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EDITORIAL

Editorial

The past 2 years have seen some dramatic changes to teaching and education as a result of the COVID-19 pandemic. This has caused disruption to some learning and for many of us changes to how we teach. *Science Education International* has a focus on supporting the teaching and learning of science but also recognizes the ongoing impact COVID-19 has had on education. The eight articles in this issue keep to the aims and scope of this journal with a focus on the teaching and learning of science and in three of the articles how education is responding to the ongoing pandemic. These eight articles come from Denmark, Austria, Nigeria, Ghana, Turkey with Bosnia and Herzegovina, and South Africa with foci on school-aged students, university students, and in-service teachers.

The first article in this issue is from Denmark's Morten Rask Petersen in his study which takes a descriptive approach to teachers' understanding and usage of strategies to help students learn through inquiry. Austria's Philipp Spitzer investigated how 1013 students in grades 8 and 11 were influenced toward a potential chemistry-related career choice in the second article. The third article comes from Nigeria's Ngozi Okafor who investigated the effects of Google Meet, Classroom Teacher Approach, and the influence of course-types on undergraduates' achievement and motivation in chemistry. Ghana's Claudia Quayson, Twumasi Ankrah Kwarteng, Ernest Koranteng, and Ruby Hanson investigated chemistry teacher trainees' difficulties in naming and writing structures of spiro and bicyclic compounds in the fourth article. The next three articles concern physics. The fifth article is from Türkiye's Ahmet Kumaş and Bosnia and Herzegovina's Sabri Kan studied physics distance education practices in high schools which were closed by the Turkish Ministry of National Education (MNE) due to the COVID-19 pandemic. The sixth article comes from South Africa's Olalekan Taofeek Badmus and Loyiso C. Jita who provide an exploration of the relevant literature on both Nature of Science and Science education with a view to aggregate and simplify scholarly positions for easy classroom usage for teachers and educators alike. Zemenu Mihret, Mekbib Alemu, and Shimeles Assefa from Ethiopia examined the effect of blended laboratory experiments on pre-service physics teachers' attitudes toward physics laboratories in the seventh article. The eight articles by Turkey's Aylin Cam, Harika Ozge Arslan, and Ceyhan Cigdemoglu investigated how the learning styles of primary pre-service teachers interacted with the flipped learning model. The final article by Ganiyu Bello, Hafsat Imam Alabi, Zakariyau Adebayo Bello, Ilias Ayo Bello, and Musa Mohammed Sulaiman examined the perceptions of the science teachers on integration of M-Learning into science class instructions in Kwara State, Nigeria.

The first article in this issue is from Denmark's Morten Rask Petersen in his study which takes a descriptive approach to teachers' understanding and usage of strategies to help students learn through inquiry. Petersen's study focuses on the interaction between learning science and doing science. Petersen highlights how the inquiry-based science education approach (IBSE) is a combination of doing science with the purpose of learning science. He goes on to note how many teachers are not prepared for this. His study is a case study on student-teacher interactions during IBSE through video recording of lessons and teacher interviews. Petersen's study reports on how these three cases illuminated the differences in student performance in IBSE. Petersen's study highlights the importance of initial teacher education in preparing student teachers for their future classrooms noting more emphasis is needed on specific scaffolding for teachers in their new role as teachers in IBSE settings.

Austria's Philipp Spitzer investigated how 1013 students in grades 8 and 11 were influenced toward a potential chemistry-related career choice in the second article. Spitzer reports on how portrayals of scientist in popular culture continue to utilize stereotypical characteristics of scientist. As a result, he wanted to investigate how these impacts on potential career choices of students, with a focus on chemistry careers. This study utilized choice theory with the intention of unveiling the connection between the academic self-concept and the occupational images of students in the field of chemistry through a survey instrument. Spitzer reports on how for these participating students the image of chemistry classes and chemistry as science differed significantly in grades 8 and 11. Spitzer points out alarming results regarding the current career choice of these Austrian students at the end of their schooling and highlights the need for increasing career orientation in schools.

The third article comes from Nigeria's Ngozi Okafor who investigated the effects of Google Meet, Classroom Teacher Approach, and the influence of course-types on undergraduates' achievement and motivation in chemistry. The onset of COVID-19 pandemic in the early 2020's exposed many inadequacies in Nigeria's education system ranging from inadequate access to the resources required for virtual learning to inadequate knowledge on the application of few available resources. Okafor highlights how many Nigerian university lecturers adapting to online lesson delivery do not have adequate training nor do many of their learners have adequate access to digital learning resources, which has contributed to the decline in students' learning outcomes in chemistry at all levels of education. Okafor's study was an ex-post facto and quasi-experimental design which involved an intact class in each of the two groups, one experimental and one as control.

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The study used three research instruments were used in data collection which include: Google Meet and Classroom Teacher Lesson Manuals (GMCTLM), Chemistry Achievement Test (CAT), and Motivation in Chemistry Rating Scale (MCRS). The results showed that undergraduates exposed to Google Meet Pedagogy (GMP) had greater achievement than those exposed to Classroom Teacher Approach (CTA); however, those with Classroom Teacher Approach (CTA) had better motivation in Chemistry than those exposed to Google Meet Pedagogy (GMP). As a result of this study, Okafor concludes with recommendations.

