

## Editorial

The fourth issue of *Science Education International* for 2021 brings together 14 articles from Turkey, the Philippines, Ghana, Brazil, Nigeria, the United Kingdom and Malaysia, and India. These authors address issues related to science teaching in preschool, primary school, high school, and tertiary for both pre-service teachers and in-service teachers. The first article from Brazil's Sandro Lucas Reis Costa and Fabiele Cristiane Dias Broietti is an analysis of the scientific practices in science education publications. The second article was withdrawn prior to publication. Oğuzhan Özdemir and Gamze Hastürk examined the relationship between prospective Turkish preschool teachers' self-efficacy beliefs in science education and their learning styles in the third article. While Dionifer Bangsa from the Philippines investigated senior high school students' self-efficacy and its relation to engagement in their online class setting in a private university in the south of metro Manila. The fifth article from India's R. S. Sindhu reports on teachers' misconception concerning valence and valency in chemistry. The effect of online science course supported with Web 2.0 tools on the academic achievement of Turkish fifth-grade Students is the focus of Kevser Arslan and Mehtap Yildirim in the sixth article. P. Okafor Ngozi examined the effect of Context-Based Learning (CBL) and gender influence on Nigerian chemistry students' acquisition of Integrated Science Process Skills (ISPS) in the seventh article. The eighth article by Esther Nartey and Ruby Hanson determined the perceptions that Ghanaian senior high school chemistry students and teachers have about organic chemistry as well as to compare organic chemistry topics that are difficult for students and teachers. The ninth article is from Mohd Syafiq Aiman Mat Noor who assessed secondary students' scientific literacy through the comparison of suburban schools in England and Malaysia. The tenth article from John Rey Celades, Celso T. Navarette Jr., Jonafel Lyca Montebon, Emerose A. Colonia, Aica A. Villanca, Charlyn P. Marayan, Ma. Remedios Cuizon, Cendie G. Misa, Jenny Rhea D. Villaver, Augustine P. Villarín, Jeffer Jay C. Ybañez, Alyssa R. Cañete, Sherwin B. Nacua, and Joje Mar P. Sanchez aimed to determine pre-service science teachers' level of ecological knowledge in Cebu City, Central Visayas, Philippines, and their relationship to their senior high school strand. While the eleventh article by Nalan Akkuzu Güven and Melis Arzu Uyulgan aimed to identify the relation between ecological intelligence and the types of multiple intelligences and how ecological awareness could be raised through activities of multiple intelligences in Turkey. The twelfth article from Ghana's Joseph Parker and Isaac Asare explored the perceptions of teacher trainees on the use of think-pair-share in teaching and learning of classification of living organisms. In the thirteenth article from Brazil's Joaklebio Alves da Silva and Monica Lopes Foleña Araújo, they present documentary research that sought to analyze,

in a comparative perspective, evidence of a proposal for education for ethnic-racial relations present and/or absent in the curriculum guidelines and in the common national base for initial teacher training and implications for the teaching of anti-racist science and biology in Brazil. Justine C. Mercado aimed to describe the experiences of Philippine students in learning physics in a virtual classroom, specifically their experiences in preparation, learning management, opportunities, and challenges they have encountered in the fourteenth article. The final article by Turkey's Tuba Demirci and Münir Oktay aimed to analyze the effectiveness of concept maps on the academic achievements of Biology teacher candidates and the elimination of their misconceptions.

The first article from Brazil's Sandro Lucas Reis Costa and Fabiele Cristiane Dias Broietti is an analysis of the scientific practices in 44 science education publications from 2010 to 2019. Their review focused on the specific research contexts of these articles; specifically, to identify in which contexts the authors carried out research involving scientific practices and to critically discuss the research contexts of scientific practices and find research gaps. Costa and Broietti highlighted eight scientific practices and through content, analysis identified six categories. Costa and Broietti concluded that the biggest trends among the research contexts were: Scientific Practices and teaching proposals (38.6%) and Scientific Practices and distinct theoretical frameworks (22.7%), totaling 61.3% of the analyzed articles. Few articles investigated the relationship between Scientific Practices and students (15.9%) and Scientific Practices and teachers (9.1%). As a result, they recommended that more work was needed in the areas of science practices in relation to students and teachers,

The second article was withdrawn prior to publication.

Oğuzhan Özdemir and Gamze Hastürk examined the relationship between prospective Turkish preschool teachers' self-efficacy beliefs in science education and their learning styles in the third article. Özdemir and Hastürk note that it is not only in preschool settings that children through exploring the world around them they work like scientists but also their experiences impact on the rest of their lives. As such, Özdemir and Hastürk argue that preschool teachers should be laying the foundations of both students engaging in and enjoying science. Their study was conducted with 193 prospective preschool teachers through descriptive survey model and correlational survey models. These participants had high self-efficacy perceptions, and most were seen to hold a diverger learning style. Özdemir and Hastürk conclude their article with recommendations.

