The RIMA Project: Looking for Quality and Excellence in Teaching Innovation

ABSTRACT

The RIMA project (Research and Innovation in Learning Methodologies, http://www.upc.edu/rima) was born in 2007, as a proposal from Education Science Institute (ICE) of the Universitat Politècnica de Catalunya (UPC-BARCELONATECH). The aim of this project is to become a forum for sharing experiences between Communities of Practice (C of P) related to innovation teaching, learning methodologies, or generic research skills in engineering education. Gradually, several professors and C of P have been incorporated during this time, setting up a work map on teaching innovation areas and main items developed in our university.

Related to the RIMA project, C of P relationship is showed below:

GENCAD – C of P in engineering creativity and ingenuity
GIAC - C of P in cooperative Learning
GIDF - C of P in physics teaching
GIDMat - C of P in materials teaching innovation
GilLABViR - C of P in virtual and remote labs
GIPBL - C of P in project/problem based learning
GIQUAL - C of P in classroom quality
GIUM-A - C of P in ATENEA Moodle uses
GRAPA - C of P in academic assessment
GRAPAU - C of P in autonomous learning
GRECO - C of P in skills research
GRenDiQ - C of P in chemistry didactics resources
GRIMAth - C of P in maths innovation teaching methodologies
GiPOE - C of P in students’ portfolio
VISCA - C of P in human values, gender, sustainability, cooperation, and accessibility

In this paper, skill map is shown, drawn up by means of an analysis after the first 3 years of the project, identifying also areas that have required more attention by RIMA members. As evidences of this period, activity of C of P’s, communication or papers related to them, generated resources and workshop or training courses, are indicated, in order to identify quality indicators for continuous improvement of this project.

Note that UPC-BARCELONATECH faculty activity linked to RIMA C of P’s, is carried out in parallel with ”conventional” research areas related to each member, and linked to usual research areas in a technical university, such as UPC-BARCELONATECH.

By analyzing RIMA map, and relating to engineering graduate studies carried out in all UPC-BARCELONATECH schools, consolidated research areas in educational innovation, can be identified. This analysis led to the identification of areas where new C of P creation, also establishment or diversification of existing ones, is needed in order to ensure that university requirements are fully covered by RIMA project.

In addition, RIMA C of P’s obtained results, associated with requested annually projections, can help to RIMA project strength areas identification, as well as improvement or more activity requirement areas selection, in order to promote the effective progress of RIMA project. Similar actions have been identified in nearby universities and have been compared, to develop a list of issues to consider in the future.
1. INTRODUCTION: UPC AND EHEA

For the last year, all the universities in Spain, including Universitat Politècnica de Catalunya (UPC-BARCELONATECH) have been modifying their curricula in order to achieve items of European Higher Education Area (EHEA). EHEA goals are related to adopt a system of easily comparable degrees across Europe, by means of a two main cycle system (undergraduate and postgraduate). For this purpose, a European credits system (ECTS) and common strategies to achieve European dimension in higher education, also teaching quality, were defined and established. Main differences of this new scenario were related to:

- Mobility promotion for students, lecturers, and administration members
- Cooperation program promotion in order to ensure quality and comparable criteria and methodologies with other European universities

This new model’s main features include a commitment to design curricular flexibility and diversification as means of responding to society requirements in a context of constant changes.

Therefore, in deepening of university autonomy concept and accountability, curricula design involves innovative proposals, based in prestige reference models, by creating a network for sharing information and collaboration between academic members.

Since EHEA implementation, a curriculum is proposed as an implementation project of university education (objectives, planning, feasibility, expected outcomes, monitoring system, and quality assurance) as a warranty for achieving professional skills in parallel to academic contents[1,2].

This new paradigm has induced several teaching method models changes, while qualification ultimate goal is student learning process in a context of lifelong learning and has highlighted the need to overcome two major obstacles:

- Lack of commitment among the students for technical studies, which have lost most attractive workload and dedication
- The social pressure in the sector, as companies require specific profiles of graduates

As a result, new roles for undergraduates and faculty have been defined and developed in order to introduce skill definition (general and specific skills) to complement “traditional” contents learning and bringing some added value to degrees[3-6].

Mechanisms for generic curricula integration have fostered skill development and specific routes design to ensure students can reach the 7 generic skills committed by UPC:

- CG1-Entrepreneurship and Innovation
- CG2-Sustainability and social commitment
- CG3 Third language (English preferably)
- CG4-Effective oral and written communication
- CG5-Teamwork
- CG6-Information resources use
- CG7 Self-learning

Universitat Politècnica de Catalunya, UPC-BARCELONATECH, consists of 9 campus, located in 6 different towns surrounding BCN, with 23 schools that host a total of 2,800 teachers and 30,000 students (Fig.1).

Geographical peculiarity has enhanced an even more complex implementation of the Plan of Bologna at the 132 degrees taught[7,8].

