

## ***Nurturing creative confidence and learner empathy: designing for academic staff development***

Daniela Gachago, Cape Peninsula University of Technology, gachagod@cput.ac.za

Izak Van Zyl, Cape Peninsula University of Technology, vanzyli@cput.ac.za

Jolanda Morkel, Cape Peninsula University of Technology, morkelj@cput.ac.za

Eunice Ivala, Cape Peninsula University of Technology, ivalae@cput.ac.za

### **Abstract**

As a contemporary and boundary spanning approach, design thinking is gaining traction in higher education, but it has not yet been established in academic staff development. The aim of this study is to reflect on a recent staff development intervention on blended learning course design, aimed at promoting a ‘design thinking mindset’ among university lecturers. By analysing empirical data gathered through participant interactions, we discuss the implications and potential of design thinking for academic staff development. Data analysis shows an increased awareness of the complex and diverse student body, a recognition for interdisciplinary collaboration, mentoring and reflective thinking. Additionally, it is highlighted that adopting design thinking is not without challenges, which include the need for continued practice, securing departmental buy-in and upscaling initiatives. The findings emphasise the importance of creating a ‘safe’ space to experiment, modelling a designing-on-the-go approach, focusing on the iterative processes of (re)design, providing scaffolding for learning, making design thinking processes explicit, building a community of practice, regular feedback and maintaining the balance between playfulness and reflection. Success of such an intervention will rely on balancing the development of design thinking skills, a design thinking mindset and creative confidence.

**Keywords:** design thinking, blended learning, academic staff development, higher education, South Africa

### **Introduction**

Higher education (HE) in South Africa has recently seen widespread disruptions as a result of national protests against untenable university fees, Westernised curricula and student exclusions. These student-led protests have highlighted the inequality that persists in the country’s tertiary system, and pointed to the need for fresh approaches to addressing systemic problems in HE. While not a panacea to structural inequality, ‘design thinking’ has long been touted as a contemporary, boundary spanning and inclusive approach to ‘wicked problems’ in both academia and civil society (Buchanan, 1992; Goodyear, 2015). More recently, design thinking has witnessed an uptake in universities around the world - beyond design disciplines - as a learning paradigm that nurtures creative problem solving and multi-perspective collaboration (Von Thienen, Royalty & Meinel, 2017).

Despite its purported benefits, design thinking is under researched in academic staff development (Gachago, et al., 2017; Goodyear, 2015). The aim of this study, therefore, is to reflect on the first iteration of a staff development intervention that set out to foster a ‘design thinking mindset’ among university lecturers. Based on recommendations from a previous study, the authors developed a short course titled *Designing for Blended Learning*, structured around design thinking principles such as problem orientation, learner empathy and collaboration. In this paper, the authors evaluate the first iteration of the course, which ran in 2017, drawing from participants’ feedback.

### **Literature review**

#### **Staff development in South African HE**

Heavy investments in information and communication technologies (ICTs) for teaching, learning and assessment in HE in South Africa (Dahlstrom, 2015), don’t always translate into visible change of practice as lecturers continue to replicate behaviourist/ teacher-centred teaching and learning methods (Ivala, 2016; Ng’ambi, et al., 2016). Academic development relies on the unlearning of assumptions developed through years of subjection to ineffective pedagogy – as academics instinctively draw on how they were taught as a primary mode of teaching.

Disrupting these practices are notoriously difficult. Bali and Caines (2018) argue that to convince academics to question their assumptions, reflect on their practices, and embrace alternatives after critically evaluating their suitability in context, to guide their actions, is as essential as it is difficult. Moreover, most training and support on the use of technology in teaching and learning focuses on effective use of technology, with little emphasis on course design and training of lecturers to effectively integrate technology in their practice (Dysart & Weckerle, 2015; Ivala, 2016). Academic staff development is often offered as a ‘one-size-fits-all’ (Bali & Caines, 2018); via once-off seminars, which raise awareness around opportunities of using technology in teaching and learning and showcase innovative approaches at the institution. What is missing, however, with some exceptions such as the regional Cape Higher Education Consortium (CHEC) short courses, are longer-term sustainable (inter)institutional strategies. These strategies must allow for follow-up and collaboration between academics and academic staff developers both in terms of technical and pedagogical support, such as short courses (ideally co-designed with potential participants) or the set-up of local peer-to-peer support/networks (Ivala, 2016).

