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Design Education for the Knowledge Society: An Action Research Study of Implementing a Liberal Arts Approach to Industrial Design Education

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Abstract: Educationists have argued that professional design education has come to function as an alternative form of general liberal arts education. However, professional design education has not fully embraced the liberal arts model of education for democratic citizenship. More often design education teaches skills for maximizing economic growth. I investigated the implications of the liberal arts approach to design education by conducting action research in an industrial design program at a public university. The insights reveal that shifting from skills-based vocational training to knowledge-based liberal education is not only a matter of implementing different pedagogical methods, there may also be changes in teacher identity. I conclude that the abilities crucial for the liberal arts model of education for democracy align with the aspects of design education for post-industrial economies and the knowledge society.

Keywords: liberal arts; design education; teacher identity; peer learning

1. Education for Economic Growth or Human Development?

Trends in higher education have led educationists and academics to argue that design education has come to function as an alternative form of general liberal arts education (Buchanan, 1992, p. 5). Now students might choose to study design as they might choose to study the humanities and arts, that is, without the intention to pursue design as a career (Schön, 1985, p. 2). Consequently, design education is caught within the 'The Conflict of the Faculties' between design as form of professional education and design as an alternative form of liberal arts education (Friedman, 2003, p. 245). Consequently, a core challenge for university-level design education is meeting the plural needs of educating students for a demanding job in a professional field and preparing citizens for life in the global knowledge economy (Friedman, 2002, pp. 27-33).

Liberal arts education, according to Martha Nussbaum (2012), is about "challenging the

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mind to become active, competent, and thoughtfully critical in a complex world” (p. 18) to “stimulate students to think and argue for themselves, rather than defer to tradition and authority” (p. 48). The ability to think critically and empathically about another with an understanding of the sociohistorical contexts of many cultures and nations enable democracies deal with the divisions within societies and work through the complex problems we face as members of an interdependent world (Nussbaum, 2012, p. 10). Consequently, Nussbaum (2012, p. 24) argues for a human development model of education for democracy, rather than a for-profit model of education aimed at maximizing economic growth. Education for democracy (Nussbaum, 2012, pp. 25-26) includes the ability to:

- think and deliberate about political issues without deferring to tradition or authority;
- recognise fellow citizens as people with equal rights who are worthy of respect;
- have concern for others and with a grasp of what different policies mean for others’ opportunities for a good life;
- imagine complex issues that affect human lives;
- judge political leaders critically and realistically;
- think about the good of the nation as a whole, not only local issues;
- see one’s nation as part of a world order where deliberation is needed to resolve transnational issues.

Professional design education has not fully embraced the human development model of education for democracy. Most often, design education is oriented towards skills training for economic growth. However, recently some researchers and academics have argued that design should support the kind of capability approach that Nussbaum advances (see, for example: Dong, 2008; Oosterlaken, 2012, 2013). Education in the abilities for democratic citizenship and communicative action of the kind that Nussbaum claims, produces the *synergy* associated with dealing with divisions in society to bring together people to meet the challenges of the present and future in an interconnected world. Consequently, this paper contributes to the DRS2020 conference theme by investigating the question: how might we incorporate the abilities for democratic citizenship and communicative action into design education?

2. Research Methodology

This project investigated incorporating communicative action into design education through conducting action research into teaching practise. This approach supplied opportunities for students to learn to communicate and think with clarity and vigour, and created conditions that enabled students to develop their own understanding of communicative action and design through implementing a constructionist rather than transmission model of education. For example:

- Students were provided with early access to the required learning materials and written questions so that students had enough time to do structured prereading.

- The class was periodically divided into groups to change pace and keep discussion going. For example, by asking students to form into small groups to answer specific questions about a text.
- The level of criticism was maintained by having students play defined conversation roles such as the story teller who presents a standpoint, or the detective who finds hidden assumptions, or the umpire who monitors conversation.
- Questioning, listening, and responding was used to keep discussion going. And student-to-student interaction was extended by responding using silence, inviting contrasting standpoints, or by restating comments.

