Chapter 8
Human-Centered Design Pedagogies to Teach Values in Technology Education

Neshane Harvey and Piet Ankiewicz

Abstract Technology is value laden; hence technology education should create opportunities for students to learn about and practically apply value judgements to enable them to become future agents of change. Over the past three decades the rationale to include values, especially moral values, in technology education has gained increased momentum. Incorporating values in technology education would prevent the discipline from becoming mere technical education. *The exploration of the context for designing and making* is one stage in the technological process to support students' exploration of value judgements. The current orthodox pedagogy should be replaced by one in which values relating to technology and technology education are co-constructed rather than imposed. Hence, a new pedagogy known as co-design is proposed. Co-design is an approach to human-centered design (HCD). Co-design is acknowledged as a novel design field which sees the user as a valuable contributor to counterbalance the values of the 'hero-designer.' Co-design can be applied as a pedagogy in design and technology education. However, design education is critiqued for the lack of opportunity for collaboration because of disciplinary silos even though the process begins with understanding core values of inclusion and questioning the notion of who designs in the age of collaboration. For co-design, the core values of inclusion and collaboration imply partnerships with users. Hence, co-design pedagogy aligns with technology education in socially constructed values which are inter-subjective and co-constructed. The first part of the chapter deliberates on a co-design pedagogy in fashion design education and findings revolving around three design principles emanating from HCD interventions, namely: (1) users as core and inspirational source, (2) design with users, and (3) identify user needs for integration with design. These three design principles act as input for design action, planning and making. Discussion then shifts to the second part where linkages are drawn to propose strategies for including the teaching of moral values in technology education.

N. Harvey (✉) · P. Ankiewicz
University of Johannesburg, Johannesburg, South Africa
e-mail: neshaneh@uj.ac.za

P. Ankiewicz
e-mail: pieta@uj.ac.za

P. J. Williams and B. von Mengersen (eds.), *Applications of Research in Technology Education*, Contemporary Issues in Technology Education,
https://doi.org/10.1007/978-981-16-7885-1_8

Keywords Human-centered design · Co-design pedagogy · Values · Design and technology education · Fashion design education

8.1 The Question We Asked and Why It is Important

The rationale to include values in technology education has been established by scholars in the field (Barlex, 1993; Breckon, 1998; Conway, 1994; Holdsworth & Conway, 1999; Layton, 1991; Martin, 2002; McLaren, 1997; Middleton, 2005; Pavlova, 2005; Prime, 1993; Rekus, 1991; Riggs & Conway, 1991). Thus, technology education should create opportunities for students to learn about and practically apply value judgements to enable them to become future agents of change. According to Martin (2002), *the exploration of the context for designing and making* is one stage in the technological process to support students' exploration of value judgements. Dakers (2005) argues that orthodox pedagogy should be replaced by one in which values relating to technology and technology education are co-constructed rather than imposed. Hence, a new pedagogy known as co-design is proposed.

Co-design, sometimes known as participatory or collaborative design, is an approach to human-centered design (HCD). Although HCD may be viewed the same as user-centered design, scholars argue that HCD reflects humanness and a "concern for people" with users becoming joint partners whereas user-centered design merely indicates "people's roles as users" therefore users are considered as study subjects (Sanders & Stappers, 2012; Steen, 2011: 45). Co-design is acknowledged as a novel design field which sees the user as a valuable contributor to counterbalance the values of the 'hero-designer' (Ordaz et al., 2018; Stables, 2017). Design scholarship strengthened the argument of the "designer as special and his skills unique" but design criticism patterned itself on art criticism which rejoiced the 'hero-designer' and disregarded the user (Baynes, 2010: 26).

Hence, co-design can be applied as a pedagogy in design and technology education (Ordaz et al., 2018). However, Fleming (cited in Stables, 2017: 65) critiques that design education lacks opportunity for collaboration because of "reinforced disciplinary silos" even though the process begins with understanding core values of inclusion and questioning "who designs" in the age of collaboration. This implies that co-design pedagogy aligns with Dakers (2005) positioning of technology education in socially constructed values which are inter-subjective and co-constructed.

