Crafting Systemic Design

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Epistemology of the unspoken

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Knowledge transfer has been evidently witnessed for generations. Through the evolution of the human race, from learning to create fire with sticks and flint to the innovation of designing human-like robots that have emotions through technology, humans have come a long way in terms of innovation that continuously defines our future today. This paper investigates the importance of knowledge generation and its transfer to enable systemic solutions to design. It refers to the role of tacit knowledge in craft and its non-explicit form of pedagogical framework. Furthermore, it looks into the systemic design practices and their framework and aims to compare how the former knowledge transfer is also an essential influence on the latter for better design solution building.

The research draws on examples of the world of traditionally skilled craftspeople and their knowledge generation and pedagogical influence on the various design practices. This is further exemplified through case studies of certain craft practises and the importance of the same in order to form a bridge and understand the various parallels between tacit knowledge and systemic design, as well as the probable learnings they can have from each other. Methodologically, the multiple case studies investigate various skilled crafts, collect empirical data and confirm the influence of tacit *knowing* to be an important influence in the systems field. The research findings reveal that tacit

knowledge has a nature to innate some process that we formally express to be used in design practices and pedagogy. It further looks at how systemic design practices are influenced by this form of knowledge.

Keywords: knowledge creation, systemic design, tacit knowledge, craft and design

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Presentation summary

Understanding tacit knowledge

Knowledge generation is an important factor to have passed on through time and lineage. Building on the existing paves the way for new learnings, ideologies, and solutions to the design world. The world of craft has thus been an amalgamation of cultures across the world. Much of this has been rooted in traditional systems of beliefs that people use to understand their environment. The systems not only constitute an essential aspect of cultural identity and social integrity, but their traditional knowledge embodies a pearl of rich wisdom and experience gained over time from direct observations over generations (Laccarino, 2003; Mazzochi, 2006).

This presentation looks at understanding the properties of the traditional knowledge form known as tacit knowledge and its importance in the genre of systems thinking. Tacit knowledge, therefore, is the inherent or innate knowledge form that is not very explicit in nature but can be learnt through certain factors of observation, demonstration or repetition. The chemist-turned-philosopher Michael Polanyi identified practical expertise and skills as a form of knowledge that cannot always be articulated or verbalised. It is further expressed as procedural knowledge that guides behaviour but is not readily available for introspection (Robert J. Sternberg, Joseph A. Horvath). Polanyi further writes, "We know more than we can tell".

Tacit knowledge is rooted deeply in people and society, closely related to symptoms, intuition, feeling, mindscape, and emotion. Being a kind of personal knowledge, it is

rooted deeply in an individual's experience and consciousness (Polanyi, 1967). The use of intangible devices such as theory, language, and discourse is often known to be used to articulate what we know. (Adloff et al.2015; Håkanson, 2007; Williams, 2001). The above clarifies that in all forms of knowledge – from riding a bicycle to the act of cooking – codifying the knowledge in certain ways that we use today for teaching or the expression of professional platforms of presentations, documentation converges to the expression of the term tacit knowledge.

The means by which we acquire and transfer knowledge are bound to objects, tools, instruments, practices, spaces, environments, and material regimes in general (Orlikowski, 2002, 2006; Orlikowski & Scott, 2015). Referring to objects thereby requires transforming their tangible aspects into elements of intangible representation - further investigating the process of knowledge articulation through material-intensive practices.

Craft practices thereby provide an appropriate way to study knowledge articulation as a process that is emergent in the relationship between the social and the material (Cook & Brown, 1999; Knappett & Malafouris, 2008). Knowledge articulation is said to be a process through which tacit skills and knowledge are made explicit" (Håkanson, 2007, p. 51) and hence capable of systematic explanation. Tacit knowledge remains tacit while being transferred from one individual to another, yet it may become explicit through the materialisation of artefacts. Collaborative craft necessitates explication before materialisation, through which the apprentice-to-the-novice transfer of knowledge takes place.

