

Chapter 9

Smartphone and STEM

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ABSTRACT

Covid-19 has also had a significant impact on schools, the use of distance learning has raised questions already present, in particular with respect to the meaning of tools and technologies. Leaving aside the aspects related to the use of the network and those of communication, the authors want to provide a brief overview of the fundamental issues related to the use of a smartphone for STEM teaching. A theme that sees two opposing positions (pros and cons) colliding, often unavailable for discussion and dialogue. Without taking a position, the text tackles the problem from three points of view: the hardware, the apps, and some possible activities that can be associated with the main functions activated by the students.

INTRODUCTION

The devastating COVID-19 pandemic and the consequent need to resort to Distance Learning (DAD in Italian) has forced students, teachers, and families to confront a largely unknown terrain. An educational path mediated by digital tools and the Internet requires appropriate devices, access to fast connections, and digital skills. However, it is essential to consider not only the effects that a given technology might have on the nature and quality of student learning but also the practices of teachers (Legrottaglie & Ligorio, 2014; Sinclair & Robutti, 2020).

When we ask ourselves which interdisciplinary approach to take and how to facilitate STEM learning, we should refer to the devices used, particularly smartphones. It is not trivial to say that it is an instrument considered almost an extension of the body. It is no coincidence that the term nomophobia has been coined to indicate

DOI: 10.4018/978-1-6684-5939-3.ch009

the “addiction” to smartphones (Cheever, et al., 2018; Mahapatra, 2019; Wai Than & Pyae Wai Shan, 2021). There are many reflections (Crescenza, 2020; Criollo, et al., 2021; Garavaglia & Petti, 2020; Keough, 2021; Celestino, et al., 2020), research on this topic (González & Muñoz, 2020; Orben & Przybylski, 2019; Park & Kaye, 2019; Rodríguez-García, et al., 2020) and literature reviews (Busch & McCarthy, 2021; Fadda & Vivanet, 2021; Jahnke & Liebscher, 2020). Of particular significance are investigations to determine the relationship between Internet addiction, social media use disorders, and student smartphone addictions (Ramazanoglu, 2020).

Would smartphones (and tablets) be “harmful” to learning? Opinions, as often happens, are divergent. According to TIMSS (Trends in International Mathematics and Science Study), those who use mobile devices for a long time have worse results in science subjects; this seems to confirm the result of several surveys (Bravo-Sánchez, et al., 2021; Felisoni & Godoi, 2018; Lepp, et al., 2015). According to other experts, this is untrue if we focus on school performance (Kay, 2018; Abbasi, et al., 2021; Da Pra, 2021).

The prohibition or use of mobile phones depends on the same subjects involved in the education of young people: parents, teachers, and students themselves, and we must think of a pedagogy oriented to the search for guided knowledge (Cervantes-González & López, 2020).

It is, therefore, worth considering the smartphone as a teaching tool (Subramanya & Farahani, 2012). Research is particularly useful (Fowler & Stickney, 2020). The latter authors examined twenty-three applications that can be used to provide instruction with the smartphone (M-learning). They classified them into six categories: audience participation, presentation, collaboration, evaluation, news aggregators or curated content, and augmented reality.

Unfortunately, it should be emphasized that institutions have difficulty addressing these issues without falling into automatic biased approaches. Many institutions refer to numerous studies claiming that the more time a student spends on digital media, the worse his or her academic performance will be by damaging physical, emotional, mental, and social development. Many countries have taken these criticisms very seriously. In Australia, policies on the use of smartphones in the classroom may vary from school to school; some schools may allow their use for educational purposes, while others may ban them during classes. In the United Kingdom, use is generally left to the decisions of individual schools, but the percentage of those banning smartphones has risen sharply. Even in the United States, policies on smartphone use in the classroom are determined at the school district or individual school level. In China, phone use in school is often banned. In France, the use of phones in primary and middle schools has been banned since 2018. In Italy, the ban on the use of cell phones during classes has been in place since 2007. It has never been lifted even

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