

# Chapter 9

## Mobile Learning for Emergency Situations: Four Design Cases from Latin America



Daniela Castellanos-Reyes, Enilda Romero-Hall, Lucas Vasconcelos,  
and Belen García

**Abstract** This practitioner-focused chapter addresses mobile learning in the Latin American context during the COVID-19 emergency. To guarantee continuity of education during the COVID-19 pandemic, instructors adopted remote education. Even though much of the remote education relied heavily on computers, millions of learners in Latin America do not have a household computer. Nonetheless, mobile connectivity is very high in Latin America, and therefore, mobile learning has greatly supported institutions during remote education. Mobile learning significantly supports learning at a distance in countries that face infrastructure challenges. Even more in the Latin American context, where mobile devices may be low-cost alternatives to computers. We present four design cases about mobile learning for continuity of education during emergencies. Each design case addresses a different country, audience, and content. The design cases focus on generic technology applications regularly used by practitioners and students. The four design cases are: (1) foreign language learning and social studies to 1st – fourth graders using online blogs in Brazil; (2) teaching STEM to 8th–12th graders through social media (i.e., YouTube/WhatsApp) in Panama; (3) education to 6th–12th graders through social media (i.e., YouTube/WhatsApp/Facebook) in Mexico, and (4) humanities higher

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D. Castellanos-Reyes (✉)  
Purdue University, West Lafayette, IN, USA  
e-mail: [casteld@purdue.edu](mailto:casteld@purdue.edu)

E. Romero-Hall  
University of Tennessee, Knoxville, Knoxville, TN, USA  
e-mail: [eromerohall@ut.edu](mailto:eromerohall@ut.edu)

L. Vasconcelos  
University of South Carolina, Columbia, SC, USA  
e-mail: [limadel@mailbox.sc.edu](mailto:limadel@mailbox.sc.edu)

B. García  
University of Michigan-Dearborn, Dearborn, MI, USA  
e-mail: [beleng@umich.edu](mailto:beleng@umich.edu)

education using instant messaging and cloud-based platforms (i.e., WhatsApp, Google Drive platform) in Colombia. Recommendations for practitioners and policymakers are provided.

## 1 Introduction

To guarantee continuity of education during the pandemic, instructors around the globe adopted Emergency Remote Teaching (ERT) relying mainly on computers (Hodges et al., 2020). Yet, around 826 million learners have no computer at home in Latin America (UNESCO, 2020). Nonetheless, mobile connectivity is high (James, 2012) in comparison to home Internet (Alderete, 2019). Thus, UNESCO and IESALC (2020) recommended Latin American institutions to adopt mobile learning (m-learning) during ERT. Mobile and networked learning are crucial to face infrastructure challenges (Castellanos-Reyes et al., 2021). Even more Latin American where “mobile phones are a more accessible and low-cost substitute for computers” (Romero-Hall, 2021, p. 8).

M-learning is “any form of learning that happens when mediated through mobile devices” (Herrington & Herrington, 2007, n.p.). Tablets and smartphones mediate learning when classrooms and computers are not available. Researchers acknowledged the great potential of m-learning to support learning in the Latin American region (Vázquez Cano & Sevillano-García, 2018). Yet, mobile and networked learning approaches are heterogeneous, reflecting the region’s diversity (Romero-Hall, 2021). Therefore, geographical proximity should not be used to generalize m-learning interventions.

Although we know the potential of m-learning to support ERT in Latin America, we do not know how implementations of m-learning differ by region. Recognizing how different m-learning approaches in response to ERT across different Latin American countries allows us to adopt initiatives in more culturally sensitive ways. This chapter presents four design cases about using m-learning during ERT in Latin America. We focus on generic technology applications used by practitioners (Kimmons, 2020) rather than paid platforms.

