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# Teaching design in emerging countries: A train-the-trainer methodology

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## Abstract

Design disciplines have constantly evolved to keep up with the emerging demands of the 21<sup>st</sup> Century. Design education is thus called to change its methods, tools and approaches. There is an increasing interest in emerging economies in design education, especially in India, where the role of creativity, communication and technology can support social and economic development. This paper aims to present the educational approach developed in the context of the Erasmus+ KA2 project entitled 'Design and Innovation Capacity Building in India/DESINNO'. The modernisation and internationalisation of Indian universities with innovative and contemporary design courses have been the main goals of a set of research and training activities. In this paper, the state-of-the-art methodologies in design thinking, sustainability, design research, social innovation and ethical issues in design are presented, leading to a bespoke educational approach that provides a platform for Indian design academics to apply modern educational approaches to their specificities and needs.

**Keywords:** Integrated product design, Interaction design, Human-centred design, Train the trainer, Strategic design, Blended learning, Design thinking, Indian universities

## Introduction

The state of the art of practice-based design approaches undertakes the focus on the design studio and design workshop methods for learning. Contemporary design approaches and associated skills are moving design education to answer to emerging issues such as the service economy, digitisation and integrated product design that are new areas of education for the Indian design institutions participating in DESINNO. The research question explored in the DESINNO project and presented in this paper aims to answer this need with a solid understanding of the value of the practice-based design approach and its implication in the tools, learning methods and related programmes. This paper presents a methodology to create innovative design courses through the transfer of knowledge to academics. This train-the-trainer methodology aims to balance the global evolution of design discourse and pedagogy and local needs, competencies and challenges. The DESINNO project revolves around the role of design and innovation centres inside the universities as places that provide a common ground for:

1. The development of innovative and permanent methods for research and design approaches.
2. The establishment of cross-sectoral projects for collaboration and co-learning.
3. The establishment of inter-industry projects to facilitate the inclusion of design thinking approaches.
4. The development of extreme affordability principles for the benefit of developing nations while taking care of the accessibility and sustainability aspects of design.
5. The development of community-based programmes to enable designers, craftsmen and artisans.
6. The modernisation and internationalisation of Indian Higher Education Institutions (HEIs) by the improvement of university design courses that will encompass product and service design by following

state-of-the-art methodologies in design thinking, sustainability, design research, social innovation, ethical issues in design, etc.

Design and innovation centres have a design lab with certain equipment and software for new product development and prototyping. These centres have a strategic role in the practice-based approach to design education. In addition to the establishment of said centres, courses new to the curricula of the three participating HEIs are to be added to support the use of the centres. Design can foster meaningful social change in emerging economies such as India, as it provides the tools to sustain economic growth, to better address the needs of citizens by providing low-cost innovation and create jobs. For the DESINNO project, we developed a social innovation approach that brings grassroots innovators in contact with designers to scale up tools and products created. Creating design-related social entrepreneurship by collaborating with academia through design and innovation tools is an important goal of the DESINNO project. To support the Indian academics in the creation of the novel courses, three capacity-building sessions were undertaken to provide them with material, content and educational methodologies to develop courses that better fit their needs and competencies.

The paper is structured in three main sections. First, the research approach, question, and state-of-the-art educational approaches concerning design pedagogy are presented. The second section presents the three capacity-building programmes put forward. In the last section, conclusions are drawn, and the lessons learned are reflected upon.

### **Design education**

Teaching design today needs a specific training methodology and the establishment of new educational experiences and services in higher educational institutions and universities. In addition, the COVID-19 pandemic has accelerated changes towards remote and blended learning, and its consequences will be felt for years to come.

The theoretical framework for a new training methodology in design starts with the concept of the well-known 'experiential learning theory', which stems from the assumption that learning is best conceived as a process, not in terms of outcomes. According to this theory, ideas are not fixed and immutable elements of thought but are formed and re-formed through experience, and thus new knowledge, skills and attitudes are achieved through an immersive and concrete learning experience. Put differently, learning is a process where concepts are derived from and continuously modified by experience (Kolb, 1984). Such a learning experience works within a boundary between observation and reflection on the one side and theory and practice on the other.

Experiential learning theory offers an asset of awareness that is increasingly demanded by professionals and apprentices in all fields of design (strategic design, service design, fashion design, interaction and communication design, etc.). The boundary between theory and practice is one in which design finds its best nourishment.

