

# Introducing Norm Creative Perspectives in Engineering and Design Educations

P-O. Hedvall and P. Mattsson

**Abstract** — The design of technologies, built environments, products, or services can result in inequalities, exclusion, and discrimination, possibly because designers—often unintentionally—reproduce social norms through their designs. This strongly relates to engineering and design educations, preparing future professionals and contributing to sustainable societies. The aim of this paper is to introduce and explore different ways to adopt such perspectives in education and training at the faculty of engineering at Lund University, LTH. Empirical materials were gathered through a literature review, discussions with critical friends and a teaching session about Universal Design for Learning (UDL) and Norm Creativity. Besides UDL, the Design Justice Framework was proposed to stimulate norm-critical thinking and thereby norm creativity in the design of new courses and as part of the education and training of future engineers and designers. The framework outlines three questions to be considered: Who participated in the design or development process?, Who benefited? and Who was harmed? As a result, we proposed teaching and learning activities, course module prototypes, on norm creative perspectives that could be adapted to different course contexts and situations. Based on this development, we discuss norm creative perspectives in relation to the benefits for students and educators, the complex social challenges in course design, and the wider ramifications of courses in engineering and design in terms of potential contributions towards the development of sustainable societies.

**Index Terms** — Design justice, Norm critique, Norm creativity, Inclusion, Equality, Universal Design for Learning

## I. INTRODUCTION

IN a sustainable society, the desires, needs and potential contributions of every citizen should be taken into account. This requires the consideration of everyone in society, on all levels, in all nooks and corners. But who is considered to be part of “all” and “everyone” in practice, and what opportunities do teachers and students in engineering and design educations get to reflect on the interaction between social justice, diversity and design of their education and training?

It is vital how “all” is conceptualized, understood and put into practice - since it affects both design processes and end results in terms of inclusion and discrimination. Today, awareness about inclusive design is increased due to the worldwide consideration of the sustainable development

goals, particularly, Goal 10: Reduced inequalities, Goal 3: Good health and well-being as well as Goal 11: Sustainable cities and communities. Different forms of design outcomes (such as buildings, products, infrastructure, technologies, systems) can intentionally and unintentionally result in inequalities and exclusion; possibly, because designers use their own experience and values to draw assumptions about user needs. In other words, social norms are reproduced by designers through design [1]. This also includes the design of courses and teaching-learning activities (TLAs).

It is thus important that designers are aware of norms in design, and have a norm-critical gaze (i.e. discussing and challenging inequalities and exclusion) that can open ways of thinking about more inclusive design [2;3]. Further, norm creativity (i.e. developing the design solutions based on norm critical analyses) should be adopted. By promoting awareness of norms, the adoption of norm-critical and norm-creative approaches could be achieved, and this could lead to a better understanding of diverse individuals with different experiences and needs in relation to inequalities and exclusion in different contexts, including educational contexts.

### A. Design Justice

The Design Justice Network has proposed a framework for analysing design processes (Figure 1), bringing together three main questions:

- Who participated in the design process?
- Who benefited from the design?
- Who was harmed by the design?

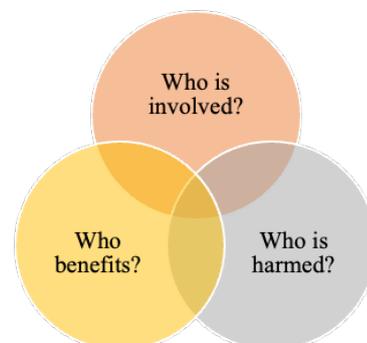


Figure 1. Design justice framework adapted from “Analyzing Design Narratives,” from Design Justice Zine, no. 1: Principles for Design Justice (ed. Una Lee, Nontsikelelo Mutiti, Carlos Garcia, and Wes Taylor) in Costanza-Chock (2020) [4].

The Design Justice Framework is meant to guide design processes to support equality and social inclusion. The questions are in themselves quite straightforward, but together they form a sharp critical lens. A central part of the

Manuscript received November 8, 2021.

P.-O. Hedvall is with the Certec research group, Department of Design Sciences, Lund University, Box 118, 221 00 Lund, Sweden (e-mail: per-olof.hedvall@certec.lth.se).

P. Mattsson is with the Environmental Psychology research group, Department of Architecture and Built Environment, Lund University, Box 118 Lund, 221 00 Sweden. (e-mail: pimkamol.mattsson@arkitektur.lth.se).

questions is “Who?”. Awareness of what norms influence the understanding of this “who” are crucial to avoid reiterating harmful norms. This is highly relevant also to higher education, considering its important role to educating and training future engineers, architects and designers. Norm awareness and a rich understanding of “all” and “who” is also relevant to teachers when creating courses or TLAs.

