

Adopting a New Roadmap for Design World En Route to an Uncertain Future

A TRANSFORMATIVE METHODOLOGY FOR DESIGNERS AND DESIGN EDUCATORS

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PAPER ABSTRACT: Recent global issues like supply-chain collapse, chip shortages, global-warming, and other disruptive developments have a very strong impact on designers and the design world, affecting everyone's wellbeing and future expectations. Design society's progressiveness depends upon adapting to new movements and trends more frequently now than ever before which originated from social, cultural, and technological necessities. Due to shifting paradigms, global as well as local tendencies, and requirements affecting the learning processes and outcomes for everyone, the teaching and learning trends are also shifting. The urgency and the necessity to adopt new approaches with critical criteria for recreating efficient and adaptable environments became evident. In the cacophony of disparate methodologies and modalities, it became harder to pinpoint what type of methodological adoption would serve the purpose better for the next best scenario for designers, academics, and design students alike. This paper aims to analyze transformative design and teaching to adapt to the changing needs for the new design world that is and will be affected by technological and logistic shortcomings. Thus, it is intended to draw conclusions from an applied methodology to provide a transformative model as a frame of reference for designers and design educators. As one of the major focal points of this study, a collaboration model between academia and industry is circumstantiated as a case-study which is backing up the hypothesis of the proposed transformative methodology to play a crucial role for recreating a road map to stay progressive and innovative for the design society.

Keywords: Design Pedagogy, Transformative Design, New Paradigms, Transformative Pedagogy, Product Semantic Model.

1. INTRODUCTION

The Essence of Design Education transcends traditional disciplinary perimeters, underscoring a multidisciplinary approach to design thinking and problem-solving. The ability to adapt and innovate in a rapidly evolving world is paramount. Design education should be a part of this progressive and innovative adaptation. New immersive, transformative, and collaborative modalities are needed for generating more opportunities which all together would have the potential to enhance the stakeholders of design education such as institutions, faculty, students as well as professional collaborators. Collaborations between academia and industry could play a significant role for the implementation of transformative methodologies in order to stay ahead of the curve for everchanging paradigms of the design world due to various factors like technological, cultural, and economic shifts as well as

human/user behaviors and expectations towards designed objects. Designers should stay adaptive, innovative, and progressive. At the same time, they should also be mindful of local tendencies since cultural, social, and economic factors can greatly influence design decisions. A transformative methodology should therefore potentially bring flexibility enough to accommodate both conventional trends and local nuances. Global trends such as digital transformation with or without AI; virtual and augmented realities are reshaping the design landscape individually, locally, and globally. These trends present both opportunities and challenges for designers. On one hand, they open up new avenues for innovation, on the other, they require designers to acquire new skills and knowledge while testing and adopting new approaches within technological, societal, and cultural realms that would also affect the design thinking and learning processes as well as educational outcomes. From a design education standpoint, students and faculty need to experience a state of being more tolerant, emphatic, environmentally conscious and humanely creative by recognizing global socio-cultural paradigm shifts that most likely require design-related responses. Incorporating transformative methodologies in design processes not only allows for the creation of innovative products and systems but also facilitates the exploration of novel design concepts and functionalities. Design education, educators and designers alike need to have a better understanding of psychology and technology.

This paper intends to explore a transformative methodology for designers, taking into account the shifting paradigms, local and global tendencies, and the requirements affecting learning processes and outcomes. This research also aims to analyze and correlate methodologies and approaches by using a case study that spans across two years which leverages a transformative teaching pedagogy for design education with societal and individual awareness; digital transformation strategies, Industry 4.0 technologies, digital tools and AI integration to design thinking and design processes.

2. LITERATURE REVIEW - DEFINING TRANSFORMATIVE METHODOLOGIES AND THEIR IMPLICATIONS FOR DESIGN EDUCATION

Slavich (2005) used the term “transformational teaching” for the first time to describe the belief that instructors can promote meaningful change in students’ lives if they view courses as stages upon which life-changing experiences can occur.