Co-design, as a new pedagogy is grounded within Martin's (2002) stage: *the exploration of the context for designing and making*. This stage is relevant because at this stage in the design process, students can explore and socially co-construct value judgements with users to counterbalance personal values that inform later stages. The first part of this chapter deliberates on a co-design pedagogy in fashion design education at a university level. The authors acknowledge that fashion design education may well include subject matter relating to moral value constructs of ethics and sustainability for application into design and making activities. Co-design is a social sustainability angle, and it is these students who learn about such value

judgements who may well apply HCD principles to design and making activities. Hence, it is possible for fashion design education to transform but a shift in mind-set and pedagogical methodologies is required to ensure that students learn to design with the needs and values of people through co-design. HCD might add value to pedagogical activities and the teaching of values but locally and internationally, fashion design education appeared as an under-developed research area (Harvey et al., 2019a, b). From an HCD lens, fashion design education also lacks academic investigation as well as practical guidelines for teaching and learning (Harvey, 2018). However, HCD is relevant given the call to move towards co-design and collaboration in design and technology education. This research gap and rationale led to the research question: what are the pedagogical strategies and underlying design principles of a HCD approach and its effects to fashion design education at a university level? Effects refer not to cause-effect relations but to participant views and experiences. Similarly, although contextualised within university fashion design education due to the context-specific nature of the research design, this new pedagogy may well be applicable to the teaching of values in school-context design and technology education.

8.2 How We Answered the Question

The methodology employed qualitative design-based research (Amiel & Reeves, 2008; Collins et al., 2004; Plomp, 2010; Reeves, 2006) embedded in an interpretive paradigm via social constructivist methods. The scholarship of HCD was reviewed to define design principles of HCD for teaching and learning interventions. Although several design principles emerged, three are considered for this chapter namely: (1) users as a core and inspirational source, (2) design with users, and (3) identify user needs for integration with design. The first design principle (DP1) serves as input or the starting point, the second (DP2) is about collaboration and the third (DP3) relates to user needs as value judgements. These three design principles of HCD specifically link to *the exploration of the context for designing and making* and were used to design two teaching and learning interventions (known as the pilot and main interventions respectively). Both interventions took the form of design projects, for implementation with first-year fashion design students at a South African urban university. The design projects served as the assessment method revolving around the assessment instruments: (1) a design journal to record, justify and make explicit all design and development activities, (2) a two-dimensional artistic fashion illustration and technical drawings of the final design solution, (3) three-dimensional prototypes and (4) a three-dimensional manufactured, wearable product.

To engage with *the exploration of the context for designing and making*, students could not apply secondary visual inspiration and manifestations of personal values and self-expression. Rather, pedagogical strategies required students to role-play in design teams of two where one student assumed the role of designer and the other that of user with autonomy to select design team members and respective roles.

The intention was to create a culture of teaching and learning about the needs and values of users to combine with that of the designer. Therefore, pedagogical strategies required design teams to: (1) engage in qualitative discussions to establish the context of design use, user needs, preferences, goals, and design requirements, and (2) in collaboration, co-design and develop a product with the user. Although HCD requires collaboration with actual users, the guidelines of studio-based pedagogy paved the way to simulate a co-design situation.

A purposive sample of participants entailed three participant sub-sets, namely first-year fashion design students as well as two university educators (educators used to represent university lecturers) who taught either design or product development activities to first-year students. Additionally, the main author served the dual role of primary observer by collecting data during the teaching and learning interventions, and secondary participant by designing both pilot and main interventions in collaboration with both educators. All participants granted informed consent for qualitative data collection which entailed participant observation, student semi-structured questionnaires and educator semi-structured interviews. Participant observations aimed at exploring and documenting, on pre-drafted observational schedules, design team's design process activity tasks and how these actions extended in *the exploration of the context for designing and making*. Participating students self-administered hard-copy questionnaires aimed at ascertaining their views and experiences regarding the design principles of HCD. Similarly, individual, digitally recorded, face-to-face, semi-structured interviews were conducted with the two educators.

Data were analysed via a constant comparative method (Merriam, 2009) with the application of Atlas.ti. Data analysis followed Saldaña's (2016, p. 14) "streamlined codes-to theory" model via first and second coding cycles. However, data collection and coding emerged simultaneously because the findings from the pilot intervention informed the design of the main intervention.

8.3 Findings

The findings are narrated around the above-mentioned three design principles of HCD. To support the findings, participant data quotations are included. Letters and numbered codes are assigned as pseudonyms to differentiate between participants. For example, E2 represents educator number two, SU1 signifies student user response, while SD1 is the student designer in the same design team. PO reflects participant observation field notes.

