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INTEGRATING MOBILE TECHNOLOGY IN EARTH SCIENCE COURSE

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Özet

Teknolojideki gelişmeler, özellikle fen eğitiminde bilgi ve beceri edinme şeklimizi değiştirdi. Özellikle öğrenci merkezli bir mobil öğrenme ortamında teknolojinin potansiyelini benimsemek, öğrenme sürecini büyük ölçüde geliştirebilir (Tayan, 2017). Günümüz dünyasında, akıllı telefonlar ve tabletler gibi mobil cihazlar, fen sınıfı da dahil olmak üzere günlük hayatımızda vazgeçilmez araçlar haline geldi (Calabrich, 2016). Bu cihazlar taşınabilirlik, bağlantı ve çok yönlülük sunarak hem öğrencilerin hem de öğretmenlerin çok çeşitli kaynaklara ve uygulamalara kolayca erişmesini sağlar. Bu çalışmanın amacı, ilköğretim matematik ve fen bilimleri öğretmen adaylarının Yer Bilimleri konularını anlamak için mobil teknolojinin kullanımına ilişkin algılarını incelemektir. Araştırma, yarı yapılandırılmış görüşmeleri ve öğrencilerin fen dergileri ve e-portfolyolar gibi ödevlerinin analizini içermektedir. Bulgular, mobil teknolojinin dahil edilmesinin, aktif katılımı, motivasyonu, kendi kendine öğrenmeyi, iletişimi, işbirliğini ve eğitimsel sosyalleşmeyi teşvik ederken öğrencilerin fen konularını öğrenmesini ve anlamasını geliştirebileceğini göstermektedir.

Abstract

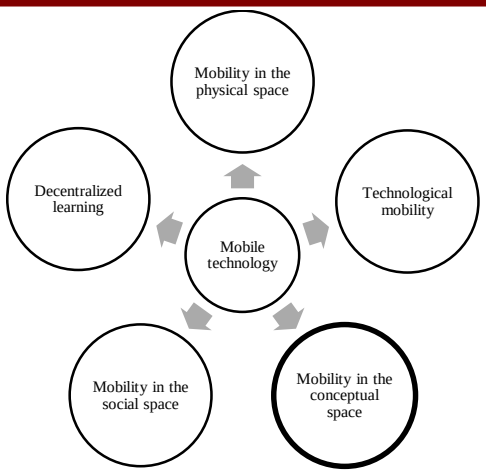
Advancements in technology have transformed how we acquire knowledge and skills, particularly in science education. Embracing the potential of technology, especially in a student-centered mobile learning environment, can greatly enhance the learning process (Tayan, 2017). In today's world, mobile devices like smartphones and tablets have become indispensable tools in our daily lives, including the science classroom (Calabrich, 2016). These devices offer portability, connectivity, and versatility, enabling both students and teachers to access a wide range of resources and applications conveniently. This study aims to explore the perceptions of pre-service primary math and science teachers regarding the use of mobile technology for understanding Earth Science topics. The research involves semi-structured interviews and analysis of students' assignments, such as science journals and e-portfolios. Findings suggest that incorporating mobile technology can enhance student learning and understanding of science topics while promoting active engagement, motivation, self-directed learning, communication, collaboration, and educational socialization.

Key Words: Mobile technology, phemonenography, pre-service math and science teachers, smart phones, tablets.

INTRODUCTION

The use of mobile technology in education is increasingly important for preparing students for the modern world. Incorporating smartphones and tablets into teaching practices equips students with skills needed for employment and fosters productivity and innovation through mobile applications. Educators have a responsibility to develop 21st-century skills such as critical thinking, creativity, collaboration, communication, and technology literacy. This study aims to enhance science education at our college and other universities by utilizing mobile technology. Implementing student-centered learning through mobile technology can be an effective teaching strategy, benefiting students and encouraging further exploration.

The mobile technology can be used for learning and teaching anytime and anywhere. It facilitates the followings (Seifer, 2017; Criollo-C, Guerrero-Arias, Jaramillo-Alcazar, & Luján-Mora, 2021):



Mobile activities encompass various educational theories such as behaviorist, constructivist, situated, collaborative, and informal/lifelong learning, requiring instructor support (Naismith et al., 2004). When integrating mobile technology into teaching, educators should approach it innovatively and promote knowledge building among students. The emergence of new technologies, including mobile devices, offers interactive and effective learning opportunities (Conole & Culver, 2010). Educators need to effectively utilize mobile technology in a changing world while fostering 21st-century skills like critical thinking, problem-solving, communication, and creativity. Integrating mobile technology into pedagogy should promote adaptable and high-quality learning (Laurillard, 2007). Teachers can use mobile technology to bridge academic and extracurricular environments, empowering students and making education more relevant (Seifer, 2017).

