A LEARNING AND TEACHING INTERVENTION
TO SHAPE RESPONSIBLE DESIGN PRACTICES

Noemi Sadowska, London College of Communication, University of the Arts London,
n.sadowska@lcc.arts.ac.uk

Tara Hanrahan, London College of Communication, University of the Arts London,
t.j.hanrahan@lcc.arts.ac.uk

ABSTRACT

Our paper considers a teaching intervention as a means to instigate learning around responsibility, via an understanding of impact within design practice, where the underpinning action research approach affords continuous analysis and reflection across teaching implementation.

Our research focuses on a six-stage workshop undertaken by 80 students, from a range of design disciplines and levels. The four-hour workshop utilises interrogatory, disruptive and prioritising activities to interrupt and explore an existing design project. Students independently and collaboratively analyse their projects across three defined areas (overview / approach / stakeholders), by mapping, connecting and challenging the systems associated with their projects.

Our analysis of collected observations and participant feedback suggest that the workshop learning environment enables students to challenge their thinking and to navigate areas of complexity, decision-making and discovery, where the findings illuminate how this prompts students to distil their objectives, define their choices and become more conceptually elastic. Significantly, our data suggests that the experience enables students to identify what matters to them versus others and to develop a clearer connection with their values, judgements and responsibilities.

Whilst the workshop tasks were not affected by discipline type, we assert that the timing of the intervention within a course project does affect engagement with some workshop aspects. We have also identified that for the intervention to have a lasting impact, our further research needs to explore follow-up methods and facilitated scaffolding.

We have set out to test curriculum design that supports students to consider the consequences and complexities of their design choices and the interconnectedness of the ecological and social systems their designs inhabit. We argue that this facilitated learning experience prompts a greater self-awareness, pointing to responsible design practices and the nurturing of future citizen designers.

Keywords: responsible design, learning environment, disruption, citizen designer, intervention

INTRODUCTION

Our research focuses on a teaching intervention as a means to initiate learning around responsibility, via an understanding of action and consequence within design practice. The intervention invites our students to

question "in whose interest and to what ends" (Drucker, 1999, in Poynor, 1999) they are designing; asking them to explore the ripples of their design, looking at both intentional and unintentional impact. Following Schmidt (2003) questioning "[w]hat is the depth and position of our [designers'] complicity..." (p.255), we unpack this via stakeholders, materiality, making and lifecycle, prompting students into "... considering not only how a product is made, but how it is to be used, and by whom … over time and space" (Braungart & McDonough, 2002, p.139). Finally, we generate opportunities for students to explore the complexity and limitations of the system(s) their design will inhabit, responding to Perkins (2006) recommendation for a greater awareness of context and social reach. "To these collaborations, we bring humanist roots, historical perspective, cross-cultural awareness, critical thinking, project leadership and a holistic approach" (Perkins, 2006).

CONTEXT

Our research is underpinned by broader studies such as The Future We Want (2012) and The State of the Art Report (2014), arguing that universities are critical to the development of sustainable skills and mindsets (in Denby and Rickards, 2016).

In the context of design education, we turn to Marshal (2014) calling for "…a sense of understanding about the processes and implications of design – an understanding of how design works in the world and structures our lives and interactions with things, institutions, systems, and each other…" (p. 245) Thus, building a case for design curricula that positions design practice not only as a purview of specialists but also as a matter of responsible citizenship. We align with Berman's (2007) argument that "[w]e have a professional duty to make sure that our inventions are not just clever, but that they are wise; that we don't just create cool things, but that we are in alignment with a sustainable future for human civilization".

If we recognise that a designer is '... an emerging synthesis...' of many things from creative to "… inventor … objective economist and evolutionary strategist" (Fuller, 1963, in Lyon, 2011 p.35), we are led to consider a perspective on the designer that is both diverse and valued. Thus, the teaching intervention at the heart of our research seeks to locate the designer, not only by their practice but via their ethics and values. We argue that designers of today, need to foremost be responsible citizens, who create, invent and strategise – a shift from 'Designer as Citizen' to 'Citizen Designer.' Hence, our teaching intervention aims to respond to Heller and Vienne (2018) request for 'citizen designer' tools, because the multi-faceted nature of design responsibility (spanning social, environmental, professional and artistic areas) is complex and therefore "[d]oing good takes effort. And it would be useful to have a kit of tools that help designers engage…" (Heller and Vienne, 2018, p.13). Thus, our research interests lie in enabling a journey towards better-informed design choices that do not negatively impact people and the planet. Roberts (2006) states that as designers, the "... decisions we make define who we are. Our ethical choices help shape the world" (p. 2). It

is this discourse and demand that motivates our research – to explore how to actively equip students to design as effectual citizens.