8.3.1 Users as Core and Inspirational Source

Findings around users as core and inspirational source were previously deliberated (Harvey et al., 2019a) but for this chapter, discussion pertains to values. Discussion

begins by highlighting a shift in mind-set which led to the value judgement of design with empathy. Thereafter, deliberations shift to designer and user views (students role-playing) to validate that empathy does manifest when users are placed as core and inspirational source to drive design because designers and users place themselves in the lived experience of the other person.

Designers found users as core and inspirational source as "eye-opening" (SD6) to support "out-of-the-box" (SD7) thinking. One designer noted: "both I and the user beneficiated a lot from seeing each other's viewpoints and collaborating on the project. I also noticed, the user didn't feel like a subject but rather an active participant" (SD2) and "the source of inspiration" (SU7). Intrinsically, the consensus was a shift towards design with empathy due to greater emphasis on user value judgement to eradicate the "notion that they [students] are star designers as seen in media" (E2) who design for themselves. Therefore, a HCD approach "encourages a bit of empathy" (E2).

Students (designers and users), confirmed an empathetic approach because of created opportunities for designers to "empathise throughout the process making them [user] be part of the entire process" (SD8). Inherently, the 'hero-designer' values metamorphosed to be "more considerate of the user" (SD9) and user value judgements to drive design. Likewise, users disclosed that their designers demonstrated empathy by taking a "closer look at understanding another person" (SU4). Additionally, design with empathy shaped a sense of cognizance for users because they too became "aware that the designer's input counts as much as yours does" (SU3). Consequently, users as core and inspirational source was perceived as "one of the most important principles that runs through the entire process" (SU11) perhaps because pedagogical strategies were designed to accommodate consideration around psychological and sociological issues of designer and user situations to result in co-created value judgements.

8.3.2 Design with Users

Discussion begins with educator perspectives regarding the advantages of design with users to change orthodox teaching practice and students' understanding about passive acceptance which are validated by student views. Deliberations shift to design with users evoking student mind-shifts regarding the role, values, and participation of users to enhance the design process culminating in the call for educators themselves to change. Subsequently, the benefits of design with users illustrate new insights, thinking, inclusivity, collaboration, and shared decision-making.

Educators concurred that design with users is advantageous in changing orthodox teaching practice because "… it's a novel new way of doing things which is going to become much bigger in the future" (E1). The shift in teaching practice created an opportunity to teach students to become future co-constructors, socially and politically responsive designers who understand that they can no longer design products and expect peoples' passive acceptance as confirmed in the quotation: "… we need to

just switch our minds out of just designing whatever we want and … expecting people to like what we put out" (E1). Similarly, student responses such as, "because design is with users, I am able to express my interests, likes and dislikes without having to just accept what the designer has designed and made for me" (SU1) confirm educator views.

Intrinsically, educators confirmed that design with users was mind-changing for students as they began to see the role and consideration of user values by incorporating user voice and participation in the design process as commented: "changed their [students] mind on the role that the user can play in the design process and the benefits that come with involving them" (E2). Students who assumed user roles agreed that design with users reshaped their mind-set resulting in a better design approach as reflected in comments: "user and designer became more open-minded" (SU9) and "designing with the user brings about a better approach" (SU5). If such conviction is instilled at an educational level, future designers might well continue to implement design with users and avoid design based on assumptions, personal values and engaged individual design and making activities. However, "we need to just switch our minds" (E1) implies that educators may need an ideological shift regarding relevant ethical and moral choices to guide teaching.

With this educational mind-shift, students learnt to engage with users (albeit students role-playing as users) without assuming that, as designers, they know what people need. Students favoured design with users because they believed that design practice unfolded in a way that better aligns with user needs and values compared with the 'hero-designer' approach. Hence, "this [design] principle is effective, due to the fact that when the user is involved, there is accuracy and proper understanding in what the user wants" (SD5). It can be argued that traditional pedagogy does require students to engage with users and come to understand their needs through market research and statistical analysis. However, as E2 pointed out "… you cannot do that by having a one-hour discussion with them". Innately, design with users aims for depth, inclusivity, and experiences of all those involved which might contribute to value-based appraisal of design in society as opposed to a surface understanding of peoples' needs and values.