While Dionifer Bangsa from the Philippines investigated senior high school students' self-efficacy and its relation to

engagement in their online class setting in a private university in the south of metro Manila. Due to Covid-19, the Philippines like many other countries has seen a shift to online learning. As this is a new mode of learning for many, Bangsa sought to investigate students' self-efficacy in this mode with gender as a variable of interest. Specifically, Bangsa wanted to determine the levels of sources of self-efficacy of the students, to explore if there were significant differences in the self-efficacy of the students across gender and if self-efficacy was significantly related to engagement. This study with 200 high school students of Physics at a private institution used a quantitative and correlation design. Bangsa reported there was a positive correlation between overall self-efficacy and cognitive and overall engagement, a negative correlation with emotional engagement, and no significant relationship with behavioral engagement. The article concludes with recommendations.

The fifth article from India's R. S. Sindhu reports on teachers' misconception concerning valence and valency in chemistry. Sindhu over the years of working with various teachers in different situations noted that misconceptions in the terms of valency and valency. His study was an intervention into how these misconceptions could be addressed. His study selected one chemistry teacher from each of the 48 schools in one region. After these teachers completed a short questionnaire, Sindhu was able to determine the misconceptions held as well as reasons for these misconceptions. Sindhu then prepared a short intervention to address these misconceptions. His study is an example of how targeted professional development can make a difference.

The effect of online science course supported with Web 2.0 tools on the academic achievement of Turkish fifth-grade Students is the focus of Kevser Arslan and Mehtap Yildirim in the sixth article. Arslan and Yildirim highlight digital teaching materials should make the education process efficient, attractive, and effective by eliminating any possible deficiencies. Specifically, they investigated the effect of online science course supported by Web 2.0 tools on the academic achievement and views of 120 5<sup>th</sup> grade Turkish students using a mixed-method study design. Arslan and Yildirim report how the use of web 2.0 tools supported the teaching and learning of these students. They conclude their article with recommendations.

P. Okafor Ngozi examined the effect of CBL and gender influence on Nigerian chemistry students' acquisition of ISPS in the seventh article. Okafor Ngozi highlighted how the new science curriculum of Nigeria emphasized students acquiring science process skills using innovative pedagogies that should be learner-centered. Okafor Ngozi's study was a quasi-experimental, pre-test/post-test, non-randomized research design involving intact classes totally 192 students subjected to CBL strategy or the control group experiencing conventional strategy. This study reported that students exposed to CBL outperformed those exposed to Conventional Strategy in the acquisition of ISPS. Okafor Ngozi concludes noting the purpose of teaching chemistry requires more than the acquisition of ISPS as students need to succeed globally.

As a result of this study, the article concludes with six recommendations.

The eighth article by Esther Nartey and Ruby Hanson determined the perceptions that Ghanaian senior high school chemistry students and teachers have about organic chemistry as well as to compare organic chemistry topics that are difficult for students and teachers. Nartey and Hanson report how despite the efforts by teachers to improve the performance of students in organic chemistry, the main body in charge of Ghanaian senior high school examinations the West African Examinations Council consistently reports poor performance of students in organic chemistry. Their study included a 103-year senior high school general science students and ten chemistry teachers undertaking two survey instruments. Nartey and Hanson reported that while 45.0% of the student sample agreed that organic chemistry was a difficult subject for them none of the teacher reported this. Their study reported on a range of topics that students and teachers commented upon as to easy or difficulty to learn or teach. Nartey and Hanson conclude how it is important that teachers are aware of their influence on their learners in generating preconceptions about difficult topics as their own perceptions may influence their students' experiences and perceptions.

The ninth article is from Mohd Syafiq Aiman Mat Noor who assessed secondary students' scientific literacy through the comparison of suburban schools in England and Malaysia. Mohd Syafiq Aiman Mat Noor argues how scientific literacy applies as much to future scientists as to those students who choose a non-science career path. The issue arises as schools balance the tension between school science scientific literacy for all and the need for some those in intending on science careers. This study used a purposive sampling technique for data collection in suburban secondary schools situated in Malaysia and England. 30 students from each country were included and completed a survey instrument. Mohd Syafiq Aiman Mat Noor reported that the participating students from England held a higher level of scientific literacy than their counterparts in Malaysia. The article concludes with suggested further research that is needed in this area.