### **Design thinking in academic staff development**

Despite the establishment of the Hasso-Plattner-Institute of Design Thinking (HPI d.schools) at the Universities of Potsdam, Stanford and - most recently - Cape Town, the growing need for design thinking across diverse curricula is not generally associated with the domain of innovation in learning and teaching in HE, or employed for academic staff development. While the application of instructional design models such as ADDIE is not new in this field, design thinking differentiates itself from these models in a number of ways, such as its focus on interdisciplinarity and the iterative, exploratory and sometimes chaotic nature of design (Razzouk & Shute, 2012), human-centred design and creativity. Human-centred design offers what most instructional design models lack, namely a focus on the person we design for (Brown, 2009; Walling, 2014). In traditional instructional design models, there is also a limited focus on creativity (Clinton & Hokanson, 2011). Finally, the emphasis that design thinking puts on ethics is of particular importance in the context of student protests in South Africa, which highlight unequal access to resources.

Although there are a growing number of studies on the potential of design thinking in education (Koh et al., 2015) and postgraduate studies (Rauth et al, 2010; Ulibarri et al., 2014), in professional development the focus is primarily on teacher education (Garetta-Domingo et al., 2017; Hodgkinson-Williams & Deacon, 2013) rather than on academic staff development more generally (Gachago et al, 2017; Goodyear, 2015).

## **Context and intervention**

This study was conducted at a University of Technology in South Africa. In 2016 the educational technology support unit servicing the six faculties at the institution embarked on the design of a short course on blended learning course design in collaboration with design experts at the institution. Design thinking was the chosen focus, drawing on a 2016 study on shared characteristics of eLearning champions at the institution (Gachago et al., 2017). The seven themes that emerged from interviewing these ‘champions’ were: collaboration and generosity; learner empathy; problem orientation; exploration and play; reflection and resilience; focus on practice and becoming change agents. We found that these characteristics corresponded largely to a design thinking mindset (d.school, 2011; Schweitzer & Groeger, 2016).

Research shows that design thinking is not necessarily a natural talent, but a skill that can be learnt (Rauth et al., 2010; Lawson, 2005) through unconscious adoption as much as through formal training (Porcini, 2009). Following design thinkers such as Rauth et al. (2010) who argue that design thinking education (i.e. the process of learning and teaching design thinking) can develop creative competence that ‘assures the students of their own ability of acting and thinking creative’ (p.7), we set out to design a short course that would incorporate design thinking methods, processes and promote a design thinking mindset. The course that was offered in a blended learning format, combining face-to-face workshops and online seminars, ran over a 10-week period. Presentations during the face-to-face workshops were kept to a minimum to allow for peer engagement and mentoring activities during those sessions. The online seminars were used for participant-led discussions on topics of blended learning, such as supporting diverse learners or the ethics of blended learning ([link to course outline](#)<sup>1</sup>). Following others (i.e. Ulibarri et al, 2014), this approach was employed to challenge lecturers to exchange their analytical, deliberate modes of being for an experimental, creative and playful approach. The course design was iterative (‘designing-on-the-go’), and responding to participants’ feedback (through, for example, weekly reflections and other forms of interaction).

<sup>1</sup> See [course outline](#)

This study follows a qualitative interpretive approach. In total, eight participants completed the 10 weeks of training - none of them from Design disciplines. Six of these participants are lecturers in the Faculties of Business and Economic Sciences and Health and Wellness: Nazleen<sup>2</sup> and Riaan work in the Unit of Applied Law while Precious and Jody are employed in the Sports Management Department. Mark and Sonwabo lecture in Biomedical Sciences. Noma works for a central support unit as a language lecturer and Tasmeen is a librarian in the Nursing Department. Data was drawn from weekly reflections submitted by participants as part of the short course assessment requirements. Furthermore, a focus group conversation at the end of the course was organised, facilitated by a colleague from a partner institution, who is both an academic staff developer and interested in design thinking. Five participants took part in the focus group conversation at the end of the course, facilitated by an external colleague and in which participants discussed experiences during the course. Questions asked focused for example on whether and how participants' understanding of course design and blended learning changed and whether and how certain dimensions of the design thinking mindset were developed. The three participants who did not attend the focus group, completed an online survey, which followed the question design in the focus group. Coding was done independently by three of the authors who went through the written reflections, the transcript of the focus group and the open-ended comments of the survey, to come up with emerging themes. An open, axial and inductive analysis process was followed. Six major themes emerged from the analysis: interaction and collaboration (with the sub-themes of nurturing empathy and modeling tools and technologies), creativity, evaluation and feedback, experimentation, time and transferring theory into practice. These themes are discussed in detail in the next section. Ethical clearance was obtained through institutional channels.

