

# **DESIGN THINKING: A METHODOLOGY TOWARDS SUSTAINABLE PROBLEM SOLVING IN HIGHER EDUCATION IN SOUTH AFRICA**

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## **ABSTRACT**

This short paper explores the potential contribution of design thinking methodology to the education and training system in South Africa. Design thinking is slowly gaining traction in South Africa. Design Thinking is gaining traction in South Africa. There is offered by the Hasso Plattner Institute of Design Thinking at the University of Cape Town geared towards empowering postgraduate students with extra skills set that are needed for sustainable development to be realised. This kind of training fulfills a need that has been discussed for years in South Africa. The need is for the higher education to empower graduates with knowledge and skills that will make a difference to society. South Africa has been continuously producing graduates that are unemployable and lack the ability to innovate and add value to society.

## **KEYWORDS**

Design Thinking; Education for Sustainability

## **1. INTRODUCTION**

Nelson Mandela said “education is the most powerful weapon which you can use to change the world. According to the United Nations education is one of the most powerful tools for sustainable development. Sustainable Development should meet current needs without compromising the future needs (Brundtland, 1987). The Sustainable Development Goals seek to provide equal access to affordable universal access to a quality higher education were introduced in 2015. These are important in South Africa where education was used as a means of exclusion, separating races, class and cultures, while continuously producing experts in their fields. Furthermore, the access for many who were denied the opportunity in South Africa, the current higher education training has not equipped them with skills to innovate and create opportunities for employment. The skills deficiency has resulted in many graduates unable to secure income. Part of the challenge is the disciplinary silos in which they have been trained without the ability to collaborate. Education for sustainability requires that we rethink the training at institution of higher learning. Graduates need to be trained to deal with complex problems outside disciplinary boundaries (Rittel, 1962). Education for Sustainability is critical as government and industry seek sustainable development. Education needs to empower students with knowledge and skills to become critical thinkers that are capable to work collaboratively solving complex social challenges.

## **2. THE ROLE OF EDUCATION IN SUSTAINABLE DEVELOPMENT**

Education for Sustainability (EfS) is defined as a transformative learning process that equips students, teachers, and school systems with the new knowledge and ways of thinking in order to achieve economic prosperity, and produce responsible citizenship while restoring the health of the living systems upon which our lives depend (Foster, 2001). Government, non-governmental organization and industry point to education as key policy instrument for bringing about a transition to sustainable development, but there is little being done to change the education (Huckle & Sterling, 1991).

Education is critical for promoting sustainable development and improving the capacity of people to address environment social and economic issues. Socially critical skills are essential for an understanding of the problematical concept of 'sustainability'. EfS seeks to develop the knowledge, skills, values and attitudes necessary to bring about the change which is also in line with design thinking which is also about changing the mindset. Furthermore, higher education should seek to produce individuals with critical skills to understand the complexity of environmental, social and economic problems and solutions and the ability to participate individually and collectively in the resolution of the problems. EfS carries with it the inherent idea of implementing programs that are locally relevant and culturally appropriate. Hence the design thinking programme is relevant for the South African context where students learn through real world projects that are context relevant.

### 3. DESIGN THINKING AND SUSTAINABILITY

Originating in design, but capable of being applied across a broad range of disciplines, design thinking brings a disruptive, game-changing potential to ways of working that have become routine and contribute to some of the challenges that face society. While the emergent of the concept of sustainability is based on the realisation that earth's resources are not limitless. Sustainability promotes consumption of products, services and systems that are developed driven by socially and environmentally benign while satisfying the user's needs. Furthermore, the development of systems, products and services that are better for society, have less impact on the environment. Furthermore, design thinking place emphasis on humans through gaining empathy for the users as well as the value of understanding the context and human place in it.

