



**THIRD WORLD SYMPOSIUM
ON SUSTAINABILITY
SCIENCE AND RESEARCH**

Sustainability Futures: Challenges
and Opportunities Towards a More
Sustainable World

April 8

Using a problem-based learning approach to develop sustainability competencies in higher education students

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RESEARCH PROBLEM

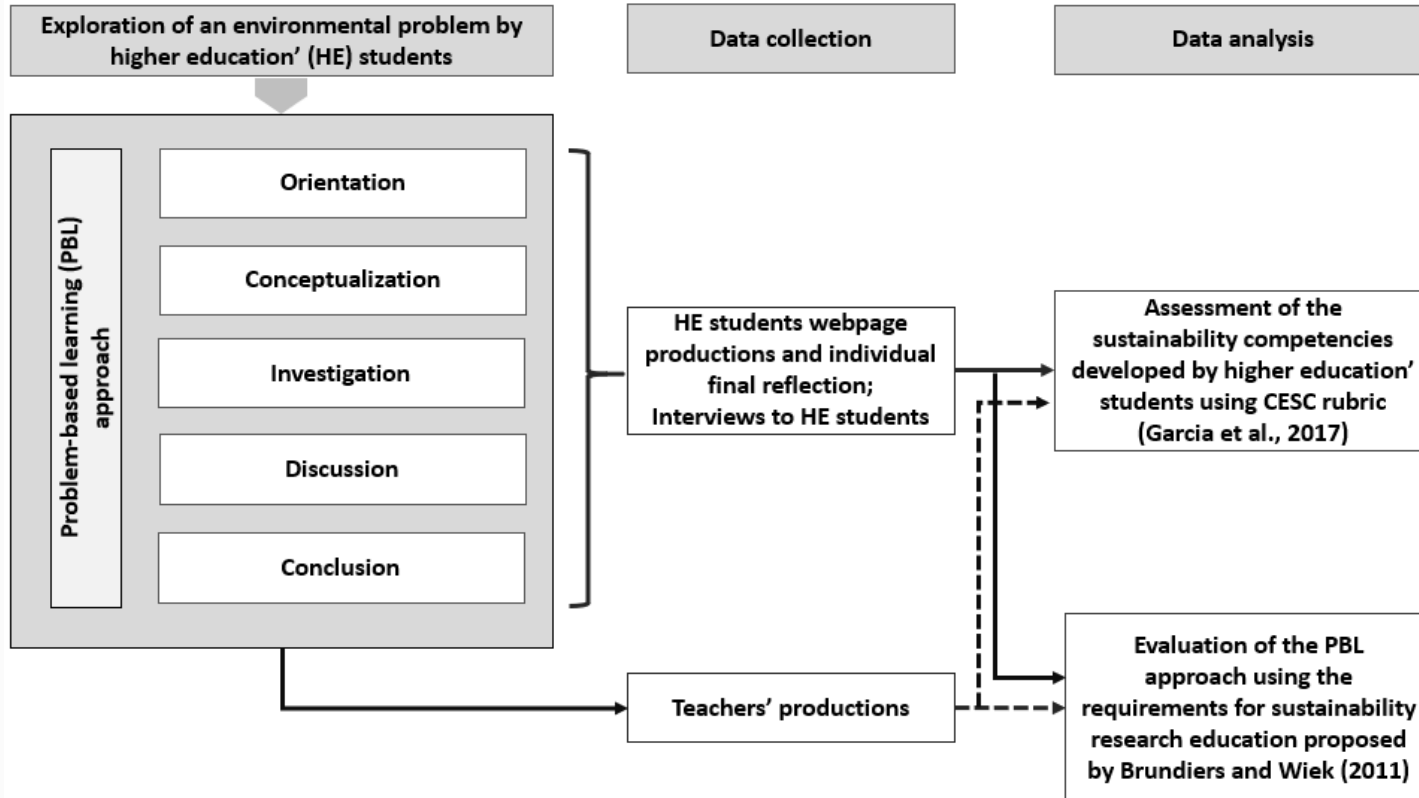
What was the impact of a problem-based learning approach in the development of sustainability competencies of higher education students?

