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MOBILE APPLICATIONS FOR PRIMARY SCHOOL STUDENTS' LEARNING IN CRISIS CONDITIONS

Abstract. This paper examines the role of mobile applications in maintaining continuity of primary education during crises, including martial law, pandemics, natural disasters, and disruptions to schooling. Based on international and Ukrainian research, it discusses the potential of mobile learning to support pupils' motivation, engagement, independent learning, and the development of cognitive, creative, and communication skills. Particular attention is paid to accessibility, adaptability, safety, and learning with limited internet access. An illustrative catalogue of 14 educational applications is provided for language learning, reading, mathematics, and computational thinking. The paper highlights the value of carefully selected mobile tools for flexible and resilient primary education.

Keywords: mobile learning; mobile applications; primary education; crisis conditions; continuity of education; educational resilience.

Today, mobile technologies are becoming an integral part of education, particularly for younger learners. During crises, including martial law, pandemics, natural disasters, prolonged power outages, or disruptions to face-to-face schooling, traditional forms of education face substantial constraints: school buildings may be inaccessible, travel may be unsafe, and lesson schedules may be disrupted by air-raid alerts. Under these circumstances, mobile learning is becoming one of the most important means of ensuring continuity of education for primary school pupils, as it makes it possible to adapt educational content to children's circumstances wherever and whenever learning takes place.

Mobile applications on smartphones and tablets considerably broaden opportunities for learning beyond the classroom. They can serve as stand-alone learning tools or provide temporary instructional support (scaffolding), facilitating independent study and preparation for lessons. This flexibility is particularly important during prolonged quarantines or when physical access to schools is restricted. Such platforms can increase pupils' motivation and engagement, facilitate the acquisition of knowledge, and develop collaboration and communication skills, even in distance learning settings.

A review of research by international scholars indicates that app-based mobile learning can substantially improve children's communication and cognitive skills, as well as their motivation. Although some pupils respond positively to this form of learning while others are less receptive, the overall findings confirm the considerable potential of mobile applications in primary education [4].

Studies also show that different types of mobile content affect younger pupils' learning abilities in different ways, including by fostering expressive, creative, and cognitive skills [6]. In primary school English language learning, the design of game-based mobile applications has been found to have a substantial impact on pupil engagement and the effectiveness of language skills practice, promoting the practical acquisition of learning material [5].

Mobile applications also play an important role in developing pupils' social interaction by enabling children to complete tasks collaboratively and interact in the learning environment, although children may differ in how useful they perceive these applications to be [2]. In addition, they provide intellectual support, personalised learning, and opportunities for social interaction,

helping to overcome the limitations of traditional instruction and fostering lasting independent learning skills [3].

Consequently, the international research and education community regards mobile learning as a promising approach to creating a flexible, adaptive, and resilient education system. It supports individualised approaches, adaptation to different learning styles, and autonomous completion of tasks by pupils. Research indicates that mobile technologies foster children's cognitive skills and emotional engagement in learning, even outside school. Importantly, mobile applications can also support blended learning models, in which online activities complement face-to-face lessons and, when attendance at school is not possible, serve as the main source of learning content.

Ukrainian studies show that mobile applications can effectively support primary school pupils' learning, particularly in mathematics, by maintaining educational continuity and adapting to different circumstances [7]. Researchers pay particular attention to learning in crisis situations, when conventional educational processes are temporarily restricted or unavailable. They also emphasise that mobile technologies can enhance pupils' motivation and increase teachers' interest in integrating these tools into teaching and learning [1].

In crisis situations, forced isolation or shifts in family priorities may prevent children from learning regularly. In this context, applications become safe 'bridges' to knowledge: they make it possible to adjust the pace and topics of learning to each child's needs, offering game-based activities, interactive exercises, and immediate feedback. Games and short learning sessions are better suited to the attention spans of children in this age group and help sustain their engagement. Furthermore, mobile applications can incorporate multimedia resources (audio, video, and animation), which are difficult to provide in printed textbooks.

Mobile learning also helps address unequal access to education. During crises, families may be in locations without regular access to schools or the internet. Many educational applications work offline or offer downloadable content. This enables pupils to continue learning where a stable internet connection is unavailable and to maintain their progress in core subjects. Another advantage of mobile tools is their scalability: a single application can reach hundreds or even thousands of children without substantial additional printing or logistical costs.