In their book *Discussion as a Way of Teaching: Tools and Techniques for Democratic Classrooms*, Brookfield and Preskill (2005) describe how the properties of discussion groups support students to learn to do communicative action. These properties were implemented into the teaching activities in a series of action research cycles. Prior to this project, the teacher mostly utilised lectures to teach design theory and one-on-one desk reviews to teach design studio. Through completing the project, the teacher's practise changed to make use of peer-to-peer learning and their teacher identity changed from studio master to learning guide. Consequently, they aligned their actual teaching practise with their preferred theory of design pedagogy, and aligned their actual teacher identity in practice with their preferred teacher persona.

2.1 Utilising Action Research in Design Education

The primary investigator used action research as a framework to systematically self-reflect during their teaching practise. Action research is an approach that aligns well with Jurgen Habermas's (1984, 1987) theory of communicative action (Kemmis & McTaggart, 2005, p. 578). The history of action research goes back to the 1950s and draws on several related traditions such as participatory research, critical action research, action learning, action science, and soft systems approaches (Kemmis & McTaggart, 2005, pp. 560-562). Action research investigates actual practices in a specific concrete way that makes them available for discussion and reflection (Brookfield, 1995). The action research process that the primary investigator employed utilised the following sequence of cycles of implementation and reflection:

1. Planning activity
2. Acting and observing process and activity
3. Reflecting on process and consequences
4. Re-planning
5. Acting and observing again
6. Reflecting again

After each action, the primary investigator wrote entries in a journal in response to the following set of questions:

1. What outcomes did I obtain?
2. How well did they accord with the outcomes I desired?
3. In what ways was I mistaken about the desirability of the outcomes?
4. What have I learned about myself, my skills, and my attitudes?
5. What actions will I try next time?

The research was conducted on campus at a public university between August 2019 and November 2019. The primary investigator transformed the pedagogical properties of discussion groups into a set of practical techniques and approaches for design education. They conducted four cycles of planning, action, and reflection on the teaching and learning activities in an undergraduate Industrial Design Studio course and a corequisite Industrial Design Theory course.

The primary investigator's design approach was influenced by Roberto Verganti's (2016) model of design as *innovation of meaning* through the *art of criticism*. The project brief was to apply knowledge of collaborative industrial design to design a concept that supports sustainable intergenerational wellbeing.

Table 1 Syllabus Outline

Week	Design Studio	Design Theory	Core Readings
1	Observation	Design ethnography, HCD	Button (2000); Norman (2013)
2	Co-design workshop	Co-design, user innovation	Hyysalo, Jensen, and Oudshoorn (2016)
3	Self-documentation	Empathic design, user experience	Koskinen, Battarbee, and Mattelmäki (2003)
4	Story	Interaction design, usability	Lowgren and Stolterman (2004)
5	Chart	Service design, systemic design	Meroni and Sangiorgi (2011); Sevaldson (2018)
6	Image	Concept design	Dorst (2015); Keinonen and Takala (2006)
7	Evaluation	Accessibility, justice	Coleman (2007); Oosterlaken (2012)
8	Sparring partners	Design Criticism	Verganti (2016)
9	Radical circle	Reflective practice	Donald A. Schön (1995)
10	Interpreters	Design Knowledge	Cross (2006); Friedman (2000)
11	Detail design	-	-
12	Final design	-	-

The primary sources of data were field notes and memos recorded in a journal. In addition, the primary investigator collected various documents and artefacts that were utilised in the teaching and learning activities. The data was analysed using constant comparative

method to identify patterns and insights (Hallberg, 2006, p. 143). The constant comparative method is a data analysis technique whereby all codes, categories, and concepts are constantly compared with all other parts of the dataset to explore variations, similarities, and differences. This approach grounds the researcher's final theorizing in the respondents' experiences so that the reader can make the connections between analytical findings and the data from which they were derived.

