CREATING AN IQ DEVELOPMENT MOBILE APPLICATION FOR SCHOOL CHILDREN

Kayumov Ahror,
Fergana Branch of the Tashkent University of Information
Technologies Named after Muhammad al-Khorazmi
3293535ahror@gmail.com

Janayev Izzatillo,
Fergana Branch of the Tashkent University of Information
Technologies Named after Muhammad al-Khorazmi
ijanayev470@gmail.com

Abstract
This study aims to explore fourth-grade students' perceptions of mobile programming education. Data from interviews, metaphors, and drawings were gathered and analyzed qualitatively. Among 135 participants, 24 fourth-graders were purposefully selected. Results indicate positive impacts on students' skills and recommend MIT App Inventor for programming education.

Keywords: Primary school students, mobile programming education, fourth-grade, views, qualitative research, interviews, metaphor, drawings, purposeful sampling, content analysis, MIT App Inventor, skills, creative thinking, social skills.

Introduction

Globalization, resource depletion, and intensified international competition in innovation have spurred nations to overhaul their education strategies. Consequently, there's a growing demand for individuals proficient in critical thinking, creativity, and problem-solving across science, technology, engineering, and mathematics (STEM) fields. The analysis of 21st-century skills underscores the importance of students acquiring competencies such as informatics literacy, creativity, cooperation, and effective communication, alongside data analysis. Recent strides in data transmission and telecommunications have entrenched computers and software in daily life, highlighting the influence of information technology developers. Thus, programming education is recognized as instrumental in equipping students with essential 21st-century skills, positioning programming as a cornerstone skill of this era. Scholarly discourse underscores programming's role in enhancing critical thinking, creativity, academic performance, motivation, problem-solving, and learning attitudes among students. Given the significance of programming education and its positive impacts, introducing coding and computer programming early in information societies can nurture a generation capable of driving societal progress.

Literature review and methodology

In the pedagogy of teaching programming to young learners, utilizing programming tools is deemed crucial for fostering both understanding and enthusiasm for programming (Chiang & Qin, 2018; Kalelioglu & Gulbahar, 2014; Panselinas et al., 2018; Papadakis & Orfanakiz, 2016; 2018; Papadakis, Kalogiannakis, Orfanakis & Zaranis, 2017; Shin & Park, 2014; Uzgur & Aykac, 2016; Yildirim, 2017). Yildirim (2017) affirmed the efficacy of Scratch in enhancing programming skills among middle school students through his study, wherein he developed a mobile application using the Scratch programming language. Similarly, in an evaluation of the information technology and software course's preliminary curriculum, Uzgur and Aykac (2016) found that including programming without supportive tools exceeded the cognitive abilities of primary school students, as perceived by information technology teachers. Gunes and Karabak (2013) scrutinized the 2012 elective information technology and software course curriculum, suggesting a curriculum model centered on the Scratch programming tool due to the absence of a defined curriculum. They advocated for an approach utilizing Scratch to foster students' affection for and proficiency in software development, particularly at the primary level. Acknowledging the cognitive limitations of primary students, presenting abstract concepts such as software development and programming via a designated tool is deemed beneficial for enhancing both engagement and comprehension of the subject matter.

In addition to the emphasis placed on computer programming education, mobile programming training holds significance in information-driven societies, given the ubiquitous presence of computers in portable mobile devices. The miniaturization of computers has made technology more accessible, with mobile phones and tablets now surpassing traditional computers in usage. According to data from the Turkey Statistical Institute (TSI) in 2018, the prevalence of mobile phones and portable computers in households has steadily risen between 2004 and 2018, while landline phones and desktop computers have seen a decline. Consequently, children are becoming familiar with portable information technologies at increasingly younger ages. Ozyurek's (2018) study on computer technology usage among preschoolers aged 4 to 6 found that 53.5% of them use mobile phones and 34.9% use tablet computers, underscoring the early integration of these technologies into children's lives.

While preschoolers encounter mobile devices early on, it's argued that children in primary school, due to their cognitive, affective, psychomotor, and social development levels, are better suited for mobile programming education, involving game and application development through coding (Morelli et al., 2011; Ozdinc, 2015). MIT App Inventor, a recent programming tool, has emerged as a solution, requiring no prior programming knowledge to create Android apps, potentially fostering a love for programming. These tools provide an accessible avenue for learning coding, akin to playing games, enabling children to enter the realm of information technology at a young age (Gray, Abelson, Wolber & Friend, 2012).

