from Olabode Osunji concerning the relationship between consciousness about environmental education concepts in secondary school chemistry curriculum and attitude of students toward the environment in Kwara state, Nigeria.

In the first article, Riza Salar and Umit Turgut investigated the effect of differentiated instruction and 5E learning cycle on academic achievement and self-efficacy of students in Physics in Turkey. Salar and Turgut noted that the learning characteristics of each student are different. Teachers must consider the diversity of students and they have to create the appropriate environment to understand, respect, and respond to this diversity. The teacher designs the teaching according to the student's needs, which are determined by frequent measurements and evaluations. Without differentiated instruction (DI), talented students may see school as a place to tolerate and think that learning will take place in out-of-school settings. In DI, the teacher creates an effective classroom environment by accepting that students do not always need to know all the answers, but instead are concerned with finding them guided learning activities. Salar and Turgut concluded, the effect of DI on academic achievement was related to the level of the students and make recommendations as a result of their study.

The second article by Sara Hagenah reports on laughing and learning together the intersections of socioemotional activity with science talk in the USA. In her paper, Hagenah examined how a group of nineteen middle school young women (young women aged 11–14 years old) in an afterschool science club built on shared histories of being female, ethnic minorities, and classmates in school. Her study was framed by ideas found within culturally sustaining pedagogy and sense of belonging theories where language, ideas, and practices shared by students in learning spaces are valued. Hagenah used a multiple case study approach that examined intersecting social interactions with productive science talk over the school year. She found that socioemotional interactions intersected with science talk in four significant ways: Fun and laughter in science spaces, comfort in sharing ideas in an all-female space, sense of belonging with each other, and feeling proud of yourself. Hagenah highlighted that based on this study, research is needed to consider how and where SE activity intersects with the science and engineering practices as outlined in the NGSS.

The third article from Turkey's Huriye Deniş Çeliker determined the prospective science teachers' biology self-efficacy and critical thinking tendency through problem-based scenario method with experiments. The perception of critical thinking and self-efficacy is important concepts for prospective teachers regarding 21st century skills. Depending on self-efficacy perceptions, teachers' efforts, aims, and desire levels on teaching may be variable. Problem-based learning (PBL) aims to encourage student-centered learning and improve students' higher-order thinking skills. PBL is an approach that places the student at the center of the learning process, offers scenarios for groups to research and provide appropriate solutions, and scenarios have problems. Unlike other studies, Çeliker's study expects prospective science teachers to specify the problems in the problem-based scenario and design an experiment as a solution. Çeliker provides evidence that the prospective teachers' problem-based scenarios with experiments in biology laboratory course contributed to improving biology self-efficacy and critical thinking.

In the fourth article by Triin Rosin, Katrin Vaino, Regina Soobard, and Miia Rannikmäe looked into Estonian science teacher beliefs about competence-based science e-testing. Competence-based, science e-testing (CBSeT) was developed to support a more competence-based teaching approach by providing teachers with appropriate feedback. Rosin *et al*. argued exploring how teachers interpret assessment information, such as that provided by CBSeT, is meaningful

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not only for identifying teacher beliefs but also in offering appropriate guidance to teachers. Their study is part of a large-scale project conducted within the Estonian Lifelong Learning Strategy 2020. CBSeT is based on a set of contextual test items, both open-ended and closed cognitive subitems which included both subject-specific (chemistry, physics, biology, and geography) and interdisciplinary competences. The general teacher belief that feedback from CBSeT provided relevant information, about which student competences to improve, was very much in accordance with the main purpose of assessment, as stated in the Estonian national curriculum. Notwithstanding the fact that most teachers identified with the purposes of assessment from CBSeT feedback being related to student learning improvement, a more dominant belief related to accountability. Rosin *et al*. concluded with six recommendations based on this study.