The Transformative Learning Theory, originally developed by Mezirow (2000), is described as being “constructivist, an orientation which holds that the way learners interpret and reinterpret their sense experience is central to making meaning and hence learning”. The theory has two basic kinds of learning: Instrumental learning focuses on learning through task-oriented problem solving and determination of “cause and effect” relationships. Communicative learning involves how individuals communicate their feelings, needs and desires with sequential phases, namely as: Phase 1. A Disorienting Dilemma, Phase 2. Self-Examination, Phase 3. Critical Evaluation of the Assumptions, Phase 4. Planning a Course of Action, Phase 5. Acquisition of Knowledge or Skills to Carry Out New Strategy, Phase 6. Exploring and Trying New Roles, Phase 7. Building Self-Efficacy in New Roles and Relationships. Transformative design is a methodology that focuses on creating change and addressing inequities through intentional and conscious research design choices. This approach is, characterized by Mertens

(2021), a focus on transformative learning and indigenous perspectives, aiming to increase social impact for vulnerable groups and cultural minorities. From a designer's standpoint, transformative design offers several benefits. Firstly, it allows designers to actively contribute to addressing societal inequities and promoting positive change through their design decisions. By consciously incorporating transformative ethical assumptions into their methodology, designers can create solutions that have a meaningful impact on communities and individuals. Additionally, transformative design encourages a collaborative and participatory approach, involving stakeholders in the design process to ensure that the solutions developed are inclusive and relevant (Hyett et al., 2020).

Irwin (2012) points out that one of the most fundamental changes for designers and the design process will be a shift in focus from objects to relationships. Accordingly, an organic model of society and environment will replace the dominant, mechanistic one and this in turn will suggest a more respectful, iterative, and inclusive process for designing solutions. Various references provide valuable insights into design methodologies, educational strategies, and the integration of new technologies in industrial design education. One key aspect highlighted in the references is the importance of incorporating transformative methodologies to adapt to changing industry requirements. Rios & Charnley (2017) emphasize the need to inform education providers, product creators, and industry stakeholders about how global manufacturing and commerce strategies for climate change will transform the practice of design. This indicates that industrial design education should evolve to align with sustainability and circular economy principles. Additionally, Demirbaş and Oğut (2020) discuss the redesign of the design brief as a digital learning tool using a participatory design approach. This approach reflects a shift towards more collaborative and interactive methods in education, catering to the needs and expectations of a new generation of learners. By involving students in the design process, educators can create more engaging and relevant learning experiences. Furthermore, Hamurcu et al (2020) explore the use of virtual reality in industrial design education, highlighting how technology can enhance creativity and representation in design. Integrating tools like virtual and augmented reality can provide students with immersive learning experiences and expand their design capabilities.

Williamson et al (2020) delve into co-creating work-integrated learning curriculum to provide transformative learning experiences. This collaborative approach involving educators, industry partners, and students is claimed to be bridging the gap between academic knowledge and industry requirements, ensuring that students develop the necessary skills for industrial design practice. In the context of digital transformation, Marchi and Baalbergen (2023) present a human-centric Digital Twin architecture for Industry 5.0, emphasizing the role of digital twins in supporting skilled operators in production automation. This innovative approach demonstrates how emerging technologies can revolutionize industrial processes and education simultaneously. Overall, by incorporating transformative methodologies, embracing new technologies like virtual reality and digital twins, and fostering collaboration between academia and industry, industrial design education can effectively prepare students for the challenges and opportunities in the evolving local and global landscape. By incorporating sustainability principles, such as minimizing adverse environmental impacts and promoting social well-being, industrial design can contribute to a more sustainable future. Central to

transformative teaching is the cultivation of critical consciousness, wherein students critically examine their assumptions, beliefs, and societal structures that perpetuate inequality and injustice.

Slavich (2009) highlights that instructors could serve as motivational leaders in this process by compelling students to realize a shared vision for a course, which encourages students to work together to maximize their personal and collective potential. In accordance with this approach, leadership and entrepreneurship courses started to be a part of design schools and curricula. This also brought to light that the faculty should follow suit by becoming a part of the efforts of integrating these concepts to design education. Transformative education aims to cultivate critical consciousness, encouraging students to question prevailing assumptions and ideologies. One of these approach methods and theories has been product semantics, which is built on the conceptual framework of semantics, which adopts meaning-centered design theory and aesthetics in the field of language (Michl, 1992). The field of product semantics provides a lens through which students can deconstruct the symbolic representations and narratives perpetuated by consumer culture. By analyzing semiotic and semantic codes embedded in products, students develop a critical awareness of how design is instrumental with consumption patterns, social hierarchies, and identities.

