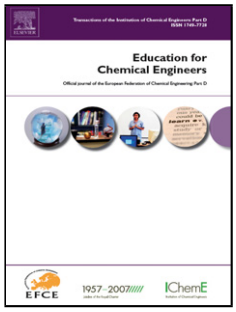

Title: A Concept Inventory for Knowledge Base Evaluation and Continuous Curriculum Improvement

Authors: Patrice Farand, Jason R. Tavares

PII: S1749-7728(17)30028-3
DOI: http://dx.doi.org/doi:10.1016/j.ece.2017.07.001
Reference: ECE 142

To appear in: *Education for Chemical Engineers*

Received date: 3-3-2017
Revised date: 26-6-2017
Accepted date: 4-7-2017

Please cite this article as: Farand, Patrice, Tavares, Jason R., A Concept Inventory for Knowledge Base Evaluation and Continuous Curriculum Improvement.Education for Chemical Engineers http://dx.doi.org/10.1016/j.ece.2017.07.001

A Concept Inventory for Knowledge Base Evaluation and Continuous Curriculum Improvement

Patrice Farand[†] and Jason R. Tavares[†]*

Department of Chemical Engineering, Polytechnique Montreal
P.O. Box 6079, station Centre-Ville, Montreal, Quebec (Canada), H3C 3A7

E-mail: jason.tavares@polymtl.ca
Telephone: 1-514-340-4711 ext. 2326
Fax: 1-514-340-4159
*Corresponding author, [†]The authors contributed equally to the study

highlights:

- A concept-validating tool is developed and applied for 4 years
- Questions are created and revised to ensure proper assessment
- Results are used to improve the undergraduate curriculum, through a valuable
- feedback loop
- A key engineering quality is evaluated with greater depth

Abstract. Students at Polytechnique Montreal have demonstrated the ability to tackle large-scale, complex calculations through their integrative projects. However, high quality engineers must not only master calculations, but the underlying fundamental concepts as well – this level of retention allows them to transfer their knowledge to the new challenges they will face. To ensure this, accreditation criteria for engineering programs in Canada require the evaluation of multiple attributes, the first of which is "a knowledge base for engineering". While most universities opt to evaluate this attribute through in-class grades, we choose to adapt a pedagogical tool (a concept inventory) to formulate an evaluation of our students. Our students are examined using a subset of questions from more than 800 chemical engineering questions, split into 10 subcategories. Data amassed over four years is presented, showing the impact of various improvements to this tool, as well as its use for instructor feedback and curriculum improvement. Key improvements include question revisions and targeted revisions of muddy concepts in the affected courses.

Keywords: accreditation, attributes, computer tools, feedback, improvement, concept inventory

1. Introduction and context

1.1 Main Issue