Table 2 Data Collection

Date	Activity	Topic	Documents	Observations	Student Reports	Journal Entries
27/08/2019	Discussion 1	Justice	Quotes	Photographs	-	1 entry
17/09/2019	Discussion 2	Criticism	Quotes	-	-	1 entry
19/09/2019	Studio 1	Sparring partners	Handout	-	7 entries	1 entry
26/09/2019	Studio 2	Radical circle	Handout	Obs. booklet	4 entries	1 entry
01/10/2019	Discussion 3	Knowledge	Quotes	-	-	1 entry
03/10/2019	Studio 3	Interpreters	Handout	Obs. booklet	5 entries	1 entry

The primary investigator conducted two closely-related cycles of action research in parallel. The first sequence focused on discussion seminars in the design theory class and the second project focused on design reviews in the design studio class.

Figure 1 Timeline of Action Research Cycles

The first action research sequence addressed the teaching and learning practices in the design theory class. The primary investigator's initial intention was to change from lecturing to discussion, so, in Discussion 1, they supplied the students with printed handouts containing selected quotations and utilized the small group discussion format. After reflecting on the outcomes of Discussion 1, the primary investigator decided to increase the criticality of the students' argumentation. So, in Discussion 2, they supplied the students

with a set of critical questions to accompany the selected quotations. After reflecting on the outcomes of Discussion 2, the primary investigator decided to obtain greater integration of concepts. So, in Discussion 3, they supplied a printed handout with quotes and critical questions for the whole text rather than just for selected sections.

The second action research sequence addressed the primary investigators' teaching and learning practices in the design studio class. Their intention for Studio 1 was to change from teacher-student design reviews to student-student design reviews. So, they organized the students in pairs to give feedback to each other. After reflecting on the outcomes of Studio 1, the primary investigator decided they wanted to keep the student-student review format in Studio 2 but obtain group discussion. So, they supplied the students with a set of conversation roles and organized them in small groups to give feedback to each other. After reflecting on the outcomes of Studio 2, the primary investigator decided they wanted to obtain in-depth evaluative feedback in Studio 3, so they reorganized the student-group interactions in a more adversarial format.

The overall result of the action research cycles was to reorganise the social structure of the studio to decentralise authoritative knowledge across the student body. In addition, the primary investigator's sense of teacher identity changed from being the studio master to guiding the students' educational experiences.

3. Insights into Implementing a Liberal Arts Approach to Industrial Design Education

The following insights were produced through synthesis of the data collected across both sequences of action research cycles.

3.1 Pedagogy Change from One-on-One to Peer-to-Peer Teaching and Learning

The first outcome was that the studio's social structure changed from an organisation where authoritative knowledge was centralised in the teacher to an organisation where knowledge was decentralised across many students (Boud, Cohen, & Sampson, 2001). This outcome was achieved by implementing two changes in teaching and learning practise.

First, the teacher changed their primary studio teaching practise from instructing students' design activity in one-on-one desk reviews to organising peer-to-peer student feedback activities. Traditionally, a one-on-one desk reviews is an activity in which the teacher and student participate in a discussion about the student's work in progress. In a design review the student arranges their drawings, models, and project materials on their desk and the teacher offers questions and comments to prompt the student to reflect on their decisions and to try out alternative courses of action. The dialogue does not merely describe the work the student has already completed, it also uses discussion to frame the design problem in new ways and uses drawing to test new solutions on-the-spot. In a design review, drawing and talking are done together in a form of reflective practice that Donald Schön (1985; 1992) calls a reflective conversation with the materials of the situation. The design review is a social

activity of learning by doing and discussion, rather than learning by accumulating facts.

Changing the studio social structure from one-on-one instruction to peer-to-peer feedback produced students as new sources of instructions and also increased the number of different sources of feedback. By using other students as sources of feedback the students did not have to wait to receive instruction from only one authoritative source—the teacher—instead students could quickly obtain feedback from one another.

Figure 2 Changing the studio social structure from one-on-one instruction to peer-to-peer feedback (see: Verganti, 2016, Part III)

The peer-to-peer feedback structure meant that the students shifted from mostly waiting to receive instructions from the teacher to groups of students continuously interacting and receiving feedback together. Which strengthened the students' argumentation skills and supported their self-reflection skills. The following quotes from the student's reports illustrate the impact of the new social structure on the teaching and learning activities.

