



## The use of rubrics for the evaluation of the subjects' practices in engineering studies, consisting in solving real cases in direct contact with companies: EVALUA-PRACTIC

*Evaluación mediante rúbricas de la experiencia de acercar las empresas a los estudiantes de ingeniería mediante las prácticas de las asignaturas EVALUA-PRACTIC*

Teaching innovation group INGENIAQ

Universidad de León

Fernando González-Andrés\*  
Olegario Martínez-Morán  
Marta-Elena Sánchez-Morán  
Xiomar-A. Gómez-Barrios  
Maria Isabel San-Martín

Raul Mateos  
Camino Fernández  
Rebeca Mulas  
Antonio Morán  
Beatriz Urbano-López-de-Meneses (UVA)

## Background

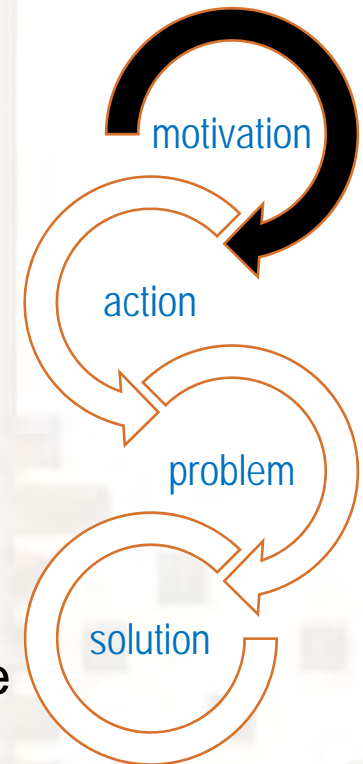
### The motivatoion

- Agenda for the Higher Education Modernization, 2014 (EACEA, 2014)

**PRIORITY:** to adjust the higher education studies to the labour market promoting the entrepreneurial spirit and enhancing the links between education, research and enterprise

- Spanish National Agency for the Higher Education Quality (2016)

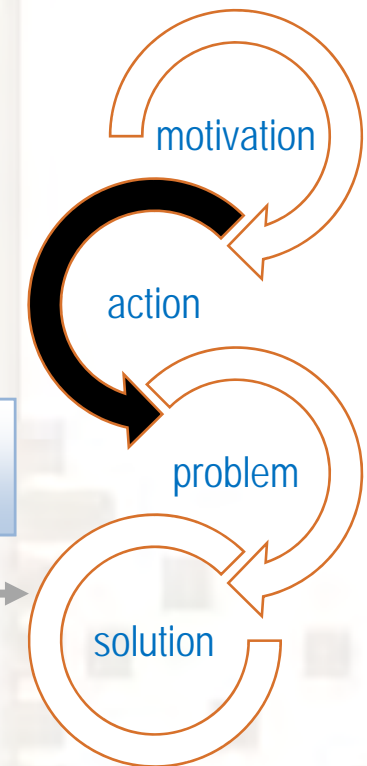
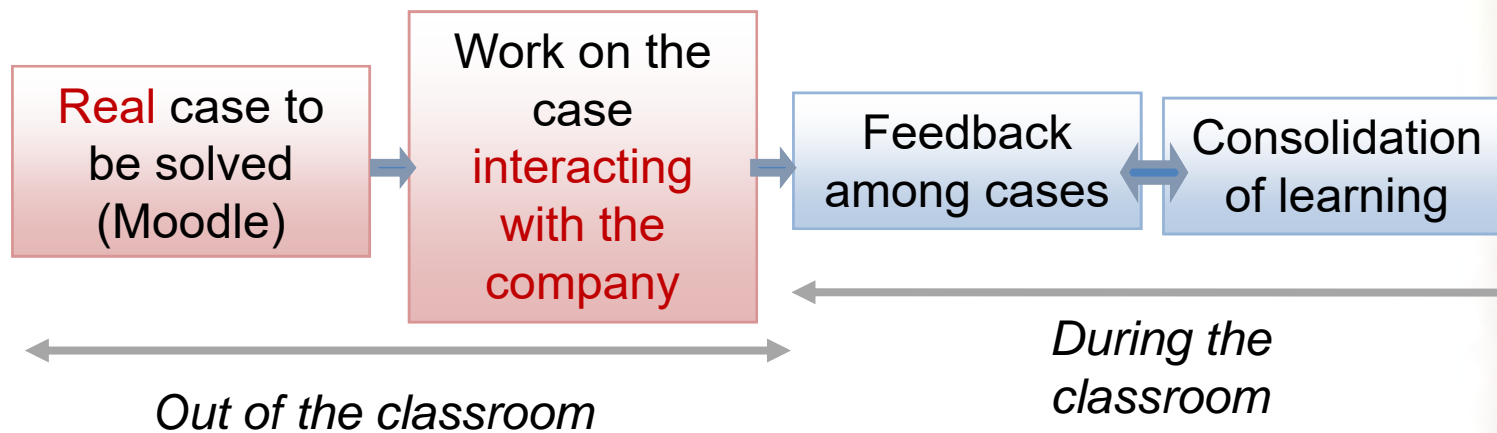
**ADVICE:** to reinforce the actions to close the students to the professional sectors in order to support the students in their access to the labour market



