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Does Design Driven by Language-like Artefacts Change Design Education Radically?

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From where do we start, how do we look at design?

As noted by Krippendorff (2007), the design development that took place during the 20th century is characterized by a change towards artificiality, due to which "design artefacts become language like" (p. 18). The word "artefact" refers to a piece of art or a creative product resulting from a skillful human activity. Thus, it is not surprising that natural sciences are not concerned with artefacts, as their focus is on the products of nature with the aim of explaining the observed phenomena in terms of physical causes, chemical reactions, biological processes, etc. Consequently, natural sciences stop at the point at which the artificial starts. Yet, artefacts reflect culture and are an integral part of human history. They are the primary source of information on past cultures, and archeologists use them to understand the way prior societies lived, thus creating, and developing stories of the past. However, the validity of such stories is a major concern, as the narratives about artefacts and cultures are developed when natural explanations fail. Therefore, artefacts should be seen as interfaces, as they provide a valuable link between what is observed and that which can be scientifically verified. Some prime examples of such artifacts are digital machines, Internet browsers, or even governments. According to Krippendorff (2007), "Interfaces reside between artifacts and their users. They consist of interactions, and they play out dynamic relationships" (p. 18).

Moreover, most artifacts are interconnected, forming subsystems that are part of even larger systems. For instance, a machine would have an interface through which it can be operated but can also be an interface to a much larger industrial complex. These relationships must be understood by designers, as they will also give them valuable insight into the changes which have been taking place over the 20th century. Being cognizant of past as well as current developments allows us to teach design online, in remote settings without any restrictions imposed by time and space.

According to Krippendorff (2007), this change towards artificiality comprises of three steps, and it commenced when humans started creating products, man-made physical things that served specific purpose. This stage spanned from the first primitive societies until the industrial production of complex machines.

The second step, the timing of which is difficult to establish, relates to the generation of goods, services, and identities. These artifacts are never completely physical, but might be represented by physical symbols, like services, brands, etc.

The third step, as already indicated, relates to the creation of interfaces between humans and machines. These artifacts are defined by human dialogue and interactions with and through machines. Such complex interfaces require interactive understanding of users for them to work as intended.

An example of such an interface is the smartphone, which is a physical entity, but its value extends across multiple levels due to its diverse functionalities. It can be used to make calls, send messages, take photos, search information online, etc., but its primary value stems from its role as an interface in communication among users. Through their interactions, users are self-organizing the "system" they have created within the given framework, and designers can only control that process to a certain point but can

rarely influence its outcome. As indicated in Figure 1 below, "Evidentially, the artifacts in this trajectory can be seen to become progressively more virtual, more fluid, more dependent on humans to keep them alive, more interactive, and more language like" (Krippendorff, 2007, p. 19).
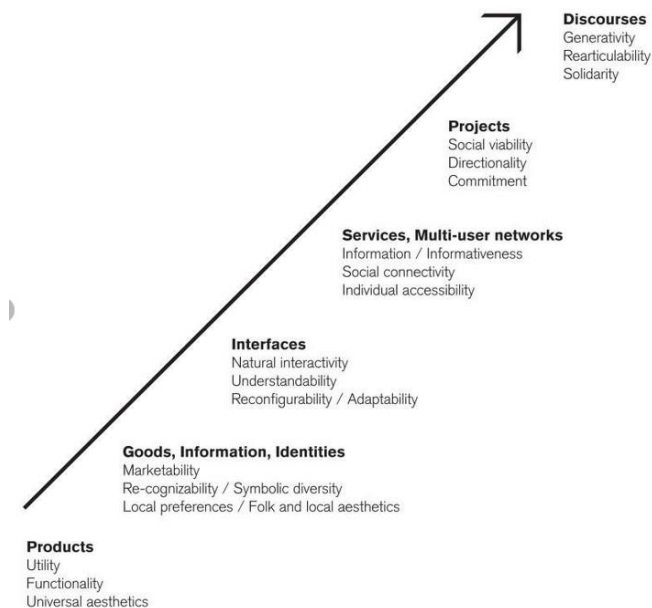

Figure 1. Trajectory of artificiality, Klaus Krippendorff

As indicated by the graph above, discourse is the ultimate step in artifact development. This discourse can take many forms, and can occur on multiple levels, culminating in institutionalized communication where reality construction occurs because of actions taken by the discourse community, like public discourse, scientific discourse, legal discourse, design discourse, etc. In such discourses, we are designing artefacts that are wording us into a specific reality. That is in fact what we are doing right now, as we are wording ourselves into a reality of design and artificiality.