Examining math and science teachers' perspectives on mobile technology usage in and outside the classroom has significant implications. It improves future science education courses and helps science teacher educators develop modules with mobile technology. The research findings will greatly impact teaching methods, pedagogy, and curriculum development.

LITERATURE REVIEW

Teacher Education is increasingly interested in mobile learning approaches (Gialamas & Nikolopoulou, 2010). Recent research focuses on achieving high levels of learning using mobile tools and their impact on teachers' experiences and students' academic achievements (Odiakaosa, Dlodlo, & Jere, 2017). Incorporating iPads into pre-service teacher education and K-12 contexts has been explored for effective strategies (Broda, Schmidt, & Wereley, 2011). Mobile technology, when integrated effectively into the learning environment, offers benefits such as flexibility, accessibility, differentiation, collaboration, and innovation in student learning (Sharples et al., 2009; Alvarez et al., 2011; Chen et al., 2009; Gialamas & Nikolopoulou, 2010). Collaboration among academics through communities of practice and professional learning communities is crucial for exchanging research and exploring the potential uses of mobile technology (Schuck, Aubusson, Kearney, & Burden, 2012). Integrating technology into Mathematics teacher education has a positive impact on student learning (Niess, 2006). The overall impact of mobile technology on teaching is largely positive, but considerations include teachers' ability and knowledge in effectively using mobile technology (UNESCO, 2017).

The success of integrating mobile technology in teaching is influenced by various factors, including students, teachers, administrators, and the availability of hardware and software tools (Ertmer, 2005). Teachers, in particular, play a critical role in this integration (Mandell, Sorge, & Russell, 2002; Zhao, Hueyshan, & Mishra, 2001). Therefore, it is crucial to investigate teachers' beliefs and attitudes towards mobile technology integration as they shape their pedagogical reasoning and behavior (Gialamas & Nikolopoulou, 2010; Prieto, Migueláñez, & García-Peñalvo, 2015; Çubukçu, Tosuntaş, & Kircaburun, 2017). Some studies suggest that teachers may be hesitant to adopt mobile technology due to concerns about increased workload and the need for further training (Dündar & Akçayir, 2014; Al-Fudail & Mellar, 2008). Therefore, understanding the views of primary school pre-

service teachers is vital for successful integration, as their positive attitudes can influence their decision to incorporate mobile technology in their teaching practices (Gialamas & Nikolopoulou, 2010)

Çubukçu, Tosuntaş, & Kircaburun (2017) conducted a study with 350 pre-service teachers, using the Technology Acceptance Model to examine their views on mobile technology. The findings revealed positive attitudes towards the usefulness and ease of mobile technology in teaching. This aligns with the results of a study by Prieto, Migueláñez, & García-Peñalvo (2015), where pre-service teachers also had a positive perception of using mobile technology in their teaching practice. Male students scored slightly higher than females in their attitudes. Additionally, Bannon, Martin, & Nunes-Bufford (2013) found that both pre-service and in-service teachers recognized the value of using iPads as a tool for Mathematics education to enhance student learning. The potential of these devices to support collaborative and contextualized learning can address concerns in Mathematics and Science teaching, such as didactic approaches. Thus, teacher educators should be prepared to explore the learning possibilities of mobile devices in science education.

