

# T+ designers: a case for transdisciplinarity in design higher education by way of a South African case study

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## Abstract

In recent years, the term 'transdisciplinarity' has been widely applied to a range of collaborative design approaches ranging from inter- to multi-disciplinary co-production. While each of these forms of co-production have their place, many of these approaches are branded, tokenistically, as transdisciplinary. According to Toomey et al. (2015), a transdisciplinary mode of collaboration is one that looks beyond bridging divides within academia, to engage directly with the co-production and use of knowledge from within and outside of the academy. Within the context of design specifically, the term 'T-shaped designers', championed by IDEO's Tim Brown, is often used when promoting design thinking to tackle complex problems, which comprises multiple stakeholders and typically occurs within a team setting. The vertical leg of the 'T' represents disciplinary depth (such as the various skills in design) and the horizontal bar suggests the application of these skills across a breadth of other contexts.

For this paper, we extend the interdisciplinary nature of the T to a transdisciplinary one. That is, we move from the traditional T-shape as a base, and propose how transdisciplinarity can be used not only to foster a heightened sense of social awareness in students, but to inculcate civic values that will be transferable beyond the academy, ultimately in their professional practice. In this way, as the vertical stem deepens, civic graduate competencies are nurtured and the T transforms into a plus. We illustrate this transformation by presenting an exit-level BA Information Design curriculum-related project. As a collaboration between the University of Pretoria (UP), South Africa (SA), and the University of Roehampton (UR), United Kingdom, the project was delivered in a meaningful transdisciplinary way, whereby students co-produced a series of accessible and engaging infomotions (information visualisations in motion) – a visual toolkit of sorts. The infomotions, which disseminate strategies for effective partnership, are aimed at early childhood intervention practitioners in South Africa. Specifically, the infomotions serve a communicative and mediative role between therapists and health practitioners, early childhood educators and family and or caregivers as they collaborate on various early childhood interventions that help young South African children (0 to 6) who may have or be at risk of developing special educational needs, disabilities and/or developmental challenges; challenges

that were highlighted at the height of the Covid-19 pandemic. At its core, the project serves to highlight the value in transdisciplinarity as an effective model for collaboration in ECI in South Africa and indeed across the globe.

## Author keywords

Design education; transdisciplinarity; information visualisation; South African design; design for development; early childhood intervention.

## Introduction

As a reflective practice (Schön, 1983) that's adept at tackling humanity's wicked problems – such as climate change, education, equality, health, and wellbeing – design is inherently collaborative and social in nature. Now more than ever, Herbert Simon's (1969, p. 129) seminal definition of design that "[e]veryone designs who devises courses of action aimed at changing existing situations into preferred ones" speaks to the transformative potential of design. For example, in contemporary design practice, cross-disciplinary partnerships are evident across a myriad of design practices; co-, participatory-, social-, transformative- and service- are just some adjectives that are used nowadays to denote that design approaches transcend predefined, historical silos of working independently.

Cross-disciplinary partnerships have also increased, given the popularisation of design thinking as a problem-solving methodology. While design and designers increasingly occupy a space in the front-end of innovation, the application of a design thinking approach is sometimes more of a fad to drive innovation (Johansson-Sköldberg et al., 2013). As such, collaborative design approaches are sometimes conflated with being inter-disciplinary and multi-disciplinary, and are thus labelled as being transdisciplinary. Using this critique as a springboard for investigation, we aim to elucidate a transdisciplinary approach specifically from a South African design education perspective. To this end, the paper presents a triangular interest in contemporary design practice, transdisciplinarity and design higher education. The paper begins by outlining the history and nature of T-shaped professionals as it appears in extant literature. Next, we provide a working definition of transdisciplinarity before presenting a curricu-



lum-related BA Information Design (ID) project. Ultimately, the analogy of shifting from a T-shape to a T+ guides the discussion for transdisciplinarity in design higher education.

### Doing things to a T

According to Ing (2008), the term “T-shaped skills” is credited to David Guest in an article that appeared in London’s *The Independent* newspaper in 1991. This was followed by its use by Marco Lansiti (1993) in an article titled *Real-World R&D: Jumping the Product Generation Gap*. Citing Lansiti, the term was subsequently used at length by Leonard-Barton (1995); the context was a study “of R&D groups in system-focused companies, emphasising skills within a team as a whole” (Ing, 2008). The term was also related broadly to problem-solving instances. During the 1990s, the focus on T-shaped professionals shifted towards a more specific role, namely T-shaped managers. This shift was informed by a move away from a more linear form of management style during the industrial age (Ing, 2008). It became necessary for professionals to not only have depth of knowledge of their discipline or area of specialisation but increasingly a breadth of knowledge or understanding of other disciplines too. Hence, this dual need informs the pictorial representation of the T-shape where the stem of the T represents disciplinary or functional skills, and the crossbar of the T connotes application of knowledge across a broader range of contexts, and end-users.

