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Experiential Learning: Lessons Learned from Global Higher Education Programs for Cleaner Production in Latin America

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Academic Work

Partnership Goals

- Strengthening academic training related to sustainable industrial development (SID) through faculty capacity building for delivering new content, curricular design and modification, and training environmental professionals in partner countries.

- Increasing adoption of cleaner production and sustainability practices in Micro, Small and Medium Enterprises (MSMEs) through increased interaction with academia, especially through experiential learning projects where students work directly with MSMEs.

- Create a virtual forum to promote systemic collaboration and information sharing on sustainable industrial development education and application among the partner institutions and others in the region.

Experiential Learning

- *"The process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience*"
  (D. Kolb. 1984. Experiential learning: Experience as the source of learning and development. Vol1)

- In order to find solutions that are new and relevant, knowledge from different fields need to be integrated and applied in the context of real-world problems that exist in the field.

Project-Based Learning Principles

The PBL Learning Principles		
Cognitive Learning	Contents	Collaborative Learning
Problem	Interdisciplinary	Teams
Project	Exemplary	Participant-directed
Experience	Theory practice	
Context		

Based on De Graaf, Erik, and Anette Kolmos. "Characteristics of problem-based learning." *International Journal of Engineering Education* 19, no. 5 (2003): 657-662.
Kolmos, Anette, and E. de Graaff. "Process of Changing to PBL." *Management of Change: Implementation of Problem-Based and Project-Based in Engineering* (2007): 31-43

Industry Competency Model

Occupation Related

- Management Competencies
- Occupation-Specific Requirements
- Occupation-Specific Technical Competencies
- Occupation-Specific Knowledge Competencies

Industry Related

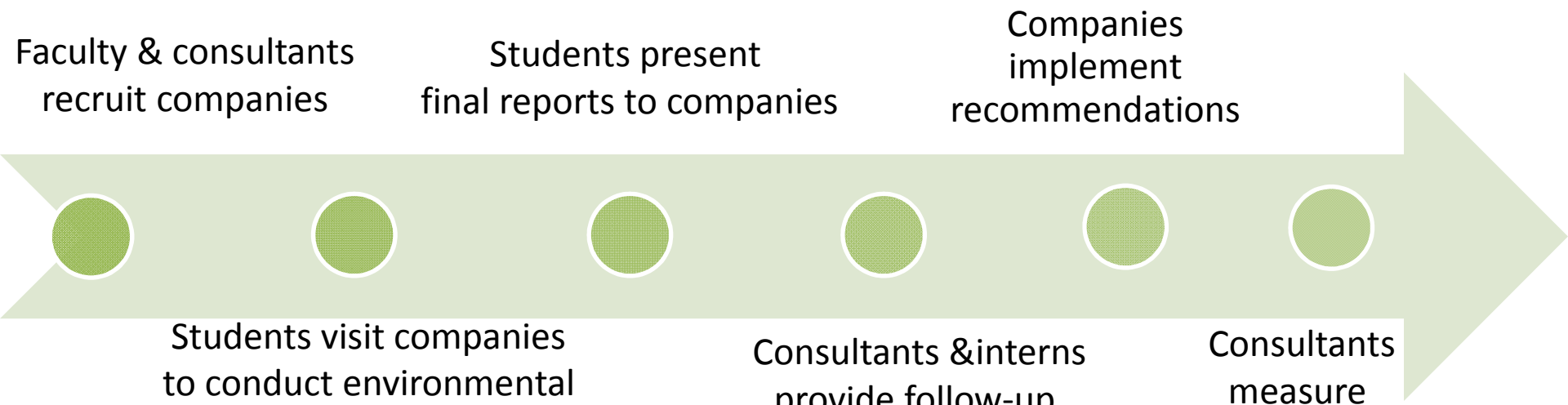
- Industry-Specific Technical Competencies
- Industry-Wide Technical Competencies

