



CHOOSE YOUR PROBLEMS! A FLEXIBLE LEARNING METHODOLOGY FOR ENGINEERING STUDENTS BASED ON PBL+

Teaching innovation group INGENIAQ
Universidad de León

B. Urbano
X. Gómez
M.E. Sánchez
R. Mateos
N. Ortiz-Liévana

C. Fernández
E.J. Martínez
O. Martínez-Morán
A. Morán
F. Gonzalez-Andres*

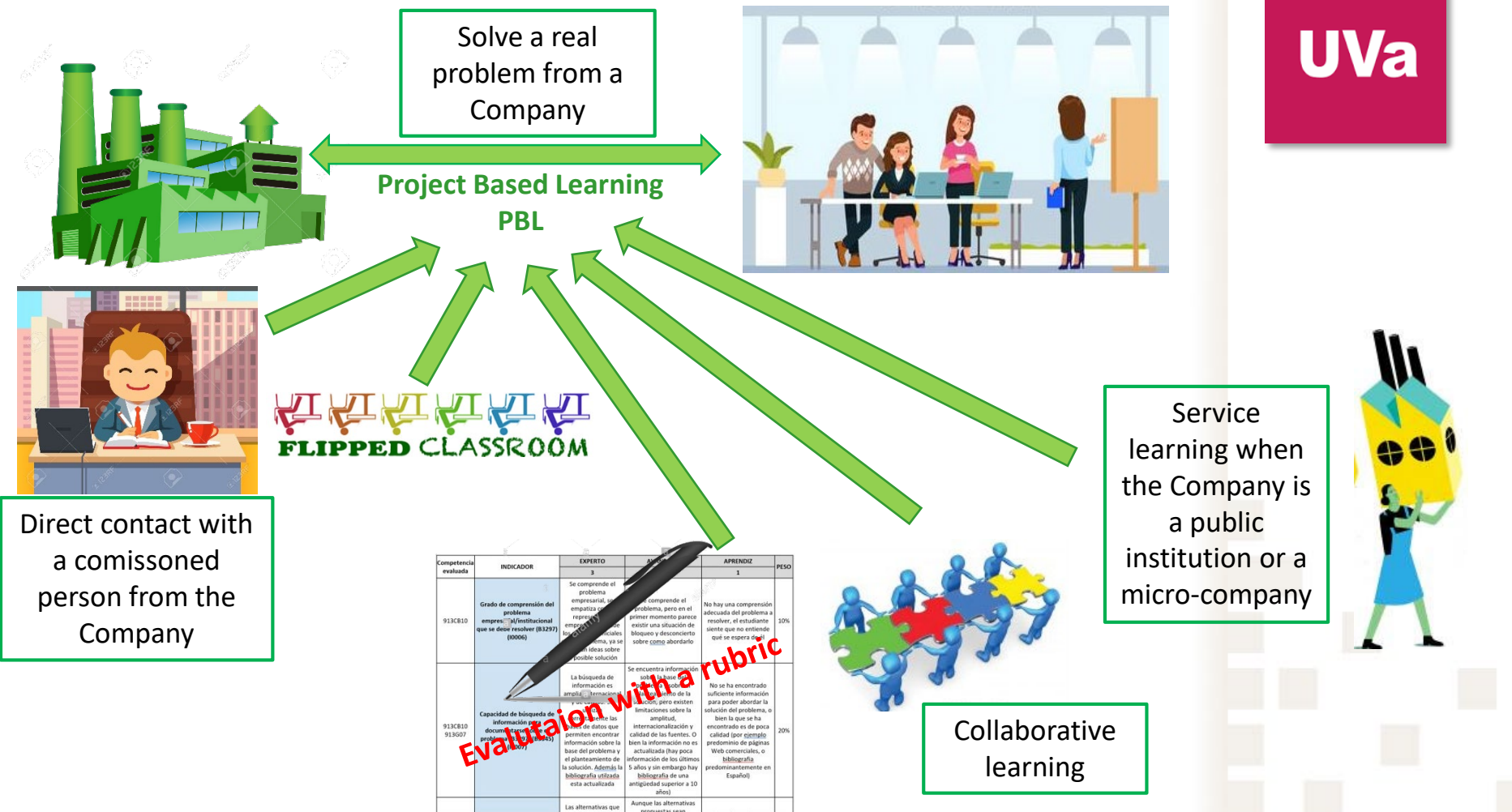
What is PBL+?

Practical activity

“To solve a real problem from a Company in contact with a representative from the Company”

It is a methodology created by the Teaching Innovation Group INGENIAQ that gathers several previously known learning-teaching techniques

What is PBL+?