## 2 Brazil

Most Brazilian schools opted for ERT due to the COVID-19 pandemic. This design case proposes integrating social studies and foreign language learning, and connecting elementary students from a Brazilian public school with American undergraduate students from a U.S. university using educational blogs and Netbooks during a pandemic. This design case is based on two premises. First, American students have some fluency in Portuguese to interact with Brazilian students or vice-versa. Second,

the Brazilian school offers one-to-one computing as part of the program One Computer per Student (Um Computador por Aluno, UCA) (Rosa et al., 2013). Schools in this program have infrastructure for wireless Internet and offer Netbooks to students.

1. Netbooks are lightweight and affordable mobile devices designed for simple tasks such as writing emails and editing documents. Elementary students used Netbooks to write educational blogs and interact with undergraduate students online.
2. Educational blogs are free online tools to write posts that display in reverse chronological order. Users can comment and react to others' blog posts, which facilitates reflection, promotes collaboration, and fosters writing skills (Vasconcelos & Araújo, 2008). Blogs are suitable for global projects because they allow interactions between geographically separated people.

In this design case, students collaboratively wrote blog posts about cultural topics designated by their teacher. For example, elementary students wrote about and posted drawings of June countryside parties (Festas Juninas). These celebrations observe the harvesting of local produce in Northeast Brazil. American undergraduate students wrote and shared videos about Halloween, a festivity on All Hallows Evening that honors those who passed away. This festivity originates from Celtic harvest feasts. Blog posts about these festivities featured garments, food, music, and typical dance. In another example, students wrote about and shared photos of tourist destinations in their respective hometowns. Once a blog post was online, students in both countries received reflection prompts to guide their online interactions. They used the comment feature to react to each other's posts, compare their cultures, and exchange further information about their backgrounds.

Outcomes of this project were beyond social studies and foreign language learning. The blog post assignments provided students with a real sense of authentic learning as they applied knowledge and skills to create content for a target audience. Elementary students developed writing and digital literacy skills as they produced multimodal content to post online. American students developed an understanding of multicultural and culturally-sensitive teaching in elementary grades. Furthermore, younger Brazilian students took older American students as role models, which led to questions and aspirations about going to college. In turn, American students created developmentally-appropriate ways to interact with younger students.

This was a promising initiative to promote m-learning during a pandemic. Yet, challenges arise for large scale implementation. Specifically, most Brazilian public schools lack the infrastructure and resources to allow m-learning. During the pandemic, 48% of elementary schools in the municipal network reported challenges in offering Internet access, leaving five million children and teenagers out of school (UNESCO, 2021). Additional government funding is needed to prepare public schools for technology-driven instruction in emergency situations.

### 3 Panama

The Ministry of Education canceled all classes in March, 2020 in Panama. Classes resumed virtually in July 2020 in public schools with curricular support from Internet sources, educational radio and television, and paper handouts distributed by the schools. School administrators and teachers strive to (a) establish technology hubs, (b) develop digital guides and assessments, (c) provide professional development for instructors and staff, and (d) establish protocols to incorporate students and parents to ERT. Yet, only 40% of learners in the public school system have access to the Internet (Svenson, 2021). School administrators, teachers, and educational foundations provided m-learning experiences based on student's available resources to reach eighth to 12th graders in public schools during school closures.

1. WhatsApp: For some secondary students, m-learning experiences included communicating with teachers using WhatsApp. WhatsApp is a very popular application for cellphones and tablets users in Panama. Teachers used WhatsApp as a supplement to online school portals or as the main method of communication and document exchange with students and parents when schools lacked online platforms. WhatsApp group chats for learners in a specific course or learners' parents are very common in Panama.
2. YouTube: The non-profit organization Ayudinga! (2021) Taught and posted an online STEM (Science, Technology, Education, and Mathematics) curriculum via the Ayudinga! YouTube channel to support learners, teachers, and parents.
3. Educa Panama: The Ministry of Education created the online portal Educa Panama to aid schools, parents, and teachers providing academic and cultural activities (Ministerio de Educación, 2021). The learning management system Moodle hosts the Educa Panama portal which is free to all learners enrolled in public schools. During the COVID-19 pandemic, the Panamanian government created STEM content for teachers to use in remote and online instruction.
4. SerTV Live Stream: The Panamanian government sponsored educational radio and television programming to support K-12 curriculum. The educational programming is available live on weekdays during school hours via the SerTV live signal. Recordings of each class are available after the live stream. The educational programming is geared towards elementary education; but, some sessions are dedicated to 6th–12th STEM curriculum.

