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When students use podcasts to share their own expertise in building proofs.

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In 2012, the University of Namur (Belgium) launched the PUNCH project ('PUNCH', 2012). Within this framework, many experiences to rethink our teaching practices were sponsored. Among many others, the POD-EN-MATH project aims to help students in computer science to complete praxeologies (Chevallard, 2006; Winslow, 2008) when learning mathematical concepts and doing this with the help of high-quality podcasts. Students will gain experience by analyzing step-by-step our own procedure to make the link between theory and technics. Doing so would permit us to make the didactic contract more explicit (Brousseau, 1984). Indeed this procedure is not documented but only transmitted orally. The next step of the project is that students themselves provide content to our podcast database. This experience put into evidence the difficulty we had to help students to communicate, to teach their own knowledge focusing on a more didactic point of view.

Podcast we proposed

At the end of their graduate program, Computer Science students should be able to model the customer's need, compute the complexity's program (in terms of number of needed operations to perform) and prove that proposed program architecture fulfills the customer's demand. Discrete mathematics is mandatory as a corner stone to reach these outcomes. However, our students have great difficulties in building up the connection between theory and practice due to, among others, our ex cathedra teaching habit, as mentioned by Winslow (2008). Our podcasts aimed at filling this gap. We proposed high-quality podcasts of five to ten minutes. Our objective is to explain step-by-step, the reasoning that permits us to obtain the solution of a problem. Indeed the difficulty they often mention is to translate the problem into a mathematical model that needs to be solved, and not the theory they should use once the mathematical model is obtained. As proposed in Houston (2009), we want them to build up their mathematical reasoning and one way to do it is by viewing our own podcasts. As future analysts, the mathematical reasoning is of crucial interest for our computer scientists. Indeed they will have first to analyze the customers' needs and next to rephrase them in terms of programming objects and methods to programmers they manage. Mathematical reasoning is using the same skill.

Podcast they had to build

Our final objective was that students should be able to build up their own podcast in the second level of discrete mathematics program. They were expected to build these podcasts, with the same level of quality and accordingly contribute to the podcast database. The problem they have to solve is on building up a podcast explaining their proof using the so-called recursive method. A specialist in

mathematics education was available to answer all their questions via personal meetings. Our students did present almost all the difficulties reported by Grenier (2012) as explained in the poster. In the light of the personal didactic supervising, some have been corrected and others have unfortunately not. The question then arises on how to improve our methodology to give them the ability to discuss about how to build up an inductive proof.

Return on experience

None of the submitted podcasts reached our didactic quality requirements and could not be shared between peers. However, students greatly enjoyed producing podcasts as well as the personal coaching. They mentioned their understanding of the recursive approach increased in quality. Grades obtained at the final examination confirmed their belief.

This experience has highlighted to us the difficulty students have when building up their own expertise independently, as well as the difficulty they have to explain to their peers how to build up their own mathematical reasoning. The question that remains is to decide what kind of approach should be used to let our students become more and more autonomous in their learning of mathematics.

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