For students, design with users brought about new insight with which to design through negotiation and consensus, rather than engaging in a hero-designer-driven approach and thinking. Resultantly, designers and users pooled personal value judgements and design ideas as noted: "it showed me how two minds work better than one. We both have different tastes and values but working together made the design much better" (SU2). Overall, "design with a [the] input from both the user and designer" (SU5) brought about inclusivity by accommodating both voices and promoting collaboration throughout the design process culminating in continuous joint decision-making as confirmed in the statement: "decisions throughout the process, were made with the user" (SD10). Concurringly, one educator (E2) argued that inclusivity, collaboration, and joint decision-making occurred across the design process resulting in informed decision-making. This finding is supported in a comment: "some of them felt that the designer students are going to be taking charge and making all the choices and it was only through exploring the process … that they

started realising … the user is also doing things in this case [which] help to make decisions, more better decisions" (E2). Hence, collective designer and user values provide a basis for choice, decision-making and action. Likewise, collaboration also created a sense of awareness about design in that designers "empathise[d] throughout the process making them [user] be part of the entire process" (SD9). This might be because pedagogical strategies did not support students' engagement in individual design and making activities.

8.3.3 Identify User Needs for Integration with Design

Narration commences with the input stage regarding how and why designers engaged in primary research, where information was recorded and how this differed from traditional pedagogical strategies. Thereafter, discussion shows that primary research led to design criteria and constraints but also contributed to social values thus supporting an empathic approach. Consequently, the benefits illustrate student's evoked critical analysis, justification, and opportunity for active learning in co-design. Discussion concludes by showing that primary research for integration with design challenged pedagogical strategies in fashion design education.

To begin *the exploration of the context for designing and making*, the input stage saw designers doing primary research with their respective users to elicit information about their needs, goals, preferences, and context of design usage as reflected in the quotation: "designer was very engaging in conversation with user … started to collect information from user … probed the user to get clarification" (PO). The documentation and synthesis of this primary research in student design journals were well documented with "data [that] was rich" (E2) hence students spent more time directing dialectic engagement with the technical and social dimensions of activity, "rather than sticking pretty pictures in a diary [design journal] … and using ideas from secondary sources" (E2) as pedagogical strategies traditionally required.

Designers and users showed versatility in successfully navigating through primary data collection and synthesis and were able to identify a focussed set of design criteria and constraints regarding user needs, goals, and preferences. Hence, qualitative primary research established the conditions for exploration and understanding to define design criteria without the influence of personal design approach, bias, and value judgements. As one designer commented, "we were able to discern her actual needs and context of use. The main design criteria are not just extracted from hypotheses" (SD7). This contributed to social values of building rapport, developing relationships and consensus in a non-judgemental way as expressed in the comment: "the user was able to communicate with me … without shying away from being judged or questioned" (SD8). These findings lean towards value judgements and sensitivity towards the other person. For this reason, E2 believed that primary research evoked an "an empathic approach in which the designer had to empathise with the user in order to gain a better understanding of what the user required from their product, for example the context of use" (E2).

Identifying user needs, goals and preferences and context of use was "beneficial" (E1) in evoking students' critical analysis and justification of the social consequences involved. The educator could not impose personal values and inclinations because designers were able to justify why they could not digress from their user's needs as echoed: "in class when I made suggestions, let's change this or take this particular direction … they tell me no, the user needs this so we can't really deviate too much from it" (E1). As such, it seems that identifying user needs, goals, and preferences shaped opportunity for student-directed active learning, independent thinking, critical analysis, and justification rather than positioning students as passive recipients of knowledge.

Active learning unfolded with students integrating primary research to trigger co-design activities by exploring diverse ways to engage with design activities, including reflection-in-action by looking back on the initial design criteria to ensure that the design solution addressed the user's needs. Students believed that primary research for integration with design elicited insight about research and how such research informs design practice as echoed: "by doing primary research, I was able to get qualitative information on the user and that formed a strong bases (sic) for our design" (SD10). Accordingly, students were afforded opportunity to "push the boundaries" (SD4) and come up with design solutions that exceeded manifestation of personal values by "making sure that the user is satisfied" (SU6).

Likewise, educators affirmed that designers could not "design what they like" (E1) from inward-looking values because they could not "solely focus on their own preferences and style" (E2). Rather, "in contrast to traditional fashion design projects, … primary data collection allowed for the design of a product that did not focus solely on satisfying the student's own perspective, preferences, tastes and/or style" (E2). The implications are that pedagogical strategies challenged "the past fashion design education which focused on the aesthetic aspects of fashion rather than the functional aspects and the needs of the users. Fashion design has been traditionally driven by the 'vision' and aesthetic of the designer" (E1). However, the shift in pedagogical strategies transformed the ethos, thinking and manifestations of personal values and self-expression to one of co-constructed needs and values to drive co-design activities thus accommodating for negotiations, stakeholder experiences and value-based appraisal.