Solve a real problem from a Company



Project Based Learning
PBL

Service learning when the Company is a public institution or a micro-company



Collaborative learning



Evaluation with a rubric

Competencia evaluada	INDICADOR	EXPERTO 3	APRENDIZ 1	PESO
913CB10	Grado de comprensión del problema empresarial (Institucional que se desea resolver (8.237) (1000)	Se comprende el problema empresarial, pero en el primer momento parece existir una situación de bloqueo y desconcierto sobre como abordarlo	No hay una comprensión adecuada del problema a resolver, el estudiante siente que no entiende qué se espera del	10%
913CB10 913G07	Capacidad de búsqueda de información por parte del alumno para resolver el problema (1000)	La búsqueda de información es amplia, interacción con fuentes de información que permiten encontrar información sobre la base del problema y el planteamiento de la solución. Además la bibliografía utilizada esta actualizada	No se ha encontrado suficiente información para poder abordar la solución del problema, o bien es que se ha encontrado es de poca calidad de las fuentes. O bien la información no es actualizada (hay poca información de los últimos 5 años) y sin embargo hay bibliografía de una antigüedad superior a 10 años)	20%
		Las alternativas que	Aunque las alternativas	



Direct contact with a comissioned person from the Company

FLIPPED CLASSROOM

Why PBL+?



Objectives



UVa

GENERAL

To show the experience of using PBL+ in Agricultural Engineering subjects.

SPECIFIC

1. To ascertain the impact of PBL+ in the improvement of the teaching-learning process of Agronomy subjects of the Agricultural Engineer curriculum
2. To summarize the most and less common problems raised by companies which can be solved by agronomic students

Methodology for specific objective 1

Evaluation of 7 learning outcomes:

Learning outcome	Verification
Improvement of academic performance	Marks achieved by students in the evaluation process (using rubrics)
Students motivation	<ul style="list-style-type: none"> • Satisfaction survey applied to the students • Self-evaluation using rubric
Effective interaction between students and company	Number of contacts student – company representative
Development of autonomous learning	Rubric items: quality of the literature used and technical quality
Critical thinking development	Survey applied to the teacher
Competences achievement (readiness of students to join the job market)	Survey to the company: <ul style="list-style-type: none"> • Readiness of students to join the job market • Usefulness of results obtained by student
Interaction between students and collaborative work	Ratio; Average number of times that each student participates in the group tutorships/total number of students