According to the six propositions of Kolb's theory, the specific focus of a new training methodology in design supports the application of an innovative didactic method (Vignati et al., 2017):

- 1 Learning is best conceived as a process, not in terms of outcomes.
- 2 All learning is relearning.
- 3 Learning requires the resolution of conflicts.

- 4 Learning is a holistic process of adaptation to the world.
- 5 Learning results from synergetic transactions between the person and the environment.
- 6 Learning is the process of creating knowledge.

The training methodology developed would therefore support the implementation of a learning experience by balancing abstract conceptualisation and reflective observation with concrete experience and active experimentation (Kolb, 2005). This methodology has been tested through three capacity-building programmes for a group of Indian delegates to train the trainers and improve an innovative design education scenario for new courses in the Indian universities. Moreover, building upon experiential learning and Kolb's theory, the didactic methodology proposed in the DESINNO project would notably offer a dynamic and innovative learning experience strictly linked to the practical and 'hands-on' dimension proper of the design discipline.

Design disciplines have constantly evolved to keep up with the emerging demands of the 21<sup>st</sup> century. According to Meyer and Norman (2020), the emerging challenges faced by designers can be grouped into four categories: performance challenges, systemic challenges, contextual challenges and global challenges. It becomes evident that design education for the 21<sup>st</sup> century can no longer focus on traditional skills. It must equip young designers with new knowledge and expertise that can help them tackle complex problems holistically, such as critical and systematic thinking.

Sanders and Stappers (2008) observed that traditional design disciplines tended to concentrate on the designing of *products*. Subsequently, these disciplines were defined by the outputs of the design process. To address emerging challenges, design practice has changed, and new design disciplines have emerged. These new design disciplines focus on designing for a '*purpose*'. The results are not limited to one type of output, e.g. physical products or built environments. In response to these changes, several traditional design disciplines have been redefined to help them stay relevant to the changing world.

This paper will focus on three emerging design disciplines, namely interaction design, service design and integrated product design, as they will become new core knowledge assets for the creative industries. To help students develop new knowledge and skills (such as systematic thinking), they must go beyond *surface* learning, where they are expected to reproduce materials, and adopt a deep approach where they focus on making sense of materials (Gibbs, 2010). This means that the educators also should move away from conventional ways of teaching, where most decisions are made by teachers, and adopt a student-centred approach, where the emphasis is on integrating learning across the curriculum (Cannon & Newble, 2000). Project/problem-based Learning (PBL) is one of the student-centred learning approaches that has been widely adopted, since it can help students develop critical and systematic thinking by engaging them in solving complex real-world problems (Nagarajan & Overton, 2019; Yew & Goh, 2016).

Two relevant methods for learning in design education were adopted to bring Kolb's theory and the process-based design education approach to practice, the design studio and the design workshop. The 'design studio' is central to the pedagogy of design (Demirbas & Demirkan, 2007; Shaffer, 2007). Design studios are a synthesis of the three diverse types of courses constituting a design curriculum (Uluoğlu, 2000). According to Hokanson (2012), the 'design studio' includes two main pillars, the public presentation of ideas to the teaching staff and the interaction between tutors and students. The basic elements of the design studio include the design brief, the design research, transitions between design thinking and practice, and the desk crit (Sagun & Demirkan, 2009; Schön, 1987) that happens on students' desks from the master designer and the design reviews.

The guided learning philosophy of the design studio is seen as the means to engage in ‘learning by doing’ (Schön, 1987). The design studio requires intensive, closely coupled cooperation for design work in teams with minimal supervision. For students’ design competencies to flourish, emphasis is given to facilitating the three factors put forward by Christiaans and Venselaar (2005): knowledge of the design process, the integration of different disciplines and the integration of theoretical knowledge in practice. The role of the tutors is more to facilitate and provide high-level guidelines and links to resources rather than to teach or directly correct participants along the way. This is according to a problem-based approach to learning, which has been applied in previous projects in short-term learning activities (Koutsabasis et al., 2011) as well as during the duration of studio courses (Vosinakis & Koutsabasis, 2013). Additional principles of problem-based learning include that participants are provided with an authentic problem at hand, i.e. a) it is related to (their future) practice, and the design problem is ill-defined or wicked (Kolko, 2012), in the sense that it does not have a unique solution which can be good or bad (not ‘optimal’ or ‘best’), b) the participants work in groups of complementary competencies, c) the participants are responsible for their learning about the problem at hand and d) the participants gradually develop a solution by practising design and engineering methods.