Owing to the scope of skills required to address wicked social and cultural problems, the general concept of T-shaped professionals has since been adopted in design, management and innovation discourse. In particular, the term gained popularity by Brown (2010) who championed the notion of designers as T-shaped people when promoting design thinking, the nature of optimal work teams (which alludes to co-creation) as well as organisational culture and hiring employees. Peter’s (2012, p. 65) explanation of Brown is that “the T-shaped designer possesses a principal skill of, let’s say, industrial design (vertical), as well as an empathic or inquisitive nature that encourages branching out into other skills, such as anthropology (lateral)”.

What’s significant with regard to T-shaped designers is Brown’s argument that the horizontal crossbar of the T is composed of empathy “... because it allows people to imagine the problem from another perspective - to stand in somebody else’s shoes” (Brown in Hansen, 2010). Furthermore, Brown highlights “active listening” as a form of empathy. Active listening is a trait that is seminal to our argument, and we return to it in more detail in the case study section.

The concept of T-shaped individuals is also evident in education-related discourse, which traverses different disciplines. For example, it can be found in design (Peters, 2012), medical (Donofrio et al., 2010), STEM (Conley et al., 2017), and engineering education (Tranquillo, 2017). The recurring theme in educating T-shaped students across different disciplines concerns nurturing students who will become graduates with attributes that will not only support them in advancing professionally, but also personally as critical citizens.

### Transdisciplinarity and the higher education landscape

Transdisciplinarity in education is not always a categorically distinct term; it is often used interchangeably with inter- and multi-disciplinary practices. However, in a recent literature review study titled “Higher education, the arts, and transdisciplinarity” van Baalen et al. (2021, p. 24) present a continuum “moving from buzzwords to a theoretically delineated usage – to make sense of the use and conceptualization of transdisciplinarity”. While it is not our intention to unpack this continuum, we align our research with an intentional theoretical usage of the term and not merely as a tokenistic adjective to describe our case study. Moreover, we show how design did not occupy an “instrumentalized position” where design approaches were used by other disciplines. Instead, a transdisciplinary approach was adopted whereby a new space of interaction was created beyond the traditional disciplinary bounds. Thus, the following understanding of transdisciplinarity, in education, serves as our working definition: “Trans-disciplinary work moves beyond the bridging of divides within academia to engaging directly with the production and use of knowledge outside of the academy” (Toomey et al., 2015, p. 1). A visual comparison by Jensenius (2012), as seen in Figure 1, makes explicit the differences between the broad range of disciplinaritys.

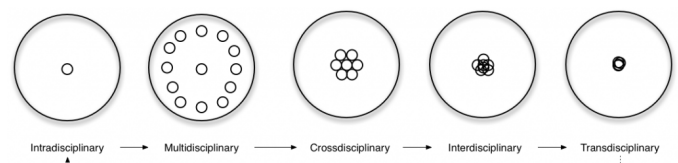


Figure 1. Visualisation of the nature of different disciplinaritys (Jensenius, 2012).

Transdisciplinarity is fast gaining ground in institutions of higher education both globally and locally. This is not surprising as higher education is also expected to evolve and adapt to changes to prepare graduates when applying their skills in the real world. Consequently, there is a universal move to outline graduate attributes, which aim to strengthen the links between what is taught and what skills are necessary not only for graduate employment but also in context of the socio-economic-political needs. At our home institution, “[t]ransdisciplinary research has long been part of the University of Pretoria’s [UP] key strategic vision” (Kupe, 2022). It is also clearly noted by UP’s Department of Institutional planning that graduate attributes “are aligned with the human capital needs of the economy and society, need to encapsulate both universal and particularly South African demands and develop in students critical citizenship” (University of Pretoria, 2023).