Benefits of Using Mobile Technology in Learning

Students rely on mobile technology for various purposes, including information search, e-books, music/podcasts, and course-specific apps (Criollo-C, Guerrero-Arias, & Jaramillo-Alcazar, 2021; Criollo-C, & Luján-Mora, 2019). Mobile technology is especially essential during the pandemic for online learning (Criollo-C, Guerrero-Arias, & Jaramillo-Alcazar, 2021). It enhances education by creating resources, recording presentations, facilitating discussions, and enabling language learning (Kukulska-Hulme et al., 2012; Hashemi et al., 2011; Criollo-C et al., 2021). Mobile technology-compatible simulations, like those developed by the University of Colorado, Boulder, engage students effectively (Cakmak et al., 2020). It also enables authentic learning experiences and caters to diverse learning needs (Musti-Rao & Walker, 2017). Mobile technology motivates and engages students outside of traditional classrooms (Tayan, 2017; Kukulska-Hulme & Shield, 2008; Lai, 2016). However, barriers to implementation include lack of technical support, teachers' attitudes, insufficient training, and restrictive school policies (Dimock, 2019). Overcoming these challenges through teacher training and protocols is crucial. Mobile technology plays a significant role in the lives of young individuals, particularly Generation Z and Generation α, making it an attractive tool for teaching and learning (Dimock, 2019). Anticipating the arrival of Generation β, it is important to recognize the significance of mobile technology in education and harness its power to enhance students' educational experiences (Dimock, 2019). Mobile devices are essential for the advancement and development of future generations, equipping them with necessary skills (Dimock, 2019).

PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

The purpose of this study is to investigate the pre-service primary math & science teachers' views of utilizing mobile technology such as tablets, smartphones in their learning and understanding of Earth Science topics in-and-out of class.

Two research questions guided the study:

1. What is the pre-service primary math & science teachers' views of utilizing mobile technology in and out of class?
2. What is the influence of the mobile technology-oriented approach on the pre-service primary math & science teachers' understanding and learning topics in Earth Science?

METHOD

Context of the Study

The study took place a state university in Kingdom of Bahrain and participants were pre-service math and science teachers specializing in primary education, enrolled in the Earth Science course as part of their bachelor's degree program. The course covered various topics related to Earth systems, energy transfer, weather, climate, rocks, plate tectonics, volcanoes, geologic time, weathering, and the solar system. A total of 56 students (45 female, 11 male) participated, and seven female students volunteered for interviews. Interestingly, none of the students

had prior experience with mobile technology in their coursework, making this course their first exposure to its use for teaching.

The instructional Approach

A mobile technology-focused teaching method was implemented for the Earth Science course in an undergraduate education program. Pre-service math and science teachers used various mobile applications for notetaking (Good note, Notes, Notes writer) and group discussions (Mindly, MindMeister, Snapchat, Canva). Instagram was utilized for discussions outside the classroom. Online quizzes were accessible through smartphones, while QR codes enabled access to files and computer simulations using smartphones and tablets. Numbers application was used for data collection and graphing in lab activities. Canva and a science journal application were used for science journal assignments. Specific sound measurement and smartphone measurement applications were used for measuring sound pitch and creating a scale model of the planets, respectively. Apart from the final exam, which was conducted on paper, the entire course was taught using mobile technology.

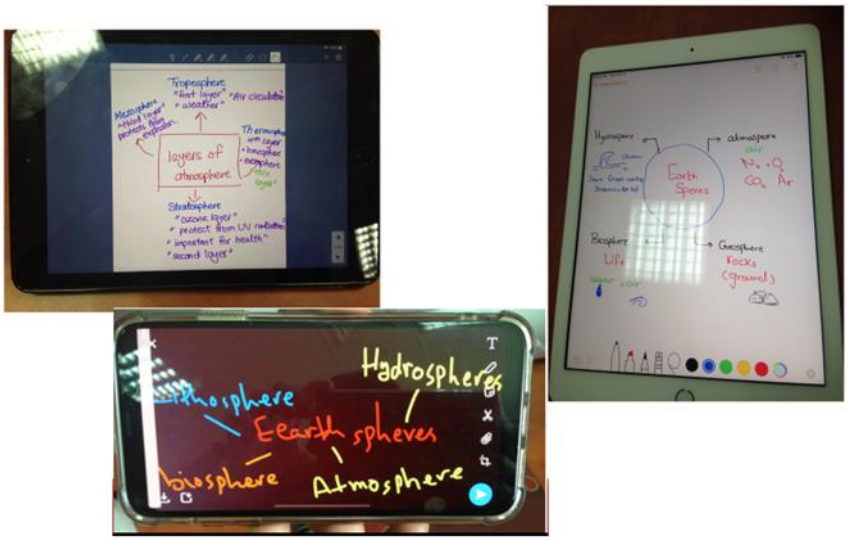


Figure 1. *Some applications to take notes such as Good note, Notes, and Notes writer (note: students used some applications on their tablets and smart phone to take notes such as Good note, Notes, Notes writer during the class.)*