OBJECTIVES OF THE PAPER

Assess the sustainability competencies developed by higher education students after experiencing a problem-based learning approach.

Evaluate to what extent the PBL approach fulfilled the requirements for sustainability research education.

APPROACH USED



PRELIMINARY RESULTS

PBL phase	Higher education students' groups			
	PLB 1	PBL 2	PBL 3	PBL 4
Orientation	Contextualization about the SDG7	Contextualization of food waste	Contextualization of invasive species	Contextualization of human impacts on terrestrial ecosystems
Conceptualization	Which is the role of renewable energy in the future?	How can we reduce food waste?	What can we do to combat invasive species?	How to reduce the human impact on terrestrial ecosystems?
Investigation	Development of a model of a future sustainable city; Interviews to stakeholders	Interviews to stakeholders; Production of a set of videos about food waste measures	Interview to higher education teachers' specialists on the problem	Online survey; Interviews to a biologist and an environmental technician
Conclusion	Possible features of future sustainable cities and renewable energy usage	Specific examples of food waste reduction. Social activism on food waste	Specific measures to combat invasive species	Specific measures to reduce human impact on terrestrial ecosystems
Discussion	Reflection about future sustainable cities and renewable energy usage	Production and discussion of a personal video about strategies to reduce food waste.	Reflection about individual and collective actions to prevent and combat invasive species	Peer discussion of a video about an outdoor visit to a natural park

PRELIMINARY RESULTS

Actual sustainability problems	Fully achieved
Stakeholders role	Partially achieved
Preparing students to help create a better society	Fully achieved
Generation of workable solutions and positive learning impact	Partially achieved
Professorial supervision	Fully achieved

PRELIMINARY RESULTS

Categories	Domains of competency	Level of sustainability competencies developed				N
		Novice	Beginner	Advanced	Expert	
Connections	Learning to know	0	0	3	2	5
	Learning to live together	0	3	2	0	5
	Learning be	0	0	0	0	0
	Learning to do	0	0	4	4	8
		0	3	9	6	18
Dialogue	Learning to know	0	0	0	1	1
	Learning to live together	0	0	0	0	0
	Learning be	0	0	0	0	0
	Learning to do	0	0	0	0	0
		0	0	0	1	1
Creativity	Learning to know	0	0	0	1	1
	Learning to live together	0	0	2	2	4
	Learning be	0	0	0	0	0
	Learning to do	0	0	0	4	4
		0	0	2	7	9

PRELIMINARY RESULTS

Categories	Domains of competency	Level of sustainability competencies developed				N
		Novice	Beginner	Advanced	Expert	
Innovation	Learning to know	0	0	2	5	7
	Learning to live together	0	0	2	0	2
	Learning be	0	0	0	0	0
	Learning to do	0	0	5	5	10
		0	0	9	10	19
Critical thinking	Learning to know	0	0	5	2	7
	Learning to live together	0	0	0	0	0
	Learning be	0	0	0	6	6
	Learning to do	0	0	0	0	0
		0	0	5	8	13
Uncertainty	Learning to know	0	0	0	1	1
	Learning to live together	0	0	0	0	0
	Learning be	0	0	0	0	0
	Learning to do	0	0	0	0	0
		0	0	0	1	1

Total		0	3	25	33	61
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MAIN CONCLUSIONS

. This work has shown that the PBL approach achieved the majority of the requirements and criteria for sustainability research education presented in the Brundiers and Wiek (2011) framework

Within the PBL approach, higher education students mobilized or developed their sustainability competencies, however with different performance levels.

Having in mind that higher education institutions have a determinant role in the education of the next generations of students who are going to face the present and the future environmental challenges, the results of this work suggest that the PBL approach has a positive impact in the development of sustainability competencies of higher education students.

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