Ghana's Claudia Quayson, Twumasi Ankrah Kwarteng, Ernest Koranteng, and Ruby Hanson investigated chemistry teacher trainees' difficulties in naming and writing structures of spiro and bicyclic compounds in the fourth article. Quayson et al. report how science students in senior high schools in Ghana have difficulty in writing and drawing structural formulae of organic compounds using the International Union of Pure and Applied Chemistry (IUPAC) nomenclature system. They go further and note structures and formulae of compounds are important ingredients in chemistry, however, science students' inability to form mental models of compounds makes naming and writing of structures difficult. Quayson et al.'s study was a case study design which used molecular model kits to enhance 1st-year chemistry teacher trainees' performance in naming and writing structures of two groups of cycloalkanes - spiro compounds and bicyclic compounds. Quayson et al. reported that due to the improvement of these chemistry teacher trainees' performance in the post-test; it is recommended that this type of kit should be used wider to support the learning of chemistry.

The fifth article is from Türkiye's Ahmet Kumaş and Bosnia and Herzegovina's Sabri Kan studied physics distance education practices in high schools which were closed by the Turkish Ministry of National Education (MNE) due to the COVID-19 pandemic. Kumaş and Kan highlight how COVID-19 has impacted on laboratory-supported applications of physics and chemistry courses, resulting in schools looking for a new perspective to alternative applications. This lack of alternative teaching practices during the COVID-19 process in Turkey reinforced the prejudices of the students against these disciplines in a negative way. Kumaş and Kan scanning method with 1,275 students about distance education practices using TV, Live Phyics, and ZOOM with semi-structured interviews of teachers, students, and parents about this experience in teaching and learning. Kumaş and Kan report on issues and concerns that were raised in this study and conclude with recommendations.

The sixth article comes from South Africa's Olalekan Taofeek Badmus and Loyiso C. Jita who provide an exploration of the relevant literature on both Nature of Science and Science education with a view to aggregate and simplify scholarly positions for easy classroom usage for teachers and educators alike. The decision to integrate Nature of Science into classroom practice is no longer a debate among science educators and curriculum experts. There exists empirical evidence to substantiate its effectiveness, judging by both the academic performance and ability of students to conceptualize abstract yet teachable areas in science. Curriculum and Assessment Policy Statement of physical science permits for teachers, fundamentally, the discretion to inculcate and incorporate Nature of Science in classroom practices. However, the usual classroom practices are far from the expectations of both curriculum experts and policy makers in the field of science education. Ambiguity, accessibility, and perceived non-domestication were three areas identified in the literature to be responsible for lack of integration aside capacity building. Badmus and Jita conclude with how the onus is for educators of science to get accustomed with the implementation of the curriculum and considering NOS as not only an appendage but also testable route for learners to conceptualize science.

Zemenu Mihret, Mekbib Alemu, and Shimeles Assefa from Ethiopia examined the effect of blended laboratory experiments on pre-service physics teachers' attitudes toward physics laboratories in the seventh article. Mihret et al. highlight how one of the factors leading to poor enrolment in physics at different levels of the education system is the student's attitude. They go on to further note the physics subject continues to be considered difficult and unattractive by some students. This study was a quasi-experimental pretest-posttest non-equivalent comparison groups design with 63 2nd-year preservice physic student teachers spread across a blended experimental group, virtual experimental group, and real laboratory group. Mihret et al.'s results showed that while all three groups improved it was those who were taught using blended mode of physics experimentation liked physics laboratory experiments more than any other groups. As a result of this study, Mihret et al. conclude their article with recommendations.

The eight articles by Turkey's Aylin Cam, Harika Ozge Arslan, and Ceyhan Cigdemoglu investigated how the learning styles of primary pre-service teachers interacted with the flipped learning model. Cam et al. report how flipped learning is growing among researchers especially in light of the COVID-19 pandemic. They then go on to note that implementation efforts on the flipped learning are not differentiated across learning styles of the participants, specifically in this study 27 primary pre-service teachers. Cam et al.'s study was a mixed-method design including static group comparison to compare participants' performances from two different cohorts. Their data collection came from the Kolb Learning Style Inventory, participants' Midterm and Final exams, and lesson plans. Cam et al. reported that based on findings, it was possible to claim that the flipped learning model helped to improve achievement more than lecturing for the study context. Cam et al. conclude that further studies should focus on how teacher education programs help pre-service teachers to improve personal epistemologies that are transferred to their instruction.

The final article by Ganiyu Bello, Hafsat Imam Alabi, Zakariyau Adebayo Bello, Ilias Ayo Bello, and Musa Mohammed

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Sulaiman examined the perceptions of the science teachers on integration of M-Learning into science class instructions in Kwara State, Nigeria. Bello et al. note that M-learning (Mobile Learning) provides educational service delivery to all, does not discriminate against gender or disability, such education service sees every citizen as the same and as such supports equity in education. Bello et al. then report that although the effects of using M-learning in classrooms especially in tertiary institutions has been studied extensively; however, less is known about science teachers' perceptions of its integration in science classrooms at the secondary school level. Their study included a purposive sampling of 129 science teachers from 34 public and 27 private Senior Secondary Schools. Bello et al. found that the participating science teachers had high perceptions of integration of M-learning in science teaching and learning, indicating that they were positively predisposed to integrate M-learning into their class lessons. They went on to note that teaching in either public or private school does not significantly influence the science teachers' perceptions of the usage and stage of readiness to integrated m-learning into teaching and learning. Bello et al. conclude with recommendations based on this study.

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