"The sparring partner activity was very interesting and helped reaffirm some of my ideas. I enjoyed the interplay between two designers. Having to justify myself and realising I was making a design assumption or understanding I had thought critically about the design, making intelligent creative decisions." (Student Report 1)

"This particular method of feedback [Radical Circle] was interesting given that each member in the circle plays a persona card with a key focus to maintain during each person's presentation. With these personas centred around the six thinking hats, this gave the feedback and questions I received very valid and ranged in terms of the components of my system. It was also very interesting and fascinating to see other people's projects and the goals they aim to achieve. A refreshing change of view and minds." (Student Report 2)

"For the interpreters feedback activity, we were split into two groups of five. Then one person

at a time goes up to the other group and sits down with their back against the group to receive feedback. I found this activity very interesting because by receiving feedback without facing the group, we were able to get more direct and honest responses.” (Student Report 3).

Second, the teacher changed their primary theory teaching method from delivering information to students through lectures to guiding students’ discussions of texts. The discussions of the texts made information time independent, meaning that students did not have to wait for the teacher to deliver a lecture in real time, rather they could use the printed handout before and during the discussion. Using the hand out meant that the students could follow the discussion and make connections between the parts.

Figure 3 Using printed handouts with quotes and questions to support group discussion (left) and whiteboards to capture group discussion (right).

3.2 Identity Change from Studio Master to Learning Guide

The second outcome was that the teacher’s primary identity changed from master to guide. This identity change is correlated with the changes to their teaching practise. Since this section address my own teacher identity it mostly draws on my journal entries and self-reflection.

First, my identity changed from master to guide when I changed my teaching practise from primarily delivering instruction in one-on-one desk reviews to organising peer-to-peer feedback activities. The students presented their design projects and gave critical feedback to each other. The students demonstrated their designs using models and drawings, they justified their decisions in response to other students’ doubts, and they debated alternative courses of action. I guided the students’ interactions by using grouping, conversation roles, and discussion processes. In contrast to the one-on-one approach, this peer-to-peer practise meant that students learned by interacting with each other rather than by imitating my demonstrations. Consequently, my role changed from demonstrating designing to

supervising learning. Which meant that my teacher identity changed from studio master to guiding learning.

“An unanticipated consequence [of the Sparring Partner activity] was that later on when I gave my own feedback to the students, there were instances where my authority was challenged the students said for example “my sparring partner recommended I add an augmented reality aspect to the design”, this was a direction that I wouldn’t have suggested myself since I wanted the student to focus on a simple product. I was forced to think about whether my advice was correct and whether I should overrule the student’s sparring partner – I decided not to since I wanted to make sure that the sparring partner’s advice was validated.” (Reflective Journal Entry 1)

Second, my identity changed from master to guide when I changed my teaching practise from lectures to discussions. The discussions featured students interacting with each other through asking questions, giving answers, and listening to what was said. I guided the students’ interactions by providing comments as needed to keep the conversation moving and to surface assumptions. In contrast to a didactic lecture, this practise meant that I was not the only possible source of information. Consequently, my role changed from delivering authoritative knowledge to guiding a discussion of different points of view.

Shifting from lectures to discussions was probably a worthwhile. However, discussion in itself does not necessarily supply epistemic value. Of course, it is possible for a discussion to remain superficial. For example, my journal entry below illustrates this issue, since in Discussion 2 the students analysed particular sections of a text in depth, but they did not integrate their analysis within the whole text.

“I handed out the quotes and gave the students 15 minutes to read and discuss in pairs and record answers to the questions. When we started the discussion in the round, the students immediately read out their answers to handout questions. Although answers were adequate, I expected there to be a more critical discussion and there was little flow between the pairs answering the questions.” (Reflective Journal Entry 2)

Consequently, I modified my approach in Discussion 3. Rather than dividing the text into sections for pairs of students to analyse, I provided a handout that included quotes and questions for the whole text. This way the all students could follow along with the discussion.