# Background

## The action

TIG INGENIAQ (University of León, Spain) has re-designed the **subjects' practices** of the engineering studies using Flipped Learning and involving a Company representative



## Background

### The problem created

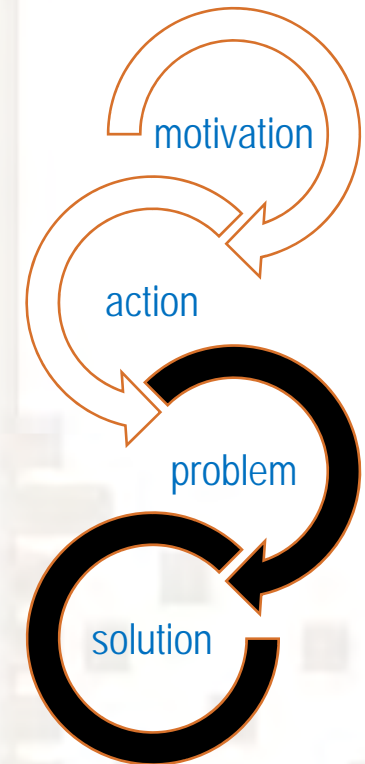
Such uncommon practical activities pose the threat of how to evaluate them.

Requirements of the evaluation process:

- Continuous
- Formative
- Shared by students and teachers
- Based in competences

### The proposed solution

The so called rubrics designed for the continuous evaluation oriented to the learning



## Objectives

**General objective** to develop and analyse the rubrics' design and application, for the evaluation of the subjects' practices in engineering studies

The **specific objectives** of this work were:

- i) to **develop** the rubrics for the evaluation of the practical activity of five subjects from Engineering studies
- ii) to **find the weak points and the inconsistencies** of the rubrics design process
- iii) to establish the best procedure to **design** successful rubrics
- iv) to **use the rubrics**, at a pilot scale, in five engineering subjects
- v) to **compare** the results of the teachers' evaluation with the students' expectations, from their autoevaluation
- vi) to **assess the usefulness of the rubrics** for the evaluation of the subjects' practices.

# Methodology and structure of the action

Rúbrica: Asignatura Procesos Biotecnológicos, Grado en Biotecnología			
Realización de un proyecto de investigación			
Nombre del estudiante:			
Nombre del evaluador:			
Aspectos relacionados con el documento Escrito (10 puntos)			
<b>Grado de desarrollo del proyecto</b>			
List of competences	La propuesta planteada es de verdadero interés, contextualizándose adecuadamente y dejando claros sus objetivos	2.5	practical work is done by students ↓ evaluation by the teachers
	Aunque la propuesta sí que es interesante, se echa en falta una mayor y mejor contextualización para comprender mejor los objetivos	1.5	
	Aunque pudiendo tener algún interés, el escaso aporte del estado del arte y la baja calidad en la expresión de los objetivos hace que la propuesta no sea significativa	0.5	
<b>Desarrollo metodológico</b>			
	El desarrollo de la metodología permite identificar claramente la consonancia con los objetivos planteado	2.5	
	La metodología planteada presenta una baja concordancia con los objetivos y conlleva a la desviación del proyecto	1.5	
	No hay relación entre los objetivos y el desarrollo experimental planteado	0.5	

## Results: Rubrics development

Relative importance (in percentage) of the dimensions and indicators considered in the rubrics developed for the five subjects analysed in this work.