Figure 2. *Using Mindly, MindMeister, Snapchat, and Canva applications to discuss topics in the small groups (Note: Small group discussion in the class: In order to discuss topics and summarize their group's learning, students utilized a range of applications including Mindly, MindMeister, Snapchat, and Canva.)*

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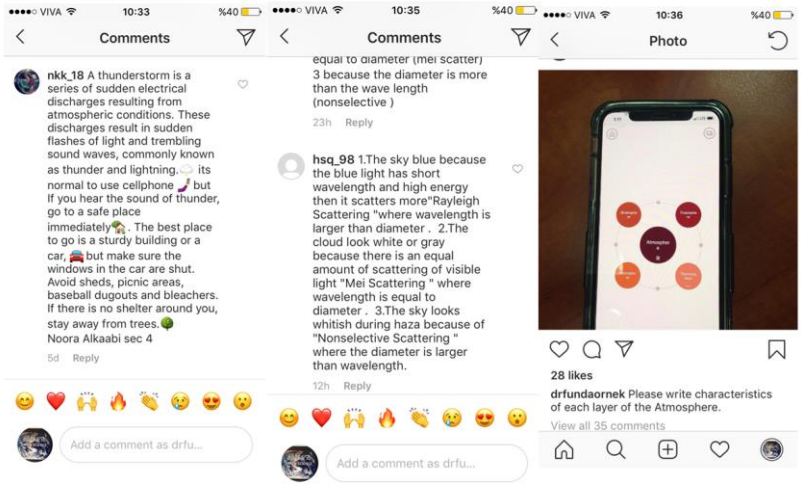

Figure 3. *iInstagram was used to discuss topics* (*Note: Discussions outside of the class (via Instagram): An Instagram account was created for the course to facilitate topic discussions, Q&A sessions, communication, and sharing important announcements.)*

Figure 4. *Taking quizzes by using their smart phones. (Note: Taking online quiz: Certain students opted to take quizzes online through Moodle. While some students found it more convenient to use their smartphones or tablets, others were not entirely comfortable utilizing their mobile devices for quiz-taking purposes, and instead chose to use their laptops.)*

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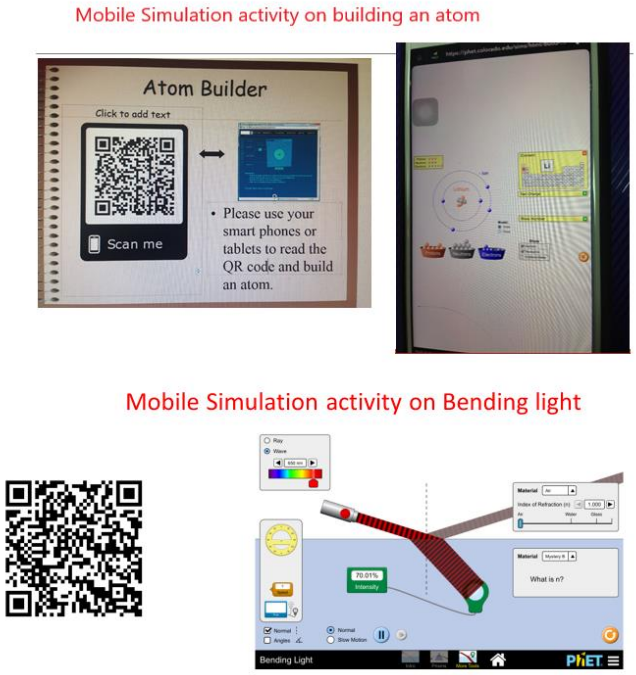

Figure 5. M*obile technology compatible simulations (Note: QR code designer and reader: To enhance accessibility, QR codes were created for interactive computer simulations, activity sheets, and course materials. The simulations chosen were mobile-friendly, allowing students to use their smartphones and tablets for answering related questions. In cases where certain simulations were not mobile-friendly, students could utilize their laptops.)*