The Massachusetts Institute of Technology (MIT) developed MIT App Inventor as a tool for teaching programming to students. It provides a visual environment where blocks are used to create mobile apps, allowing users to develop their own applications. Building an app with MIT App Inventor involves selecting and connecting appropriate blocks, akin to solving a jigsaw puzzle. This approach not only engages users but also enhances their problem-solving skills. The visual nature of App Inventor minimizes syntactic and cognitive challenges for beginners, offering features like block selection from menus and shape-guided block merging. MIT App Inventor finds extensive use across various educational settings in the USA, including post-graduate programs, summer camps, teacher workshops, and computer courses from primary school to university (Gray et al., 2012). Experimental studies by Papadakis et al. (2016) explored the impact of using Scratch and App Inventor on student performance and attitudes, revealing that the App Inventor group demonstrated higher performance compared to the Scratch group and traditional text-based programming learners. Another study by Papadakis (2019) investigated behavioral and learning differences between Scratch and App Inventor users, finding that students learning with App Inventor exhibited more positive attitudes, higher motivation, and improved learning outcomes compared to those learning with Scratch.

Results:

This study aimed to explore the perspectives of fourth-grade students engaged in mobile programming education. Employing a qualitative research approach, the study opted for a holistic single case design. Case studies were chosen for their ability to offer an in-depth exploration to researchers, allowing for a comprehensive understanding without direct intervention in the event. This design facilitates a nuanced examination of the subject and provides opportunities to infer the effects or relationships between individuals and the subject matter (Saban & Ersoy, 2017).

The research cohort comprised 24 fourth-grade students, selected from a pool of 135 participants through purposeful sampling, all of whom volunteered to participate. In qualitative research, interviews with 5 to 25 participants typically suffice (Yildirim & Simsek, 2018), aligning with the study's approach. Mobile programming education was conducted across eight laboratories, evenly divided into morning and afternoon groups. Three students from each laboratory were included in the study, totaling 24 participants. Concerned about potential age-related limitations, individual interviews were conducted with each fourth-grade student. Of the participants, 16 were male and 8 were female, aged between 9 and 10. Among them, 19 attended state schools, while 5 were enrolled in private schools.

The meaning of the mobile programming education

It seems like you haven't provided the samples of the students' drawings, descriptions, and comments about their drawings. If you have them, feel free to share, and I can help you analyze or interpret them! Binoculars drawn by a student are shown in Figure 1.

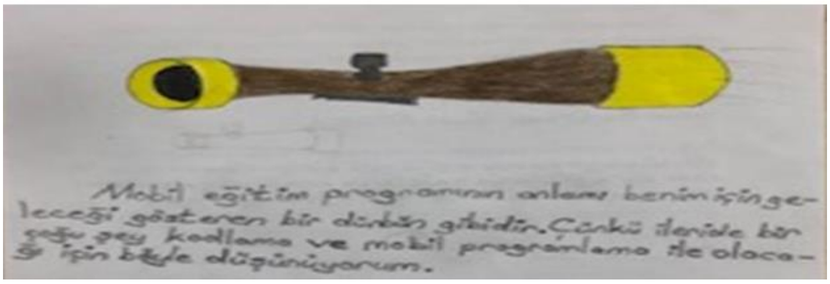

Figure 1. Looking ahead with the mobile programming education

Web of Teachers: Inderscience Research
webofjournals.com/index.php/1

The drawing of binoculars representing the student's perception of mobile programming education as "binoculars that show the future" reflects a forward-looking perspective. The student believes that coding and mobile programming will play a significant role in shaping the future, as indicated by their comment. This interpretation suggests that children today view contemporary devices such as mobile phones and computers as integral parts of their lives, anticipating that these technologies will continue to evolve and become even more central in the future. They likely perceive mobile programming education as a tool for understanding and navigating this future landscape. In essence, the drawing symbolizes the student's anticipation of a future society where information technologies, facilitated by coding and mobile programming skills, will be fundamental, thereby highlighting the importance of preparing for this technological future through education.