Due to the lack of household computers, online resources have been deployed for access via mobile devices. Internet access via mobile devices is an essential tool for K-12 students. Unfortunately, Internet access via mobile service is available to only 38% of the country (Molina Alarco, 2020). Also, Panamanians access the Internet via mobile devices using “prepaid plans with limited minutes that are insufficient for browsing or using the learning platforms and other channels put in place for educational continuity” (ECLAC-UNESCO, 2020, p. 6). Thus, unequal access to learning during the COVID-19 pandemic has widened pre-existing gaps in

information and knowledge access (ECLAC-UNESCO, 2020). Despite all these disparities, m-learning provides opportunities for those who can afford it.

## 4 Mexico

After the first COVID19 case was reported in February 2020, K-12 classes were suspended for four weeks to plan how to deliver instruction to all students in Mexico. The Secretary of Public Education (SEP) launched the program “Learn at Home” which delivered video content to millions of K-12 students through television, YouTube, and Facebook live. Lessons were also broadcasted over radio stations to make them accessible to students who did not have Internet or television access at home. Enormous challenges arose when K-12 schools started ERT, such as: lack of student access to technology and educational resources, sometimes lack of parental support, and lack of teacher training on remote learning practices.

The pandemic widened the digital gap among students from different socioeconomic status and between urban and rural communities. About 50% of the population in urban areas have access to an Internet connection at home, but the percentage is much lower in rural areas or among the population living in poverty. Furthermore, there is a high number of students who live in poverty whose parents have limited literacy skills. These students are at a higher risk of falling behind in normal conditions, but when Covid19 started they did not have adequate resources to succeed academically. After schools closed, more than one million rural students were left without teachers, and adequate learning opportunities. In poor communities, neighbors organized open learning communities to share resources and tutor each other.

Between Spring and Summer of 2020, SEP provided emergency training for teachers to acquire remote learning skills through webinars, crash courses, and Massive Open Online Courses (MOOCs). K-12 teachers adopted the following tools that students could access using mobile devices:

1. Zoom: Teachers used Zoom to deliver synchronous lessons to keep continue building a learning community (Joia & Lorenzo, 2021). Zoom was used mostly with students who had reliable internet and to record videos that students could watch asynchronously.
2. YouTube: SEP created the “Learn at Home” channel to deliver video content during school closures. These video lectures were also broadcasted in several television channels to support students without internet (Aprende en Casa, SEP, n.d.). These videos are also available in SEP website.
3. Facebook Groups: Teachers created Facebook groups to communicate with students and parents. Facebook groups were used as repositories of lecture videos and instructional materials. In addition, Facebook allowed teachers to build a community of learners through asynchronous discussions.
4. WhatsApp: Teachers used this app to communicate with students and parents via text. Yet, teachers also answered students’ questions through voice or video calls.

Furthermore, WhatsApp was used to collect pictures of student work (Blanchard et al., 2021).

Mexico's educational system could be improved to react to future emergency situations, but also to reach all students in normal conditions. There is a need to continue training teachers to acquire digital skills and digital education pedagogies for optimal utilization of resources.