Thus, in crisis situations, mobile learning is not merely a supplementary tool but a key means of ensuring continuity of education for primary school pupils. It combines several essential characteristics: accessibility—the opportunity to learn anywhere and at any time; adaptability—the adjustment of learning materials to individual needs and learning pace; safety—the protection of personal data and control over content; and effectiveness—support for the development of core competencies and motivation to learn.

To implement mobile learning effectively, teachers need to carefully select educational applications covering the main subjects taught in primary school. These include Ukrainian language and reading, a foreign language (English), mathematics, and integrated courses that help children understand the world around them, including nature, society, and health. Using such applications makes it possible to revise material systematically, consolidate knowledge through practice, and develop digital literacy from an early age.

Table 1 presents an illustrative catalogue of free educational mobile applications for primary school pupils.

In summary, mobile learning is becoming an important means of maintaining educational continuity for primary school pupils in crisis situations. It enables educational content to be tailored to individual needs, offers flexibility in the pace and format of learning, supports pupils' motivation and engagement, and promotes the development of cognitive, creative, and communication skills.

Table 1. Educational mobile applications for primary school pupils

No.	Application	Description	Subjects / learning areas	Link for preview before downloading (Google Play / App Store)
1	Vyvchaiu – ne chekaiu 	A Ukrainian educational application for pupils in grades 1–4: video lessons, interactive games, and practice exercises aligned with the New Ukrainian School (NUS).	Ukrainian language, reading, mathematics, integrated course	https://primary.org.ua/
2	Learning.ua 	Interactive exercises, tests, and educational games in Ukrainian.	Ukrainian language, mathematics, reading	https://learning.ua
3	YOY (ЙОЙ) 	Game-based learning of Ukrainian for younger pupils, particularly children from linguistic minorities.	Ukrainian language	https://www.yoy-app.com/home-engl
4	Read Along by Google 	An application for learning to read, with audio guidance and speech recognition.	Reading, literacy	https://readalong.google
5	Duolingo Kids 	Basic reading and phonics taught through short game-based tasks.	Reading, language development	https://www.duolingo.com/abc
6	Mysheniatkova abetka 	A simple application for learning the Ukrainian alphabet with audio pronunciation.	Ukrainian language (grade 1)	https://play.google.com/store/apps/details?id=com.impulsis.games.mousealphabet.ua&pcampaignid=web_share
7	ScratchJr 	Visual programming for children without text-based code; develops logic and creativity.	Computer science, STEM, thinking skills	https://www.scratchjr.org
8	Lightbot 	A logic-based game introducing basic algorithms and programming concepts.	Computer science, logical thinking	https://lightbot.com
9	PBS Kids Games	A collection of free educational games covering mathematics, language, and understanding the world.	Mathematics, reading, ‘I Explore the World’	https://pbskids.org/games
10	PhotoMath 	A mathematics learning application for self-assessment, with step-by-step explanations.	Mathematics (grades 3–4), self-assessment	https://photomath.com/articles/?category=Math+Explained%3A+Arithmetic

No.	Application	Description	Subjects / learning areas	Link for preview before downloading (Google Play / App Store)
11	TODO Math 	A mathematics learning application (in English).	Mathematics (grades 1–4), logical reasoning tasks	https://play.google.com/store/apps/details?id=com.enuma.todomath&hl=uk
12	Khan Academy Kids 	A game-based application featuring mathematics, reading, phonics, and storybooks (in English).	Mathematics, reading (grades 1–2)	https://www.khanacademy.org/kids
13	Edugames 	A Ukrainian game-based educational application for pupils in grades 1–4 (partly free).	Mathematics, Ukrainian language, alphabet, English, 'I Explore the World'	https://edugames.rozumniki.com/
14	LogicLike 	A Ukrainian game-based educational application for pupils in grades 1–2.	Various exercises developing logical thinking	https://logiclike.com/uk

Mobile applications provide a safe and accessible environment for independent work, the integration of multimedia resources, and interaction with peers, even where access to schools or the internet is limited. Their scalability and adaptability make them a key means of supporting flexible, personalised, and resilient learning in contemporary conditions.

Conclusion. Thus, mobile learning in primary education under crisis conditions not only supplements conventional teaching and learning but can also become its main mode when access to schools is restricted. It combines accessibility, adaptability, safety, and effectiveness; supports individualised learning and the development of children's key learning competencies; and encourages their active participation in education.

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