### Case study: infomotion

Following this imperative, we introduced transdisciplinarity in our undergraduate ID programme. The ID course appreciates that design does not exist in a social vacuum; rather, it affects and is affected by larger social concerns and consequently, students are encouraged to appreciate the outcome of their work within a broad socio-cultural environment.<sup>1</sup> This means

1 One of a kind in South Africa in terms of its broad-based approach, the BA ID programme promotes design thinking through the exposure to and integration of various communication design disciplines. The philosophy in ID is to consider teaching and learning strategies that centre on learning by doing, hermeneutic enquiry, experiential learning, balancing theory with practice, and encouraging both individuality and civic responsibility

that the pedagogical strategy aims to prepare students to work within the expansive domain of humanist or socially-oriented design.

Keeping the social underpinnings of the course in mind, the following section provides an intimate overview of a fourth (and final) year student animation project conducted in 2022. It was delivered by a team of lecturers, led by the authors and Alexander Melck (Phlogiston). The project serves to highlight the value in transdisciplinarity as an effective model for collaboration in early childhood intervention (ECI) in SA and across the globe. As we demonstrate, the practice-lead project, whereby students engaged with and gained valuable field insights from ECI practitioners as well as the project team, is fundamentally transdisciplinary in its conception and execution. That is, it is not merely an interdisciplinary project in which students engage with different fields of expertise at different points in the project. At its core, the stages of the project are led by two principal lecturers, who not only provide a sense of continuity in facilitating these ongoing interactions, but also help students to filter and leverage the diverse perspectives and focus their project outcomes in order to create innovative and impactful design solutions. Moreover, although our focus is on this practical project, it is worthwhile pointing out that it formed part of a larger ECI research initiative. That is, in its broader conception, the design contribution lies in distilling complex, dynamic and interconnected ideas gleaned from the research.

The research initiative, led by Dr Susana Castro-Kemp (UR), sought to identify current practices and challenges faced by ECI teams in delivering interdisciplinary provision for young, vulnerable children. In collaboration with Prof Shakila Dada (UP) and Dr Alecia Samuels (UP), the initiative looked specifically at ECI in SA. A national survey with ECI practitioners across disciplines was conducted, followed by more in depth virtual focus groups and telephone interviews.

The team identified a range of challenges specific to the local ECI context. Notably, the researchers found that owing to the high level of poverty, 30-50% of households are not able to meet basic nutritional needs, let alone consider any sort of specialised medical treatment for children with significant developmental needs (May et al., 2020). Moreover, the study notes a significant shortage of ECI practitioners available to the public health sector. At least two million children in SA live with disability. Unfortunately, as of 2019, 70-80% of children with disabilities (CWD) are reliant on the public healthcare sector, which accounts for less than 20% of the registered ECI practitioner workforce (Kathard et al., 2020). To respond to these challenges, the research outlines three overarching strategies. Firstly, the researchers address the efficacy and resource intensity of different modes of collaboration in ECI and suggest that a transdisciplinary model is more sustainable in terms of manpower and continuity in treatment. Secondly, in order to achieve effective transdisciplinary collaboration, the research promotes various modes of open and constructive communication involving active listening and joint decision-making as a way of building trust

between practitioners and reaching consensus about the child's needs. Finally, the researchers found that collaborative ECI is most effective when it is family-centred, whereby families are considered as part of the team of experts and are empowered in the decision-making process with regard to care for their children so that intervention is more likely to continue at home.

With these strategies in mind, the researchers collaborated with our ID division, to develop a series of motion graphics that unpack these strategies in a meaningful and accessible way. The aim was to produce a series of infomotions (information in motion) - a toolkit of sorts - that serve a communicative and meditative role between therapists and health practitioners, early childhood educators and caregivers as they collaborate on various interventions that help children (ages 0 to 6) who may have or be at risk of developing special educational needs, disabilities and/or developmental delays.<sup>2</sup> As a set-up for the practice-based project, students were divided into nine groups of five. The research and findings gathered in the first phase of the project were distilled into nine abstracts (divided into three categories) each subsequently informing the respective student groups as they progressed into the research and conceptualisation phase of the project.

During the conceptualisation phase of the project, students were encouraged to conduct supplementary research in a variety of ways. To start with, students took part in a story-building workshop, where they unpicked the key elements of good storytelling. The idea of the workshop was to develop a sense of narrative thinking; to gain insight into the way we internalise information so that students produce meaningful stories, as opposed to stale, instructional videos. From there, groups worked through and pitched several ideas, each revolving in some way around metaphorical analogy; comparing the core problem statement in their research to an accessible or relatable phenomenon.