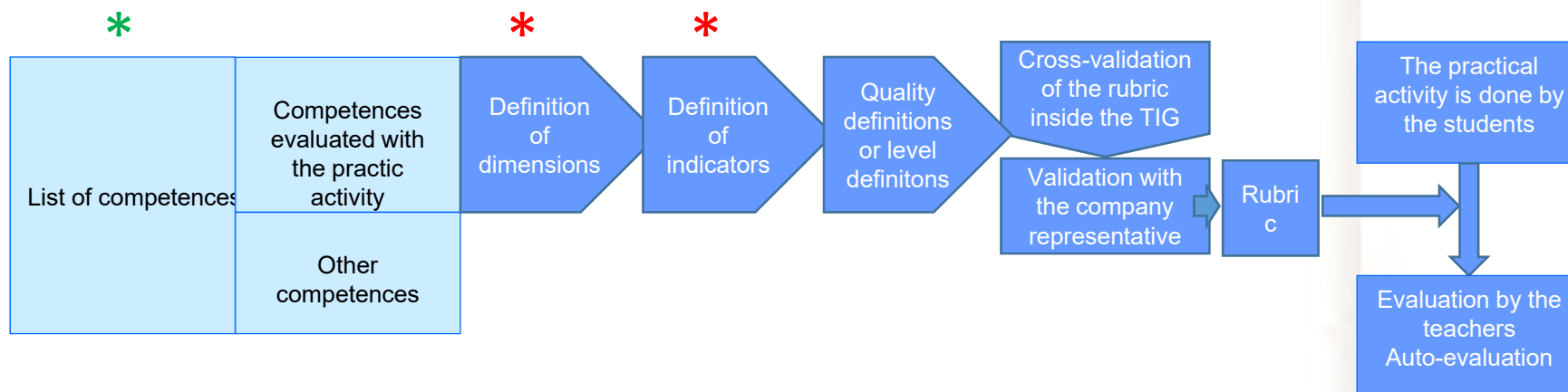
Dimensions	Indicators	Ornamental crops	Biotechnological processes	Plant Production Systems	Business administration and Marketing	Innovation in industry
Understanding of the problem and search for information about the state of art	Ability to understand the problem to be solved	15 %		15 %		
	Ability of searching information to make an adequate state of art	15 %		15 %		
	Level of interaction with the company	15 %		15 %		
Content of the solution	Excellence in innovation proposals	15 %	17 %	15 %		30 %
	Technical and methodological excellence	10 %	17 %	10 %	37,5 %	
	Technical viability of the proposal	15 %	17 %	15 %	25,0 %	30 %
	Socioeconomic impact		17 %			
Oral presentation to the potential client, academics and company representative	Quality of the presentation from the formal viewpoint	10 %	33 %	10 %	25,0 %	15 %
	Quality of the responses to questions from the company supervisor and from the audience	5 %		5 %		15%
In classroom activities	Attendance to the classes and attitude during the presentation of problems from other students				12,5 %	10%



☞ The same competence was evaluated with different indicators in different subjects which means different interpretation of the dimensions