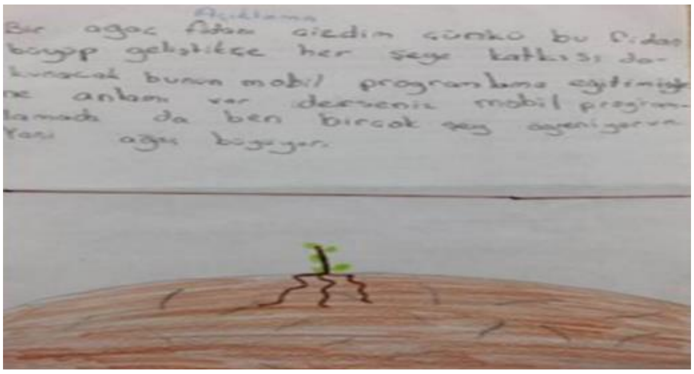

Figure 2. A sapling growing with the mobile programming education.

The drawing of a tree sapling symbolizes the student's perception of personal growth and development through mobile programming education. The student sees themselves as the sapling, starting small but with the potential to grow and contribute significantly over time. By engaging in mobile programming education, the student feels empowered to learn and improve their programming skills, likening this process to the growth of a sapling into a tree. This metaphor suggests that the student recognizes the value of mobile programming education in nurturing their abilities and enabling them to make meaningful contributions to society. It reflects a sense of ambition and determination to continue learning and growing, ultimately aiming to become a valuable asset to the community, akin to a fully grown tree providing shade and support. In essence, the drawing illustrates the student's understanding of the transformative power of education and their aspiration to flourish and make a positive impact on the world through their newfound programming skills.

Figure 3. S;U;C;C;E;S;S with the mobile programming education

The poster design reflects the student's positive attitude towards mobile programming education while also acknowledging the need for hard work and dedication to succeed in this field. The emphasis on the word "programming" in large blue font suggests the central role of coding in the student's perception of this education. The inclusion of "hardworking" in a yellow rectangular box, accompanied by an exclamation mark, indicates the student's awareness of the effort required to excel in programming.

The yellow hexagonal boxes contain words such as "adventure," "information," "technology," "entertainment," "imagination," "understanding," and "loving," suggesting that the student sees mobile programming as a multifaceted endeavor encompassing creativity, knowledge acquisition, and emotional engagement. The heart figures associated with "understanding" and "loving" imply a genuine affection for the subject matter.

Moreover, the arrangement of letters in the small triangle boxes spells out the word "success," indicating the student's aspiration for achievement and accomplishment in mobile programming. Overall, the poster conveys the student's belief that mobile programming education offers opportunities for exploration, creativity, and personal growth, while also recognizing the importance of diligence and perseverance in realizing one's goals in this field.

Conclusion:

The findings of the study show that the attitudes of the students who attended the education changed in a positive way. Besides the interview data obtained from the study, the students were asked to develop a mobile app project either individually or as a group at the end of the 4-week education. Students' self-development of an application using the MIT App Inventor programme can be shown as evidence that both students improve their scientific and thinking skills. Durak (2016) developed a curriculum for gifted students in primary school, teaching the Scratch programming language, and asked students to develop projects at the end of the teaching–learning process. It was concluded that the developed projects positively affected the students to see and complete their knowledge and skill deficiencies, to gain responsibility awareness and to increase their motivation. In another study, where fifth-grade students were taught coding with Scratch, it was stated that students' project development during education positively affected their critical thinking and conceptual understanding skills (Alp, 2019). The students participating in the education were selected from different schools, and the majority did not know each other before the education, which allowed them to make new friends. In addition, group work was encouraged whilst designing applications, which aimed to increase their social skills. Opening the project presentations and apps of the students to share on the Google Play store also led to the positive developments in students' social skills. Due to its relationship with Google, App Inventor provides many advantages for both teachers and students (Morelli et al., 2011). In the interviews, it was revealed that the education helped the students to feel they would achieve, that they made new friends and that they were pleased to share online.