“The illustrative quotes with targeted questions were a useful method to obtain student participation. And although all students participated in the discussion, to some extent I didn’t get synthesis of the concepts, rather I got a connected sequence (i.e. coverage rather than integration). We went through all the sections of the text one after the other, but did not develop a deep synthesis or interpretation of the whole.” (Reflective Journal Entry 3)

Journal Entry 3 shows that even though I modified the handout structure to link each section to the next section, I did not obtain the depth of conceptual integration I desired. Rather I obtained a sequence of analyses.

Although I did not obtain all the outcomes I desired, I did change my role from delivering authoritative knowledge and demonstrating designing to guiding a discussion and supervising learning.

Consequently, by changing from instructing to guiding, I aligned my actual teacher identity in practice with my preferred teacher persona.

4. Discussion

Industrial design grew out of the first industrial revolution, when capitalism emerged in the beginning of 19th century England and Europe (Forty, 1986; Heskett, 1980). The early industrial designers were not managers of the new product development process, their responsibility was to shape the form of a product's enclosure (Spark, 1986). In the 20th century, post-industrial economies emerged (Friedman, 2012). These new types of economies were not based on exploiting natural resources to create desirable goods, rather they created value by exploiting knowledge to invent innovative kinds of goods, services, interfaces and systems (Gilbert, 2005). In the post-industrial era the primary job of industrial designers is not limited to styling products, rather industrial designers need to work at the beginning of the new product development process and to produce innovation through cooperating in multi-disciplinary teams (Coyne & Snodgrass, 1993; Jones, 1980; Rittel, 1984).

Since post-industrial economies create value by exploiting knowledge, industrial design education should equip students with the capabilities to work with knowledge and build knowledge (Friedman, 2000). Scardamalia and Bereiter (2014) identify five aspects of knowledge building in education:

- Knowledge building is viewed in terms of authentic knowledge creative work within classroom communities.
- Knowledge building should open up new possibilities for improving ideas rather than aiming to reach final truths.
- Knowledge building discourse should integrate critical and collaborative dialogue.
- Information of all kinds is valuable insofar as it contributes to knowledge building.
- Knowledge building should produce explanatorily coherent practical knowledge for innovation and socially responsible change. A kind of principled practical knowledge.

The changes I implemented into my teaching and learning activity in this project align with Scardamalia and Bereiter's (2014) five aspects of knowledge building in education. First, students were supported to *build knowledge together* when I changed the social structure from one-on-one instruction to peer-to-peer learning. Second, by implementing a series of peer-to-peer feedback activities, I supplied the students with opportunities to *feed criticism forward to develop and improve their design projects* for the next feedback session. Third, by shifting from lectures to discussion groups I implemented an approach that supported *collaborative dialogue between students*. Fourth, by decentralizing authoritative knowledge within the student cohort, I *valued information from all participants*. Fifth, by aligning the curriculum content for the theory paper with the design brief for the studio paper, I supported the students to *shift their knowledge between explanatory concepts and practical applications*. Consequently, I produced educative experiences in industrial design that are

appropriate for post-industrial economies and the knowledge society.

Arguably, Scardamalia and Bereiter's (2014) five aspects of knowledge building align with the abilities Nussbaum (2012, pp. 25-26) lists as crucial for the human development model of education for democracy. Consequently, we are not faced with a choice between education for profit or education for democracy. Rather, in a post-industrial economy and knowledge society, the human development education provides a base that supports the potential for economic growth.

For example, the syllabus described in this paper (Table 1) supplied experiences that supported students to obtain abilities in education for democratic citizenship. First, the students had to *think and deliberate about political issues* by engaging with the topic of sustainable intergenerational wellbeing. Second, the students learned to *recognise and respect fellow citizens as people with equal rights* through conducting ethnographic research in context. Third, students needed to *have concern for what different policies mean for others' opportunities for a good life* by implementing empathic design approaches in co-design workshops. Fourth, the concept design process entails *imagining complex issues that affect human lives*. Fifth, the student compared and contrasted their own design concepts with existing policies which provided them with the opportunity *to judge political leaders critically and realistically*. Sixth, by utilising systemic design approaches, the students were supported to think about how their concepts affected *good of the nation as a whole, not only local issues*. Seventh, by critically reflecting on their concepts in relation to theories of justice and epistemology, the students were able to *see their projects with a world order with transnational issues*. Consequently, the teacher produced educative experiences in industrial design that are appropriate for the human development model of education for democracy.