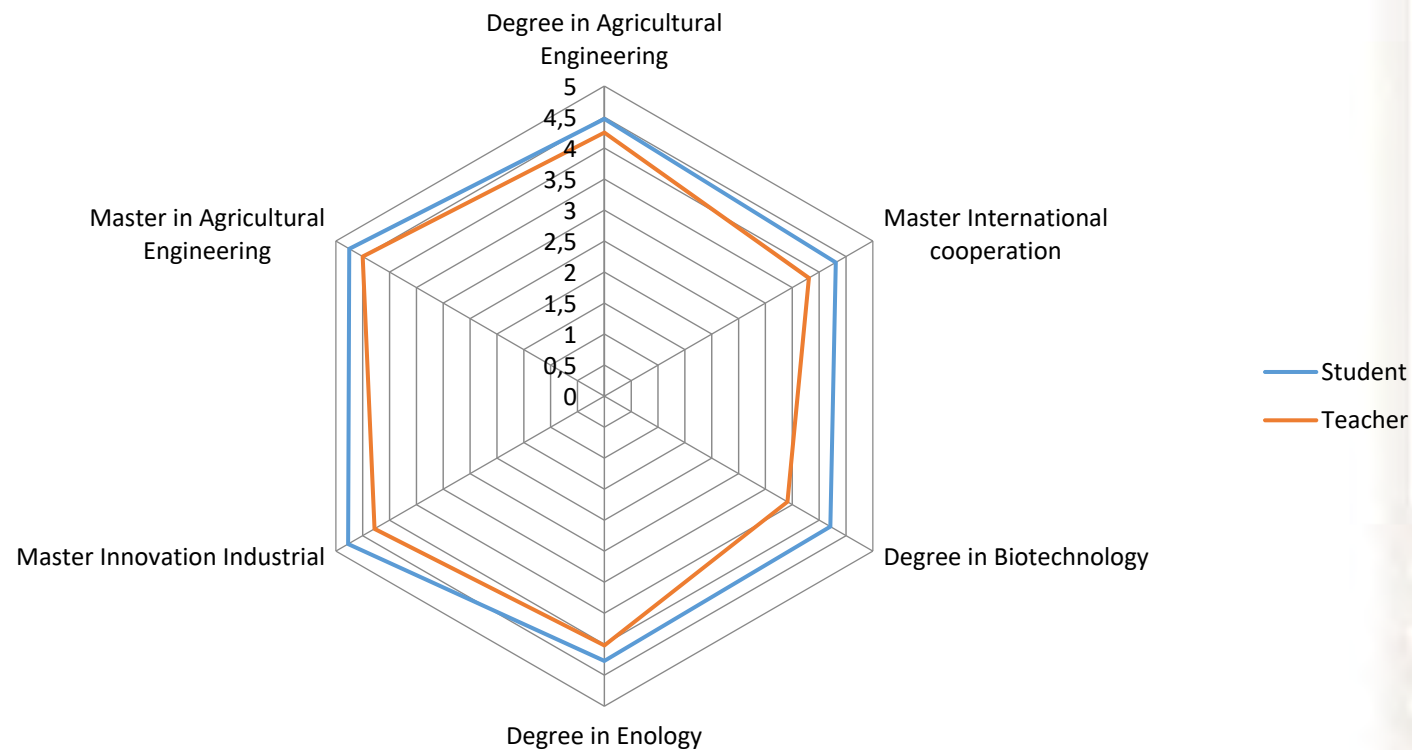
# Results: Weak points and inconsistencies

## Weak points of the rubrics design process





# Results: Analysis of the results after pilot test



## Conclusions

- The rubrics of 5 subjects have been designed and evaluated in a two-step process
- A weak point of the rubrics is the great variation of approaches for the same competences in different subjects, depending on the teacher, which makes necessary a coordination effort in the formulation of the rubrics
- The companies' representative highlighted that the main weak point is the lack of achievement of the competences related with the autonomous and individual work
- The use of the rubrics has helped the students to understand the objective of the subjects' practices, keeping to a minimum the differences between the students' expectations and the teachers' rating
- The system based in rubrics has the disadvantage of being time consuming to prepare, but they make easier and more objective, the final evaluation of the subjects' (though a traditional evaluation based on "the feeling" of the student's performance is less time consuming)

## Experiencia estudiante

Asignatura	Nivel	Area de Conocimiento	Titulación
Sistemas de Producción Vegetal	Master	Producción	Ingeniería Agrnómica

Pros	Contras
<ul style="list-style-type: none"> <li>• Permite el aprendizaje para el manejo de herramientas de búsqueda bibliográfica en bases de datos; así como el desarrollo de las técnicas de selección de artículos o documentos científicos de mayor relevancia para el tema elegido.</li> <li>• Supone una práctica en la elaboración de documentos científicos adaptándolos a los formatos adecuados.</li> <li>• Permite la interrelación entre alumno y empresa, así como intercambiar información y experiencia en el tema a desarrollar.</li> <li>• Supone una forma de dar a conocer alumnos de cara a las empresas colaboradoras.</li> </ul>	<ul style="list-style-type: none"> <li>• En determinados casos, supone una situación incómoda tanto para las empresas como para los alumnos, debido a que los alumnos deben ponerse en contacto con las empresas en periodos en los que estas no tienen demasiado tiempo para dedicarles y esto supone un alto nivel de compromiso para ellas.</li> <li>• Toda la carga de la asignatura se vuelca sobre el documento redactado por el alumno, sin embargo debería dedicarse un porcentaje de tiempo de horas de clase al resto de los temas que abarca la asignatura.</li> </ul>