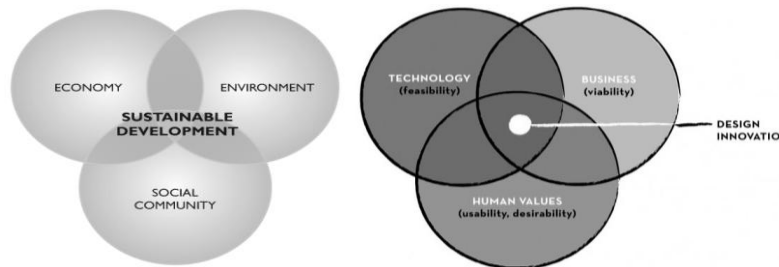


Figure 1. Framework for sustainable development and design thinking

Design thinking is a methodology for innovation that combines creative and analytical approaches and requires collaboration across disciplines. The process of design thinking draws on methods from engineering, design, and combines them with ideas from the arts, tools from social sciences, and insights from the business world. The students in design thinking programme learn the process in a team environment and internalised it, and apply it in their own contexts (Novak, 2011). Traditional education system promotes working in silos while working on tamed problems. Furthermore, the analysis of contextual, human-centered techniques to promote sustainable design of products, services and environments by holistically considering people, environment, energy, economics, and health is important. Design thinking merged with design for sustainability combines insights to provide a means whereby users of products, services and systems become inseparable partners in ensuring the longevity of our natural, social, and economic environments.

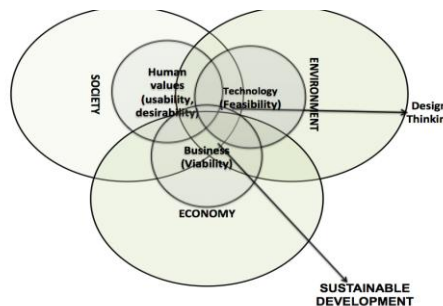


Figure 2. Framework juxtaposing Design Thinking on the Sustainable Development

While sustainable development focuses on society, environment and the economy, design thinking focuses on human desirability, technological feasibility and business viability which are all critical to development. When the sustainability principles are combined with the design thinking methodology can have more impact towards promoting and achieving sustainability.

## 4. DESIGN THINKING METHODOLOGY

Design thinking uses designer's sensibility and methods for problem solving to meet people's needs in terms of technological feasibility and economic viability (Brown, 2009). The methodology brings a process towards building sustainable systems, services and products. In education it is about creating transformative learning experiences to help students develop a process for producing creative solution and build creative confidence tackle complex challenges. Design thinking uses abductive reasoning. According to Kees Dorst abduction reasoning, is associated with 'problem solving' (Dorst 2006). Constructivist thinking considers abductive inference to be the only knowledge-generating mechanism (Fischer, 2001). Problems in abductive cognition appear to be spectacularly contextual (Mackonis, 2013).

"Einstein once said a problem can never be solved from the context in which it arose". In design thinking complex problems are solved by multidisciplinary teams with diverse views about the challenge help in generating solutions that have wider applicability. Educating students who can work in different context to those they have been trained is crucial for society to be able to solve the complex challenges. Design Thinking requires a shift in the mindset from working in silos to an appreciation of the power of teams and the diversity that the teams offer in terms of worldview, cultural perspective and education. Design thinking is action oriented in order for teams to fail fast and learn quickly from their mistakes.

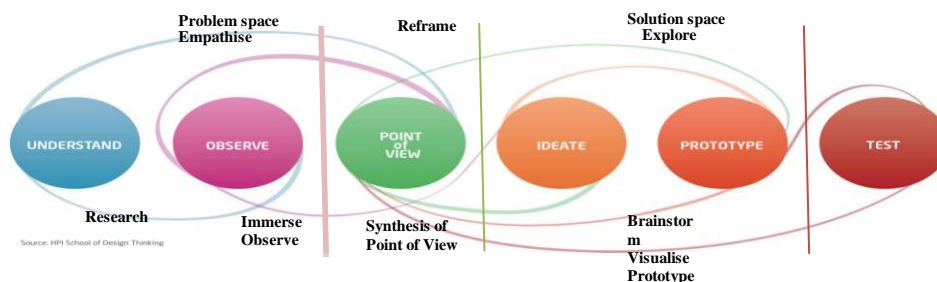


Figure 3. Design Thinking Process

Designers test their prototypes with the users in order to further their understanding of the problem and the solution. Therefore, an action-oriented mindset needs to become second nature and is fundamental for dealing with ill-defined problems (Buchanan, 2002). The experiential learning theory model juxtaposes two approaches to grasping concrete experience and abstract conceptualization as two approaches to transforming experience reflective observation and active experimentation which are both key to design thinking training (Beckman and Barry, 2007). The methodology is about using design tools to tackle more complex problems, rather than focusing on enhancing the look and functionality of products, it is about designing user experiences, instead of consumer products. It is about creating ideas that better meet the users need and aspirations, rather than making already developed ideas more attractive. Design thinking helps teams understand the value of constraints. When designers are dealing with a problem they take its constraints as suggestions and tend to think about underlying issues from a broader perspective (Norman, 2013).