Foundational

- Personal Effectiveness
- Academic Competencies

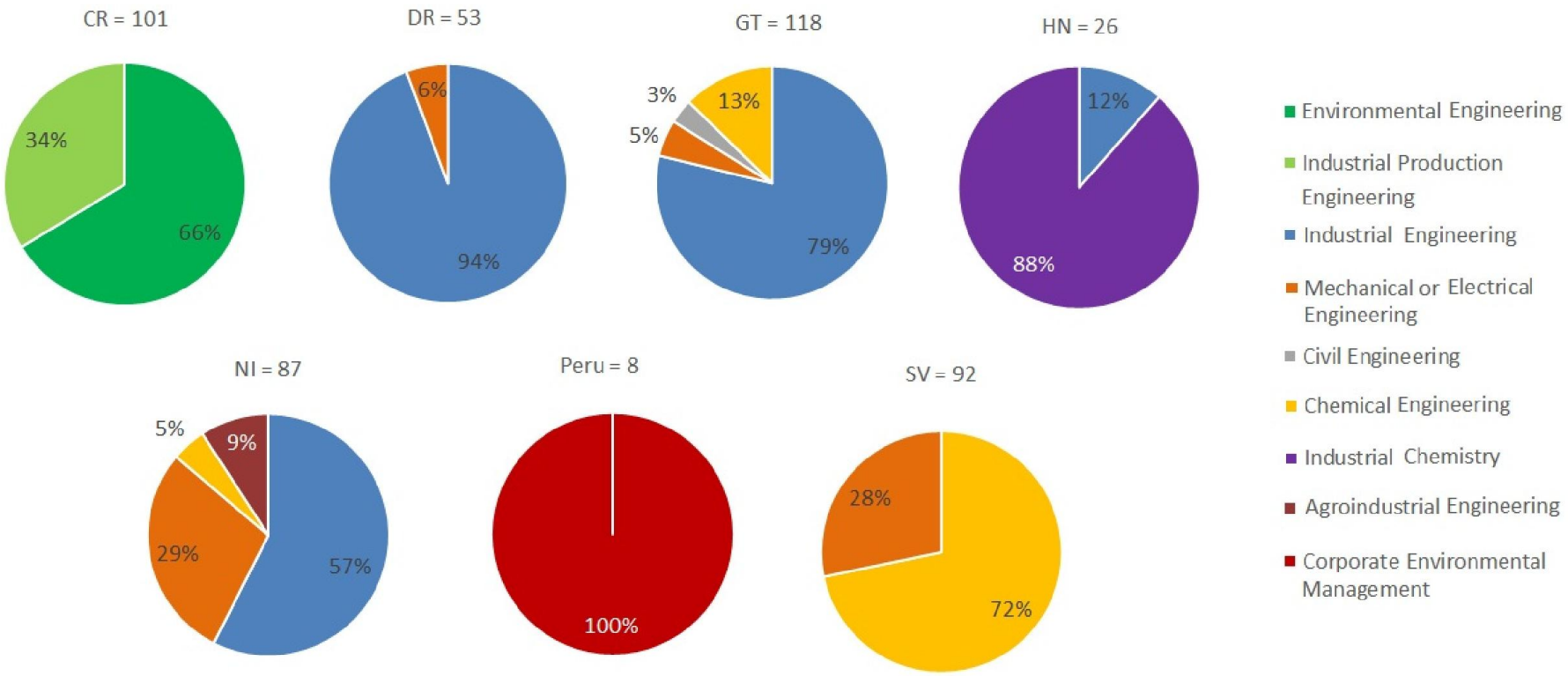
Adapted from CareerOneStop is sponsored by the U.S. Department of Labor, Employment and Training Administration http://www.careeronestop.org/CompetencyModel/

Practicum Development



Minimum on-site time 20 hours

Participating disciplines



485 students trained through practicum courses and internships

Research Questions

- What technical competencies do the students gain from the courses/practicum/internship?
- What social responsibility competencies do the students gain?
- What workplace competencies do the students gain?

Results of Surveys Conducted

- 72 student respondents from 6 countries
- Technical Questions
  - Pre/Post course assessment surveys
- Teamwork Questions
  - What were the benefits of being part of a team?
  - What challenges lie in teamwork?
  - How did the team change your perception of teamwork?

What did you learn about benefits of teamwork?

Elements of teamwork. Multiple choice selections	Honduras (8)	Guatemala (38)	Costa Rica (3)	El Salvador (17)	Peru (8)
Collaboration	66.7%	59.1%	100.0%	88.2%	50.0%
Communication	50.0%	63.6%	66.7%	58.8%	75.0%
Commitment	83.3%	77.3%	33.3%	88.2%	100.0%
Work ethics	83.3%	45.5%	33.3%	64.7%	62.5%
Time management	33.3%	59.1%	100.0%	0.0%	62.5%

How did the team change your perception of teamwork?

I learned…	Honduras (8)	Guatemala (38)	Costa Rica (3)	El Salvador (17)	Peru (8)
To appreciate the work with other	66.7%	50.0%	100.0%	16.7%	87.5%
To respect the opinions of others	100.0%	72.7%	66.7%	50.0%	62.5%
To respect the diversity of knowledge and skills background	50.0%	50.0%	66.7%	66.7%	100.0%
To be responsible for my job	33.3%	36.4%	66.7%	83.3%	37.5%
To communicate better	66.7%	40.9%	66.7%	66.7%	37.5%

What were the most challenging aspects of teamwork?

Challenges	Honduras (8)	Guatemala (38)	Costa Rica (3)	El Salvador (17)	Peru (8)
Mis-communication	75.0%	45.5%	66.7%	33.3%	75.0%
Lack of similar backgrounds	50.0%	86.4%	33.3%	50.0%	50.0%
Lack of similar work ethic	12.5%	9.1%	33.3%	0.0%	12.5%
Takes too much time	0.0%	36.4%	0.0%	0.0%	0.0%
Other team members did not do their part	0.0%	13.6%	0.0%	50.0%	0.0%

Lessons Learned: Students

- Students learned the complexity of technical issues related to decision-making for sustainable development in cleaner production.
- Complex dynamics of working with others in team collaboration.
- Communication with others who have different backgrounds and perspectives is challenging

Lessons Learned: Faculty

- The multi-dimensional decision-making perspectives involved in sustainable development are difficult to capture in the curriculum and experiential learning

Conclusion

- Having technical competencies for problem-solving and producing innovative solutions is only one element of the approach, but there is also the need for interdisciplinary skills of cooperation, communication, teamwork, project management and life-long learning.

Thank you

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Pathways to Cleaner Production in the Americas: www.cleanerproduction-la.org

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