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MICRO-SCALE CURRICULUM DEVELOPMENT IN DESIGN FOR SUSTAINABILITY EDUCATION

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ABSTRACT

This paper explores and discuss how formalised learning activities, inspired by design methods, can be used as a pedagogic means to support transformative learning in design for sustainability education.

The paper departs from the experience that formal efforts with strengthening sustainability in design education are often focusing on macro-level curriculum development; on the progression of courses based on learning objectives and goals and less on what we call micro-level curriculum development, being the actual learning activities constituting a course.

In the paper, we introduce a template for formalising learning activities, we present concrete learning activities developed in the context of fashion design for sustainability education and we demonstrate how these can be used to structure a course.

INTRODUCTION

This exploratory paper departs in the field of design for sustainability education and discusses the necessity to increasingly consider the multiple levels in curriculum development.

Experience is that implementation of initiatives supporting sustainable transition are often focusing on higher-order and macro-scale of institutional or program levels making explicit values, mindsets and perspectives, whereas formalising and working systematically with activities in courses and how to implement on micro-scale, lack attention and acknowledgement.

In this paper, we argue that in order to fully integrate design for sustainability in the curriculum and to support levels of transformation (Sterling, 2010) in design for sustainability education, it is necessary to work on all levels of curriculum simultaneously and interlinked. This means to apply curriculum development in-courses as a means to support progression between-courses.

Consequently, here we present a structure for learning activities to support sustainability in design education as well as examples of, how these activities can be combined. This is based on the question:

How can we, inspired by design methods, work with formalised learning activities to support design for sustainability education?

We find that, the paper is specifically relevant for institutions and tutors working within these that:

- Want to integrate activities focusing on design and sustainability in an existing curriculum (course/program)
- Are designing a (new) curriculum (course/program) focusing on design and sustainability
- Already have integrated aspects and perspectives of sustainability in the curriculum, but would like to obtain a better understanding.

CURRICULUM DESIGN AND DEVELOPMENT

In education, curriculum development and maintenance thereof occur on multiple levels.

- On institution level guided by the study program
- On program level guided by the course description
- On course level guided by the course brief

Both the course description and the study program are formal and documents used to define the learning objectives and goals of courses and programs, while the course brief is used to describe in-course content such daily activities, assignment(s) given, deliveries and required readings. Whereas the first two are recurring documents, the latter is formally re-written each time a course is running. Even though practice is to take inspiration in previous years' courses and to engage the same tutor(s), in-depth understanding of the course content and progression in activities are person-driven and thus vulnerable and can be difficult to communicate.

DESIGN METHODS AND CURRICULUM DEVELOPMENT

Being tutors and researchers in the field of design, the use of design methods and processes is strongly acknowledged and integral parts of our way of working.

In many ways, tutoring can be compared to facilitating a design process. The needs and goals are determined by the course description and the methods applied and their structure in-between are described in the design brief.

However, whereas we expect students to be explicit and transparent on their use of methods by means of a research question, procedure and evaluation of experiments and how they inform each other – on validity, reliability and replicability – we rarely do the same ourselves when it comes to the learning activities we apply in teaching. The below table outlines the parallels in design practice and course design

Table 1. Comparison between design process and course structure

	Design process	**Course module**
Entry	Need and research question	Learning objective and goals
Procedure	Combination of design methods	Combination of learning activities
Support	Design tools	Presentations literature, learning tools
Outcome	Design concept	Deliveries

We find it relevant to explore and discuss, what we can learn from design processes and design methods in teaching situations. We want to emphasize that learning activities have different roles and natures and that combinations of activities can support not only a course

itself, but the progression in a curriculum as learning activities will be easier to trace and build on across courses.

In the same way that the syllabus is a considered as a well-established means to guide progression, we argue that formalising learning activities – making them explicit – can support progression in courses and programs and to communicate and transfer knowledge between students, tutors, head of programs etc.

Emphasising the similarities to design, but also research methodology, learning activities can build on quantitative and qualitative, link and inform each other through 'accumulation', 'comparison', 'expansion', 'series' or 'probing' (Krogh & Koskinen, 2020) as well as they can take place in a 'lab' (e.g. in class room), a 'field' (e.g. as excursions and field work) and a 'showroom' setting (e.g. exhibitions) (Koskinen et al., 2012).

