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Teaching sustainable engineering using disassemble-analyse-assemble (DAA) activities and lifecycle assessment (LCA) approach in first year engineering education

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There is a growing realization among engineering educators that a new vision for the education of engineers needs to evolve to keep up with the challenges of tomorrow. In such context, introduction to sustainable engineering is a new module introduced into the first year, first semester of the engineering curriculum at the Faculty of Engineering, Sri Lanka Institute of Information Technology in Sri Lanka in 2014. Sustainable engineering education is interdisciplinary in nature, making it more challenging to teach to the first year engineering undergraduates. Many past studies have demonstrated that active learning techniques would be more effective in terms of learning interdisciplinary skills and systems thinking. Usually, reverse engineering is a technique used in engineering education to teach engineering design, most in mechanical and electrical engineering disciplines, but it has not been widely used in teaching sustainable engineering. Life cycle thinking is very important in engineering education as it would provide room for making informed decisions by engineers, when they design products, systems etc. The objective of the paper is to present how the steps of life cycle assessment (LCA) and reverse engineering can be integrated in content delivery and assessment design of a first year sustainable engineering module, highlighting active learning pedagogies. The structured approach used in reverse engineering and life cycle analysis approach enabled the fresh engineering undergraduates a smoother transition from high school to university learning environment. This was evident through the active engagement during the workshop sessions as well as the grades obtained for the term project when compared to the previous year.

Keywords: assessment, reverse engineering, student centered learning, systems thinking

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