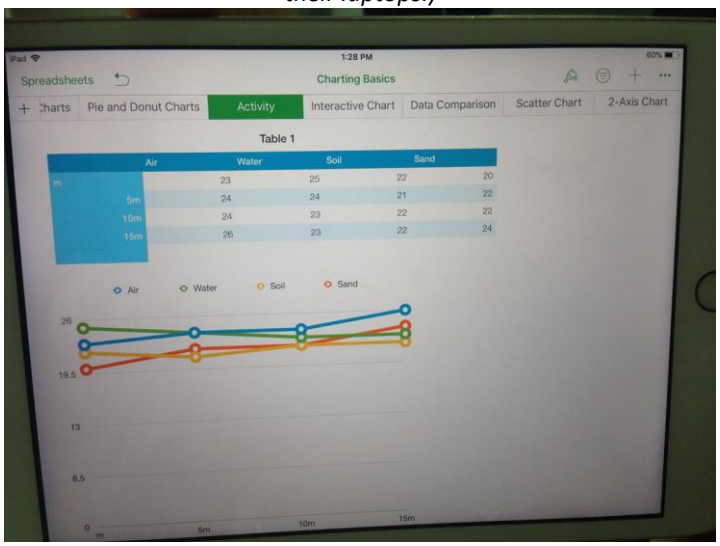

Figure 6. N*umbers application to record data and graph. (Note: Lab activities (taking data and graphing): The students in the science lab conducted a lab activity to examine the impact of solar energy on various materials. Instead of using traditional pen and pencil methods, they utilized digital technology by recording data and creating graphs on tablets or smartphones using the Numbers application.)*

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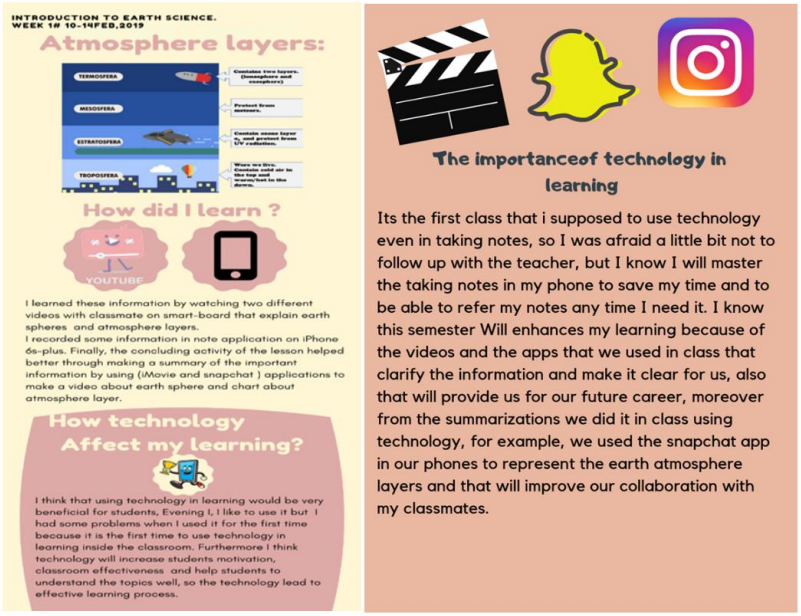

Figure 7. *Canva application to prepare science journals. (Note: Science journals: As a final project, students utilized the Canva application to compile their science journals. On a weekly basis, they documented their acquired knowledge and detailed their learning process.)*

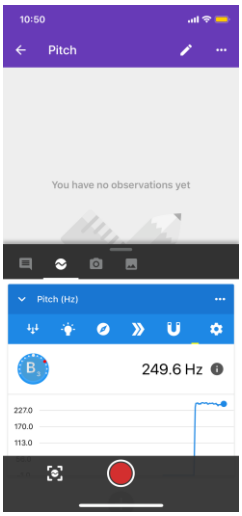

Figure 8. U*sing science journal application. (Note: Science Journal application: The pitch of sound was measured by students using the Science Journal app, which utilizes the microphone on their mobile devices.)*

Theoretical Framework for the Study: Phenomenography

This qualitative study adopted a phenomenographic framework to explore the perspectives of pre-service math and science teachers on the use of mobile technology both inside and outside the classroom. Phenomenography is a research approach that seeks to understand the diverse ways in which individuals experience and interpret the world around them (Khan, 2014). By using this framework, the study aimed to uncover the various ways in which the participants in this group perceived and comprehended the innovative teaching approach incorporating mobile technology (Author, 2008; Han & Ellis, 2019).

Data Collection

Data for the study were collected from various sources, including semi-structured interviews with seven student volunteers, analysis of students' assignments and e-portfolios, and discussions conducted via Instagram. The study aimed to understand pre-service math and science teachers' perspectives on using tablets and smartphones to enhance their learning of Earth Science topics. Informed consent was obtained from all 56 participants before their participation in the study.