### B. Norms, Norm critique and Norm creativity

Based on Alves Silva et al. [5], definitions of these core concepts are provided as follows:

- *Norms* are assumptions, expectations, and ideals about how we should live together and thereby, specifying what is right and wrong and how ones should behave in different contexts or settings. A typical example of a social norm is that we should not hurt anyone. Another example is working hours from 9-to-5 or eight working hours per day. Unawareness of norms in design may contribute to inequalities or exclusion.
- *Norm critique* is the process of analysis and questioning of norms that can lead to different kinds of discrimination. Norm critique would reveal what/who norms include and what/who norms exclude.
- *Norm creativity* is an approach to create new, more inclusive and equal design solutions as well as opportunities based on norm-critical analysis.

### C. Aim

The aim of this paper is threefold: 1) to introduce design justice perspectives in the context of education and training, 2) to present examples of course modules involving norm awareness to introduce the notions of norm critique and norm creativity and 3) to discuss norm creativity in an LTH context.

## II. EXAMPLES OF COURSE MODULES

We developed three course modules with the overarching aim to stimulate students’ reflection on norms in engineering and design in relation to individual diversity, design justice and social aspects of sustainability.

Several publications [1-3] addressing norm critique and norm creativity were found. They point to the important roles norms play in design to support accessibility, inclusivity, and equality. In addition, we are grounding the TLAs in Universal Design for Learning (UDL) [6-8], seeking to provide multiple ways to prepare for classes, engage in the activities and express learning and knowledge.

### A. Module 0 – Introducing norms and norm critique

This first module aims to build background knowledge of this new topic to students. The module comprises a lecture raising awareness of norms and an individual photo-based assignment encouraging students to be norm critical. The students are asked to find and reflect on two examples of designs that may contribute to exclusion/inequality, and inclusion/equality, respectively. All students will be provided equal opportunities to access information and

learning materials, and to reflect on their own learning in different ways (such as oral presentation, text, sketches, photos, or their combinations). In line with Bigg’s SOLO taxonomy [9], students are expected to develop the understanding of norms and norm creativity from unistructural level towards relational level.

### B. Module 1 – Group assignment

The aim of this module is to guide students to apply norm critical and norm creative approaches to suggest what design solutions might be. It is expected that students would obtain the prior knowledge through the previous module and further develop the understanding by means of active TLAs. For the group assignment, groups of 4-5 students are asked to identify a norm challenge or problem in everyday design and propose at least one design solution. The module also includes peer group feedback and oral presentations with opportunities to obtain feedback from the rest of the class and teachers, and to reflect on their works. Students will be provided multiple ways to express their learning and knowledge through oral presentations, texts or sketches. Throughout the module, all students are expected to obtain a better understanding at the relational level in accordance with the SOLO taxonomy [9].

### C. Module 2 – Norm creative speed project

This module consists of a full-day project, where the students iterate through a full design process. They are expected to involve participants/end users and, at the end of the day, to present their sketches and prototypes. The speed project is meant to offer learning opportunities by applying the design justice framework in a norm creative design project. The students work in teams of 4-5 students on a design project on the theme “Transitions”. This theme pinpoints the informative and elucidating process stage where a transformation is happening, from one activity to another, from one phase or stage to another. Examples are, stepping on a bus, going to the gym, convening with other students, and finding a place to study together, starting to work from home, and graduating high school. Transformations often involve categorisations (from pedestrian to bus passenger, etc.) of some kind and operate on different scales, and the students can select a scale that fits their interest. Potential end-users from different backgrounds are expected to be involved all day, for consultation and engagement as participants in design activities and tests. The students are asked to consider carefully how to involve the users, e.g., when, how and on what level, as co-creation is a key component of working with inclusive development.

We consider this module as a stand-alone one to serve both formative and summative assessments.

## III. DISCUSSION

### A. Teaching norms, norm critique and norm creativity

Combinations between lecture-based, task- and problem-based learning activities have been proposed for teaching this subject. It has been found that the students positively responded to different strategies of combining lecture-based with project-based learning [10]. In this case, traditional lectures are applied aiming to provide the understanding at

unistructural and multi-structural levels [9] – leading to the task- and problem-based learning assignments (a speed project). It is expected that the individual and group assignments together would encourage active and collaborative learning among students. Involving end-users coming from diverse backgrounds in the speed project would bring lived experiences to the classroom and thereby, facilitating collaborative learning among students to better understand real-life problems or challenges, as well as openings and opportunities.