8.4 The Affordances of the Three Design Principles for Teaching Values in Technology Education

It has already been mentioned and acknowledged in the literature on technology and technology education that technology is value laden. Parts of the theoretical framework that underpins this section have been published elsewhere in a different format like the implications of Andrew Feenberg's critical theory of technology for the teaching of values in technology education (Ankiewicz, 2019). Technology exists

because of human activity and is developed and used in social and environmental contexts. As such, it is shaped by communal beliefs, values, and attitudes of individuals, organisations and society and, in turn, has a significant effect on shaping culture and the environment (Conway, 1994; Martin, 2002; Stables, 2017). Technology education based on determinism and instrumentalism that views technology as value neutral will reduce technology education to technical education (Conway & Riggs, 1994; Hansen, 1997; Martin, 2002; Stables, 2017). The distinct types of values in technology education will be discussed in the next section.

8.4.1 Types of Values in Technology Education

A meta-synthesis of literature reveals various values in technology and in technology education, for example aesthetic, economic, social, moral, environmental, political, and spiritual values (Jones et al., 2013; Martin, 2002; Pavlova, 2005). Scholars have classified these values into broader categories.

Values of function (Rekus, 1991) and formal, practical, and technical values (Pavlova, 2005) are synonymous and referred to as technical values, which relate to value judgements concerning the functionality/efficiency and effectiveness of technology. Technical values are strongly dominating in most approaches in technology education, but without explicitly referring to them as values (Pavlova, 2005). Teachers (to represent educators at school level) put the highest priority on teaching technical values (Holdsworth & Conway, 1999; Pavlova, 2005), with their hierarchy of values resembling the following: technical, aesthetical, economic, environmental, social, cultural, moral, and political (Pavlova, 2005).

A second type of values is instrumental values (values of usage) (Rekus, 1991) or non-technical values (Pavlova, 2005). Values of usage are judgments concerning the morality of action related to the usage of technology, which may only be done by acting individuals themselves (Rekus, 1991). Instrumental values encompass such concepts as ambitious, open-minded, capable, helpful, honest, imaginative, intellectual, logical, responsible, and self-controlled (Pavlova, 2005). Technology education mostly deals with two major kinds of instrumental values, namely those with a moral focus and those related to competence or self-actualisation. In the practice of technology education, values related to competence take priority over moral values (Holdsworth & Conway, 1999; Pavlova, 2005). Pavlova (2005) argues that moral values should take priority in the hierarchy.

Moral education will be emphasised if technology education includes technical (formal, practical or values of function) and non-technical values (instrumental or values of usage) (Rekus, 1991). Teachers need to introduce students to the kinds of moral dilemmas they will face in everyday life as a direct result of the spread of technology (Dakers, 2005).

In the next section the authors argue that emphasising the above-mentioned three design principles might be instrumental to create a shift from the dominance of technical values, as well as values related to competence, to moral values in technology

education. The three design principles will be linked to the theoretical framework for values in technology education, and the linkages will be indicated by showing the relevant design principles in brackets.

8.4.2 Teaching Values in Technology Education

As moral values are inherently part of acting individuals themselves (Rekus, 1991), the most frequently proposed way of teaching values in technology education is to encourage students to think about values themselves (DP3) (Pavlova, 2005). Technology teachers and students need to be explicit about the values involved at all levels of technology and to clarify, justify and debate their choices (Conway, 1994; Conway & Riggs, 1994; McLaren, 1997; Riggs & Conway, 1991). Technology teachers should be upfront about the collective values guiding technological development in society and in technology education, as well as the specific values which guide both technologists and prospective technologists in schools (Riggs & Conway, 1991). Students should have opportunities of valuing technology independently without teachers imposing their own sets of values and norms (DP3) (Rekus, 1991).