We hope that this relation between curriculum development and design methods and processes is somewhat clear to those who engage with both. We also hope that with this paper, we can support and push forward work with curriculum development with multi-level focus.

THE LEARNING ACTIVITY TOOL

The empirical part of the paper takes point of departure in the 'Learning Activity Tool', a collection of formalised learning activities, developed as part of the FashionSEEDS project (2018-2021). FashionSEEDS is an Erasmus+-funded project to support fashion design for sustainability education through development of tools and toolkits on course and program level available on an open-source platform from the summer 2022.

Based on the authors' previous experience with developing learning tools to facilitate working with design and sustainability (Author 1 2017, 2020, Author 2 2020), in the project the Activity Learning Tool, a collection of learning activities, was proposed as a way to offer a tangible means for tutors to find inspiration in, engage with and apply in teaching.

In the project, the learning activities can inform the developed 'Course Development Card', a collection of 15 course unit descriptions structured in pillars of sustainability and levels of transformation and the 'Tutor toolkit', developed for tutors to plan course modules.

The activities are described based on a common template. The following presents the underlying thoughts behind the development of the template and the information provided for each learning activity. As a way to evaluate the template, while developing the activities, the authors used the template to understand

the progression of the courses they had previously taught.

DEVELOPING THE TEMPLATE

With inspiration in design methods, a template was developed to include descriptions:

- Description: The objective of and goal with the activity together with a guiding entry question to contextualise the activity ('Why')
- Procedure: The step-by-step execution of an activity to describe the procedural framing of the activity ('How')
- Resources: The resources recommended to conduct and support the activity such as existing toolkits, related activities and literature ('What')

To further structure the activity, the following filter options were applied and illustrated with pictograms:

- Pillar(s) of sustainability with reference to (Dessein et al., 2015) ('Why')
- Timeframe ('How')
- Teaching approach with reference to the didactic triangle (Rienecker et al., 2015) ('How')
- Activity format with reference to approaches to knowledge production in the design process (Friis, 2016) ('How')

The collection of learning activities was planned to exist both as a physical card deck in A5 size and as a digital entry on the FashionSEEDS platform. The online platform increases visibility and accessibility of the tool, while we regard the physical deck as instrumental for concrete and hands-on course development.

DEVELOPING THE COLLECTION OF ACTIVITIES

Prior to developing activities, extensive work was put into collecting existing resources as the primary strategy was to propose activities based on these. After a couple of iterations, where the number of activity ideas came down from more than 70 to 38, these were further briefly described by means of objective, procedure, relevant pillar(s) of sustainability, estimated time frame(s), activity format(s) and proposed literature. The collection was then shared with the project partners that were asked to evaluate the quality and relevance of activity ideas within one specific pillar each.

Based on the project partners' feedback, the learning activities were further described. In this process, activities were modified, split and merged to ensure an even distribution of activities across filter options and resources. The detailing of cards was also informed by sustainability key competences (UNESCO, 2017; Wiek et al., 2011) and Bloom's taxonomy of learning (Anderson et al., 2014; Bloom et al., 1956). However, as we see that the complexity of each activity can be adjusted to fit a certain level, it was deliberately decided that these should guide rather than define the activities.

Per ultimo January 2021, the collection counts 38 learning activities, but more will likely be added as the project continues. The final layout of both the digital version on the platform and physical version in a printed card deck is in its final stage. In figure 1, the learning activity 'Wardrobe stories' is shown in the current layout draft for the printed deck.

