The challenge of being a mathematics teacher

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One of the things that teachers at the university level have to learn by experience is how to adapt their lectures and classroom activities depending on their intended audience. For instance, it is understood that teaching mathematics to mathematicians is different than teaching them to pre-service elementary school teachers. However, how to carry out this adaptation or what exactly should be changed is not often discussed. On the basis of my personal experience in the matter, here we use the Atherton model to reflect about my own practice and try to extract some conclusions about the difficulties of the above-mentioned adaptation.

Keywords: teaching at university level, reflective practice model, Atherton model.

INTRODUCTION

There are many challenges that young researchers face when they finish their Ph.D. and want to embark on a career as teachers at the university level. Firstly, doctoral students often receive no mentoring on how to teach. Indeed, most Spanish universities do not have induction or mentoring programs at this level. Secondly, most young teachers have temporary jobs in different universities for the first years before acquiring a permanent job. This impacts negatively on their training as teachers. Moreover, as Zucker (1996) points out, student evaluations are important to keeping a position and being promoted. He states that young assistant professors sometimes put getting good ratings above all, even if that means lowering the level of what they teach. Zucker speaks of his first years of teaching experience, in which he determined that a fundamental problem that many teachers face is that most high school students graduate without knowing how to learn, something that may be remedied by proper orientation at the beginning of the students' first university year.

Finally, mathematics university teachers face another challenge: a widely diverse array of students, from future scientists or engineers to elementary school teachers.

In this context, I try to answer the following question: How do young teachers adapt the content of their classes and their teaching style to the intended audience, beyond following the syllabus and general advice given by colleagues?

THEORETICAL FRAMEWORK

Schön (1983) and Dreyfus and Dreyfus (1986) have proposed reflective practice and skills models, in which future professionals must cultivate either their capacity to reflect in and on action, or their ability to do things automatically. Other authors like Atherton (2013) think that there are problems with both models and proposes to

concentrate on exploring the components of expertise. His model has the form of a pyramid, with the following levels: Competence, Contextualisation, Contingency and Creativity. Therefore, this last model provides us with a framework in which to reflect about the adaptations that a teacher at each level is capable of making.

METHODOLOGY

I have taught different Mathematics subjects in the undergraduate degrees of Mathematics, Chemistry, Agricultural/Industrial Management Engineering and Primary Education. However, my way of teaching was different in each of them. In this work, I focus on three degrees (Chemistry, Engineering and Primary Education) and a common topic (Statistics) and use my lesson plans for all of them as a source of data in order to analyze the adaptations made in each degree.

SOME RESULTS

The first time I had to teach Statistics was to Chemistry first-year students. It was my first year teaching and I had received no training whatsoever in how to do so. Therefore, I simply explained the material that was given to me by the more senior teachers, in order to acquire a competence similar to them. Later, I had to teach Statistics to future engineers. I was given both a syllabus and a textbook that I had to follow, but both my experience and the familiarity with the subject allowed me to reflect on what I was doing, and to discuss with my colleagues what to teach and in what order. In other words, I tried to contextualise my knowledge to the situation.

From last year, I am teaching future elementary school teachers and one of the topics that we teach them is Statistics. However, the perspective is different, since I no longer have to concentrate on the applications of what I teach (what most interests chemists and engineers) but rather on how to teach it. This has forced me to adapt the level of formalism and the goal of my explanations. Perhaps, the adaptation to future events or circumstances in such a way approaches the contingency level.

In general, the reflection about this transition of levels has improved my way of teaching and advanced my acquisition of professional skills.

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