Chapter 10
Creativity Development Through Inquiry-Based Learning in Biomedical Sciences

Gemma Rodríguez
Universitat Pompeu Fabra, Spain

Josep-Eladi Baños
Universitat Pompeu Fabra, Spain

Mar Carrió
Universitat Pompeu Fabra, Spain

ABSTRACT

The increasing complexity of biomedical research has led to new models for collaborative research at large scale. Big science projects require multidisciplinary teams and skills, such as creativity, to foster innovation. Higher education can play an important role in fostering creativity with active-learning strategies, such as the Inquiry-Based Learning (IBL) approach. In this chapter, we explain how the Universitat Pompeu Fabra (UPF) in Barcelona, Spain, used IBL to bring medicine and human biology students together to find creative solutions to solve a challenging problem in biomedicine. In this interprofessional experience, students were taught creative techniques in a creativity workshop. The positive results, which were highlighted by external evaluators for their high quality, demonstrate the value of these collaborative projects in encouraging creativity. We propose that integrating the IBL pedagogical methodology with creative techniques and interprofessionalism is a valuable approach for fostering students' creativity and generative and research skills.

INTRODUCTION

During the late 20th and 21st centuries, science has experienced a revolution that has had massive impact on human development and in our everyday lives. This scientific revolution has also influenced society's own vision of science: people tend to identify successful science with scientists who have a deep knowledge of a discipline and mastery of the scientific method (Nature Editorial, 2015). Actually, this is not completely true. There are other important requirements to match such success, such as the

DOI: 10.4018/978-1-5225-3158-6.ch010

ability to think critically and to solve problems collaboratively, as well as good communication skills. Furthermore, more skills are required in this age of information. This climate of change and innovative creativity has been valued as one of the main 21st century skills (Tan et al., 2009).

With globalization, the increasing complexity of biomedical research has led to new models for collaborative research at a large scale (Esparza & Yamada, 2007). Science has become a driver of innovation, and academic research has participated in large, expensive and collaborative big science projects, which are characterized by international multidisciplinary teams of scientists and experts (Vermeulen, 2010). This phenomenon, known as Big Science, is not a recent development: the nuclear physicist Alving Weinberg coined this term to describe the Manhattan Project, which developed the atomic bomb. This was not the only example of Big Science in history: another big biomedicine project and the prototype of big biology has been the Human Genome Project (HGP), in which Big Science and "Little" Science - that is, science performed on a smaller scale and usually carried out in small teams - joined forces. In these kind of projects, creativity of individual investigators is complemented with collaborative partnership and interprofessionalism, in which members of different domains work collaboratively towards a common purpose: to make discoveries that impact knowledge, future education and health care (Oandasan & Reeves, 2009). Investigators' creativity can be augmented by a more targeted and collaborative plan and fostered by group thinking (Esparza & Yamada, 2007). Big Science can be an important way to harness the creativity of researchers, enhance innovation and supply resources to solve urgent health problems (Esparza and Yamada, 2007). Big biomedicine represents a new way of solving problems with the collaboration of Little Science approaches, to foster problem-solvers, collaboration, scientific creativity, discovery and innovation.

Creativity is an integral and intrinsic property of science and the scientific process. Scientists are constantly challenged to extend knowledge as new experts, and to combine seemingly unrelated information to create a new knowledge (Barrow, 2010). However, some circumstances have led to a phenomenon called incremental science, in which some scientists prefer to develop ideas that are based only on existing or similar products, rather than providing a source for innovation or new paradigms (Epstein, 2013).

The development of repetitive scientific inquiries and a lack of creativity in this domain is a reality that might have been influenced by traditional learning. It is known that nowadays students are expected to absorb more and more information (Adams *et al*., 2009). Lecture-based learning has been the predominant mode of instruction since universities were founded in Western Europe over 900 years ago (Brockliss, 1996), despite ample evidence that many students gain little new knowledge from traditional lectures (Hrepic *et al*., 2007). Moreover, it is well documented that these methods engender passive learning rather than active engagement, boredom rather than intellectual excitement, and linear thinking rather than cognitive flexibility (e.g., Halpern & Hakel, 2003; Nelson, 2008; Perkins & Wieman, 2008). Thus, students have little opportunity to develop generative skills such as problem solving, creative thinking, motivation, or persistence, which are all essential skills for thinking like creative scientists (Nature Editorial, 2015).

BACKGROUND

What Kind of Creativity Can Be Trained in University?

Most people identify creativity as the ability of individuals to generate novel ideas; nevertheless, creativity is much more than that. The concept of creativity, over the years, has proven to be elusive to define.