Nachhal(l)tigkeit – Sustainable Professional Education for an Environmentally Sound Textile and Clothing Industry

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Abstract

The DBU-funded teaching project "Nachhal(l)tigkeit" systematically integrated industry-specific sustainability and transformation challenges of the textile value chain into the engineering-based master's education at the Faculty of Textile and Clothing Technology, Niederrhein University of Applied Sciences. The aim was to equip students with a systemic understanding of sustainability and solution-oriented competencies alongside their subject-specific expertise. Didactically, an approach combining Problem-/Research-Based Learning and the Flipped Classroom method was developed, piloted and evaluated.
A key outcome is the project's full institutionalization: instead of a single elective, two modules were permanently anchored in the "Textile Products" master's programme – the mandatory course "Sustainability Management" (4 SWS, summer term) and the advanced elective "Applied Sustainability Management" (4 SWS, winter term), together accounting for 12 credit points. Evaluation showed that combining theoretical lectures, problem-based work on real SME case studies and best-practice input from industry as a source of motivation proved especially effective, yielding the strongest learning outcomes. Students' own data collection for life cycle assessment in particular substantially deepened their understanding of sustainability evaluation.

As an example, results from the third pilot (and first institutionalized) semester (winter 2025/26) are presented. Two student teams investigated the mechanical fibre-to-fibre recycling of post-consumer textiles (polo shirts and hotel towels). They produced their own recycled fibre yarn, fed their process data into a life cycle assessment model built with Umberto and ecoinvent, and discussed their results in comparison to industry- and research-based data.

The project demonstrates that an agile teaching format – research-oriented, problem-based and grounded in genuine industry partnerships – both motivated students and enabled them to connect an understanding of current, industry-specific sustainability problems and environmental impacts with a broader, systemic grasp of sustainability. As a model with strong transfer potential to other engineering degree programmes, the concept could equally be adapted to other departments or fast-evolving, highly topical fields.

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