

## Chapter 20

# Teaching Statistics and Operations Research Online: Experiences at the Open University of Catalonia

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### EXECUTIVE SUMMARY

*This chapter presents a case study of online teaching in Statistics and Operations Research (OR) at the Open University of Catalonia (UOC). UOC is a purely online university with headquarters in Barcelona, Spain, with students from many countries. As common to most math-related knowledge areas, teaching and learning Statistics and OR present difficult challenges in traditional higher education. These issues are exacerbated in online environments where face-to-face interactions between students and instructors as well as among students themselves are limited or non-existent. Despite these difficulties, as evidenced in the global growth of online course offerings, Web-based instruction offers comparative benefits*

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*to traditional face-to-face instruction. While there exists a plethora of literature covering experiences and best practices in traditional face-to-face instruction in mathematics, there is a lack of research describing long-term successful experiences in Statistics and OR online courses. Based on the authors' experiences during the last decade, this chapter aims to share some insights on how to design and develop successful online courses in these knowledge areas.*

## **INTRODUCTION**

Information Technologies are changing the way in which higher education is delivered in developed countries. In the last decade, the use of instructional technologies has experienced steady growth in universities around the world (Ex: learning management systems for individual and collaborative learning, Internet-based academic resources, online repositories and databases, specific software for some knowledge areas, groupware and social networking software...). With the spread of these technologies, new pure-online universities have emerged and traditional face-to-face universities worldwide are witnessing transformations that affect the nature of the courses and degree programs they offer. These technological innovations have also driven the growth of distance learning and related teaching opportunities. On the one hand, students who are time constrained due to job or travel difficulties, or place constrained due to geographic location or physical disabilities are now able to access courses and degree programs at their convenience (Simonson et al., 2003). On the other hand, students and professors from one university can participate as learners or teachers, respectively, in online courses offered at other universities. This dynamic thus promotes virtual mobility and knowledge sharing among distant universities.

With the rapid growth of distance and global education, e-learning models are currently practiced widely all over the world (Nagy, 2005; Allen & Seaman, 2008). Current instructional technologies facilitate the shifting from a traditional educational paradigm centered on the "masterful instructor" to an emergent educational paradigm

that considers students as active and central actors in their learning process. In this new paradigm, student learning outcomes are achieved with the help of instructors, technology and other students. The instructor's primary role shifts from one of knowledge transmission to learning facilitator and specialist responsible for course design, guidance and supervision. In Europe, for instance, this paradigm shift is officially promoted by the Bologna declaration and the subsequent development of a European Area of Higher Education which aims to increase the international competitiveness and employability of European citizens (Van der Wende, 2000).

Regarding the areas of Statistics and Operations Research (OR), educational reforms are widespread both in pure-online and face-to-face education. For example, many instructors are being encouraged to try new teaching strategies based on online support, inter-disciplinary collaborative learning, and integration of statistical and OR software in their courses (Hardin & Ellington, 2005; Leon et al., 2006; Faulin et al., 2009). University departments worldwide have also begun working on new, engaging curricula that promotes conceptual understanding versus simple procedural knowledge. The goal is to increase student's abilities to solve important real-life problems in different market sectors including solutions that yield improved efficiencies (Camm, 2007). Of course, this task is not easy and numerous challenges must be confronted. Some of these challenges are due to the intrinsic nature of the so called "Internet-generation" student while others are due to the intrinsic nature of Statistical and OR content (Leon et al., 2008).

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