## 5 Colombia

ERT instruction in Colombia started in March, 2020 in higher education. Some universities stopped for one week to prepare instructors for the transition (Blu Radio, 2020). Other universities made the change overnight. Yet, instructors received many invitations to webinars about tools available for supporting ERT. These webinars addressed multiple software (e.g., Zoom, Teams, Google Meet) rather than making in-depth demonstrations of only one. Despite institutional efforts to inform instructors about many applications, they preferred to use already familiar platforms. The pressure to support students influenced instructors' decisions to adhere to familiar tools rather than venture to new ones. Mainly because instructors wanted to provide students with some degree of stability to face the uncertainty of ERT. Their decision led them to rediscover tools that they had long used in in-person instruction but did not know how to adapt to ERT. The following are some of m-Learning tools that instructors used:

1. Google Workspace: Colombia instructors and college students already used Google Drive as cloud service. Yet, as a result of the pandemic they discovered that the Google Workspace platform offers other free services from videoconferencing (i.e., Google Meet) to online classroom platforms (i.e., Google Classrooms) that facilitated ERT.
2. Kahoot: Instructors guided course design decisions based on students' suggestions and word of mouth advice. For example, informal conversations about not knowing how to implement quiz-like activities in ERT prompted students to suggest applications like Kahoot.
3. WhatsApp: Like in previous design cases, it became a mobile file repository and a teamwork collaboration tool. Furthermore, WhatsApp became an easier communication tool between instructors and university staff taking a greater role than emails. However, instructors and students experienced technology fatigue due to "constant connectivity" (UNESCO & IESALC, 2021, p. 12). Therefore, minimizing time online and setting communication boundaries is a must.
4. Video Conferencing Platforms: Home Internet access in Colombia is out of reach for many, but that is not the case with mobile phones. Home connectivity issues drove learners to use laptops for screen sharing and video but mobile phones for audio. Furthermore, applications like Teams and Zoom worked smoothly on mobile devices but needed additional passwords and frequent

updates in computers. Adding extra steps to an already stressful situation favored mobile devices for synchronous classroom sessions rather than laptops and desktops.

Instructors recommended asking students about their expectations from ERT before making decisions. Negotiating expectations humanize interactions rather than over-focusing on “must-know” software. Also, instructors should master one platform rather than familiarizing with a handful of them to avoid tech overload. Mastering one platform could reduce technostress and increase confidence with technology (Gañán Moreno et al., 2020). Furthermore, instructors suffered from anxiety about cheating behaviors and students experienced connectivity issues during exams. Therefore, rethinking assessment is crucial to face another crisis, for instance, by adapting project-based assessment (Sambell et al., 2013).

The COVID-19 pandemic aggravated other aspects of higher education. For instance, mother instructors who reported longer working hours during the pandemic, some of them are had their abilities to work limited due to their responsibilities as heads of households and increased workload at home (Gutiérrez et al., 2020). Finally, while surviving the crisis, Colombia faced a historic social upheaval with a national strike lasting over months. ERT allowed education to continue even with the national strike. Those who wanted to engage in demonstrations perceived that having the classroom within hand’s reach prevented them from practicing their civic rights. The ubiquity of m-learning forced participants to decide between classroom assignments and political participation.

## 6 Discussion and Conclusion

The World Bank (2021) reported the Covid-19 pandemic as the most significant shock of the education system. Especially in Latin America, where school closures might increase the number of children who do not reach the minimum proficiency levels in the PISA test scores by 16%. Furthermore, The World Bank (2021) estimated that only 33% of counties are implementing measures to improve access to infrastructure to students at risk of being excluded from ERT. Furthermore, the effects of the pandemic go beyond numbers. College students reported experiencing pedagogical distress due to faculty’s lack of digital competencies (UNESCO & IESALC, 2021). Yet, although efforts to implement guidelines for school openings are higher in elementary and secondary education, higher education still requires more significant input from all stakeholders.

Our design cases concur with international reports in that stakeholders must act promptly to protect the future of students in the Latin American region in three main points: (1) increasing budget for infrastructure, (2) creating institutional guidelines and policies, and (3) providing professional development for instructors. Improving the Internet infrastructure and access to m-learning devices to students is crucial, especially for rural or impoverished areas. Furthermore, governmental guidelines



for ERT are scant. Creating policies and action plans is vital to address future crises. These guidelines need input from all stakeholders, primarily the learners. As suggested in the Colombian design case, it is critical to ask learners about their expectations and fears about ERT.