Data Analysis

The study utilized interviews, assignments, and Instagram discussions to examine the views of pre-service math and science teachers on mobile technology in teaching and learning. Semi-structured interviews were conducted with seven students after completing the course, recorded with consent, and transcribed for analysis. Triangulation was employed to ensure credibility, involving another expert to interpret the data and comparing findings for compatibility (Patton, 2002). Primary data from interviews, assignments, and Instagram discussions were included, providing a basis for the conclusions. Analysis utilized ATLAS-Ti software, employing inductive analysis to identify coding categories and comprehensively describe the variety of responses. An independent expert was involved in the coding process for consistency. The reliability of the data was assessed by comparing coding decisions using the inter-rater reliability formula:

Reliability= [number of agreements/(total number of agreements + disagreements)] (Miles & Huberman, 1994, p.64).

After re-evaluating the data, adjustments were made to the coding categories to address conflicting evidence. The inter-rater reliability levels for interviews, assignments, and Instagram discussions were calculated as 0.85, 0.91, and 0.93, respectively. Refining the coding categories resulted in agreement among the results. The categories included expectations, mobile technology, difficulties, understanding and learning, new approach to learning, and assignments. Select excerpts were included to support assertions and encourage in-depth discussions.

RESULTS

This section explores the perspectives of pre-service math and science teachers regarding the use of mobile technology in both in-class and out-of-class learning of science. The research methodology involved conducting semi-structured interviews, analyzing students' assignments, and examining discussions held on Instagram. Quotes and excerpts from the interviews, assignments, and Instagram discussions are indicated using shorthand notations. These notations include adding comments after the fact in parentheses, omitting unimportant and unrelated words using curly braces, and excluding inaudible words or sentences. To ensure privacy, pseudonyms have been replaced with labels such as S1, S2, S3, etc.

A deeper understanding of the students' opinions about the course and the way it was taught was gained through the analysis of data from semi-structured interviews, assignments, and discussions on Instagram. Quotations from the interviews, assignments, and discussions were used to support the results obtained. An independent expert in science education, who did not teach the course, also analyzed the same data and our findings were found to be compatible. Due to limited space, only a few quotations were chosen to support the findings, but they were representative of the other students. The data were categorized into several themes, which emerged while reviewing the transcripts, assignments, and discussions in Instagram. These themes included expectations, mobile technology, difficulties, understanding and learning, new approaches to learning, and assignments.
The pre-service math and science teachers come into a course with specific expectations about how it will be taught, what will occur, and how they will participate in the classroom. However, these students were taken by surprise when the instructor introduced a completely new teaching method centered around mobile technology. They had not anticipated that the instructor would replace traditional tools like pen and paper with mobile devices. The students' reactions suggest that they were not prepared for this type of learning environment,

where activities, note-taking, presentations, and even measuring and graphing would be conducted solely using smartphones and tablets.

> *S1: It such an amazing idea and actually I'm so excited to do it since nowadays everything relating to (mobile) technology so it gives us opportunities to get used to using it in a proper way.*
>
> *S2: We never experienced this way before. So exciting! Since technology is playing an important role in education nowadays, I think that using smart phones or tablets to take notes or other activities is a good thing to do because it will save time, effort and it is hard to loose. For example. Taking notes {…}it is easier to share and restructure when needed, like adding more information.*
>
> *S3: This is the first time to me using mobile technology to learn inside the classroom. And it affects my learning positively by {…} 1- Enjoying while sharing my work with the class. 2- Collaborating with my group to make the work by using apps. 3- Searching in the internet provides to me many options and information about the topic.*

The use of mobile technology, such as smartphones and tablets, proved beneficial for pre-service math and science teachers' learning and comprehension of class concepts. These devices facilitated exploration, creative idea sharing, and discussions among classmates both inside and outside the classroom. Instagram was particularly noted as a platform for continued learning, where students engaged in science-related discussions and shared ideas with peers and the instructor. Some students who were quieter in face-to-face discussions felt more comfortable participating on Instagram. The collaborative and peer-learning opportunities were highly appreciated, as they empowered students to construct their own knowledge and develop a deep understanding of science concepts. The following quotations provide further insights into these perspectives.