3. ADOPTING PRODUCT SEMANTICS - A CASE STUDY FOR TRANSFORMATIVE METHODOLOGY

According to Wahl and Baxter (2008), design plays a central role in shaping a sustainable civilization. It does so in the material dimensions of industrial design, architecture, and regional planning, as well as in the immaterial dimension of the metadesign of concepts and inclusive multiperspectives from which a holistic/integral worldview could emerge.

To meet the demands of tomorrow's design landscape, also correlating and distilling some of the approaches analyzed in the previous section, a product semantic model for design education was adopted to subserve as a transformative method. Product semantics draws from multiple disciplines, including design, anthropology, psychology, and semiotics. Evans and Sommerville (2007) propose a product semantic model which introduces the basic ideas, concepts, principles, and language of product semantics and to practice them. This model claims to enable students to articulate design problems in a new way, engage in research about the meanings their designs might have for others, and to enhance their ability to defend their proposals in the face of competing discourses whilst increasing the competence of translating these ideas, concepts, and principles into design practices. Integrating product semantics into transformative design education promotes interdisciplinary learning, bridging the gap between theory and practice. Students engage with diverse perspectives and methodologies, enriching their understanding of the complex interplay between design, culture, and society. This multidisciplinary approach fosters creativity, innovation, and collaboration, equipping students with the tools to tackle complex problems from multiple angles. By integrating insights from relevant references, a comprehensive approach could be developed to address the evolving needs of industry and society. One key aspect is the adaptation of design education to the factors such as changing user needs, expectations, and attitudes; variety of market-dependent industry norms and technological advancements that rapidly change and affect user interaction and interfaces. As emphasized by

McDonald (2022), this adaptation is crucial for preparing student designers to navigate the complexities of modern design processes and effectively contribute to the industry. By integrating concepts such as empathy, collaboration, and creativity into the educational paradigm, students can develop a solid foundation for future professional endeavors, aligning with the demands of a rapidly evolving job market. A study by Kozhanova et al (2015) highlights the significance of incorporating design technologies into higher education to educate students as future professionals demanded by today's job market. By focusing on the didactic construct of design technologies, educators could cultivate students' personalities and equip them with the necessary skills to excel in the design field. Moreover, the research by Ollenburg (2018) underscores the central role of projecting and shaping the future in the design process. By emphasizing the importance of designing for the future, educators can instill in students the mindset and skills needed to anticipate and meet tomorrow's demands effectively. By synthesizing these insights and leveraging a product semantic model for design education, educators can create a holistic approach that integrates design thinking principles, technological advancements, and a forward-thinking mindset. This approach empowers students to become adaptive, creative, and innovative designers capable of addressing the challenges and opportunities of the future design landscape. In the realm of industrial design education, the integration of semantic and transformative methodologies plays a crucial role in enhancing the quality and innovation of product design processes. By leveraging concepts from product semiotics, cognitive semantics, and hierarchical semantic frameworks, designers can promote multi-disciplinary knowledge sharing, coordination, and ultimately improve product quality (Fang, 2022). Additionally, the utilization of form-finding methodologies as a formative research strategy in industrial design education has shown promising results through empirical-analytical approaches and collaborative tools (Torreblanca-Díaz et al., 2019). While some design education programs touch upon affordances and product semantics, there is a gap where many industry designers do not explicitly consider these elements during the design process (Parmentier et al., 2020). According to Elmuti et al (2005), bridging the divide between academia and industry could be facilitated through strategic alliances between universities and corporations, fostering a collaborative environment that benefits both parties. Aligned with this notion, Findeli (2001) claims that rethinking design education methodologies for the 21st century involves theoretical, methodological, and ethical considerations to ensure that educational practices align with the evolving needs of the industry. As highlighted by Ramirez (2006), sustainability in industrial design education is gaining prominence, with a focus on preparing future industrial designers to contribute to a more sustainable future through their work. By embracing innovative learning schemes that facilitate collaboration between industry and academia, such as collaborative training programs focusing on digital transformation, pointed out by Simões et al (2021), industrial design education can stay abreast of industry needs and equip students with the skills required for the evolving landscape of design.