A lack of professionals trained to teach at a distance is not a trend exclusive to Latin America. Instructors and administrators need professional development on technology integration to adequately respond to ERT in the future. The intervention in Brazil included training for both instructors and learners on the basic functions of mobile Netbooks. Furthermore, as stated by Kimmons (2020), institutions should aim to adopt generic technology applications. We observed across cases that WhatsApp and YouTube were widely used across countries. On the one hand, WhatsApp was leveraged as communication system between instructors and students, and instructors and parents. Furthermore, WhatsApp also became a file sharing platform and document repository. However, instructors were at risk of fatigue due to an overload messages and issues at establishing boundaries in communication. On the other hand, YouTube was used largely by governments and non-profit organizations to provide curriculum support for teachers to leverage in class.

In Mexico, educational institutions implemented MOOCs to support teacher education; however, further support is needed for those who lack basic digital literacy skills. Finally, training based on distance education theory was absent. We speculate that the time pressure faced favored an overfocus on software instead of pedagogy. We recommend institutions adopt comprehensive and efficient models like the Community of Inquiry framework which has been widely implemented in the distance and online learning field (Castellanos-Reyes, 2020).

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## References

- Alderete, M. V. (2019). Broadband adoption in Latin American countries: does geographic proximity matter? *Problemas Del Desarrollo. Revista Latinoamericana de Economía*, 50(198), 31–56. <https://doi.org/10.22201/iiiec.20078951e.2019.198.67411>
- Aprende en Casa, SEP. (n.d.). Home [YouTube channel]. <https://www.youtube.com/channel/UCk-PjGg2A6lN6aGC2jdxQrw>
- Ayudinga! (2021). *¿Quiénes Somos?*. Ayudinga!. <https://ayudinga.org/quienes-somos/>
- Blanchard, K. P., Fregoso-Urrutia, D. J., & Guevara, J. C. A. (2021). Engaging rural communities in Mexico: Educating youth and their families during a pandemic. *Childhood Education*, 97(3), 22–31.
- BluRadio(2020). Las universidades en Bogotá que suspendieron clases por el coronavirus. <https://www.bluradio.com/salud/las-universidades-en-bogota-que-suspendieron-clases-por-el-coronavirus>
- Castellanos-Reyes, D. (2020). 20 years of the Community of Inquiry framework. *TechTrends*. <https://doi.org/10.1007/s11528-020-00491-7>