## Findings and discussion

In what follows, we describe themes that emerged from participants' feedback on the course.

### Interaction and collaboration

One strong emphasis of the course design was collaboration among colleagues from within and outside their disciplines. Working with and from different perspectives allows participants to learn to cope with contexts that are messy, complex and ambiguous (Jobst, Endrejat & Meinel, 2011). Participants were encouraged to sign up as departmental course design teams and were grouped across disciplines for workshop activities. This was appreciated as Nazleen's comment shows: "But then because [my colleague] was here, we could bounce ideas and correct each other's understanding of certain things; ... doing it with someone who understands the context that you are working in was invaluable."

An activity that the design team introduced in this course was the world cafe methodology (Soeder, 2016) that is usually employed to facilitate large group dialogue. This methodology encourages everyone's contribution, connects diverse perspectives, promotes listening together for insights and shares collective discoveries, as Mark states: "I was pleased to learn that my fellow participants are all from *various disciplines*, it made the experience more varied. I especially liked the rotation between discussion groups [in the world cafe]"

### *Nurturing empathy*

One of the key components of user-centred design (Brown, 2009), is focusing on the end-user and the importance of co-designing interventions with this end-user (in our case, the learner). To emphasise the notion of designing for a specific learner, to put the learner at the centre of the design process, the design team introduced the 'persona' activity at the beginning of the course. Personas (Seitzinger, 2016) are graphically represented user archetypes that help define the intended design activity (Van Zyl & De La Harpe, 2014). It is an informed and experienced description of a hypothetical (end) user (in our case, the learner), their context, challenges and goals. Respondents commented on their increased awareness of their students' diversity in circumstances, personalities and needs. The following comment of Precious illustrates this: "I have started to pick up *distinct differences* in my students that I have previously been unaware of."

### *Modelling tools and technologies*

The course designers invited a variety of mentors / champions to the course and encouraged them to share their own practices in informal conversations (rather than formal presentations) with participants. Using their pedagogical innovations as case studies, to be analysed and used as examples or 'precedent' (Lawson, 2005; Hitge, 2016) by course participants, was an important strategy to encourage more creative uptake of technology. Jobst and Meinel (2012) call this strategy of constantly observing others as model in action, 'vicarious experiences. The success of this approach depends on mentors' ability to externalise their tacit knowledge, i.e. design thinking (Koh

<sup>2</sup> All names changed.

et al., 2015), and the mindset that enables it, as the following comment shows: “Loved [the experts]. Inspirational and encouraging. More confident to try new things [survey].”

Design activities and assignments for the course focused on a participant’s teaching practice and were chosen to be as authentic as possible. While we modelled certain tools in the course (such as the online conferencing tool, Blackboard Collaborate, as mentioned in comment 1 below), participants were encouraged to go beyond the course tools and experiment with a range of tools and technologies if they saw them fit for their context (see comment 2). In respondents’ comments we found a growing understanding of the affordances of tools and technologies and an increase in sensitivity towards their students’ established practices:

.... using *Blackboard Collaborate* gave me ideas on how to use it in my own class (focus group)

I think *Zoom* is convenient easy to use tool as it saves time, using 1 tool for various functions allowing the user/student to select which format (mp4/mp3) he/she wants to utilise (Tasmeen)

I would like to try [*Twitter*] with my class, however something to think about is most of our students in South Africa are more likely to have Facebook accounts than Twitter, and if they do they are likely not very active users. Another popular social media platform these days is Instagram, though I'm not sure how effective it would be as an education tool; probably not very helpful as it is mainly to post pictures and short videos and such. In sport maybe we could use it to post pictures of events we attend and signage at the venue and such (Precious)