### B. Design justice of the course modules

The course modules are originally designed for campus-based courses and thus, equal access to facilities, learning materials and equipment, and physical safety should be considered for all students [11]. Hybrid options could be applied to modules 0 and 1, whereas module 2 – the speed project preferably takes place on campus. However, flexible options should be considered if students as well as other participants face difficulties to travel and be on site. In line with a UDL strategy, teaching staff, students as well as stakeholders should be involved in setting up the TLAs including scope and timing [10].

The overall TLAs consider various types of designs (from small scales of products to larger scales of interior, building and urban design) for students with different backgrounds and interests. The group assignment and project on one hand, could encourage active and collaborative learning but may not meet different learning styles and paces. The assignments also offer adjustable levels of challenges.

### C. Design justice-based teaching practices

The design justice framework is considered to facilitate the design process improving inclusiveness and equality. This is of particular relevance to engineering and design educations at LTH that involve the design and development in various scales and contexts, including educational contexts. The three questions provide a critical lens, which could facilitate the design of courses and TLAs to support UDL and therefore, improve the accessibility of teaching-learning.

The teaching practices should be based on design justice as a core trait of the course modules or TLAs, and offer a steppingstone for future norm creative engineers, architects, designers and developers to deal with the complex social challenges in design. To achieve this, we suggest that students should be involved in the design of the courses. For example, pilot students take part in joint exploration of how to create TLAs supporting awareness of norms, learning norm critical and norm creative design as well as intersectional analysis.

## IV. CONCLUDING REMARKS

- 1) To promote norm awareness and thereby, stimulating norm critical and norm creativity thinking in engineering and design educations, the design justice framework could provide guidelines for the analytical process.
- 2) The examples of course modules introducing norm awareness and the notions of norm critique and norm creativity were developed for design and architecture

educations. However, the design concepts could be adapted to different course contexts and situations.

- 3) Together with UDL, the design justice framework should also be considered in the design of courses and TLAs to support accessibility of teaching and learning.

## REFERENCES

- [1] H. Ekström and C. Sundbom, "Norm-critique in practice: haptic and tactile design methods in the notion of care," in Nordes 2019, Helsinki, 2-4 June, 2019.
- [2] T. Öhrling, J. Normark and Å. Wikberg Nilsson, "Norm Creativity in Student Design Projects - One Approach to Creating Sustainable Societies," in *Proc. the 20th International Conference on Engineering and Product Design Education (E&PDE)*, London, 6-7 September, 2018.
- [3] Å. Wikberg Nilsson and M. Jahnke, "Tactics for Norm-Creative Innovation," *She Ji: The Journal of Design, Economics, and Innovation*, Vol. 4, pp. 375–91, 2018.
- [4] S. Costanza-Chock, *Design Justice: Community-Led Practices to Build the Worlds We Need*. Cambridge, MA: The MIT Press, 2020. E.
- [5] M. Alves Silva, K. Ehrnberger, M. Jahnke and Å. Wikberg Nilsson, *NOVA- methods and tools for norm creative innovation*. Stockholm: Vinnova, 2016.
- [6] D.L. Edyburn, "Would you recognize universal design for learning if you saw it? Ten propositions for new directions for the second decade of UDL," *Learning Disability Quarterly*, Vol. 33, no. 1, pp. 33-41, 2010.
- [7] B. Rydeman, H. Efrting and P.O. Hedvall, "How can we make teaching more inclusive?," in *LTHs 10: e Pedagogiska Inspirationskonferens*, 2018.
- [8] B. Rydeman, H. Efrting and P.O. Hedvall, "Towards a more inclusive university-supporting teachers through Universal Design for Learning," *Studies in health technology and informatics*, Vol. 256, pp. 98–106, 2018.
- [9] J. Bigg and C. Tang, (2011). *Teaching for quality learning at university: what the student does*. (4<sup>th</sup> [rev.] ed.) Maidenhead: McGraw-Hill/Society for Research into Higher Education & Open University Press, 2011.
- [10] K.P. Nepal & G. Jenkins, "Blending project-based learning and traditional lecture-tutorial-based teaching approaches in engineering design courses," In *22<sup>nd</sup> annual conference for the Australasian Association for Engineering Education (AAEE)*, Fremantle, Western Australia, 2011.
- [11] S. Burgstahler, Equal access: Universal design of instruction [Online], Available: <https://www.washington.edu/doiit/equal-access-universal-design-instruction>