Exploring and developing a shared understanding of the issues surrounding engineering mathematics

J. BILBAO[1], E. BRAVO[1], O. GARCÍA[1], C. REBOLLAR[1], C. VARELA[1], A. UUKKIVI[2], O. LABANOVA[2], M. LATÕNINA[2], E. SAFIULINA[2], A. CELLMER[3], J. CYMERMAN[3], IGOR KIERKOSZ[3], K. BROWN[4], G. KELLY[4], A.P. LOPES[5], F. SOARES[5], C. FENISER[6], V. BOCANET[6], F. RUSU[6]

[1]University of the Basque Country UPV/EHU, [2]TTK University of Applied Sciences, [3]Koszalin University of Technology, [4]Letterkenny Institute of Technology, [5]Polytechnic of Porto (P. Porto) / ISCAP - CEOS.PP, [6]Technical University of Cluj Napoca

[1]SPAIN, [2]ESTONIA, [3]POLAND, [4]IRELAND, [5]PORTUGAL, [6]ROMANIA

javier.bilbao@ehu.eus

Abstract: - Although Mathematics is a pillar which many of the subjects of any Engineering degree are based on, and in spite of being used as a tool in almost all of such subjects, it is sometimes difficult for students to assimilate the mathematical concepts. Since this relationship between Engineering and Mathematics is unavoidable, a consortium of universities from different countries is working on a project, EngiMath, to, on the one hand, make it easier for teachers to teach Mathematics in the first years of Engineering degrees; and, on the other hand, to promote study from a "student-centric" point of view. As a previous step to the development of educational material that fulfills these purposes, a study of the students' feelings about Mathematics and their experience in studying them has been carried out.

Key-Words: - Information Theory and Applications, Computer Science, Erasmus+ Projects, Mathematics Curricula, Higher Education, Engineering Education, Teaching Methods, Web-based Education, Learning Objectives, Math Skills, Educational Experiences

1 Introduction

Until not many years ago, it was common for research on the teaching-learning of any area of knowledge, including mathematics, to focus on cognitive processes, or how a student is able to capture, encode, store and work with the information that is normally transferred to him or her by the teacher. But in this process there are other factors that also influence, such as motivational, affective, metacognitive, evolutionary and social factors, which can have their importance in the context of education [1]. Focusing on Mathematics related subjects in Higher Education, their teaching has sometimes been done through algorithmic procedures often decontextualized from real applications and their relationship with other subjects. Moreover, in this process in which its applicability in everyday life has not been taken into account, formulas learned by heart have been used [2] with little relation to their real application. In these cases, it is common for students to replicate what they have seen in class, without a clear idea of why or what for, and without knowing very well what to do in the case of small variations in the types of problems posed in class. We could say that the students have learned the concepts, but only to apply them in situations equal to those created by the teacher. This is one of the reasons why the contents may lack real meaning for these students. Likewise, there are places in which results are prioritized without concern for the mental processes that the student develops when solving mathematical exercises or problems [3]. However, other authors claim that, in order for the teaching to be meaningful, and also for the student to learn to learn and learn to think, this student must be the protagonist of his or her own knowledge in a