### Promoting creativity

Research shows that creativity is best taught through domain-specific training and by developing skills associated with creativity, such as problem identification, conceptual combination, idea generation and idea evaluation (Clinton & Hokanson, 2011). Design agencies such as Ideo (2011) developed design activities for educators to model design processes. Such activities include stakeholder interviews, persona development, problem definition and the use of metaphors. Participants remark positively on the design activities, but mention the persona activity, the focus on problem definition and the learning metaphor as particularly useful:

I have [...] begun to empathise more with students as [the persona activity] has opened me up to the idea that I have neglected the fact that there are *different personalities* in the classroom and they all behave differently, learn differently and face difference struggles and ... require different interventions to reach their full potential (Precious)

Design thinking focuses on the process rather than finding a quick solution, which allows for flexibility to teaching interventions and testing of different ideas towards *solving complex problems* (Jody)

... the other highlight for me was the *learning metaphor* and having that graphical visualisation of what your subject is about was actually quite an eye opener (Mark)

Having participated in the course, respondents noted that they started thinking differently about learning and course design. Participants noted that the course helped stimulate both their individual and collective creativity, focusing more on the iterative process of course design rather than on outcomes.

So for us it was – it actually *changed the way we were thinking* of designing our subjects and especially because we have students who will be going back to their communities, we will be doing block release with students and those sort of things. So, it’s given us a lot of tools that we can use and it made us think about the whole process of designing our courses very differently (focus group).

I think because design thinking pushes the boundaries of our “conventions”, it will challenge me to think outside the box and bring *real creativity* to my delivery of my course. I think design thinking is very different from our “traditional” ways of curriculum design because it is not linear (Precious).

Hodginkson-Williams and Deacon note: ‘a key component of the design thinking process is fostering the ability to not only solve problems, but to define problems’ (2013: 84). Koh et al. (2015) warn that more experienced academics might jump too quickly to established solutions and design surface level change, finding it difficult to shift their established practices. Interventions such as the world cafe and the design brief development gave participants time to ponder a variety of problems from different viewpoints, thereby remaining in the problem space for longer (Lawson, 2005), as the following comment shows:

*For me it never occurred that a problem could be understood.* I just saw a situation; there is a problem and then what's the solution? That was my standpoint before I started this course but now I can understand that there is more to a problem than just what I see there, is the other person's point of view as well, where they are standing and how they see that problem. And what might be a problem to them might not appear to be a problem to me so for me, that understanding of what a problem is and looking at it from all angles or all possible angles was a revelation and I enjoyed coming to it (focus group).

### **Ongoing evaluation and feedback**

Design thinking contains iterative cycles of creation and reflection (Rauth et al, 2010). As part of the assessment strategy in this course, participants were required to conceptualise and design actual course interventions. A strong emphasis was placed on continuous reflective practice (Hitge, 2016). Participants wrote weekly reflections on their design journey, and they were encouraged to obtain regular feedback from peers and students, as well as to take part in facilitated online and face-to-face reflective design conversations (Lawson, 2005) aimed at fostering creativity and innovation. In their feedback participants noted the value of regular feedback and evaluation loops in their current course designs.

The present feedback mechanism ... cannot ensure timeous intervention or a change in direction for those that raised issues. So [students] input in the design is limited and for them most probably meaningless. It seems then that feedback must occur as delivery takes place. So the design process must include *feedback and redesign* (Riaan).

### **Safe and supportive space to experiment**

Ulibarri et al. (2014) highlight the importance of creating an emotional, supportive, non-judgemental atmosphere to foster creativity. One example of how we introduced playfulness is the introduction of learning metaphors. Learning metaphors prompt and guide the development of a learning activity or a course by framing all elements of the activity within a certain learning experience, such as 'sitting around a campfire' or 'the amazing race' (Morkel, 2015). We also tried to design activities that participants would experience as 'different' (as shown above) and challenging, such as facilitating online webinars. Participants noted that the course was challenging at times, and make reference to their lack of digital literacy skills, but also working in disciplines not known for their creativity, as Riaan notes: "As academic disciplines, Law is not known for encouraging risk-taking".