For instance, the tribal bamboo basket makers of the Dang district of Gujarat, India, live around the soil where bamboo plantations thrive (Figure 1). For the longest time, ever since their existence, they continuously experiment with the use use of bamboo and the process of splitting the same into thinner strips or other forms and the innovation of making baskets along with other artefacts. The skill of making these artefacts has been passed on for generations to date, and the only method of transfer of knowledge is through demonstration or observation. The children of the tribal artisans grow up with constant exposure to all the processes of making the products, also being involved at times in order to assist the process. This exposure helps interiorise and dwell on the tool/experience/knowledge gained that lets the learner gain new experiences and

knowledge. We thus become unconscious of some actions that we perform due to the internalisation of the knowledge gained. The role of tacit knowledge in craft is, therefore, semantic in nature as it helps to articulate the understanding through materiality.

Figure 1. Tribal skilled artisans of Dang working with students with a demonstration of weaving bamboo baskets.

A short observational study was performed with two clusters of artisans. One with the Dang district of Gujarat with the tribal bamboo crafters and the other with the natural hand block printing work of Ajrakh prints with the artisans of Kutch, Gujarat. Both setups involved the demonstration of the craft through the traditional process to graduate students from the field of design. Interviews with the artisans to understand their process of working were done during this time. A defined framework was analysed through the study that is explained below.

Table 1. Study framework.

Sr No	Area of research	The artisans setup
1	A platform for visualising a concept or design	Commences with direct printing/ marking of boundaries using blocks as a measuring tool / making the base of a basket to interlace it
2	Thinking process/approach	More lateral thinkers where approach problem solving from various directions Does not follow the rules in a linear manner
3	Learning methods	By repetitive observation, learning by doing and understanding through mistakes
4	Nature of knowledge to learn	Explicit knowledge - 20% Tacit Knowledge - 80%

The above study, was performed with students in mind, looked at the understanding developed by the learners from the formal schooling format, the students. The aim was to compare the epistemology that is derived from the properties of tacit knowledge and understand its existence in the process of design thinking. While the students seemed to commence drawing in order to visualise the ideas and thoughts, more linear and analytical thinkers with fragments of divergent and converging theories also included the process where they abide by rules. The learning methods were by theory and explicit knowledge shared by mentors.

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While we look at understanding the nature of tacit knowledge, we further compare its role in the design thinking process today. This process is known to be a linear process that mainly consists of five stages; empathise, define, ideate, prototype and test. These principles have been developed in order to provide a system for the process of design thinking and its pedagogy. As Claudia Maris states that many researchers attest that design is influenced by tacit knowledge in a distinctive way (2012). In “Practices of Everyday Life”, philosopher Michel de Certeau states that a particular problem arises

when the form of theory is no longer the solution to that issue (1984). Design researchers today have been seen to experience the same at times, thus trying to work to a practice-based model. Here there is a regard for design practice and objects that produce knowledge, also termed epistemic objects. Researchers have questioned the knowledge culture of design through the work of Nigel Cross in "Designerly ways of knowing", which directs to unspoken knowledge. Kristina Niedderer (2007) states

> … tacit or unspoken knowledge plays an essential role both in the research process and in analysing and communicating research outcomes. This form of knowledge seems important for the generation and application as well as the experience and judgement of research and its results, and for creating new experiences, abilities, and knowledge. (p. 6)

As seen previously, tacit knowledge has been interpreted in several ways. It is known that skills carry tacit elements and lack verbalisation. Researcher Michal Polanyi further states that both theoretical as well as practical knowledge belong to tacit knowledge and are influenced not only by the cultural or scientific aspect but also from a socialist point of view. Nonaka & Takeuchi have theorised the four stages of knowledge conversion to be socialisation, externalisation, combination and internalisation. Socialisation is the process by which one individual acquires the tacit knowledge of another individual. For example, in the context of craft, socialisation between practitioners occurs during observation, imitation, and repetition. Externalisation is the process by which tacit knowledge is articulated through various modes of expression; images, codes, manuals, and documents typify forms or articulated knowledge (Nonaka et al., 2008, p. 22). The combination is the process by which different types of explicit knowledge are merged to create new explicit knowledge. This process permits the systematic transfer of articulated knowledge between individuals, groups, and entire social structures. Internalisation is the process by which explicit knowledge, regardless of its format, is acquired as new tacit knowledge by an individual or a group.