4. CASE STUDY – A PRODUCT SEMANTIC MODEL

Design is a discipline of making and of doing. Design education should start with an understanding of psychology and technology. The designer plays a role in making the user interpret some facts and

methods that are not in the foreground and creates its reception by making analogies and metaphors on the structure of a product. This enables design to be perceived more easily, interpreted, and used by conveying proper messages about their use. Signs in the context of product semiotics and semantics, distinctive indicators and affordances may vary according to products; various user mindsets, design movements and trends; time periods and stylistic characteristics. The designers use the design language to convey a message that they wish to create to the users through the design they create. There are many variables that designers deal with when creating a unique design language. Having knowledge about the target audience's mental processing of information definitely provides new possibilities for the designers to create a design language that will speak to the user in the most effective way. This process also requires a degree of motivation to approach world-related issues and tasks at hand differently during design education.

According to a study by Garner and Evans (2015), the motivation to learn is promoted when: a learner's curiosity is aroused due to a perceived gap in current knowledge; the knowledge to be learned is perceived to be meaningfully related to a learner's goals; learners believe they can succeed in mastering the learning task; learners anticipate and experience satisfying outcomes to a learning task; and learners employ self-regulatory strategies to protect their intentions.

4.1 METHODOLOGICAL FRAMEWORK AND OTHER PARAMETERS

The model utilized in this case study is two-fold. Students participate in this model in two major sections, one being a collaborative design studio, also one with an industry sponsor, and one group in Product Semantics course. In this course, they experience and apply cognitive aspects such as emotional design levels, affordances and other semantic models which play a crucial role in enabling interaction in design that require attention, skill, habit, and agility while interacting with a new product or act according to their habits of use in previous and archetypal examples. Working on different collaborative groups with professional advisers and collaborators in studio environment, they also develop their designs in coordination with product semantics course, focusing specifically on creating experiential and tangible projects based on user experiences and expectations. The way the semantic model sequences inform research and design decision processes are explored in Figure 1.

Design education processes also rely heavily on cognitive and emotional parameters. Emotion has a substantial influence on the cognitive processes of users, including perception, attention, learning, memory, reasoning, and problem solving. The product semantics model seems to be the closest model to accommodate these critical aspects of design in education. This model not only analyses the emotional design levels, but also works with tangible methods to establish emotional design principles in design thinking and execution.

4.2 SEQUENCING

Preparing students to adapt to the changing social norms and how these affect design thinking, learning, and practicing outcomes is key. Also, both procedural and executional scenario-based education principles should be implemented. Working on denotational and connotational aspects of concepts and

products is the primary concern. Understanding the meanings and the cultural significances help design students to create better experiences. Accordingly, work groups are established, both in design studio and product semantics course. They work in product semantics groups in order to find out what cultural significances exist as well as how other norms are playing key roles in design thinking and development of their studio projects. This is methodized via the following sequencing:

Design Research with Semiotic Analysis, which is a transformative methodology that focuses students on the study of signs and symbols in design. They engage in semiotic analysis to deconstruct the meaning of products, advertisements, and relevant visual communications. By analyzing the signs, symbols, and cultural codes embedded in design artifacts, they start gaining insights into how meaning is constructed and conveyed through design.

Semantics-Based Design Projects, where students are tasked with creating products that embody specific cultural, social, or emotional meanings. Students are tasked to design products, by utilizing metaphors and analogies, symbolizing sustainability, representing personal tastes or a particular cultural heritage. This sequence enables students to learn how to use product semantics as a strategic tool for storytelling, brand identity, user engagement while addressing individual and cultural norms.