## 5. BROADER PRINCIPLES OF DESIGN THINKING

### 5.1 Human-centered Approach

Human-centered design is a philosophy, not a precise set of methods, but one that assumes that innovation should start by getting close to users and observing their needs" (Norman & Verganti, 2012). Taking a

human-centred approach shifts perspective from technical to one in which human biases and heuristics play a role, and where personal values, attitudes, beliefs, cultural settings are considered when designing solutions. Human-centered design takes a socio- technical view (Emery and Trist, 1960), balancing the requirements of two, competing “systems” (Hedberg and Mumford, 1975; Heller, 1989). Human-centered approach advocates the design and development of flexible systems that permit the people who work with them to shape and manage their work (Gill, 1991; Kapor, 1996; Lehaney, Clarke, Kimberlee and Spencer-Matthews, 1999). Human-centered systems production should concern itself with the joint questions of "What can be produced?" and "What should be produced?" The first is about what is technically feasible, the second about what is socially desirable (Kuhn, 1996; Lehaney, Clarke, Kimberlee and Spencer-Matthews, 1999). In essence design thinking is not about what is, it focuses more on what could be?

## **5.2 Research Based**

Design thinking applies qualitative techniques of information gathering such as ethnographic, interviews, observations and immersion into the context (Korn and Silverman, 2012). In 1984, Kolb pulled from these many theories of learning to build what he called “experiential learning theory” in which he defined learning as “the process whereby knowledge is created. through the transformation of experience,” as applying the four steps of experiencing, reflecting, thinking, and acting in a highly iterative fashion.

## **5.3 Design Thinking Looks at a Broader Contextual View**

The design thinking methodology forces participants to unpack and understand that any system operates by interacting with its environment. Therefore, understanding the contextual view by describing graphically the interaction of the system with the various entities in its environment. The interactions consist of data flows from and to the entities. The contextual view clarifies the boundary of the system and its interface with the environment in which it operates. It also helps in expanding the challenge to a wider frame of reference. The innovation process is grounded in deep understanding of the context of engagement and use of a solution through the concrete analytical work done through interviews and observation (Beckman & Barry, 2007).

## **5.4 Collaborative and Multi-Disciplinary**

Design thinking encourage the understanding of social interactions. It also serves as a valuable common language that diverse teams and groups of people can use to effectively collaborate on challenges and projects. With a multidisciplinary team, the solution that is developed is relatable to more people. There is always something new to learn when interacting with someone different from you. Design thinking is a multidisciplinary mindset regardless of whether design is directly involved or not (Buchanan, 1998).

## **5.5 Iterative Deliveries and Prototyping**

Design Thinking is a creative human-centered discovery process followed by iterative cycles of prototyping, testing and refinement. Design thinking promotes the production of provisional outputs that can be tested with the user in order to develop understanding of both design problems and alternative solutions (Lawson, 1997). Design thinking can be likened to a good conversation, from which helps the team get a better understanding than where they started. Testing with the users allows for teams to learn fast from their failures. Solution evolves from a series of prototypes that helps to explore options (Boehm, 1986; Houde and Hill, 1997). Prototypes provide the means for examining design problems and evaluating solutions (Houde and Hill, 1997).

## **6. CONCLUSION**

This paper looked at the design thinking methodology as a valuable process toward sustainably tackling the higher education challenge of training graduates are expert in their disciplines. Design thinking explores

creative ways of problem solving which critical to dealing with some of the social challenges in society. The methodology gives none designers the confidence that the can be part of crating a more desirable future, and a process to take action when faced with a difficult challenge. The creative confidence is required in the education sector as it has to produce citizens who are ready to make a positive contribution to society and able to deal with complexity of the work environment. The next phase of this research will be to engage with graduates who have gone through the programme.

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