As enabling factors participants mention the support received from their peers and course facilitators, as this comment from the survey shows: "It's [the] continued support from facilitators and I feel I have an academic community I belong to... they are passionate about their work and exercise a whole lot patience... why not clone them perhaps?" Moreover, the course enabled them to experiment with various tools without the fear of failure within a community of practice, supporting each other. In this regard, the course was a safe space within which to explore options and alternative interventions, as discussed in the focus group: "And you *don't feel isolated*. I mean we could, when we went to report back in meetings, we could back each other up so it doesn't seem as if you're this mad hatter trying to convince everybody of something that you read off the internet somewhere".

### **Time commitment**

As expected, the course did present a number of challenges. For participants who were mostly academics, already under considerable pressure from high teaching loads, administration and research expectations, signing up for a 10-week course, required a significant time commitment, as the following comment from the focus group shows: 'It could have been a little bit more *condensed* if it makes sense, to five weeks instead of ten'. Participants also commented that the course material was too much: "I didn't get the chance to do the readings that we got beforehand because *there wasn't time* to do it (focus group)."

The preparatory readings required for the online session, were discussed in depth during the focus group. While some reported to enjoy them, others argued for 'less academic' reading, that should have taken them outside the 'usual' academic space/practice: "*Ja, I think for me it's more of an escape*. I feel like we read a lot, every day it's always about reading. At work you read, most of the time you have to read. So, I thought it would just – just get an escape from your everyday" (focus group).

### **Transferring theory into practice**

Most disappointing for us, however, for a course on blended learning course design, which should focus on iterative prototyping, was that participants expressed concern that the course did not allow enough transfer into their own practice, as exemplified by the following exchange during the focus group conversation:

- Participant: We would have liked, with the exercises that we did, designing the personas and all of that [...that] we can go back to class, maybe see how we can use that in class. I don't know if that makes sense.
- Interviewer: So you mean more applied or...?
- Participant: Yes, yes.

This is an important observation as the course specifically set out to support academics in the practical integration of tools and technologies in their practice.

## Conclusions

This paper set out to reflect on the first iteration of an academic staff development intervention on blended learning design, aimed at promoting learning design / design thinking principles, processes and mindsets (Rauth et al, 2010). As Taheri et al. (2016) suggest, towards developing design thinking capacities, we need to consider three specific outcomes: skill-based, cognitive (i.e. design mindsets) and affective outcomes (i.e. creative competence). The data shows that the course was received positively and there is evidence of a shift in how participants understand and engage in course design. Participants also display a growing awareness of the complexities of designing learning for a diverse student population (both cognitive outcomes). The course encouraged playfulness and experimentation through the design activities selected, the informal atmosphere and the mentors (i.e. slightly more experienced eLearning champions), who shared their practice and experience - all of which has helped develop creative confidence in participants (affective outcome). As this was the first iteration of the course design, we were 'designing-on-the-go' which also added to the atmosphere of experimentation, openness and modelled risk-taking. Similar to other studies (Ulibarri et al, 2014), participants appreciated the course as a safe space to think, talk about design and 'play at design'. 'Designerly ways of knowing' (Cross, 2007) were modelled and are evident in participants' responses.

There was an important concern about direct application and more rapid prototyping of design activities in participants' practice (skill-based outcomes). Taheri et al. warn (2016, n.p.) that 'while design thinking trainings create a safe environment for failing and experimenting for trainees so that they develop beliefs in their own creative ability, the development of skills which foster their creative agency is important.' They argue that this is particularly important in professional contexts, where individuals need to apply their learning within their own working contexts. An exaggerated focus on cognitive and affective aspects of design thinking might result in unrealistic expectations of what can happen outside the training space. However, as Irwin (2015, p. 93) notes, when introducing design thinking into new contexts, at the beginning, the main value of design thinking processes may not be 'the ideas and solutions we developed but rather the cultural transformation that resulted.... [over time we] developed a (mostly) collaborative, consensual group process that became the basis for profound change'.

Another important point raised in the feedback was the need to (co)-design with and for *all* participants. Participants' responses reminded us to be sensitive to designing for a diverse group of people - those more and less digitally literate, those more or less risk averse, those in teaching positions and in other roles, those drawn to academic readings and those looking for more accessible information.