As a part of this process, we make use of metaphors, generate new vocabularies, or even construct an alternative world, allowing us to teach design via any medium. Therefore, **design driven by**

language-like artefacts can be taught remotely in distance settings without any limitations.

As Krippendorff (2007) observed, "Virtually all artifacts emerge in transitions from one form to another" (p. 19). Although this is a general description, it is easy to follow and can be applied to any context. For example, a restaurant may be advertised online, and we can access its marketing content via our smartphones. The artefact "webpage" will guide us to the restaurant, an artefact created by its owner aided by the constructor, who used the architectural plans—as another form of artefact—created by an architect.

In the restaurant, we will receive service as an artefact performed by a waiter, who will present us with a menu, yet another artefact form. Once the desired dish has been chosen and consumed, we will pay with cash, an artefact created to facilitate an exchange of goods and services. Referring to Krippendorff's (2007) trajectory, in this everyday scenario, we can see five processes that characterize artifacts:

- The menu will eventually get damaged, and the restaurant building and its furnishings will decay over time. Indeed, all physical things are artefacts based on physicality disappearance over time.

- All physical entities also malfunction or break by accident, but can also lose their utility (e.g., computers become too slow) and will need to be replaced.

- The context may change, so that the artifacts gain a different meaning. For instance, when a phone is presented in a museum to show the history of communication, its meaning has changed from a communication device to an exhibit. In other words, an artifact becomes decontextualized, as it serves another purpose.

- An artifact can be used as intended but may generate other byproducts that are not always desirable. For example, by using

fossil fuel, we can cook, heat our homes, and operate machinery, but we also pollute our environment.

- All artefacts are eventually rendered obsolete because they go out of fashion.

As shown above, artifacts are not stable, for they change over time and may be attributed to different conceptual categories by their users. These unintended consequences may not be predictable but should be addressed when creating the initial artefacts.

It should also be noted that, even though crafters also produce physical objects, they are different from designers. According to Bürdek (2005), the term "designer" should apply only to individuals that use drawings and models to develop ideas, concepts, etc., with the aim of facilitating reproduction of the same object. Use of these tools was the major step towards mass production and has led to the reliance on language-like artefacts in design. For instance, production of catalogues comprising of furniture drawings allowed designers to market their products to potential customers without sending the physical goods. This practice not only marked a major step towards the key processes in design, but also allowed various alternatives to be tested without the need to produce them.

Today, a key aspect of the design process is the language-like construct of an intended artefact to be performed, produced, or constructed. That is the difference that sets it apart from the original craft design which involved shaping the material and adjusting the shape and function if needed to meet its user's requirements.

Therefore, the original craftsmen did not engage with the design artifact as a design object. Even today, prototyping can be used in the design development, especially in software design, where the artificiality between interfaces and projects is particularly evident.

In software design, the artefacts we are creating are prototypes that can be characterized not only a by their form and function, but also by their impact on communication across all levels of the organization. Prototypes can be any representation of a design idea, but they always identify only a limited subset of the whole, due to their form and medium used in their creation.

Such limiting entities are described as boundary objects, and their main objective is to enhance the understanding and exchange of design ideas in organizations. Boundary objects like language artefacts are given meaning by the community they define. They may be abstract or concrete, but they have different meanings in different social worlds (Rhinow, Köppen, & Meinel, 2012). Mark, Lyytinen, and Bergman (2007) recognize four essential features of design boundary objects, namely the capability to promote shared representation, the capability to transform design knowledge, the capability to mobilize for action, and the capability to legitimize design knowledge. For instance, if we consider a design theory as an artefact, it is bounded by an artificial system.

Mark et al. (2007) further noted that object justifies procedure choices that "inform the mobilization and integration of heterogeneous and uncertain system and domain knowledge during system design and implementation, resulting in for improved designs" (p. 547). Such boundary objects, theories, or prototypes have the capability to promote shared representation, to transform design knowledge, to mobilize for design action, and to legitimize design knowledge.

Why this detour to boundary objects, artifacts, and design?

The former discussion can be summarized as follows:

Teaching design online, virtually, in distance settings, fosters the use of design prototypes, boundary objects, and theory much more effectively than lectures given in a traditional classroom

setting. The medium forces all involved to work with documents, which are bounded prototypes or boundary objects.

Within a particular medium and a specific environment, such as online teaching setting that is driven by language artefacts, the exchange of artefacts, objects, theories, or prototypes promotes shared representation. Design knowledge is explicated for communication, and these explications have the capability to generate design actions. Such artifacts are boundary objects that comprise the core elements of design knowledge (Mark et al., 2007).