The next phase was scriptwriting, where students began to translate their concepts into a workable, tangible structure. While still exploratory in nature, groups untangled structural concerns such as logical flow, repetition, abbreviation and integrating case study examples. Students were also given further classes on script-writing practice, again with an emphasis on narrative storytelling. The focus here was to develop a story arc, through writing and structure, the rhetorical nuances in narrative writing and lessons on the value of micro-editing to inject voice and texture to a piece. For example, the first group was tasked with describing not only what the concept of collaboration is in theoretical terms, but also *show* in a meaningful way, how this concept has practical and immediate value to their practice.<sup>3</sup> In order to do so, the group used inversion as a rhetorical strategy to contrast the practice of 'do-it-yourself' (D.I.Y.) versus collaboration. In the script, the designers flesh out statistics that describe, with some whimsy, the follies of D.I.Y. in day-to-day home improvement; construction gone awry, broken bones and missing appendages. At the halfway point in the script, these 'mishaps' are described as reasonably 'fixable' since one is always able to "rebuild, repaint and reattach."

2 To view the nine infomotions, visit <https://youtube.com/playlist?list=PLMKOPjH7a7lyQ83LDsOnWpAWUR8CETmn> (Information Design, 2022).

3 To view the infomotion entitled *Why collaboration matters in early childhood intervention*, visit <https://youtu.be/p81buijyxPI> (Information Design, 2022).

In contrast, the script concludes that this is *not* the case when it comes to ECI, since the first six years of a child's life are developmentally fundamental and are not as easily 'redone' if a mistake is made. Hence, ECI is not a do-it-yourself project, but requires timely collaboration.

Importantly, at this point in the project, the groups were put in touch with ECI practitioners, via an online chat platform, Slack. This proved to be helpful to the script-writing process, since students were able to use the insights and real life stories they gleaned, to help ground some of the more abstract research concepts they were dealing with and that had to be distilled in an accessible way. A good example of this is in the case of one group who tackled the topic of 'why families are important to ECI.'<sup>4</sup> The students' research exposed them to a myriad of occupational and physical therapy intervention techniques that can be continued at home. In order to avoid simply negotiating different viewpoints by listing an overwhelming array of techniques in the script, students depict a simple scene that mimics an actual scenario of an occupational therapist teaching parents of a CWD a mirroring technique to help with physical and mental coordination. Interestingly, in recalling the experience to the students, the practitioner also happened to mention that owing to the particular child's difficulty with maintaining eye-contact, it was the child's mother who suggested that the activity be modified to where they do it without facing each other. After months of initially stalled treatment, this slight modification had a substantial impact on the child's uptake of successive techniques.

Working with various ECI practitioners also brought to light an incongruence in the initial narratives across the first four research themes. Initially the second and third infomotions were meant to be summaries of three models of collaboration (multi-, inter and transdisciplinary collaboration) with the fourth as a conclusion that transdisciplinarity is the preferred model. What became clear however, was that there was an assumption that transdisciplinarity may be viewed as the preferred model simply because it is listed as the third mode. Therefore, in the interest of accessibility for knowledge dissemination, it was important to first unpack the strengths and weaknesses of the former models, but specifically as a point of *contrast*. And so, in discussion with the groups, the disciplines came together to find a consistent, overarching metaphor, of modes of water-dissemination, as forms of collaboration that occur in nature.<sup>5</sup>

After several iterations of the scripts, students recorded a rough edit as a prototype to present to the project lecturers, researchers and ECI practitioners.. The prototyping was used to gain a bird-eye view over continuity between the nine scripts as a whole. That is, how certain concepts described in earlier infomotions are ultimately clarified, picked up on or circulated without unnecessary repetition in later ones. Secondly, the researchers and practitioners were particularly helpful in identifying incongruencies in use and application of terminology. Upon finalisation of the scripts, students collaborated with sound producers and a voice over artist from UP's local radio station to record the scripts. At this point, stu-

dents were taught how to direct the voice over artist in terms of tone, texture, mood and pronunciation to ensure that the target audience receives the message in an accessible and engaging way.

Next, students begin to consider and develop a visual style for their infomotions that is not only conceptually appropriate to the research theme, script and narrative, but appropriate for the intended audience. At the same time, students are required to consider scene-to-scene animation by way of a storyboard. Storyboarding, as a type of visual shorthand, helps students to work through and prototype the relevance and meaning of several narrative ideas fairly quickly, without committing to hours of work that goes into just a few seconds of animation.

Students then moved onto the audio-mixing phase. This is arguably the most important technical aspect to an infomotion since, in most cases, the audio guides the pacing and rhythm of the animation for the viewer. Where syncing to the voice-over most obviously guides the pacing of a motion piece, students are taught to pick up on, enhance and add audible changes in the backing track to help create drama through climax and anticipation. Moreover, backing tracks and sound effects were also employed to help shape the atmosphere for a piece.

