Chapter 6

Learning in the Laboratory: Accessing Videos With Quick Response Codes

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ABSTRACT

Using QR codes to access videos in engineering laboratory classes might be a successful way of building a bridge from concrete to digital content. With QR codes placed on an apparatus, students know exactly which video to watch, allowing them to view the videos while performing the experiment or at home when writing the report. Low-cost videos do not require expensive equipment and software, and keeping them short assures a minimum download time for use with smartphones and tablets. The aim of this chapter is to evaluate the importance undergraduate engineering students attribute to these videos and their reaction to the possibility of accessing them with QR codes scanned by a smartphone or a tablet, using access statistics and video viewings to support the findings. Results show students attributed some importance to the videos, and that the QR codes are very helpful as means to quickly and easily access the videos.

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INTRODUCTION

The aim of this chapter is to report the findings of research that evaluates the importance students attribute to low-cost, educational, short videos that explain the operating procedure of laboratory apparatuses and the students’ reaction to the possibility of accessing videos with QR codes by using a smartphone or a tablet. For a better understanding and support of the results, access statistics and video viewings will also be used.

The rest of this chapter is structured as follows. Following this introduction, the second and third sections address the state of the art regarding the use of videos and QR codes in higher education. In the fourth section, solutions and recommendations are described and presented, namely the case study, the methods used in this research and the results. The final section presents a discussion of results and conclusions.

Background

Active learning in engineering is impossible without laboratories, and the recognition of their importance by engineering teachers dates back to 1980 (Fishenden & Markland, 2006). From the earliest days of engineering education, instructional laboratories have been an essential part of study programs (Feisel & Rosa, 2005; Pandermarakis, Sotiropoulou, Passa, & Mitsopoulos, 2012; Surgenor & Firth, 2011). This is expected because the overall goal of engineering education is the preparation of students to practice engineering and because students’ understanding of a domain can be enhanced when they engage in laboratory experiments (Litzinger, Lattuca, Hadgraft, & Newstetter, 2011). In addition, many studies have emphasized the role of laboratory education in students’ motivation, which is particularly important considering ‘the continuous drop in student numbers taking engineering and science courses’ (Abdulwahed, Nagy, & Blanchard, 2008, p. 2).

Krivickas and Krivickas (2007) argue that engineering education is inconceivable without laboratory instruction, but the modernised laboratory presents a challenge to the academic staff in developing new and more effective instruction and facing the ‘many disadvantages such as constraints on time, resources, maintenance, expensive equipment, and safety hazards’ (Abdulwahed et al., 2008, p. 2).

Undoubtedly, the massification of higher education is a challenge as laboratories requiring human and material resources depend directly on the number of students. But if, as Feisel and Rosa (2005) mention, this works against a quality laboratory experience, the introduction of Information and Communications Technology (ICT) works for it.

The broad use of ICT, which can be seen as an obstacle to conventional hands-on classes in the laboratory, really is an opportunity because almost every student has the
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