> *S4: I learned through using a creative mobile application called VivaVideo, that helped me in combining texts, pictures, and voice record to end up with a meaningful summary video about earth spheres. I take my class notes using Microsoft Word and Note application in my iPhone mobile. I learned through Instagram discussion about the characteristics of each layer of the Atmosphere. I learned through using SnapChat application in my mobile technology, to create a short gif video that describes the four layers of the atmosphere. I used my mobile phone to open Wikipidia website and encyclopedia.com websites to define and learn the new words like trace gasses hail, tropical cyclone, storm surge, and vertical wind shear instead of interrupting the instructor and asking her. I learned about the classification of earth climate based on its region through scanning the QR code on the presentation slide. I used mobile application in my iPhone called "numbers" to organize my experiment data and create a line chart. I create my lap report using Microsoft PowerPoint application in my iPhone mobile. I learned through Instagram discussion about rocks and minerals; difference between glacier and iceberg; the doppler effect. I used my mobile technology to translate the new words using translation application. I learned using the simulation about making glaciers and ice sheets shrink and grow by changing temperature, precipitation, slope, and other variables. I learned through Instagram discussion about the difference between glacier and iceberg. I learned using the simulation that helped me in understanding how to guess the year to cause a change. I learned using the simulation about mechanical weathering that was very interesting and simplified the topic. I learned using the simulation about transform the rock equation. I learned using the simulation that shows how caves are form by the effect of rainwater, lava, and bacteria. I learned through a game that shows how soil treatment, amount of water, and incline effect the amount of soil…*

Pre-service math and science teachers expressed that apps like Canva allowed them to unleash their creativity and conveniently organize their ideas for completing assignments. Conversely, certain students acknowledged that certain assignments, such as science journals, demanded significant time and effort but ultimately facilitated better comprehension and organization of their knowledge and ideas. Additionally, utilizing smartphones or tablets for quizzes was seen as a novel and beneficial approach. The following quotations delve into these notions.

S5: {…} The first one was science journal. This assignment was about writing what and how we learned in any way we liked, I used Canva as it was easy to use? and offered many options like no other programs/websites. I benefited a lot from doing this assignment as I did each science journal accordingly for its week which acted as a useful summary to recall the information for the quizzes as well as a way to study. Not only that, this assignment would help me to make studying journals for my students as it taught me how to be creative with my designs because students likes colorful things as well as how to write a summary in the first place.

S6: First competency is Assessment (6), I achieved this competency because in this course I did a new way of assessment by doing online quizzes. Second competency is Communication & Instructional Technology (7), this competency is the most one I achieved and did in this semester because Dr. Funda allows us to use our Mobile technologies inside the classroom and outside it. For example, science journal, It helped me to make a summary for the lesson, identify the main concepts, and remembering the information through writing it in my own words. My English language skill has improved through writing in my own words. Taking notes on my phone helped me to complete the science journal. Using Canva and Microsoft word programs in doing the science journal has contributed in enhancing my skill in using mobile technology. Which that it will help me as a future teacher to use the technology in an effective way that increase the student engagement.

The findings from interviews, assignments, and Instagram discussions of pre-service math and science teachers were summarized. Overall, students' views in interviews aligned with their responses in assignments and discussions. Most students had positive views of the course, particularly regarding the use of mobile technology in and out of class. In their science journal responses, they discussed their learning experiences and the role of mobile technology. Students appreciated using smartphones and tablets, interacting with classmates and the instructor, and engaging in activities that applied to real-life problems and complex scientific concepts. Some students mentioned challenges in assignments due to the amount of work and reliance on mobile technology. However, they felt a sense of accomplishment when using apps for investigation and acquiring new information. Despite concerns, the majority of students expressed satisfaction with the course and saw no need for changes. Students shared their thoughts on the course, including the teaching methods and the instructor, through interviews and their assignments. The course focused on utilizing mobile technology, such as smartphones and tablets, to engage students in investigative and exploratory activities, aiding in their understanding and knowledge acquisition. This approach also encouraged students to analyze systems and make connections to real-life situations, making their learning more meaningful. The use of mobile technology, particularly during group work and discussions on platforms like Instagram, enhanced students' self-learning and collaboration skills. Additionally, this approach promoted the use of mobile technology in teaching and learning, preparing students for their future roles as educators. One student highlighted the cognitive and practical benefits of using mobile technology in their learning journey.

S7: At the end, I will talk about the benefits of this course and how it develops me cognitively and practically and how it will help me as a future teacher. This course developed my collaboration skills, especially when I did the activities inside the classroom I did them with my colleagues which improve my communication and collaboration skills and that will help me in the future as a teacher, to collaborate and share ideas with other teachers. Furthermore, this course develops my technology practice because I used the mobile technology in different aspects in this course during the semester, and this will help me as a teacher because We are in a time of technology development and the future of education is "Technology".