Our reflection on this course emphasises the difficulty to strike a balance between process and product, playfulness and structure, challenging tasks and feeling of safety and trust, lightness and depth. It encouraged us to create a 'safe' space to experiment, take risks and fail, and in doing so to challenge attitudes of perfectionism prevalent in academia. We also recognised the importance of combining established elements of academic staff development, such as academic readings, to establish trust, with activities that push participants' thinking about teaching and learning. We noticed the importance of modelling a designing-on-the-go approach through design team and mentors, focusing on the iterative processes of (re)design while working on larger projects (course designs) and providing scaffolding to help participants develop and gain creative confidence. Most importantly, it shows how follow-up and continued work including constructive feedback on lecturers' practice is crucial to strengthen cognitive, affective and skill-based outcomes of such academic staff development.

Design is a *slow* process (Goodyear, 2015; Irwin, 2015; Ulibarri et al, 2014) - not a quick fix. How to sustainably transfer design thinking into one's own and into a departmental practice is an important challenge to consider. Nurturing creative confidence and learner empathy requires a community of practice to draw from, on an ongoing basis. This suggests that a brief once-off academic staff development intervention is insufficient. Instead, academics should be encouraged to continually share their experiences (failures and successes), present their

approaches to blended course design, ask questions and share solutions, at various departmental, faculty or institutional meetings or other academic forums.

## References

- Bali, M., & Caines, A. (2018). A call for promoting ownership, equity, and agency in faculty development via connected learning. *International Journal of Educational Technology in Higher Education*, 15(1), 46. <https://doi.org/10.1186/s41239-018-0128-8>
- Brown, T. (2009). *Change by Design* (Google eBook). Retrieved from <http://books.google.com/books?id=x7PjWYVUoVAC&pgis=1>
- Buchanan, R. (1992). Wicked problems in design thinking. *Design issues*, 8(2), 5-21.
- Clinton, G., & Hokanson, B. (2011). Creativity in the training and practice of instructional designers: The Design/Creativity Loops model. *Educational Technology Research and Development*, 60(1), 111–130. <http://doi.org/10.1007/s11423-011-9216-3>
- Cross N. (2007). *Designerly ways of knowing*. Basel: Birkhaeuser.
- d.school. (2011). Design Mindset and Process (PowerPoint). Retrieved from <https://dschool.stanford.edu/resources/getting-started-with-design-thinking>
- Dahlstrom, E., (2015). *Educational Technology and Faculty Development in Higher Education: Search Report*. Louisville, CO: ECAR.
- Dysart, S. and Weckerle, C. (2015). Professional development in higher education: A model for meaningful technology integration. *Journal for Information Technology Education: Innovative Practices*, 14: 255-265.
- Gachago, D., Morkel, J., Hitge, L., van Zyl, I., & Ivala, E. (2017). Developing eLearning champions: a design thinking approach. *International Journal of Educational Technology in Higher Education*, 14(1), <http://doi.org/10.1186/s41239-017-0068-8>
- Garreta-Domingo, M., Sloep, P. B., Hernández-Leo, D., & Mor, Y. (2017). Learning design for teacher professional development. *International Journal of Educational Technology in Higher Education*, 14(1), 36. <http://doi.org/10.1186/s41239-017-0074-x>
- Goodyear, P. (2015). Teaching as design. *HERDSA Review of Higher Education Volume 2*, 2, 27–50. Retrieved from <http://www.herdsa.org.au/wp-content/uploads/HERDSARHE2015v02p27.pdf>
- Hitge, L. (2016). *Cognitive apprenticeship in architecture education: Using a scaffolding tool to support conceptual design*, Unpublished Master Thesis. Cape Town: University of Cape Town.
- Hodgkinson-Williams, C., & Deacon, A. (2013). Pedagogic Strategies to Support Learning Design Thinking in a Masters Course. *Educational Research for Social Change (ERSC)*, 2(1), 82–97.
- Ideo. (2011). Design Thinking for Educators. *Evolution*, 1 (April), 94. <http://doi.org/10.1007/978-3-642-13757-0>. Retrieved from <http://www.designthinkingforeducators.com/>
- Irwin, T. (2015). Redesigning a Design Program: How Carnegie Mellon University is Developing a Design Curricula for the 21st Century. *Solutions*, (February), 91–100.
- Ivala, E. (2016). Educational Technology Training: Staff Development Approaches. *International Journal of Educational Sciences*, 14(3), 195–204.
- Jobst, B., & Meinel, C. (2012). How Can Creative Self-Efficacy Be Fostered in Design Education ? In *International Conference On Engineering and Product Design Education* (pp. 5220–5226). Antwerp, Belgium: Artesis University College.
- Jobst, B., Endrejat, P., & Meinel, C. (2011). Does design thinking mediate critical innovation skills? An interview approach to synthesize five competencies taught at the D. School. In *International Conference on Engineering and Product Design Education* (pp. 199–204). London, UK: City University. Retrieved from <http://www.scopus.com/inward/record.url?eid=2-s2.0-84859221331&partnerID=tZOtx3y1>
- Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H. Y. (2015). *Design thinking for education: Conceptions and applications in teaching and learning*. Singapore: Springer. <http://doi.org/10.1007/978-981-287-444-3>
- Lawson, B. (2005). *How designers think: The design process demystified* (4th ed.). Oxford: Architectural Press.