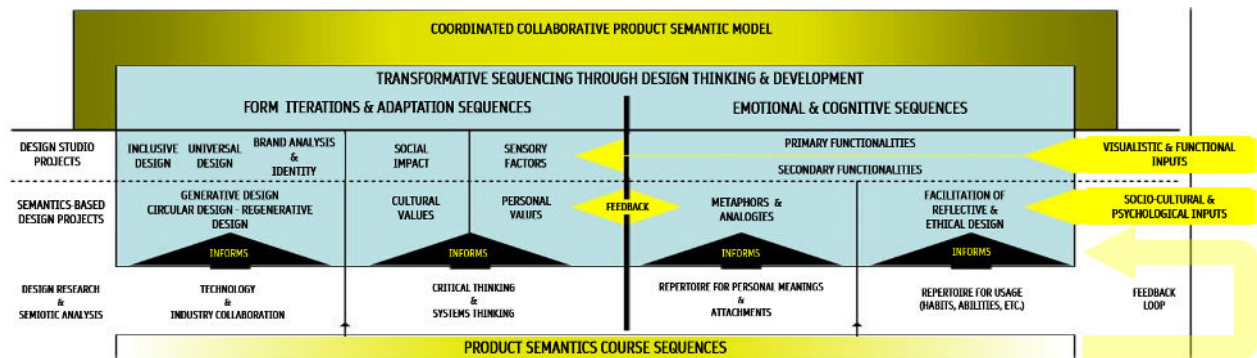


Figure 1. Coordinated Collaborative Product Semantics Model (Elcioglu, 2024)

Facilitation of Reflective and Ethical Design, emphasizes reflection, self-awareness, and ethical engagement with the world. To follow up on the previous sequence, this framework enables students to reflect on the ethical implications of design decisions and their impact on individuals, local and global scales as well as covering environmental concerns. They develop a deeper understanding of their role as designers and the ethical responsibilities that come with it which complements the transformative goals of this design education model whilst fostering a sense of social responsibility and ethical leadership.

Inclusive and Universal Design Studies Sequence adopts an inclusive mindset that triggers innovation and creativity amongst students, expanding their problem-solving to include accessibility, and inclusivity.

Social Impact Study Sequence allows students to discuss social and cultural issues, promote social equity and inclusion, and empower communities via design.

Critical Thinking and Systems Thinking Sequences enable students to think systemically, encourage them to question assumptions, challenge norms, and explore alternative perspectives while recognizing the interconnectedness of various design components within systems. This comprehension of different

components of a system interacting with each other, design students could identify leverage points for intervention and come up with solutions addressing underlying root causes rather than just symptoms.

Generative Design Sequence helps students to leverage generative design tools such as AI sketching, rendering, VR and AR to create options to enhance their design thinking and development.

Circular Design and Regenerative Design Sequence capacitate the students to create their closed-loop systems by focusing on the concepts like reuse, repair, recycle, upcycle and downcycle in order to minimize waste, and maximize resource usage while helping them increase the meaningful exchanges with their usage scenarios between products and users.

While creating their designs, students test the information and experiences learned in Product Semantic course in their aligning design studio in accordance with their rubric requirements (Fig. 1).

4.3 ADDITIONAL SEQUENCES AND INTERACTIONS

Methodology adopted by this case study, with the participation of professional advisers, collaborators, and other faculty who are working in relevant fields, consists of a couple of modules which enable students to work on different tasks in different time frames respective to their course loads.

Guest Lectures and Industry Partnerships are also crucial components of design education. Invited guest speakers and various collaborators from industry who specialize in design, engineering and other relevant fields share their insights and experiences with students on a regular basis. They provide up-to-date real-world examples of how products and systems are utilized to create meaningful, memorable, and impactful experiences across different sectors while providing students with real-time hands-on learning opportunities and industry mentorship.

5. RESULTS AND DISCUSSIONS

Major emphasis areas for design programs were observed to be promoting the design intellect by curiously pursuing the knowledge in socio-cultural, technological, economical norms; balancing emotional, cognitive, and physical aspects of design education that would enable the students and the educators; and pursuing scalable teaching services through sustainable strategies. In the context of design thinking and learning processes, the product semantic approach which was case studied here holds a potential to encourage continuous learning and adaptation in design education with the help of collaborators and other simultaneous sources. It also supports the idea that learning should be a dynamic and lifelong process, fostering a transformative environment where designers can thrive amidst ever-shifting paradigms. Reconsidering mental and physical health, social emotional and cognitive development that identified objectives of the implementation of new modalities as well as academic development and identity development is a part of this adaptation (Fig. 2).