That is the foundation of a great online design program, which must also highlight the importance of studying artefacts—artefacts as designed objects, artefacts as boundary objects, artefacts as prototypes, and artefacts as theories. The designing of such projects that incorporate all the aforementioned elements is a key prerequisite for a future design program. Online design programs that do not emulate classical classroom settings have an immense potential to advance the design discipline into domains in which design has been practiced for decades, but this reality has not been reflected in the educational curricula, since there was always a strong focus on the shared experience. This shortcoming can be mitigated by the distance learning programs because they require explicit and shared representations, as well as being conscious about the need for the creation of knowledge.

How does this perspective compare to other initiatives in design education for the 21st century?

In their recent article, Meyer and Norman (2020) highlight the necessity of education designers in the increasingly complex world. They further posit that the current education cannot prepare designers for the immensely complex challenges they need to respond to, even though the essential learning happens somehow and somewhere.

The preparation for practice in other disciplines like medicine, law, and business is more systematic, as the curriculum addresses the performance, systemic, contextual, and global challenges. This same set of skills must also be imparted to design students. To emphasize this point, Meyer and Normann (2020) contrast the history of design curriculum with the evolution that has taken place in business schools since the late 1950s. Their findings indicate that most design programs to date have been conducted in a classical studio setting, where the classical design practice dominates.

While their analysis is comprehensive, the authors have failed to include in the mapped trajectory the potential progression towards distance education, where the language-like artefacts dominate the communication as well the design process, the prototyping as well as the designs as the ultimate outcome. Meyer and Normann (2020) nonetheless propose some very valuable themes which should dominate the design curriculum for the 21st century:

Design methods
Research methods
Core principles of business
Creativity Leadership Communication
Computational methods
Thinking by sketching and making Ethics
The real world

The question prompted by this list is whether thinking by sketching and making shouldn't be replaced by design thinking, since the making of prototypes for example changes if the artefacts are getting language like. In addition, the authors do not address design artefacts as bounded realities or their potential

value in responding to societal issues. In sum, in this comparative evaluation, the change towards artificiality is omitted. The proposals for knowledge and skill areas are very valuable, but remain framed by a story we have invented by looking at artefacts and documents, layers of documents, and frames, which we call history of design or business. Such a comparison is valuable, but it might miss the target if the paradigms in the field of design change.

We can also question whether all designers need to be educated in the same way. On this issue, it is worth noting Swanson's (2020) argument that, as differences in all domains are inevitable, different forms of design education must also exist. Swanson believes in the value of diversity in individual experiences and the individual viewpoints, as they promote design thinking and thus design making. We can surmise from this assertion that design making is a variation of design thinking.

The trajectory of artificiality depicted in Figure 1 can help justify Swanson's perspective, as products, identities, interfaces, systems, projects, and discourses will still necessitate product designers focusing on form and function, aesthetics, and usability, each of which may be user centered. Along this trajectory, graphic designers will still operate, but their role will be less significant than in the past, since many of the designers are now working with interfaces and networks. In their current work, they encounter system-related challenges such as how to design services for emergency departments in hospitals. Complexity of such systems is huge, and the skills and knowledge of designers require different texts and contexts.

The design of policies for political and socioeconomic systems is another domain in which growth is expected in the future and will

require changes in the design education to respond to these challenges. While some institutions may choose not to adapt and continue to practice as they did in the past, others will embrace this new landscape. In either case, design education will involve digitalized communication, as it has already permeated all aspects of our lives. Digitalization pertains to all possible artefacts we can think about. However, the relationship between the digital artefact and the intended artifact is beyond the scope of this article and its further elucidation is left for future studies.

At this juncture, it is important to consider the meaning of "design for all" if design education for the 21st century cannot be generalized to ensure that the same curriculum is taught to everyone and everywhere. Maybe we can better appreciate the reasons behind this lack of uniformity if we consider other educational domains. While it is true that certain subjects can be taught in a similar manner, such as math, biology, etc., others are very context-dependent and the curricula adopted will be tailored to different cultural settings, levels of economic development in the countries in which they are taught, or even developments in other areas. All these factors will play a role in design education and will affect the value placed on designing a discourse to extend the notion of design. Even if the global design community could reach a consensus on a certain structure and content, knowledge, as well as skills that need to be taught at different levels of design education, the inequality in place and time can never be eradicated. For instance, the COVID-19 pandemic has shown that there is no single method for responding to a specific event, as some solutions need to be local or individual.