The second learning method investigated is the design workshop. In the context of design, workshops typically involve participatory or co-design activities and have been defined as “a form of participatory design, consolidating creative co-design methods into organised sessions for several participants to work with design team members” (Hanington & Martin, 2012). However, there can be several arrangements of a design workshop, depending on the learning goals and the problem context. Design workshops have been proposed in several contexts and forms to deal with complex problems that require a participatory design approach, including co-design activities (Holman et al., 2008), change management (Holmberg & Robèrt, 2000), urban studies (Hou, 2013) and urban planning (Wates, 2014).

Generally, design workshops entail several activities that facilitators plan and orchestrate. The workshops often begin with an overview of topics and an agenda, may continue with field visits (Goodman et al., 2012), observation or ethnographic research, followed by brainstorming and closely coupled cooperative design, modelling, artefact making and testing. In between these activities there may be breaks with short inspirational presentations or stakeholder visits.

According to this preliminary research, it is relevant to remark on the importance of the practice-based approach in the learning methods adopted in design education. Three key findings emerged as strategic pillars for the definition of an innovative teaching design methodology customised for the contemporary needs of Indian academics:

- Integration of different disciplines
- A problem-based approach in a real-life environment
- Co-design and co-creation of knowledge and values (trainer to trainer, trainer to student, student to student).

With the theoretical foundations and formative decisions on how to train the trainers set in stone, we moved to develop three capacity-building sessions. These sessions aimed to apply the state-of-the-art findings and give our Indian colleagues the content and scaffolding to build their courses that would make use of the design and innovation centres established and combining them with contemporary design pedagogy. In the next section, these three capacity-building sessions are presented and discussed.

## Capacity-building sessions

In this section, the authors present the experience of running three capacity-building sessions aimed at supporting an HEI in India in planning and developing educational content to support the three design and innovation centres. The capacity-building sessions adopted a train-the-trainer methodology with a specific methodology and tools for training, research and applied research activities with companies and institutions. Before training design students, it is fundamental to train who is going to train them. The train-the-trainer methodology has equipped a panel of 35 Indian experts (PhD students, researchers and professors from three universities) with a particular method and set of design tools with the following aims:

- To start developing future courses and laboratories
- To practise a constructive, holistic, empathic and iterative approach that is flexible and that can be applied as both an educational and collaborative strategy
- To provide resources, content and an overall educational approach to teaching design in a hands-on, experiential way.

The methods and tools offered and explored during the capacity-building sessions can be further used by the Indian experts along with students in teaching and designing new services but also with local entities, external stakeholders and international partners. These choices were informed by desk research and fieldwork (Bofylatos & Azariadis, 2022). The synthesis of the research supported the establishment of the design centres as a focal point for the development of the design strategy in India. The train-the-trainer methodology was chosen as an effective method to scale up the interventions selected and to complement and strengthen the labs with both educational material as well as pilot projects. The following sections present the educational approach, the tools and methods adopted and the didactic organisation of the three capacity-building sessions.

## Face-to-face session with a focus on integrated product design

Brunel University London hosted a capacity-building programme titled *Integrated Product Design* in Uxbridge, UK between 24 February and 6 March 2020 for nine delegates from three Indian partner institutions. The programme was developed based on the concept of T-shape designers. According to Hansen and von Oetiger (2001), the horizontal part of the *T* refers to a breadth of knowledge across various aspects of design, while the vertical part of the *T* is defined as the depth of knowledge of professional designers. Thus, this capacity-building programme aimed to build upon designers' core skills and broaden their knowledge in other areas. The subjects delivered under this programme can be grouped into four areas:

1. Professional practice (e.g. co-design and research-informed teaching)
2. Strategic design (e.g. strategic design management, branding and future forecasting)
3. Entrepreneurship (e.g. innovation process and innovation management)
4. Technical design (e.g. design for manufacturing and advanced manufacturing)

The programme is underpinned by the Double Diamond model (Design Council, 2019). The model was chosen because it reflects design practices in industry. It was constructed based on 11 case studies from diverse types of organisations, such as product and service design (e.g. LEGO® and Starbucks), physical and digital design (e.g. Whirlpool and Microsoft) and emotional and functional design (e.g. Xerox and Alessi). The process contains four main stages: discover, define, develop and deliver. The first two stages focus on exploring and framing the question(s), while the latter stages concentrate on creating and realising solution(s). At the heart of the process is the notion of convergent and divergent thinking in the design

process. Designers need divergent thinking to explore all possibilities at the *discover* and *develop* stages. However, they also require convergent thinking to systematically narrow down the scope and deliver practical solutions in the *define* and *deliver* stages. This model was integrated into many lecture materials and activities.