The fifth article from Sweden's Eva Davidsson and Pernilla Granklint-Enochson comments on teachers' way of contextualizing the science content in lesson introductions. Davidsson and Granklint-Enochson highlighted that several large-scale studies have identified a lack of interest and negative attitudes toward learning science to include countries that achieve high results on international large-scale science tests such as Program for International Student Assessment and Trends in International Mathematics and Science Study. Davidsson and Granklint-Enochson noted while students may achieve high results on these kinds of tests, they may also find school science generally irrelevant or uninteresting. The socioscientific approach to science instruction has been promoted as a way of enhancing students' interest and motivation for learning science. Davidsson and Granklint-Enochson's interest was in exploring how teachers employ school science and relate it to other societal contexts. Their study reported a variety of ways in which teachers used contextualization, specifically at the intersections between school science context and the context of everyday life, other school subjects, or language. The researchers went on to note that teachers tended to employ several different contexts to highlight and explain the scientific content in their lesson introductions. Davidsson and Granklint-Enochson concluded it is likely that the tool of contextualization is not an obvious or self-evident way of conducting science teaching. Consequently, organizing the teaching setting to also involve contextualization could be an educational competence to be studied in PD and in teacher education.

Turkey's Zeynel Kablan and Aslıhan Günen reported on the relationship between students' reflective thinking skills and levels of solving routine and non-routine science problems in the sixth article. Reflective thinking skills are thought to be an important factor affecting the success of problem solving both routine and non-routine science problems. Kablan and Günen's study addressed three problem solving skills: Questioning, reasoning, and evaluating. Kablan and Günen's study was designed as descriptive research and aimed to determine the relation of eighth-grade students' reflective thinking skills toward problem solving and their level of solving routine and non-routine science problems. This study noted that as the students' scores of reflective thinking towards problem solving increased, their level of solving routine and non-routine problems also increased. Kablan and Günen found a relationship between these three dimensions and levels of solving routine and non-routine problems. However, when these relations were further examined in detail, the highest relation with routine problems was the evaluating variable and the lowest one was the reasoning variable. This occurred exactly opposite in the non-routine problems; the highest relation was observed in the reasoning dimension and the lowest relation was observed in the evaluating dimension. Kablan and Günen concluded with recommendations for further research based on this study.

The seventh article is from Kamil Arif Kirkiç and Ömer Yahşi who investigated the characteristics of innovative Turkish teachers concerning the relationship between science teachers' views on student achievement and learning and teaching motivation. Teachers play a crucial role in changing schools and classrooms. It is recognized that teachers' beliefs and ideas, which are the essential components of the learning-teaching process, shape their behavior in the learning environment. The aim of Kirkiç and Yahşi's study was to determine the relationship between science teachers' views on student achievement and learning and their own teaching motivation through correlational survey methodology. According to the results of the analysis, it was determined that the opinions of these science teachers about student achievement and learning were positive in the total scale and subdimension scores, and their teaching motivation was just above the average in the total scale and subdimension scores. In addition, they reported that these teachers' views on their students' achievement and learning were less predictive of teaching motivation. Kirkiç and Yahşi concluded with recommendations.

The eight article by Adam Channell, William Cobern, David Rudge, and Amy Bentz from the USA sought teacher and parent perspectives on NGSS alignment following teacher PD. Channell *et al*. examined United States K-12 science teacher interactions with parents during NGSS reform following teachers' PD participation, as well as parent accounts of understanding and support for NGSS. Channell *et al*. highlighted how parents are an often overlooked stakeholder when it comes to educational policy and standards reform and there is only a limited number of articles that shed light on parent understanding and support of NGSS. The study utilized two populations, teachers and parents, two sets of survey and interview questions. Channell *et al*. reported that parents were generally unaware of NGSS and many teachers were not even aware that NGSS parent resources existed. Channell *et al*. concluded if parents were better informed about NGSS, parents could become more likely to be allies for teachers as opposed to barriers to NGSS implementation. As a result of this study, there are three recommendation proposed by the researchers.

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The final article for this issue is from Olabode Osunji concerning the relationship between consciousness about environmental education concepts in secondary school chemistry curriculum and attitude of students toward the environment in Kwara state, Nigeria. Environmental problems touch every nation and adversely affect the lives and health of their populations. The most common environmental problem in the Kwara state is pollution through the dumping of waste refuse, burning of waste or coal, industrial discharge among others. Osunji examined the relationship between consciousness about environmental education concepts in senior secondary school chemistry curriculum and the attitude of students toward the environment in Kwara using a descriptive survey design. Osunji reported that there was a high correlation between the students' consciousness about environmental education and attitude toward the environment among senior secondary school students toward the environment in Kwara. However, Osunji noted that these students were consciousness about environmental problems, but that they lacked general knowledge about environmental issues. Osunji concluded his article with two recommendations.

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