2. ICE-UPC AND THE RIMA PROJECT

In this context, the Education Sciences Institute at Universitat Politècnica de Catalunya (ICE-UPC) is a relevant basic unit, also as an observatory for all levels at UPC-BARCELONATECH. ICE-UPC main objectives, based on innovative teaching initiatives analysis, development and assessment, as well as solutions identification, are focused on ensuring a true smooth process of teaching and learning for the university community (Fig. 2).
ICE-UPC activities, related to learning improvement, are linked to three main areas of activity (Fig. 2):

- Initial training (ProFi) and continuous teacher training (training on research, on management, on teaching improvement and instrumental training)
- Support to educational projects for teaching improvement at university
- ICT resource management and use at university education (ATENEA-Moodle, The Factory)

Activities related to these three areas are carried out through training courses (internal or external trainers), initiatives of Communities of Practice (C of P), project development, training in new learning methodologies, etc. as shown in Fig. 3 diagram, emphasizing the element of RIMA- C of P.

The RIMA (Research and Innovation in Learning Methodologies) project’s aim is related to enhance teaching innovation visibility currently developed at Universitat Politècnica de Catalunya, UPC-BARCELONATECH. At the same time, it seeks to promote lecturers participation in educational research and innovation activities, from RIMA stakeholders impulse (RIMA Communities of Practice, C of P)[9-11].

As this project is included in ICE-UPC Teaching Innovation Program, an institutional umbrella is insured, and RIMA project main objectives[12] are focused on:

- Participation and involvement of UPC-BARCELONATECH academic community encouragement in projects and initiatives for innovative teaching development and learning methodologies implementation, without excluding participation of other universities members and other academics
- Dynamization of projects design for advances enabling focused in UPC-BARCELONATECH, but extended to academic community, as the best way for improvement and innovation in teaching
- Strategies towards achieving objectives and results for transmission in academic level, while achieving the greatest impact possible in the academic community
- RIMA C of P activities dissemination by sharing respective experiences and promoting the creation of synergies in educational innovation and learning methodologies development
- Build-on a teacher core from our academic community, in order to participate in training activities and advice, while supporting other academic communities, if requested, about educational innovation and learning methodologies development
- Enable RIMA members with visibility in their respective fields of action

C of P currently in RIMA project, are related to some of the generic skills described above (GRAPAU, GRECO, VISCA), or learning methodologies related to basic subjects (GReDQ, GIDF, GRIMath) or specific (GILAVir, GIDMat), learning methodologies (GENCAD, GIAC) or assessment methods (GRAPA, GIUM-A GTPoe, GIPBL, GIQUAL), as shown in the following diagram (Fig. 4).

C of P-ICE linking provides involved members:

- Institutional support, in order to be considered as research groups linked to UPC-ICE
- Academic coordination support, as an ICE appointment, through a specific person that will promote project implementation.
- Technical support virtual environment
- C of P visibility, in addition to results and initiatives dissemination, through the RIMA platform, institutional communicates, or broadcast periodic newsletter that covers the goals and initiatives taken by different groups
Orders for collaboration, as the ICE has become a preferred way to meet needs such as academic collaboration impart training, providing advice, searching for experts in specific areas, preparing materials and resources to support educational innovation and improvement

- Technical support, technology and logistics, to ensure support, accompaniment and visibility of the tasks that groups develop and also to encourage revitalization, communication and collaboration between members of groups and between groups, etc

- Financial support from a contingency budget for specific groups and the general functioning of the project

After a population data analysis, it is revealed that 380 people are linked to all RIMA groups, and 67% are UPC-BARCELONATECH members, while the remaining 33% are related to other academic environments, or high school.

Table 1 lists the population data of RIMA C of P, indicating the number of members related to only one C of P, or to several ones.

<table>
<thead>
<tr>
<th>C of P RIMA</th>
<th>Total members(*)</th>
<th>Only this CoP</th>
<th>More than one CoP</th>
<th>% UPC member</th>
<th>% NO UPC member</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENCAD</td>
<td>14</td>
<td>10</td>
<td>4</td>
<td>93 %</td>
<td>7 %</td>
</tr>
<tr>
<td>GIAC</td>
<td>123</td>
<td>75</td>
<td>48</td>
<td>52 %</td>
<td>48 %</td>
</tr>
<tr>
<td>GIDF</td>
<td>18</td>
<td>12</td>
<td>6</td>
<td>94 %</td>
<td>6 %</td>
</tr>
<tr>
<td>GIDMat</td>
<td>25</td>
<td>22</td>
<td>3</td>
<td>68 %</td>
<td>32 %</td>
</tr>
<tr>
<td>GILABVir</td>
<td>35</td>
<td>30</td>
<td>5</td>
<td>94 %</td>
<td>6 %</td>
</tr>
<tr>
<td>GIPBL</td>
<td>16</td>
<td>2</td>
<td>14</td>
<td>87 %</td>
<td>23 %</td>
</tr>
<tr>
<td>GIQUAL</td>
<td>18</td>
<td>5</td>
<td>13</td>
<td>100 %</td>
<td>0 %</td>
</tr>
<tr>
<td>GIUM-A</td>
<td>16</td>
<td>13</td>
<td>3</td>
<td>100 %</td>
<td>0 %</td>
</tr>
<tr>
<td>GRAFA</td>
<td>44</td>
<td>4</td>
<td>40</td>
<td>77 %</td>
<td>23 %</td>
</tr>
<tr>
<td>GRAPAU</td>
<td>34</td>
<td>8</td>
<td>26</td>
<td>97 %</td>
<td>3 %</td>
</tr>
<tr>
<td>GRECO</td>
<td>93</td>
<td>52</td>
<td>41</td>
<td>30 %</td>
<td>70 %</td>
</tr>
<tr>
<td>GReDiQ</td>
<td>35</td>
<td>22</td>
<td>13</td>
<td>100 %</td>
<td>0 %</td>
</tr>
<tr>
<td>GRIMAth</td>
<td>27</td>
<td>24</td>
<td>3</td>
<td>96 %</td>
<td>4 %</td>
</tr>
<tr>
<td>GTPoC</td>
<td>30</td>
<td>5</td>
<td>25</td>
<td>90 %</td>
<td>10 %</td>
</tr>
</tbody>
</table>