The tenth article from John Rey Celades, Celso T. Navarette Jr., Jonafel Lyca Montebon, Emerose A. Colonia, Aica A. Villanca, Charlyn P. Marayan, Ma. Remedios Cuizon, Cendie G. Misa, Jenny Rhea D. Villaver, Augustine P. Villarín, Jeffer Jay C. Ybañez, Alyssa R. Cañete, Sherwin B. Nacua, and Joje Mar P. Sanchez aimed to determine pre-service science teachers' level of ecological knowledge in Cebu City, Central Visayas, Philippines, and their relationship to their senior high school strand. Celades et al. note that environmental literate people can make informed decisions that benefit the environment and sustainability. Celades et al. go on to position pre-service teachers as crucial to future students' growth and development as they will be able to encourage and increase awareness in their students. Their study included 66 pre-service teachers both male and female as well as both science, technology, engineering and mathematics (STEM) and non-STEM with

face-to-face survey methodology. Celades et al. reported that these pre-service teachers held above average knowledge. As a result of this study, the article ends with four recommendations.

While the eleventh article by Nalan Akkuzu Güven and Melis Arzu Uyulgan aimed to identify the relation between ecological intelligence and the types of multiple intelligences and how ecological awareness could be raised through activities of multiple intelligences in Turkey. Güven and Uyulgan argue that there needs to be an ecological awareness, and this requires multidisciplinary knowledge as well as social, emotional, and intrapersonal intelligence. Güven and Uyulgan's study was a case study of 68 pre-service Turkish teachers collecting data by interviews, multiple intelligence inventory, ecological intelligence scale, and students' notes. They reported that that interpersonal was the type of multiple intelligences that most correlated with ecological intelligence. Güven and Uyulgan highlight that in-class activities concerning environmental issues and ecological concepts can be effective if developed for the interpersonal type of intelligence. They conclude by arguing how this study indicated that the theory of multiple intelligences is useful in terms of appropriateness of content, activities, and benefit.

The twelfth article from Ghana's Joseph Parker and Isaac Asare explored the perceptions of teacher trainees on the use of think-pair-share in teaching and learning of classification of living organisms. Parker and Asare note that think-pair-share, as a cooperative learning strategy that includes time for thinking, time for sharing with a partner, and time to share among pairs to a larger group, allows teachers to gather information about what and how students are learning. In this study, Parker and Asare investigated how 80 Ghanaian pre-service teachers understood this strategy. They reported there was an improvement by these pre-service teachers when think-pair-share was adopted to teach classification of living organisms in science. Parker and Asare concluded that initial teacher education should adopt this strategy for effective teaching and learning.

In the thirteenth article from Brazil's Joaklebio Alves da Silva and Monica Lopes Folena Araújo, they present documentary research that sought to analyze, in a comparative perspective, evidence of a proposal for education for ethnic-racial relations present and/or absent in the curriculum guidelines and in the common national base for initial teacher training and implications for the teaching of anti-racist science and biology in Brazil. da Silva and Araújo's study employed indirect

documentation to collect the data about initial training of science and biology Brazilian teachers regarding Education for Ethnic-Racial Relations. da Silva and Araújo critique the current policies and documents regarding initial teacher education. They conclude that the new Curricular Guidelines and the Common National Base for the initial training of teachers in Brazil do not bring concrete evidence of an effective educational process aimed at Education for Ethnic-Racial Relations. They conclude their analysis with a plea for future practice to be able to benefit from this analysis.

Justine C. Mercado aimed to describe the experiences of Philippine students in learning physics in a virtual classroom, specifically their experiences in preparation, learning management, opportunities, and challenges they have encountered in the fourteenth article. Mercado notes Physics education is about teaching and learning that involves an active learning approach but when COVID-19 forces a shift to online learning, how do students experience this change. Mercado used descriptive phenomenological research design with ten pre-service teachers. Mercado's article reports on the four themes that emerged from her study. These ten participants prepared well for their online learning and address the challenges that arose from a shift from face-to-face to online learning. The article concludes with implications for a possible future should online teaching and learning become normalized.

The final article by Turkey's Demirci and Oktay aimed to analyze the effectiveness of concept maps on the academic achievements of Biology teacher candidates and the elimination of their misconceptions. Demirci and Oktay highlight how and why it is just as important to detect misconceptions as it is to eliminate them in science. Demirci and Oktay's study was an experimental design with pre-test and post-test control with 60 Turkish pre-service teachers. Participants completed two survey instruments. Demirci and Oktay concluded that for these participants the teaching method based on concept maps had a positive effect. Their article ends with an argument on how concept maps method could be used for students to make sense of micro-dimension concepts such as protein synthesis and to facilitate them to make connections between these concepts.

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