Although the programme offered several hands-on activities, it did not involve a task that linked all aspects together. At the end of the teaching activities, the courses were formally evaluated with questionnaires and a final group discussion. According to the feedback collected for the first capacity-building session, it would have been more useful to include a task that connects all subjects, such as portfolio development. In general, the delegates found the *process-oriented* approach useful. They observed that the application of the Double Diamond model in teaching and learning activities could help assure the quality of the process and outcomes, as well as avoid subjectivity in assessment.

#### Blended e-learning session focused on service design

Due to COVID-19 restrictions, Politecnico di Milano organised a remote capacity-building programme between 10 and 23 October 2020 for 18 professors and experts from the three Indian partner institutions. The programme took place through an exploration of blended e-learning potential and assets using both online interactions and offline activities:

- 1 Online interactions:
  - Lectures
  - Gamified learning experience (several challenges and feedback)
  - Microlearning (learning nuggets)
- 2 Offline interactions:
  - Assessments
  - Co-working activities and round table discussions

The topics, contents and tools were planned and offered to guide the Indian partners in starting to design their future courses and labs by envisioning possible synergies as systems, both internal and external to academia.

To achieve this goal, the training programme focused on service design and was implemented through a creative process based on the human-centred design approach and, thus, throughout three main phases of inspiration, ideation and implementation. The human-centred design makes systems desirable from a human point of view with what is technologically feasible and economically viable (Ideo, 2011). This approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability and counteracts possible adverse effects of use on human health, safety and performance (International Organization for Standardization, 1999).

According to the feedback, the Indian professors and experts appreciated the innovative ways of using online platforms and tools proposed during the programme. The topics and themes offered a fresh perspective based on a systemic approach that keeps participants' motivation and ambition high. Further reflections and improvements lie behind the possibility of cooperative sessions among the three Indian universities.

#### Blended learning session focused on interaction design

Due to the COVID-19 restrictions, the session offered by the University of the Aegean (UAEGEAN) also had to be delivered online with synchronous and asynchronous learning activities. During a two-week

programme, the university offered a multifaceted lecturing cycle to cover the main aspects of interaction design, ranging from theory to practical examples and case studies.

The presentations and dialogues on the selected theoretical issues implemented examples, and co-working activities were designed to offer inspiration and insights to both the UAEGEAN lecturers and the participants from the Indian universities.

UAEGEAN offered a broad and holistic view of the fields and connected them to digital heritage management (Chatzigrigoriou et al., 2021) and connected computer-aided design subjects to human-computer interaction (HCI) and its evaluation tools. Thanks to the assignments, the Indian experts had hands-on experience of usability studies in the local setting and implemented the empirical conclusions in the framework of DESINNO. Thanks to a selection of online platforms and tools, the Indian experts could work together remotely in a collaborative way.

During the capacity-building session, the lecturers introduced the concept of interaction design through an introduction to HCI. They presented how it is educationally approached as a theoretical course, as a studio course and in terms of research outcomes. In this direction, the participants were given specific scientific papers to discuss among them at the next online session. Hence, the first assignment focused on an overview of HCI and education in design engineering and research in the UAEGEAN by reading three relevant papers outlining different tools applied to HCI and usability, with digital heritage as the central case study. The second assignment focused on running a heuristic evaluation of the Indian Railways e-service and filling in the heuristic evaluation sheet through task analysis. The participants were asked to try to define the individual tasks involved in the process of booking the ticket, e.g. “you could use task analysis to determine the separate steps the user follows to book a ticket and turn them into tasks to measure their time and errors”. Thus, the third and last assignment was dedicated to running a usability test and producing a report of the key findings and directions to redesign the same platform.

Overall, the two-week programme managed to achieve a high degree of success. The participants evaluated the course highly. The lecturers provided an overview of the fields of HCI and interaction design, outlined the synergies with fields adjacent to it such as digital heritage management, design for all and service design and pushed the participants to reflect and gain a second-order understanding of interactive systems through the two evaluation assignments.

## **Conclusions**

### **Lessons learned**

After the completion of each capacity-building session, the participants were invited to provide feedback through an online questionnaire on their experiences of the training provided. Overall, all three capacity-building sessions were considered highly successful, receiving an average score of 4.5/5 on a Likert scale (1=Poor, 5=Excellent).