DISCUSSIONS AND IMPLICATIONS

As technology continues to advance, education will undergo dismantling (Ahmad, 2020). To explore the views of pre-service primary math and science teachers regarding the use of mobile technology in learning Earth Science topics, this study aimed to contribute to the growing body of evidence on the effectiveness of mobile technology as a teaching tool. The researcher was particularly motivated to incorporate mobile technology in and out of the

classroom due to its ubiquitous nature in society. Additionally, students themselves are increasingly reliant on smartphones and tablets, making it beneficial for educators to harness these devices to support and enhance learning experiences. Prior research has highlighted various ways in which mobile technology devices can enhance teaching and learning, including facilitating engagement, communication, collaboration, and sharing of learning experiences among students (Bernacki, Greene, & Crompton, 2020; Ravizza, Uitvlugt, & Fenn, 2017). The present study further adds to this body of knowledge by demonstrating the positive effects of using mobile technology in teaching science topics, as evidenced by previous studies conducted by Crompton et al. (2016) and Kantar & Dogan (2015).

According to Mohammadi, Sarvestani, & Nouroozi (2020), the use of mobile technology in education presents new learning opportunities that go beyond traditional activities. Students can engage in simulations and construct their own learning, catering to their interests and needs. It also promotes self-directed and personalized learning, encouraging active engagement in class even while taking notes. Bere & Rambe (2019) found that mobile technology can enhance learning and engagement in physical and social spaces. For example, platforms like Instagram can be used for discussions and active student participation. Moreover, mobile technology allows for collaboration and communication between students and teachers, even at a distance, facilitating educational socialization. This is particularly beneficial for shy students who may feel more comfortable expressing their opinions on online platforms like Instagram. Mobile technology enables informal learning, self-directed based on individual needs and interests. Students can access additional resources and video content, broadening their knowledge on various topics such as global warming. Additionally, mobile technology provides various tools that support teachers in managing resources for learning experiences and aids in students' understanding and development of new knowledge. For example, science journal apps enable students to observe and record data or explore their surroundings. The accessibility and flexibility offered by mobile technology are essential, as students can access educational resources and their own notes anytime, anywhere (Zhang, 2016). This eliminates the need to carry heavy books and notebooks as all information can be accessed through a mobile device (Criollo-C & Luján-Mora, 2019; Bano et al., 2018). Furthermore, the risk of losing notes taken through mobile apps is minimal due to the possibility of backup. Another advantage of mobile technology in education is its ability to motivate students. The ease, interest, and fun associated with using mobile technology make education more enjoyable and can increase student participation (Criollo-C, Guerrero-Arias, Jaramillo-Alcazar, & Luján-Mora, 2021).

Ahmad's study (2020) emphasizes the necessity of incorporating mobile technology into educational systems rather than considering it an option. The findings highlight the increasing demand among generation Z and α students for personalized and customizable educational services. Educational institutions must embrace this trend to enhance students' learning experiences and equip them with the skills needed for a successful future. The integration of mobile technology in education not only benefits students' improvement but also enhances their competitiveness in the 21st-century job market. Leveraging mobile technology provides students with access to quality employment opportunities and fosters the development of essential skills required in today's rapidly evolving workplace. By utilizing mobile technology, educational institutions can promote productivity and innovation among students, preparing them to thrive in a technologically driven society.
In conclusion, the incorporation of mobile technology in educational systems is no longer a luxury but a necessity. The benefits of mobile technology, such as personalized learning experiences, improved collaboration, inclusivity, flexibility, and cost savings, highlight the need for educational institutions to embrace this trend. By doing so, we can empower students and equip them with the skills and knowledge necessary to succeed in the digital age and thrive in a rapidly changing world.

Research and Publication Ethics

In this study, all rules specified in the "Directive on Scientific Research and Publication Ethics of Higher Education Institutions" were followed. None of the actions specified under the second section of the Directive, "Actions Contrary to Scientific Research and Publication Ethics", have been carried out.)

Kurul adı= BTC Research Committee

Karar tarihi= June 24, 2019
Belge sayı numarası= N/A

Disclosure Statements

1. Contribution rate statement of researchers: Author % 100
2. No potential conflict of interest was reported by the author.

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