

Chapter 12

Students' Questioning and Creativity: How are These Related?

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ABSTRACT

University students must develop several higher-order skills along their higher education route. One of these fundamental skills is creativity. The practice of questioning is one of the modes to enhance creativity. In this paper, the authors illustrate how students' approaches to creativity can be linked to the types of questions they ask in Higher Education. Several teaching and learning strategies were implemented in a geology course and a chemistry course, at the University of Aveiro, Portugal, as a way of promoting students' questioning competence. The relationship between the kinds of questions asked and the students' approaches to creativity is analysed and discussed.

1. INTRODUCTION

Is it possible to organise life in schools and class-rooms in such a way that young people not only have the opportunity to express their creativity, but systematically become more creative? (Claxton et al., 2006, p. 57)

Presently, universities are expected to develop student degree of deep, conceptual, and integrated learning (The Quality Assurance Agency, 2007). This kind of learning involves being creative, and the context of our research, of asking quality questions. Force (2000) sees the process of question-generating and, in particular, the design

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and use of higher-level questions as exercises in the improvement of creative skills: “*to enhance creativity, we must develop and maintain an attitude of creative questioning*” (p. 1).

Carin and Sund (1985) also demonstrated that students reach significantly higher levels of thinking when they are encouraged to develop skills in generating creative questions and when they are provided opportunities for dialogue with peers about the questions raised.

We perceive creative thinking to require an obvious tendency to ask questions. Actually, in our view, one of the most important indicators of creativity, along with experimenting, thoughtfulness, attentiveness, environment-setting and resilience (Claxton *et al.*, 2006), is the capacity to question, leading in sequence to a deep approach to learning. Thus, in this paper, we intend to investigate the kind of questions university students ask, as indicators and consequences of creativity. In particular, we propose to:

- Describe teaching and learning strategies used to foster students' creative thinking.
- Identify and characterise the different types of questions students ask during their learning.
- Characterise and map students' approaches to creativity.
- Discuss the relationship between students' questions and students' approaches to creativity.

This paper starts by exploring the role of students' questioning in the development of higher-order thinking skills, such as creativity (Ten Dam & Volman, 2004; Zoller & Pushkin, 2007), followed by a discussion on how to develop students' questioning in higher education. The study presented in this paper was developed with first-year Chemistry students in Science and Engineering courses, and Geological Engineering master students, at the University of Aveiro,

in Portugal. This study intends at contributing to the development of pedagogical models that promote student-focused approaches, stimulating university students to become active participants in their learning process, and teachers to act as promoters of innovative teaching strategies.

2. THEORETICAL FOUNDATIONS

2.1. Approaches to Creativity

Contemporary society is characterised by fast and complex change processes (Barnett, 2000) covering all spheres of life. According to the Report on the EUA Creativity Project (2007), creativity has been identified both as a key factor to adequately addressing the challenges caused by these changes as well as a major driving force towards knowledge creation.

When approaching creativity our first difficulty is to define it: *what is creativity?* The literature on creativity proposes that the term may vary considerably and seem to depend to a high degree on the contexts in which the topic is discussed. Even if there may be no single, “one-size-fits-all” definition of creativity, there seems to be a common agreement amongst creativity researchers that creativity involves a mental process as well as an outcome of that process. It is important to emphasise that creative ideas do not always lead to creative results, so this aspect should be considered in particular. In the same line of thought, creative results are not always based on creative processes.

In 1990, Osche stated that creativity involves

Bringing something into being that is original (new, unusual, novel, unexpected) and also valuable (useful, good, adaptive, appropriate) (Osche, 1990, p. 2).

This definition is still applicable, according to Kleiman (2008, p. 209), “*creativity involves*

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