Students then begin to animate. As a form of animation, infomotion affords the designer time and sequencing as tools to unfold a meaningful narrative. Motion graphics need to evoke rhetorically powerful signs and symbols quickly in order to effectively and intelligently communicate complex concepts. Therefore, they should communicate singular, accessible concepts. In other words, in promoting accessibility in the production and dissemination of knowledge, students were encouraged to simplify the scene-for-scene depictions to produce focused ideas, one at a time. If more than one idea is communicated per scene, there is a chance that the animation may confuse or overwhelm the viewer.

As part of the ID degree, there is a strong emphasis on the value of reflection as an analytical and developmental tool. For this reason, students were briefed, at the onset of the project, to document their research, critical thinking and design processes; from concept, storyboarding and animation to working with and across disciplines. Students had to consider moving from their initial insights to developing a more robust and thoughtful concept. Students had to consider, for example, what they might have originally assumed would be an appropriate conceptual solution compared to what was ultimately gathered from the transdisciplinary interactions. Ultimately, owing to the transdisciplinary focus, students reflected on how, if at all, consultation with fellow group members, project leaders, the client and ECI practitioners helped to evolve their thinking and design approach.

### Developing T+ designers

The aim of the transdisciplinary project was both pedagogic and practical. The project facilitated epistemological development of design students. More significantly, they learnt about

4 To view the infomotion entitled *Why families matter in early childhood intervention*, visit <https://youtu.be/KLRPnFKBFIQ> (Information Design, 2022).

5 To view these three infomotions, visit [https://youtube.com/playlist?list=PLMKCPojH7a7JcapKaSIH04Fsv\\_UIOJcbZ](https://youtube.com/playlist?list=PLMKCPojH7a7JcapKaSIH04Fsv_UIOJcbZ) (Information Design, 2022).

the co-production of knowledge as it relates to the idea of design as a relational practice, comprising reflective as well as reflexive processes. Students engaged with research for design from a different perspective, to script a 'new' narrative.

Although the project constitutes various research phases, the reason we focussed on the practical component specifically is twofold; as design is a field invested in critical thinking and problem-solving it is typically the case that designers are required to develop a deep understanding of the problem at hand in order to thoughtfully consider the research initiative and its initial findings and strategies, but then also to communicate these findings to the end user in an accessible, intelligible and meaningful way. Through a real-world project, students experienced first-hand that design serves as a throughway between the research and end users, and is able to distil possible communicative gaps in both the acquisition, dissemination and uptake of research.

With regard to the traditional T-shape, the design education context of the project facilitated areas of professional design practice; students were expected to apply disciplinary depth by synthesising and building on their design skills, scaffolded over their former years of study (the vertical leg of the T). Perpendicular to this, the complex nature of ECI in SA introduced different contexts, stakeholders - including research and end-users - and disciplines to the students (the horizontal bar). The breadth of engagement required students to broaden their worldviews; it highlighted that their design decisions need to be informed through cooperation, collaboration, prototyping, and dissemination and not only imagined by their preconceptions.

Social change is at the heart of knowledge creation – not only within the bounds of this project, but also in terms of fostering a sense of social and ethical design citizenship that is maintained, paid forward and extended further as design graduates enter their chosen professional field. What this project showed us was how to nurture "citizen designers" (Resnick, 2016). Through facilitation of the project, we recognised a transformation in the students' problem-solving approach; an empathic outlook was evident, which from a civic point of view, gives them a sense of agency in making socially impactful messages heard. This conscious approach to transdisciplinarity was also carried over in subsequent ID projects. More importantly, the deep social awareness and civic responsibility that students gained will hopefully extend beyond the classroom, like the stem of the T extending upwards to shape a plus (+); a T+ shaped designer. This is not to say that social awareness and civic responsibility is not part of the traditional T-shape. Instead, it is our position that (1) more attention on *strengthening* the link between design education and design practice, and (2) on encouraging the design student to strive for civic responsibility beyond the classroom, might strategically extend the core tenet of the traditional T. Over time the experience of transdisciplinary design practice may become transferable graduate attributes that designers embody not only in their professional trajectories but also social, cognitive and basic values that contribute to a more socially-just world. Given SA's apartheid past, the socio-economic inequalities that still plague the country will indeed benefit from solutions developed from within and for a local context.

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