Figure 1. Example of learning activity 'Wardrobe stories' in a layout draft.
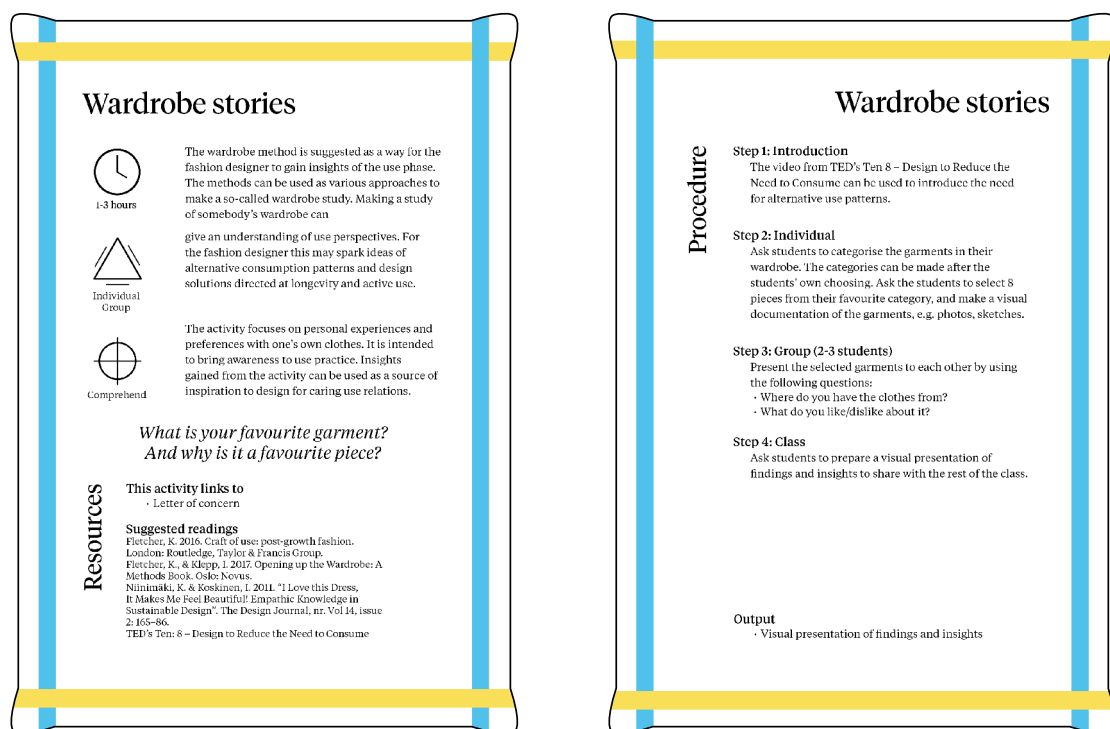
USING THE LEARNING ACTIVITY TOOL

The following will provide an example of, how the formalized activities can be used to frame the content and progression of an introductory level course module with focus on materials use in garments and with the environmental pillar as the common denominator of the activities. The proposed course module consists of five learning activities:

- Insights of unused garments
- Materials origin and functions
- Recycling facility
- Exploring material parameters
- Garments with many lives

The learning activities in their printed deck layout draft is shown in figure 2, while table 2 outlines the progression of the learning activities by means of Teaching approach(es), Activity format(s) and Entry question.

In development of the course module, we have aimed for applying a variety of teaching formats based on the individual student and group work to facilitate students' learning progression.