Thanks to the capacity-building sessions, 35 Indian experts received training on all three main design disciplines that the target Indian universities focused on, namely industrial product design, service design and interaction design. Additionally, a vast volume of resources has been produced, e.g. educational material, presentations, scholarly articles, videos and audio-visual material that can be used by the Indian HEIs for the development of their courses and lectures.



The blended approach adopted in the three capacity-building sessions allowed the authors to measure the impact of design education delivered both traditionally (face to face) and with an innovative e-learning approach. The most valuable insights collected from the practical application are:

- Design contents: In addition to the three focus of the design disciplines included in the teaching activities (product design, service design and interaction design), the Indian experts declared a high interest in exploring the fields of design for social innovation and human-centred design.
- Design methods: The hands-on and assignment-based approach to teaching was evaluated as effective. The opportunity to apply what the participants learned in practical assignments with a strong relation to real applications in new courses or new educational experiences was evaluated as a relevant outcome. The blended sessions were evaluated to be well planned and apt for the educational goal. The adoption of a practice-based approach in e-learning education allowed for the exploration of new ways of applying and including technologies in the design of teaching programmes.
- Design Tools: The participants enjoyed going through the exercises that were supported and facilitated using templates and formats.

The train-the-trainer methodology applied for field testing the design education in the capacity-building sessions has demonstrated the following:

- The effectiveness of the systemic approach in design education: train the trainer with a multidisciplinary and systemic approach to support the building of an innovative mindset for the future education of Indian students with contemporary skills and visions of the design discipline. Instead of providing a concrete framework of western design, our Indian colleagues were given a scaffold to create a bespoke approach that better addresses local challenges and existing design perspectives, hoping to decolonise Indian design education.
- The use of a blended approach demonstrated the possibility to adopt an inclusive approach in design education in emerging countries. The effectiveness of new tools using digital technologies can improve the number of experts and professors involved in train-the-trainer experiences without losing effectiveness and engagement.
- The capacity for social change through increased empathy developed by the adoption of human-centred design approaches. Both human-centred design, as elaborated in design thinking, and human-computer interaction usability and design for all tools foster understanding of the users in the context of creativity.
- The evolution of the diffuse design capacity of grassroots innovators in the context of the maker movement as part of the labs established. Leveraging design as a facilitator of bottom-up solutions can create new social value that is context-specific and embedded in everyday problems in a local context.

## Repeatability and scalability

All capacity training programmes, namely integrated product design, service design and interaction design (or digital design) were developed to be turned into either new elective courses or new content that can be integrated into existing courses.

To scale up 10-day capacity training programmes into proper courses, further developments were carried out. Firstly, all teaching materials were gathered, formatted and shared on the online repository. In this way, all the professors involved in the train-the-trainer courses could access these materials and use them for their teaching and learning activities. The teaching materials and feedback were then used to form the basis for new elective courses or to add content to existing courses. Next, the three Indian universities engaged were asked to identify which courses they would like to develop further, and a benchmarking exercise was carried out. The aim was to capture the good practice of leading courses in related fields to develop the teaching materials further and address the feedback collected. The courses included in the benchmark exercise are shown in Table 1 below.

Topics	Courses included in the benchmarking exercise
Integrated Product Design	BSc Product Design & Technology, Loughborough University, UK MEng Design Engineering, Imperial College, London, UK MA Collaborative and Industrial Design, Aalto University, Finland
Service Design	MA Service Design, Royal College of Art, UK MDes Design Innovation & Service Design, Glasgow School of Art, UK MA Service Design, University of the Arts London, UK
Introduction to HCI	BA User Experience Design, University of the Arts London, UK MSc Human-Computer Interaction Design, City, University of London, UK MSc Human-Computer Interaction, University College London, UK

Table 1: Courses included in the benchmarking exercise.

After the capacity-building sessions, a concrete application of the tools and methodologies tested has been implemented through the definition of specific syllabuses for three new courses, with the involvement of the professors who attended the capacity-building sessions. The new syllabuses were developed based on key points extracted from the benchmarking exercise and the capacity-building training materials. After that, they were reviewed by corresponding staff at the Indian institutes. Once the syllabuses were approved, the tutor's guidance for each course was developed accordingly. The teaching teams who created and delivered the capacity-building programmes were also invited to add relevant information and to provide further feedback/comments to all syllabuses and tutor guidance. The practical application of the contents and the teaching methodologies in innovative design education programmes represent the beginning of the answer to the research aim of the authors, namely the modernisation and internationalisation of Indian universities with innovative and updated design courses with a set of methodologies based on design thinking, sustainability, design research, social innovation and ethical issues in design.

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