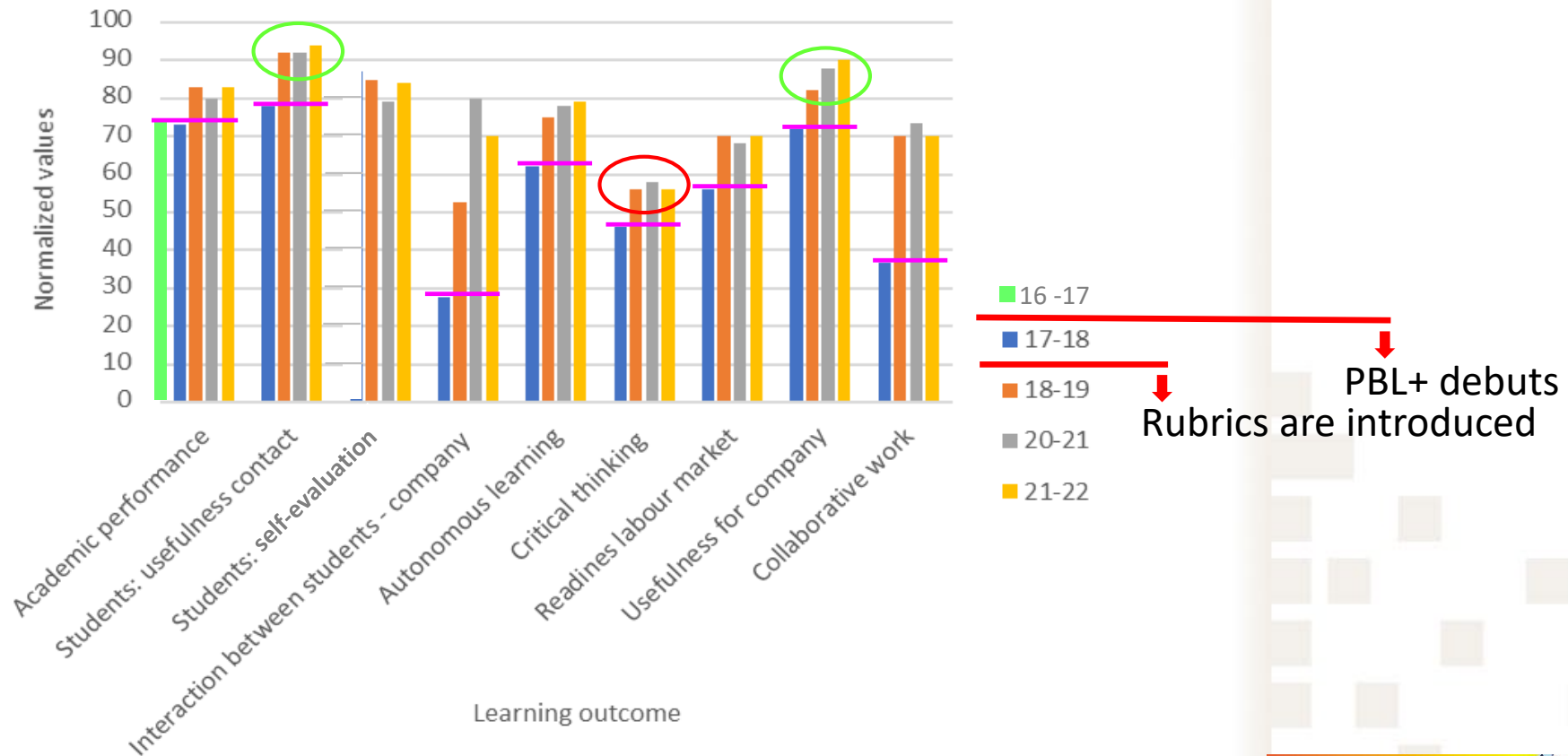
Methodology for specific objective 2

Specific Objective No. 2 To summarize the most and less common problems raised by companies which can be solved by agronomic students

A list of the most popular problems offered by the Agrarian companies to the students

Results

Impact of PBL+ in the improvement of the teaching-learning process of Agronomy subjects: Normalized values



Rubrics are introduced

PBL+ debuts

Results



Type of problem	Details (wherever necessary)	N° works	%
Phytosanitary issues	Emerging plague or diseases	8	28%
	Development of resistances to classical treatments	9	31%
Physiopathies from unknown but not-biotic origin		6	21%
Weeds control	Due to the appearance of resistance to classical treatments	2	7%
Adaptation of productive practices to new regulations	Reduction of acrylamide contents in potato chips that involves changes in potato production process	1	3%
Transformation to organic production		1	3%
Other agronomic problems	Includes the distribution of the plots (pollination problems due to the distribution of pollinators in the plot); irrigation and fertilization management	2	7%

Do it really helps to bridge the gap between academy and society?



The main shortcomming

Is there a reliable and useful source of knowledge publicly available?



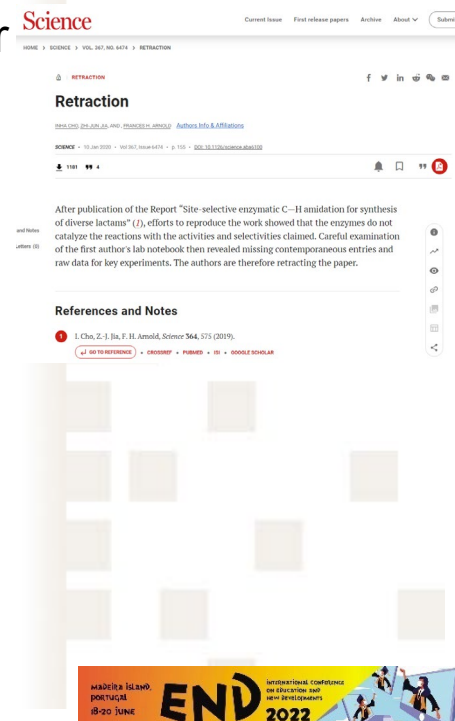
Ideally (theoretically) the scientists generates the necessary knowledge to solve the problems and with PBL+ the students learn to use such information (scientific papers)

The main shortcomming

Actually, the students feel lost in such a tangle of information much of it useless:

- An important part of the scientific papers provide repetitive information that do not contribute to knowledge generation
- Scientific papers get lost in pure theoretical musings, useless for knowledge generation and transfer
- Many scientific papers are unreliable
- Scientific papers are written thinking in academic promotion and publishers enrichment, not in transferring useful knowledge for the society

👉 J. Otto Lottes Health Sciences Library 2020: In 2020 One Journal Publishing Company was More Profitable Than Netflix (Taira Meadowcroft)



Discussion

The PBL+ has been designed to be used in face-to-face teaching systems, because the interaction between the students and the companies is a key aspect of the system.

The results obtained in the survey indicate that:

- For technical and engineering disciplines, the visio-conferences cannot replace the in-person exploration of the processes in which the problems to be solved are born
- But not even in most of the management and economical subjects, the face-to-face interaction to understand the companies' problems can be fully replaced by a virtual communication, although they adapt better than the pure engineering disciplines



Conclusions

1. The use of PBL+ in the course “Crops Production Systems” gave good values for the learning outcomes considered.
2. One of the components, namely the use of rubrics, was critical to obtaining good performance because they help students to focus their work on relevant aspects closely related with competencies to be achieved
3. The students find a lot of useless public information, they are unable to make a critical selection, and thus fail in providing **innovative** solutions to the company.
4. Critical thinking continues to be the most challenging competence to be attained.
5. The main concerns of Agrarian businessmen keep relation with phytosanitary or physiopathy issues.
6. The results obtained can be extrapolated to other subjects related to the curriculum of Agricultural Engineers, especially those associated with Agronomy

Acknowledgements

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