References:
1. Akhundjanov U. et al. Distribution of local curvature values as a sign for static signature verification //E3S Web of Conferences. – 2024. – T. 508. – C. 03003.
2. Zulunov R. et al. Building and predicting a neural network in python //E3S Web of Conferences. – 2024. – T. 508. – C. 04005.
3. Zulunov R. et al. Detecting mobile objects with ai using edge detection and background subtraction techniques //E3S Web of Conferences. – EDP Sciences, 2024. – T. 508. – C. 03004.
4. Muminjonovich K. A. CREATING MATHEMATICAL MODELS TO IDENTIFY DEFECTS IN TEXTILE MACHINERY FABRIC //Al-Farg'oniy avlodlari. – 2023. – T. 1. – №. 4. – C. 257-261.
5. Yusubjanovich S. N., Muminjonovich K. A. TRIKOTAJ TO 'QIMALARINING SHAKL SAQLASH XUSUSIYATLARINI RAQAMLI BAHOLASH USULLARI //Al-Farg'oniy avlodlari. – 2024. – T. 1. – №. 1. – C. 57-61.
6. Muminjonovich K. A. METHODS OF TECHNOLOGICAL MACHINERY MONITORING AND FAULT DIAGNOSIS. Intent Research Scientific Journal, 2 (10), 11–17. – 2023.
7. Sharifjonovich M. K. MODELS FOR DETECTING DEFECTIVE FABRICS IN KNITTED PRODUCTS //Academia Repository. – 2023. – T. 4. – №. 11. – C. 24-27.
8. Ermatova Z. ZAMONAVIY DASTURIY MAHSULOTLAR YARATISH VA SIFATINI YAXSHILASHDA DASTURLASH TILLARINI O 'QITISHNING O 'RNI //Research and implementation. – 2023.
9. O'G'Li A. M. A. et al. Tibbiy tasvirlar ichida alohida qiziqish hududlarini (Region of interest–ROI) avtomatik aniqlash va izolyatsiya qilish //Al-Farg'oniy avlodlari. – 2024. – T. 1. – №. 1. – C. 142-146.
10. Qaxramonovna E. Z. PROBLEMS OF FEMALE STUDENTS IN LEARNING PROGRAMMING SUBJECTS //Intent Research Scientific Journal. – 2023. – T. 2. – №. 10. – C. 116-123.
11. O'G'Li A. T. U., Kizi A. D. B. DEVELOPMENT OF ALGORITHMS IN THE ANALYSIS OF DEMAND AND SUPPLY PROCESSES IN ECONOMIC SYSTEMS //Al-Farg'oniy avlodlari. – 2023. – T. 1. – №. 4. – C. 251-256.
12. Abdurasulova D. DEVELOPMENT OF METHODS OF OPTIMIZATION OF PROGRAMS USING COMPLEX ALGORITHMS //Journal of technical research and development. – 2024. – T. 1. – №. 1.
13. Kayumov A., Maxamadjonov N. MOBIL QURILMALAR ISHLAB CHIQISH FANINI O 'QITISHDA SUNIY INTELLEKTNING RO 'LI //Conference on Digital Innovation:" Modern Problems and Solutions". – 2023.
14. Muminjonovich K. A. TO'QIMACHILIK KORXONALARI SALOHIYATINI OSHIRISHNING TASHKILIY-IQTISODIY MEXANIZMLARINI TAKOMILLASHTIRISH //Journal of technical research and development. – 2023. – T. 1. – №. 1. – C. 77-80.
15. Шарибаев Н. Ю., Каюмов А. М. ЧИСЛЕННАЯ ОЦЕНКА ФОРМОСОХРАНЯЮЩИХ СВОЙСТВ ТКАНЕЙ ПОСРЕДСТВОМ АНАЛИЗА

ИЗОБРАЖЕНИЙ //Universum: технические науки. – 2024. – Т. 4. – №. 3 (120). – С. 33-36.

16.Abrorjon X., Asliddin U. HOW TO CREATE SOCIAL MESSENGER PYTHON SOFTWARE FOR STUDENTS //Best Journal of Innovation in Science, Research and Development. – 2024. – Т. 3. – №. 4. – С. 332-341.

17. Abrorjon X., Samandar G. AUTOMATION OF PRIVATE HOSPITAL SYSTEM "HEALTHY" IN C++ //Best Journal of Innovation in Science, Research and Development. – 2024. – Т. 3. – №. 4. – С. 326-331.

18. Alisher o'g'li X. A., Kamoljon o'g'li K. K. PRODUCTION OF A SCHOOL LIBRARY WEBSITE //Miasto Przyszłości. – 2024. – Т. 46. – С. 1005-1009.

19. Kholmatov A. ways to teach programming to non-mathematics students //Journal of technical research and development. – 2023. – Т. 1. – №. 2.

Web of Teachers: Inderscience Research
webofjournals.com/index.php/1