We have also aimed for activity formats that predominantly support analysis of the topic from a reflective mindset, but with steady changing back between doing and thinking, between 'collecting' and 'comprehending' that in the last learning activity is converted into 'conceptualising' and thus translating learning into something concrete.
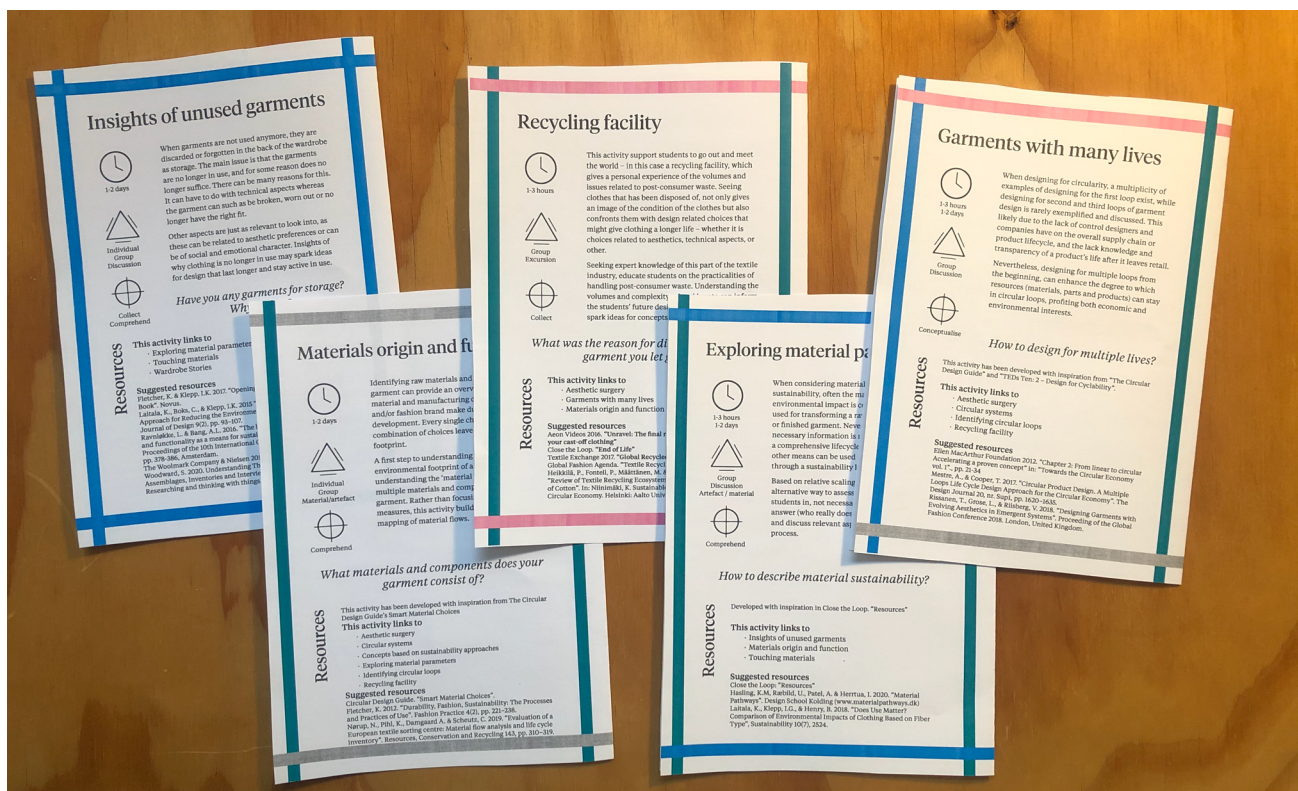
If looking at the questions asked in the five learning activities, the first three takes point of departure in students' own wardrobe and thus relate potentially new insights with something they know already. This can be a launch pad for increasing complexity and pushing students into working in other contexts.

DISCUSSION

Reflecting on the learning activities as a means to support transformative learning in design and sustainability education, they have been developed to emphasize and mature students' ability to reflect on and account for what they learn and how they can use it. Here we see that students' cognitive learning (Anderson et al., 2014; Bloom et al., 1956) and development of sustainability key competences (Wiek et al., 2011) are directly linked to transformative learning.

Furthermore, we have developed the learning activities in an 'open format' that make them integrable on multiple levels in education. In the learning activity 'Wardrobe stories' studies can start with studying their own wardrobes and if wanting to increase the level of complexity, studying others' wardrobes, such as being in a different place in life than the student. We hope that tutors and course planners will embrace and use this flexibility built into the proposed learning activities to create attention and discussion on the role of different teaching approaches in (design for sustainability) education.

Figure 2: Outline of the five learning activities in a course model example.

Learning activity	⬤⬤⬤⬤	🕐	△	⊕	?
Insights of unused garments	Cultural	1-2 days	Individual Group Discussion	Collect Comprehend	Have you any garments in storage? Why is that?
Materials origin and functions	Environmental General	1-2 days	Individual Group Artefact/material	Comprehend	Which materials and components does your garment consist of?
Recycling facility	Economic Environmental	1-3 hours	Group Excursion	Collect	What was the reason for disposing the last garment you let go of?
Exploring material parameters	Environmental Cultural	1-3 hours 1-2 days	Group Discussion Artefact/material	Comprehend	How to describe material sustainability?
Garments with many lives	Environmental Economic General Cultural	1-3 hours 1-2 days	Discussion Group	Conceptualise	How to design for multiple lives?

Table 2: Overview of the five learning activities based on Pillar(s) of sustainability, Timeframe, Teaching approach, Activity format and Entry question.

CONCLUSION

In this exploratory paper, we have proposed to work with formalised learning activities to support micro-scale curriculum development in design education for sustainability. The learning activities are defined by a template inspired by design methods. Furthermore, we outline a sequence of learning activities as an example of a course module emphasising teaching formats, activity formats and entry questions.

We argue that formalising learning activities can:

- Provide a frame for formalising already used learning activities in a course or program.
- Create a means for making explicit and communicating course / program content.
- Support progression of a curriculum based on defined parameters allowing for cross-scale referencing of learning activities
- Offer learning activities for reference and inspiration.

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