Design education's main area of focus is the studio culture that fosters technological integrations, communicational models; utilizes collaborative tools and pedagogies that require transformation in order to understand; analyzes and empathizes to serve better to cognitive and behavioral aspects of societies as well as individuals. It is an inevitable necessity for innovative and functional design understanding to metamorphose into a more flexible construct; and to integrate advancements towards

individuality. Transformative design education equips designers with the flexibility and resilience to navigate complex and uncertain environments. By embracing experimentation, iteration, and learning from failure, design students can adapt their approach and continue to innovate in the face of adversity.

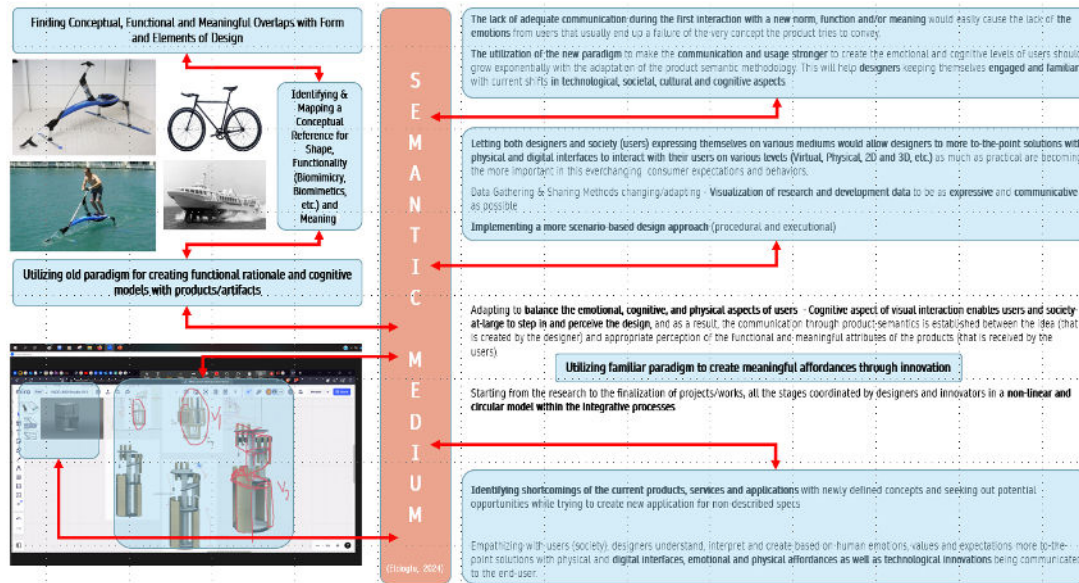


Figure 2. Semantics Medium and Flow Chart of Applied Data (Elcioglu, 2024)

6. CONCLUSION

The rapid pace of change in the world as well as the design industry necessitates continuous learning for designers. However, the learning process is not just about acquiring new knowledge. It's also about applying this knowledge in a meaningful way. Transformative methodology for designers should be adaptive, flexible, and experiential. It should enable designers to navigate shifting paradigms, respond to global and local tendencies, and enhance their learning processes and outcomes. Transformative methodology should emphasize experiential learning. By adopting such a methodology, design education and designers can stay ahead of the curve and continue to create meaningful experiences and relatable solutions for everyone. It also should offer designers and design educators as well as students a dynamic and vigorous framework to create impactful and inclusive solutions by consciously addressing inequities and promoting positive change. In conclusion, to create a better future through industrial design, it is imperative to embrace transformative methodologies that integrate sustainability, collaborative practices, and strategic problem-solving. As a transformative methodology, product semantics model could offer design students and designers a metamorphic, elaborative, and emphatic tool for designing products that not only function effectively but also communicate with their users more meaningfully, resonate emotionally, and contribute to positive societal and environmental outcomes by inspiring, empowering, enriching individuals and communities spanning across the globe.

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