However, modifying the teacher's teaching and learning practises for design education for democracy in a post-industrial knowledge society had the correlated effect of changing their teacher identity from master to guide. Teacher identity is an ongoing process of personal and contextual interpretation of who one considers oneself to be and who one would like to become (Beijaard, Meijer, & Verloop, 2004; Trautwein, 2018; van Lankveld, Schoonenboom, Volman, Croiset, & Beishuizen, 2017). From reflection on the literature and through discussion with my colleagues, four aspects of teacher identity stand out:

- That forming teacher identity separates identity from personal self;
- That teacher identity is also separated from professional identity and researcher identity;
- That as teacher identity becomes institutionalized it excludes emotional aspects of teaching;
- That, despite these forces of separation and exclusion, teachers may view the value of education in terms of social justice and transformation.

After completing this action research project, I believe that I empathize with some of these aspects of teacher identity and not others. First, I agree that conceptualizing my teacher identity as a guide who organizes educative experiences rather than a professional designer,

separates my teacher identity from my personal identity, my professional identity, and my researcher identity. Second, my experience of developing an institutionalized teacher identity has not excluded emotional aspects of teaching; I still feel that there is an emotional component in teaching as a guide-on-the-side. Third, I agree that despite developing a separate teacher identity, I still view the value of education in terms of social justice and transformation.

Further research is needed to understand the implications of the shift in design education from skills-based vocational training to knowledge-based higher education. This research project indicates that the change to knowledge-based higher education is not only a matter of implementing different pedagogical methods. My experience suggests that there also correlated changes in teacher identity. Future research that investigates teacher identity change in design education, for example through interviews with expert design educationists, would provide insight into the lived experience of design education for democracy in a post-industrial knowledge society.

5. Conclusion

This article began by claiming that design education may be framed as both as a form of professional education and as an alternative form of liberal arts education. The primary focus of liberal arts education is human development for democratic citizenship, as opposed to a model of education aimed at maximizing economic growth. But, arguably professional design education has not fully embraced the human development model of education for democracy. The primary investigator conducted action research to investigate the implications of the liberal arts approach to design education through implementing peer-to-peer learning and communicative action activities in their teaching practise.

This paper has made the argument that the abilities crucial for the human development model of education for democracy align with the aspects of education for post-industrial economies and the knowledge society. The value of this perspective is that it critiques the false choice between “education for profit” or “education for democracy” (Nussbaum, 2012). In particular, the argument suggests that the human development model of education provides a base that supports the potential for economic growth in a post-industrial economy and knowledge society. Indeed, Nussbaum (2012), makes a similar argument:

“a mixed liberal arts education recognizes that higher education prepares students in two distinct ways: for a career, but also for citizenship and life. The liberal arts system does not force any student to make a bitter choice between studying all humanities and studying no humanities, and it does not force parents to subsidize what looks like a dead-end major. You can get your valuable engineering degree while still reading Plato and Tolstoy. And this allows parents to relax: their child can pursue the humanities while still doing something useful that prepares them for career success.” (p. 149)

The issues discussed in this paper give us better insight into the implications of aligning design education with liberal arts education. The discussion highlighted that shifting from skills-based vocational training to knowledge-based liberal education is not only a matter of

implementing different pedagogical methods, there may also be changes in teacher identity. The teacher found that changing from delivering authoritative knowledge and demonstrating design skills to guiding discussions and supervising learning changed their teacher identity from sage-on-a-stage to guide-on-the-side. In doing so the insights contribute to our understanding of the lived experience of educationists working in public universities. The contribution of this paper has been to highlight that managing pedagogical changes should also take into account how those changes will affect teacher identity.

Caveats worth mentioning include that since the insights are the product of systematic self-reflection and interpretation of qualitative data, they represent an in-depth account of the primary investigator's experience rather than objectively generalizable results. We do, however, hope that by making these arguments, that we have made clearer some of the issues involved in educating designers for democratic citizenship in post-industrial knowledge societies.

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