- Morkel, J. (2015). *Ideate create iterate: A learning design workshop*, ELearning Update, Caesar's Palace, Johannesburg. Retrieved from <https://www.slideshare.net/jolandamorkel/learning-design-workshop-at-elearnigupdate-2015>
- Ng'ambi, D., Brown, C., Bozalek, V., Gachago, D., & Wood, D. (2016). Technology enhanced teaching and learning in South African higher education - A rearview of a 20 year journey. *British Journal of Educational Technology*, 47(5), 843–858. <http://doi.org/10.1111/bjet.12485>
- Porcini, M. (2009). Your new design process is not enough! Hire design thinkers! *Design Management Institute (DMI) Review*, 20(3), 6–18.
- Rauth, I., Köppen, E., Jobst, B., & Meinel, C. (2010). Design Thinking: An Educational Model towards Creative Confidence. *1st International Conference on Design Creativity (ICDC 2010)*, (December), 1–8.
- Razzouk, R., & Shute, V. (2012). What Is Design Thinking and Why Is It Important? *Review of Educational Research*, 82(3), 330–348. <http://doi.org/10.3102/0034654312457429>
- Schweitzer, J., Groeger, L., & Sobel, L. (2016). The design thinking mindset: An assessment of what we know and what we see in practice. *Journal of Design, Business & Society*, 2(3), 1–23. [https://doi.org/10.1386/dbs.2.1.71\\_1](https://doi.org/10.1386/dbs.2.1.71_1)
- Seitzinger, J. (2016). 10 Learner experience powers from experience girl! Retrieved from <https://www.slideshare.net/catspyjamas/10-learner-experience-powers-from-experience-girlmoot16-agents-of-change>
- Soeder, U. (2016). The World Cafe Design Principles. Retrieved from <http://www.theworldcafe.com/keyconcepts-resources/design-principles>
- Taheri, M., Unterholzer, T., Strasse, H., Hölzle, K., & Meinel, C. (2016). An educational perspective on design thinking learning outcomes. In *The ISPIM Innovation Forum*. Boston, USA: ISPIM.
- Ulibarri, N., Cravens, A. E., Cornelius, M., Royalty, A., & Nabergoj, A. S. (2014). Research as design: Developing creative confidence in doctoral students through design thinking. *International Journal of Doctoral Studies*, 9, 249–270.
- Van Zyl, I., & De la Harpe, R. (2014). Mobile Application Design for Health Intermediaries. Considerations for Information Access and Use. In *Proceedings of the International Conference on Health Informatics (HEALTHINF)* (pp. 323–328). Angers, France.
- Von Thienen, J., Royalty, A. & Meinel, C. (2017). Design thinking in higher education: How students become dedicated creative problem solvers. In *Handbook of research on creative problem-solving skill development in higher education* (pp. 306-328). IGI Global.
- Walling, D.R. (2014). *Designing learning for tablet classrooms: Innovations in instruction*. Switzerland, Springer International.