Within Martin's (2002) stage of *exploring the context for designing and making*, the choice of the starting point of a technology project is important to show the connections between context, technology, and value judgments (DP1) (Conway & Riggs, 1994; Martin, 2002). The teacher should choose an issue or project brief that relates to the current value system of the students (DP3), taking psychological and sociological aspects of the students' situation into consideration (DP1, 3) (Rekus, 1991). In this regard, technology teachers may capitalise on the pedagogies associated with science, technology, and society (STS) studies. STS studies may promote a critical approach to technology in curriculum documents by considering the relationship between society and technology (Pavlova, 2005). STS teaching commences with everyday issues instead of organising technology lessons around concepts and processes (DP1, 3). Furthermore, interdisciplinary project work and integrated STS programmes may create a context in which students construct their relationship with technology and learn about its topical, motivational, and interpretative meaning (DP2, 3) (Hansen, 1997). It may also require some integration across artificial subject boundaries of the school curriculum (DP2) (McLaren, 1997). It is important for technology teachers to encourage critical thinking and questioning so that students are aware that technology is related to people, society, and the environment (DP3). How students' value technology will shape their future (DP3) and they are entitled to discuss such issues in the classroom (DP1) (Jones et al., 2013; Martin, 2002).

Dakers (2005) cautions, that because of the so-called narrow functionalist model, many technology students, when faced with a problem, attempt to proceed directly from problem statement to solution. Students are consequently unable to engage with the social and political ramifications provoked by the spread of new and emerging technologies (DP2, 3). Learning in this model aims at the assimilation of students into

an already established value system which is more concerned with control than with liberation. Based on the instrumental role of technology and its social and cultural implications, Dakers (2005) argues for a new pedagogy for technology education that engages students with questions concerning technology (DP1, 2). The current authoritarian transmission model of instruction should be replaced by one in which values relating to technology and technology education are co-constructed rather than imposed (DP1, 2, 3).

One of the best ways of assessing the impact of values or moral education is to look at the way in which students' design processes are informed by applying value judgements and a sensitivity towards users (DP1, 2, 3) (Martin, 2002). It is therefore crucial that students are given the opportunity to reflect on their explorations of a value-based appraisal of technology in society (DP2, 3) allowing their reflections to influence their own approach to design (DP3) (McLaren, 1997). Students should be accorded opportunities to not only act as 'hero-designers' following the narrow behavioural approach (Dakers, 2005), but also to negotiate and collaborate with users (DP2, 3). They should be exposed to knowledge in technical disciplines which is associated with 'hero-designers' as well as qualitative knowledge associated with users (DP3).

An overemphasis on teaching technical values and values related to competence (Holdsworth & Conway, 1999; Pavlova, 2005) at the expense of moral values reduces technology education to technical education. Students need to look beyond immediate usefulness and profitability to effects on users (DP2, 3), through environmental impact (Riggs & Conway, 1991). By attending to the context and the experience of all those involved (DP1, 2, 3), the range of values may be made explicit and confidence in handling value judgments may be encouraged (Conway, 1994). According to Dakers (2005) a narrow functionalist model of learning and teaching within the technology education curriculum is more concerned with the processes embedded within the methods of a technology's production and manipulation, than with a critical analysis of the social consequences involved (DP2, 3).

These include a shift from teaching content matter in isolation from social considerations, towards a dialectic engagement with the technical and social dimensions of technological activity (DP2, 3), to make technology education meaningful to all students (Hansen, 1997; Rekus, 1991). Students also need to examine relevant ethical and moral choices as well as factors that enable or influence critical design decisions (DP2, 3) (McLaren, 1997). Without such an ideological shift, technology education will remain a narrow and limited curricular area, restricted to the production of a technologically subservient and compliant underclass (Dakers, 2005). The design or technological process furthermore involves a great deal of decision-making. Choices are made before every stage, for instance choosing what to make (Martin, 2002). Values provide a basis for choice, decision-making and action in a wider context (DP2, 3) (Pavlova, 2005).

Students should know that technological development depends on values on the one hand and has its own laws of development on the other hand (Pavlova, 2005). Subsequently, and as part of a critical and democratic pedagogy within technology

education (Dakers, 2005), students should also be introduced to the politics of technology that is essential for a technical democracy (DP2, 3). Students' ability to make value judgements will not only enable them to handle present technology, but also empower them to cope with future ethical demands of a rationally structured society when they must make responsible political decisions as citizens or politicians (Rekus, 1991). Students should also be sensitised to how the public's resistance based on a broad range of politically legitimated human values may give rise to alternative rationalities (DP2, 3). This opens the opportunity to develop technology beyond the technical values of economics and effectiveness only (Pavlova, 2005). Drawing from these linkages between values in technology education and the design principles, the subsequent section concludes with pragmatic guidelines for co-design pedagogy to teach moral values in technology education.