- Castellanos-Reyes, D., Maeda, Y., & Richardson, J. C. (2021). The relationship between social network sites and perceived learning and satisfaction: A systematic review and meta-analysis. [book chapter]. In M. Griffin & C. Zinskie (Eds.), *Social Media: Influences on Education*. Information Age Publishing.
- ECLAC-UNESCO (2020). *Education in the time of COVID-19*. United Nations. [https://repositorio.cepal.org/bitstream/handle/11362/45905/1/S2000509\\_en.pdf](https://repositorio.cepal.org/bitstream/handle/11362/45905/1/S2000509_en.pdf)
- Gañán Moreno, A., Correa Perez, J. J., Ochoa Dique, S. A., & Orejuela Gómez, J. J. (2020). *Tecnoestrés laboral derivado de la virtualidad obligatoria pro prevención del COVID-19 en docentes universitarios de Medellín (Colombia)* (pp. 1–23). Trabajo (En)Cena. <https://doi.org/10.20873/2526-1487e021003>
- Gutiérrez, D., Martin, G., & Ñopo, H. (2020). The Coronavirus and the challenges for women's work in Latin America. *UNDP Latin America and the Caribbean, 18*, 142–166.
- Herrington, A., & Herrington, J. (2007). *Authentic mobile learning in higher education*. [Conference session]. Australian Association for Research in Education.
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *EDUCASE Review*. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- James, J. (2012). *The impact of mobile phones on poverty and inequality in developing countries*. <https://doi.org/10.1057/jit.2012.21>.
- Joia, L. A., & Lorenzo, M. (2021). Zoom in, zoom out: The impact of the COVID-19 pandemic in the classroom. *Sustainability, 13*(5), 2531.
- Kimmons, R. (2020). Current trends (and missing links) in educational technology research and practice. *TechTrends, 64*(6), 803–809. <https://doi.org/10.1007/s11528-020-00549-6>
- Ministerio de Educación. (2021). *¿Que es Educa Panama?* Mi Portal Educativo. <http://www.educapanama.edu.pa/?q=que-es-educa-panama>
- Molina Alarco, D. (2020). *Online classes, offline student: A pandemic of inequality in Panama*. El Faro. <https://elfaro.net/en/202009/internacionales/24779/Online-Classes-Offline-Students—A-Pandemic-of-Inequality-in-Panama.htm>
- Romero-Hall, E. (2021). Current initiatives, barriers, and opportunities for networked learning in Latin America. *Educational Technology Research and Development, (0123456789)*. <https://doi.org/10.1007/s11423-021-09965-8>.
- Rosa, V., Coutinho, C., Coelho Da Silva, J. L., Souza, C., & Rosa, S. (2013). Programa Um Computador por Aluno no Brasil. In M. J. Gomes, A. Osório, A. Ramos, B. Silva, & L. Valente (Eds.), *Challenges 2013: Aprender a qualquer hora e em qualquer lugar, learning anytime anywhere. Atas da VIII Conferência Internacional de TIC na Educação* (pp. 61–71). Centro de Competência TIC do Instituto de Educação da Universidade do Minho.
- Sambell, K., McDowell, L., & Montgomery, C. (2013). *Assessment for learning in higher education*. Routledge. <https://ebookcentral.proquest.com>
- Svenson, N. (2021). *Panama, el país con mas tiempo sin aulas del mundo*. Agenda Publica. <https://agendapublica.es/panama-el-pais-con-mas-tiempo-sin-aulas-del-mundo/>
- The World Bank. (2021). *Acting now to protect the human capital of our children*. <https://doi.org/10.1596/35276>.
- UNESCO. (2021). *Enfrentamento da cultura do fracasso escolar*. <https://www.unicef.org/brazil/media/12566/file/enfrentamento-da-cultura-do-fracasso-escolar.pdf>
- UNESCO & IESALC. (2020). *COVID-19 and higher education: Today and tomorrow. Impact analysis, policy responses and recommendations*. <https://bit.ly/34TOSvu>
- UNESCO & IESALC. (2021). *Closing now to reopen better tomorrow? Pedagogical continuity in Latin American Universities during the pandemic*. [https://www.iesalc.unesco.org/wp-content/uploads/2021/07/Closing-now-to-reopen-better-tomorrow-FINAL\\_EN.pdf](https://www.iesalc.unesco.org/wp-content/uploads/2021/07/Closing-now-to-reopen-better-tomorrow-FINAL_EN.pdf)
- United Nations Educational Scientific and Cultural Organization. (2020). *Startling digital divides in distance learning emerge*. UNESCO.

- Vasconcelos, L., & Araújo, J. (2008). Using educational blogs to foster authorship in academic writing. In J. Araújo, L. Almeida, M. Rodrigues, & M. Dieb (Eds.), *Proceedings of the I Colloquium about Hypertext (CHIP): Literacies on web*. Hiperged.
- Vázquez Cano, E., & Sevillano-García, M. L. (2018). Ubiquitous educational use of mobile digital devices. A general and comparative study in Spanish and Latin America Higher Education. *Journal of New Approaches in Educational Research*, 7(2), 105–115. <https://doi.org/10.7821/naer.2018.7.308>

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