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EDITORIAL

Editorial

The third issue of volume 34 brings together authors from Turkey, the Philippines, Ethiopia, and the United States of America (USA). The first article from Turkey's Esra Kabataş Memiş, Sümeyra Zeynep Et, and Elif Sönmez investigated the experiences of pre-service science teachers related to the use of technology. Cennet Elmas and Bahattin Deniz Altunoglu report on their study of Turkish K-8 science teacher candidates' integration of cognitive and emotional goals in achievement settings regarding biology learning in the second article. The third article by Derya Sönmez and Gamze Hastürk aims to determine the relationship between the ecological identities of Turkish primary school teacher candidates and their environmental risk perceptions. Girlie Mae Zabala studied the influence of the competency of Philippine teachers and the laboratory environment in an online setting on their students' science process skills (SPS) using a mixed methods approach and convergent design in the fourth article. Ethiopia's Gidele Gito Gizaw and Solomon Sorsa Sota review and assess the strategies available in the literature to improve the practices of SPS among students in this issue's fifth article. The sixth article from Turkey's Erkan Bozkurt presents a bibliometric analysis of systems thinking research in the field of science education. The final article of this issue is from the USA's Kadir Demir and Brett Criswell, who focused on understanding changes that were taking place in promotion and tenure (P&T) practices in eight selected institutions of higher education (IHE) in the state of Georgia.

The first article from Turkey's Esra Kabataş Memiş, Sümeyra Zeynep Et, and Elif Sönmez investigated the experiences of pre-service science teachers related to the use of technology. Memiş *et al*. argue that education and teaching technologies are examples of these positive developments, and the integration of technology into the educational environment is considered as an important resource for individuals who have the 21st century skills. While the integration of technology into education is expected to overcome some problems, there is the potential to create new problems. Memiş *et al*.'s study was a phenomenological design used to explore the experiences and perspectives of ten pre-service teachers on the integration of technological applications into science teaching. Their participants were asked to use their teaching experience to teach a subject of their own choice specific to the field of science at the higher education level by planning and delivering a course in which technological applications are integrated through any teaching method. Memiş *et al*. concluded that, based on the results of the research and the related literature, more practice is needed to enable pre-service teachers to gain integrated experience in the use of technology during their undergraduate studies.

Cennet Elmas and Bahattin Deniz Altunoglu report on their study of Turkish K-8 science teacher candidates' integration of cognitive and emotional goals in achievement settings regarding biology learning in the second article. Elmas and Altunoglu discuss issues related to students studying biology and highlight motivation as one of the key issues. As such, they sought to develop measurement tools to determine individuals motivations or motivational beliefs. Their study was both qualitative and quantitative research, with 581 pre-service Turkish K-8 science teachers using their "Achievement Goal Questionnaire for Biology Learning." Elmas and Altunoglu note that their study provides the first implementation of cognitive-affective bifurcating within the mastery and performance (approach-avoidance) framework of goal orientation theory. They also report that the cognitive and affective bifurcation of the items that compose the theoretical measurement model was confirmed by empirical data.

The third article by Derya Sönmez and Gamze Hastürk aims to determine the relationship between the ecological identities of Turkish primary school teacher candidates and their environmental risk perceptions. Sönmez and Hastürk note that some of the current environmental problems, such as climate change, deforestation, acid rain, extinction of species, melting of glaciers, pesticide pollution, and genetically modified foods, will show their effects in the future. Therefore, the relationship between the environment and identity (ego) has enabled the concept of ecological identity to enter the literature. Ecological identity is related to values, attitudes, behaviors, and beliefs towards the environment. Their study used a correlational survey model with 198 pre-service Turkish teachers. Sönmez and Hastürk reported that there was a moderately positive and statistically significant relationship between the pre-service primary school teachers' ecological identities and their environmental risk perceptions, but no statistically significant difference according to gender, grade level, or prior study in this area. Sönmez and Hastürk conclude that educational measures should be taken in order to increase the pre-service teachers' ecological identity levels and end their article by making several recommendations based on this study.

Girlie Mae Zabala studied the influence of the competency of Philippine teachers and the laboratory environment in an online setting on their students' SPS using a mixed methods approach and convergent design in the fourth article. Zabala reports on how in the Philippines that many students have low mastery levels to no mastery levels that need immediate attention, despite many students with a master's level of education. This occurs even with legislation ordering higher education institutions to produce graduates with high academic, thinking, behavioral, and technical skills and competencies that fit the

industry and national and international standards. Zabala's study used convergent mixed methods with 384 participants. Zabala's study noted that the teachers teaching chemistry laboratories were considered effective in their competencies, and the laboratory environment was often favorable to students. Zabala goes on to conclude that hands-on experiences in the laboratory will lead to helping learners achieve independence by collaborating with a competent teacher in a learning environment that fosters the acquisition of skills. Specifically, Zabala reports on the five essential themes that emerged from the lived experiences of the participants. The article concludes with recommendations based on this study.

Ethiopia's Gidele Gito Gizaw and Solomon Sorsa Sota review and assess the strategies available in the literature to improve the practices of SPS among students in this issue's fifth article. Gizaw and Sota report on a review that searched the literature for strategies helpful to developing SPS among students and the factors that affect their development. This review of relevant literature was conducted between October and November 2020 using Google Scholar, Scopus, Education Resources Information Center (ERIC), Science Direct, Justor, and Research Gate which resulted in 56 articles. The articles reviewed ascertained that the inculcation of these skills can be realized in students through the integration of SPS-related activities into curricular materials, classroom lessons, assessments, or questioning strategies. Teaching strategies, particularly student-centred methods and multiple representation approaches, are effective for improving students SPS. Gizaw and Sota conclude with three recommendations.

The sixth article from Turkey's Erkan Bozkurt presents a bibliometric analysis of systems thinking research in the field of science education. Bozkurt reports how presenting critical thinking along with systems thinking (ST) has been stated to be effective in gaining students' understanding of more complex and real-world challenges. As ST literature in science education is still being developed, it is important to present the current situation or state of the art and point out future directions for research. Bozkurt notes that there is only a single bibliometric study on ST; however, there is no research about the science education dimension of ST research. A bibliometric analysis was used in this article. It identifies patterns, authors, and frequently used words in a field of study. From the bibliometric analysis, it is evident that while ST research in science education has become more prominent, it really accelerated after the declaration of UNESCO's "The Education 2030 Framework for Action" report in 2016. Bozkurt concludes that the systems thinking approach has the potential to bring real-life subjects into the classroom, such as ecology, earth systems, biology, stem, agriculture, health sciences, engineering, management, etc. As such, to achieve a sustainable future, systems thinking should be a central part of education.

The final article of this issue is from the USA's Kadir Demir and Brett Criswell, who focused on understanding changes that were taking place in P&T practices in eight selected IHEs in the state of Georgia. Demir and Criswell highlight that research-intensive or extensive universities have a culture that often engenders resistance to shifting from traditional pedagogical practices towards reform-based, student-centered practices. They go on to note that the importance of improving the scholarship of teaching (ST), the scholarship of teaching and learning, as well as the scholarship of engagement and creating innovative solutions to enduring teaching and learning problems in higher education is increasingly being recognized. Then Demir and Criswell highlight how, in research-oriented institutions, promotion and tenure (P&T) are manifestly driven by research. Their study used a qualitative, holistic, single-case study approach to investigate changes that were taking place in P&T practices in eight selected institutions of IHE in Georgia. They concluded that while there is some evidence that several faculty were being rewarded in the P&T process for reform scholarship, more study needs to be done to determine the extent to which faculty P&T decisions recognize and reward this work.

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