8.5 Conclusion

It is accepted that technology and technology education are value laden. Thus, technology education should create opportunities for students to learn about and practically apply value judgements to enable them to become future agents of change. However, in the practice of technology education, technical values and values related to competence take priority over moral values. Pavlova (2005) argues that moral values should take priority in the hierarchy, while Dakers (2005) calls for a new pedagogy in which values relating to technology and technology education are co-constructed rather than imposed.

Hence, the proposed co-design (an approach to HCD) as a new pedagogy for university fashion design education. The scholarship of HCD was first reviewed to define design principles of HCD. Although several design principles emerged, three were considered for this chapter namely: (1) users as core and inspirational source (DP1), (2) design with users (DP2), and (3) identify user needs for integration with design (DP3). These three design principles of HCD specifically linked to Martin's (2002) stage: *the exploration of the context for designing and making* and were used to design two teaching and learning interventions.

Following from the findings which emanated from the qualitative design-based research in fashion design education, and congruent to Dakers' (2005) call, we believe that a pedagogy based on the three design principles might be conducive to affect a shift from the dominance of technical values and competence as non-technical values to moral values. Thus, based upon our meta-synthesis of the theoretical framework of values in technology education and its link with the findings of the three design principles we propose new pedagogy for co-design to teach moral values in technology education that comprises the following: When introducing a technology project to students for the stage of *exploring the context for designing and making* divide them in pairs of two where the one assumes the role of designer and the other one the role of user. The technology teacher must ensure that the curriculum, learning outcomes

and activities are planned to accommodate for: (1) users to be the core and inspirational driver, (2) for students to engage in primary qualitative research with users to explore their views and values for integration with design, (3) create opportunities for co-design activities and (4) place less emphasis on the functionality/efficiency and effectiveness of students' products. Likewise, teachers should change their ideological beliefs, imposition of personal value judgements and pedagogical strategies to accommodate for student engagement, co-constructed values, and collaboration.

This proposed new co-design pedagogy should be further explored at school level through action research cycles as further research in future. As mentioned earlier, in this research, role-playing in design teams comprised of two members with agency to select respective roles. However, as a way forward, action research could be that teachers' grant student's agency to role-play in a two-member design team or even a three-member design team with one user and two designers, or vice versa. The question remains, how will teachers implement this role-playing in an effective way that two or even three students with same aptitudes role-play as designers and users? Likewise, through action research, it becomes questionable how teachers can set up the role-playing in a way where the user and designer are both knowledgeable in what they are supposed to do.

References

Amiel, T., & Reeves, T. C. (2008). Design-based research and educational technology: Rethinking technology and the research agenda. *Educational Technology & Society, 11*(4), 29–40.

Ankiewicz, P. (2019). The implications of Feenberg's critical theory for technology education. In J. R. Dakers, J. Hallström, & M. J. de Vries (Eds.), *Reflections on technology for educational practitioners: Philosophers of technology inspiring technology education.* Brill/Sense.

Baynes, K. (2010). *Models of change: The impact of 'designerly thinking' on people's lives and the environment. Seminar 4 modelling and society.* Design: Occasional paper 6. Loughborough University. https://repository.lboro.ac.uk/articles/Models_of_change_the_impact_of_designerly_thinking_on_people_s_lives_and_the_environment_seminar_4_modelling_and_society/9350111

Barlex, D. (1993). The Nuffield approach to values in design and technology. *Design and Technology Teaching, 26*(1), 42–45.

Breckon, A. (1998). National curriculum review in design and technology for the year 2000. *The Journal of Design and Technology Education, 3*(2), 101–105.

Conway, R. (1994). Values in technology education. *International Journal of Technology and Design Education, 4*(1), 109–116.

Conway, R., & Riggs, A. (1994). Valuing in technology education. In F. Banks (Ed.), *Teaching technology.* Routledge.

Collins, A., Joseph, D., & Bielaczye, K. (2004). Design research: Theoretical and methodological issues. *The Journal of the Learning Sciences, 13*(1), 15–42.

Dakers, J. R. (2005). The hegemonic behaviorist cycle. *International Journal of Technology and Design Education, 15*(2), 111–126.

Hansen, K. H. (1997). Science and technology as social relations towards a philosophy of technology for liberal education. *International Journal of Technology and Design Education, 7*(1–2), 49–63.