Still, the value of such a search for design education for all does not stem from an agreement on uniformity, since all actors within the participating community will take the aspects of what has

been discussed they deem beneficial and will use them as they feel most appropriate. Such processes, just like discourses, are characterized by their own rules, including discontinuity (Faust, 2015). There might be statements which some people will agree on, and might even create a sub-discourse. But as Foucault (2013) stated, in trying to understand the formation and development of a discourse we must abandon the pre-existing notion of unity.

In an attempt to summarize the environment of design education for the 21st century, we have uncovered the complexity and simultaneity of the design education in the past, present, and future, and in so doing we have also revealed discursive views and concepts pertinent to this topic. This can be called "design for all," since all curricula have their specific weaknesses and strengths, depending on the point of view we are taking.

The author of this article was recently asked to structure and develop a design curriculum that would best meet the needs of the current market, and the result was a pure asynchronous distance learning program. Early on in this process, discussions were held on whether the "real design domains" like industrial or even automotive design should be incorporated to reflect the expertise of the university faculty.

Looking at market data to see where the interest and the jobs for graduates are, the decision was made to launch Master's in Design Management and Master's in UX & Service Design programs. This led to the question if a universal design curriculum could be created to educate the designers for tomorrow. To comprehend the professional context, the chart depicted in Figure 2 was used.
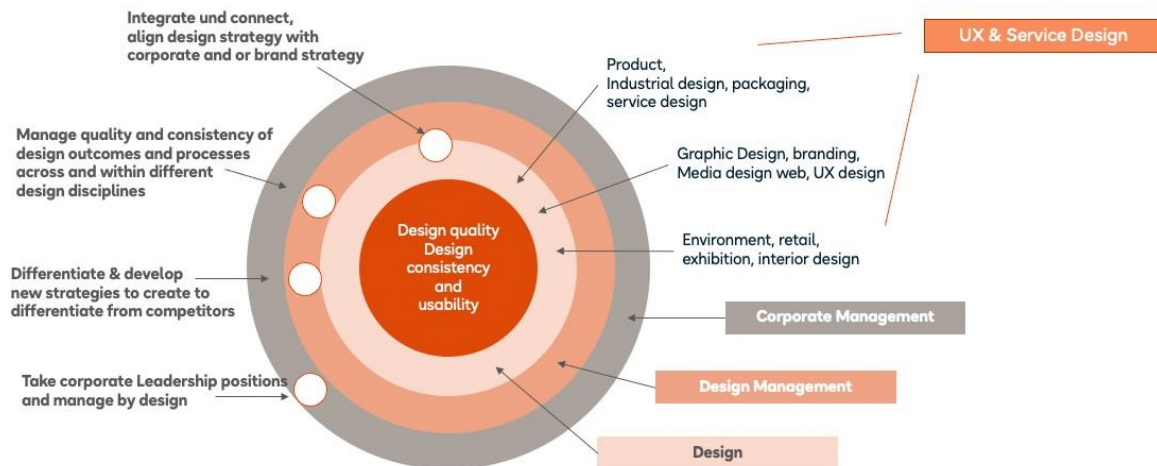
Figure 2. Design Management and UX and SD in Management Context (SRH, Mobile University, www.mobile-university.de)

Design Management as a discipline has developed to incorporate design projects, align strategies, and manage outcomes and processes to allow companies to differentiate their products from those offered by their competitors. Therefore, its goal is allowing those in corporate leadership positions to manage by design. To achieve these objectives, a curriculum for the 21st century distributed by online channels focuses on four areas, respectively related to management, design (methodology, design theory, and system design), design management (strategic design management, design management leadership, and decision making in design and management), and practical projects with companies and professionals in the industry as a part of which all these skills are applied and developed. In this curriculum based on four pillars, ethics and sustainability are integrated into all modules, especially in system design and the practical projects.

The asynchronous study program is scripted by a study path, which is guided by the pertinent scientific principles. Therefore,

explicated knowledge is the base of all modules, and is presented as text, charts, and images. A digital platform is provided to access diverse sources of information, including a comprehensive library, as well as videos and live lectures.

Practice in design is fostered through design assignments, which are sometimes broken into smaller parts, but mainly align with the duration of a particular study module. Required group work is facilitated by the use of a digital portfolio, allowing students to access their work from anywhere and provide and receive feedback on all coursework, including prototypes. As the main concern related to online teaching pertains to the loss of haptic ern related to online teaching pertains to the loss of haptic experience, we have made sure that all assignments have a practical component, and its outcome can be reviewed and qualified.

Although we are proud of the curriculum we have developed, we appreciate that it is not universally applicable. By its nature, a curriculum is an extended discourse of design only for those who will study in these programs.

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