(*) Sum of group members is greater than 380 because there are some member who belong to more than one group.

Through table 1 data, can be noted that RIMA C of P's are mostly (or completely) composed by UPC member, except most numerous GRECO and GIAC.

Geographical adscription of RIMA member information, is shown in Fig. 5, grouped by UPC-campus/centre.

The distribution in Fig. 5 is proportional to the total number of lecturers on each campus, and thus the campuses can be considered to participate equally in the improvement activities and educational innovation carried out at the UPC.

In 2009, the RIMA project involved 10 C of P and 157 members. Since then, project development and progression has been remarkable, both regarding diversity of C of P, also in number of members linked to them.

Furthermore, it should be noted that the last RIMA C of P's recently created, ensures that in this project, UPC basic skills have at least one work-group linked to RIMA. This means that UPC academic and, by extension, university academic community, can easily identify several expert research groups related to learning methodologies and assessment of UPC basic skills (Fig. 6).

Fig. 6 Direct/indirect relationship between RIMA C of P and UPC basic skills
As a result of this study shortcomings of the RIMA project have been identified, while some basic skills are not so clearly related to a specific C of P. From this evidence, a 3rd language research RIMA group, related to university teaching in technology field, will be constituted in the immediate future.

3. THE RIMA PROJECT RESULTS

Since the RIMA project inception, different communities of practice have developed support materials, reference documents communication for conferences and/or meeting and referent papers (more than 50 communication and papers in national and international journals and conferences).

Production of all C of P related to the RIMA project is incorporated into the project homepage. Furthermore, electronic version of all documents has been incorporated to UPCommons repository (Fig. 7), free access to consulting.

![Fig 7 UPCommons, virtual repository of RIMA results](image)

The elements that can be found in UPCommons are:

- Bibliography on learning methodologies (Cooperative Learning-GIAC, Materials Science and Technology-GIDMat)
- Monographic, notebooks, handbooks and guides, (Quality-GIQUAL, Sustainability and Social Commitment-VISCA, Portfolio-GTPoE, Autonomous Learning-GRAPAU, Skills research-GRECO, Fig. 8)[4,13-17]
- Guide to Lab Skills Assessment (GRAPA)[18-20]
- RIMA meeting proceedings volumes (JID-RIMA 2009, JID-RIMA 2010)[21]
- Teaching Quality Awards (GReDiQ)[22,23]
- Videos and low cost videos (Teaching YouTube Channel)[24,25]
- Educational material (exercises, powerpoint, notes...)

![Fig 8 Monographic publication related to RIMA C of P](image)

Which one is the relationship between lecturers dedication to educational innovation in their teaching and students assessment?

Many RIMA members usually used SEEQ survey, and results shown that students get much more confident in several subjects, and they have performed better on assessment. Mission accomplished!

In terms of quality, RIMA-GIQUAL constitution, for teachers not accustomed to quality management, has facilitated how to identify a training process in classrooms, from beginning to end, with traceability and control managing for continuous improvement.

4. CONCLUSIONS

RIMA project has been designed and created by ICE-UPC, as a joining space for teaching and learning research group, for sharing experiences between communities of practice, and also activities and results. The main objectives of the RIMA project are:

- Improving educational research and innovation in university teaching, focusing on students learning
- Encouraging research in teaching innovation at university, also C of P creation in different educational areas
- Providing information, support, and solutions related to the educational needs arise as a result of EHEA new scenario

The existence of a collaborative virtual space to share resources, experiences and materials between all RIMA groups, allows dissemination of activities related to the Communities of Practices. In this way, C of P, and independent groups, can share experiences and results, and also update them in RIMA platform, helping virtual networks arising.

RIMA dissemination within UPC is still in early stages and Educational Research in Tech Universities is not always recognised in the same way than “Conventional research”...

This project has generated synergies between different groups, thus making an efficient use of resources and initiatives.
5. ACKNOWLEDGEMENTS

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6. REFERENCES

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