Harvey, R. N. (2018). *A Human-centered design approach to fashion design education* (Doctoral thesis). University of Johannesburg. https://ujcontent.uj.ac.za/vital/access/manager/Repository/uj:32308?site_name=GlobalView

Harvey, N. Ankiewicz, P., & Van As, F. (2019a). Fashion design education: Effects of users as design core and inspirational source. In *Conference Proceedings of the 37th International Pupils' Attitudes Towards Technology (PATT) Conference held in Malta.* Conducted by the L-Università ta' Malta.

Harvey, N. Ankiewicz, P., & Van As, F. (2019b). Design-based research: Bridging the gap between fashion design education and research on design. In *Conference Proceedings of the 8th International Design Education Forum of Southern Africa (DEFSA) Conference held in Cape Town.* Conducted by IIE Vega School and Cape Peninsula University of Technology.

Holdsworth, I., & Conway, B. (1999). Investigating values in secondary design and technology education. *The Journal of Design and Technology Education, 4*(3), 205–214.

Jones, A., Buntting, C., & De Vries, M. J. (2013). The developing field of technology education: A review to look forward. *International Journal of Technology and Design Education, 23*(2), 191–212.

Layton, D. (1991). *Aspects of national curriculum: Design & technology*. National Curriculum Council.

Martin, M. (2002). Values and attitudes in design and technology. In S. Sayers, J. Morley, & B. Barnes B. (Eds.), *Issues in design and technology teaching*. Routledge Falmer.

McLaren, S. V. (1997). Value judgements: Evaluating design—A Scottish perspective on a global issue. *International Journal of Technology and Design Education, 7*(3), 259–278.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.

Middleton, H. (2005). Creative thinking, values and design and technology education. *International Journal of Technology and Design Education, 15*(1), 61–71.

Ordaz, M. N., Klapwijk, R., & van Dijk, G. (2018). Supporting learning design language in primary education. In *Conference Proceedings of the 36th International Pupils' Attitudes Towards Technology (PATT) Conference held in Malta.* Conducted by the Athlone Institute of Technology, Co. Westmeath.

Pavlova, M. (2005). Knowledge and values in technology education. *International Journal of Technology and Design Education, 15*(2), 127–147.

Plomp, T. (2010). Educational design research: An introduction. In T. Plomp & N. Nieveen (Eds.), *An Introduction to Educational Design Research. Seminar Proceedings Conducted at the East China Normal University, Shanghai (PR China).* Netherlands Institute for Curriculum Development: SLO.

Prime, G. M. (1993). Values in technology: Approaches to learning. *Design and Technology Teaching, 26*(1), 30–36.

Reeves, T. (2006). Design research from a technology perspective. In J. V. D. Akker, S. Gravemeijer, S. McKenny, & N. Nieveen (Eds.), *Educational design research*. Routledge.

Rekus, J. (1991). Teaching technology with a focus on moral education. *International Journal of Technology and Design Education, 2*(2), 41–46.

Riggs, A., & Conway, R. (1991). Values and technology education. *Design & Technology Teaching, 24*(1), 31–33.

Sanders, E. B. N., & Stappers, P. J. (2012). *Convivial toolbox: Generative research for the front end of design*. BIS Publishers.

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). Sage.

Stables, K. (2017). Critiquing design: Perspectives and world views on design and design and technology education, for the common good. In P. J. Williams & K. Stables (Eds.) *Critique in design and technology education. Contemporary issues in technology education*. Springer.

Steen, M. (2011). Tensions in human-centred design. *CoDesign, 7*(1), 45–60.

Neshane Harvey is Head of Department and Associate Professor in the Department of Fashion Design, Faculty of Art, Design and Architecture at the University of Johannesburg. She has dual qualification streams in fashion design and education specializing in design education. Her research interest is on human-centered design (co-design/participatory design) praxis as alternative pedagogy for fashion design education. She is a member of the Design Education Form of Southern Africa (DEFSA).

Piet Ankiewicz is full Professor of Technology Education in the Faculty of Education at the University of Johannesburg. His research interests include the affordances of the philosophy of technology for technology classroom pedagogy, teacher education, indigenous technology knowledge systems, and STEM education. He also has an interest in students' attitudes towards technology. He has been rated by the National Research Foundation as an established researcher with international recognition. He is a member of the Editorial Board of the *International Journal of Technology and Design Educatio*n.