Furthermore, in practice-based design research, tacit knowledge is considered inherent in the master-apprentice model and constitutes an aspect of authority since it can only be conveyed by examples and imitation of an expert (Mareis, 2012, p. 67). The above theory of the SECI model(Fig 2) explains the apprentice and novice relationship in the

form of knowledge-making, and that is an important aspect of design and its pedagogy. The above representations are then understood to be abstracted from memory and registered as individual bodily experiences (Ignatow, 2007, pp. 120-122) that are further articulated into an explicit form of learning, also known as design thinking.

Design thinking thus builds on the above theories and is seen as a paradigm for solving user-centric problems (Dorst, 2010). This form of thinking is said to be people-centric and their needs and is intuitive, empathetic and iterative in nature. Visualisation and prototyping are the primary tools for its practice.

The nature of craft practice is also similar to that of what has been formalised as design thinking. For example, an artisan of hand block printing works on intuitive methods of the composition of any design on the fabric. (Interview with Abdul Jabbar Khatri, 2021). They think about the user's need for that particular product and intuitively work to create the same. The important note to make here is that due to the tacit nature of this knowledge, he does not need to follow any linear process that we formalise as the design Process today. The tacit nature itself lets him surpass that process with a leap to visualisation and prototyping.

The tacit nature of systemic design

As designers move upstream from traditional product and service design to engage with challenges characterised by complexity, uniqueness, value conflict, and ambiguity over objectives; they have increasingly integrated systems approaches into their practice. This synthesis of systems thinking with design thinking is forming a distinct new field of systemic design (Ryan, 2014). Design thinking is said to be focused on people and their needs and is intuitive, empathetic and iterative in nature which leads to visualisation and prototype making. On the other hand, systems thinking focuses on the system and the relationship between the parts; it is systematic, analytical and multi-dimensional and results in the modelling and mapping of solutions. As a result of further investigation, the need for open-ended and flexible collaborations is the way forward to provide collaborations that are both designerly or systemic in nature.

While comparing this setup with the nature of craft knowledge, some argue that craft reflects multiple ways of knowing, which have the ability to accentuate complex

thinking. The tacit knowledge inherent to craft practices is, as Polanyi argues, a complex knowing process on which other types of knowledge (e.g. the cognitive) are based (Zhan, 2017). Scholars reflect on the craft-making process and the self-awareness nature and review assumptions of this knowledge and thus conclude that experience and practice are critical aspects in both acquisition and sharing of tacit knowledge. While working on a craft, Follet and Valentine (2010, p.5) mention a system of design that informs design as a subject. Its essence thus can be an ecological attribute, localism, complex thinking and authentic being (Zhan, 2017).

Craft also has shown a strong connection to the field of sustainability. The fact that it works with materials and regenerative resources from nature in amalgamation with human labour is influenced highly by their cultural backgrounds. The ecological awareness, cultural continuity and authentic lifestyle of craft and its making could offer valuable insights for relooking at our current institutional culture and public ideologies (Zhan, 2017).

Conclusion

Craft is not only a form of tacit knowledge-making but also a form of complex thinking. For example, a weaver begins by spinning yarn from the fibre, dyeing it with dyes, spreading it to untie the knots and spreading a smooth bed of yarns (warp), setting up the loom with the warp and beginning the process to weave a fabric of a particular design. The example itself entails the complexity of hand weaving a textile piece and the complexity that is involved in its making, not just in the physical setup but also in the cognitive aspect of constructing the fabric and its design. The perspective gives us the possibility to understand the characteristics of craft-making that involves a process of dealing with complex cognitive and practice-based solutions. We conclude that properties of systemic design involving elements of the tacit nature are an important part of addressing challenges to the field of design. The paper thus posits that the innate form of learning strongly influences the systemic designers and helps in providing a direction to the same.

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