LEARNING AND TEACHING INTERVENTION

Our intervention is framed by action research, stemming from the need to combine an investigation of a particular learning and teaching approach with a reflection on its effectiveness, whilst raising awareness of the collaborative input between researchers and students. Stringer (2014) highlights that action research is implemented to solve an immediate problem or is developed as a reflective process of progressive problem-solving to address a wider human-centred issue. Cunningham (2008) states that "… action research gives us an iterative, systematic, analytic way to reflect on what we are doing in class, to evaluate our success at achieving our classroom goals, and to chart the direction of future classroom strategies based on what we have learned" (p.1). The implementation of the planning, acting, observing and reflecting research stages, enables us to deliver the workshop to students whilst continuously analysing its impact. The reflective nature of this method also creates an emancipatory opportunity for students, who gain awareness through questioning their own process.

Our learning and teaching approach is delivered as a proactively disruptive workshop, which intentionally interrupts an existing course project to challenge its design thinking and making. The four-hour activity consciously sits outside of assessment criteria enabling it to focus on process, not outcomes, and to support an open mindset that provokes critical thinking. Going beyond the dialogical approach of the class critique, the six-stage format of the workshop deploys a range of activities that support a joint 'studio' experience where the learning environment enables students to navigate the roles of personal thinker and constructive peer, exploring inner thoughts and outwardly expressing ideas. Students record these interactions on paper (via writing and mapping) and verbally, in response to the individual, paired and collective tasks. At the heart of the process is a structure that asks students to cumulatively analyse their projects across three areas: Overview, Approach and Stakeholders. The workshop sequence of activities are set out and summarised in Figure 1 (below). Figure 2 shows examples of students' participation and outcomes from across the workshops.

1	**2**	**3**	**4**	**5**	**6**
MAP	**DELIVER**	**INTERROGATE**	**DISRUPT**	**PRIORITISE**	**SHARE**
Exploring the present	**Delivering the vision**	**Probing the impact and influence**	**Radically reimagining**	**Formulating opportunities and decisions**	**Identifying discoveries and learning**
Define the project by plotting out: **Overview** Project objective, the idea or theme. **Approach** Project process, the production and medium / platform. **Stakeholders** Engagement with individuals, communities and organisations.	Consider the Overview and identify potential challenges and successes. Unpick these further via '5 whys' questioning.	Plot materials and equipment used in the Approach. Swap with a peer to delve into a selected item's life-cycle (consider environmental impact, systems thinking, resources, materials, waste). Add extreme and unintentional users to Stakeholders. Swap with a peer to map values and emotions to a chosen stakeholder (consider social influences, empathy, engagement).	Swap the Overview with a different peer to then reimagine the project through opposing and alternative ideation. Informed by fictional scenarios with challenging ecological and social conditions e.g. toxic air (due to pollution levels), limited space (due to overpopulation). Exchange reimagings and draw-out new opportunities that have surfaced.	Individually consolidate findings (personal and peer contributions) through highlighting areas of potential transformation across All Areas; overview, approach and stakeholders. Organise these decisions via a Priority Assort Matrix which considers difficulty versus importance.	Collectively review, and re-chart the Priority Assort Matrix in groups. Surmise and share discoveries, actions and reflections via class presentation of the matrices. Complete feedback form.
[20 mins]	[20mins]	[45 mins]	[40 mins]	[40 mins]	[45 – 60mins]

Figure 1 – Workshop Stages

In the spirit of intervention, the workshop utilises 'design-orienting scenarios' to create a disruptive mid-point that uses speculative visions "of what things could be like if certain conditions were fulfilled, of what could be achieved and how", (Manzini, 2015, p.129) to initiate ideation, inform change within their project thinking and ignite a '[d]esign attitude… embracing ambiguity and discontinuity' (Michlewski, 2015, p.64).

The staged format of the intervention enables the development of an accessible multi-disciplinary and multilevel learning environment to meet the subject, ability, and cohort variations. To date, six workshops have been delivered to 80 participants (ranging between 10 – 20 students) from across four degrees, including art direction (second year), spatial design (third year), design management (MA) and data visualisation (MA). The project interruption point ranges from early concept development stage to project proposals two weeks from submission.

Figure 2 – Workshop Activities

At the commencement of the workshops, students are introduced to the research project and then given consent forms to consider and sign (clarifying the research purpose, process and outcomes). Our research has University of the Arts London Research Ethics Approval and adheres to its Code of Practice.

Data is collected in the form of observation statements, where one researcher observes and notes students' responses to tasks facilitated by the other researcher (Figure 3). Additionally, for the three latter workshops, a feedback form is given to students to complete at the end of the workshop (Figure 4). The discourse captured within the observation data is then evaluated for the types of learning opportunities we believe the workshop affords its participants versus the engagement students demonstrate. The data from the feedback forms is analysed for students' perception of the learning they had undergone. The insights gained from the analysis of the two data sets are captured in the sections below.

DISCOURSE ANALYSIS OF WORKSHOP OBSERVATIONS

The following section presents the analysis of the discourse captured within the recorded observations of students' engagement with the learning experience across the six different workshops.

Recorded during the progress of the workshops, these observations describe how students engage with each stage. The observation statements document whether workshop instructions were queried, how students wrote down their responses, if answers were specific or general/abstract in content, what methods students used for arriving at task decisions and the information/comments they shared in presentations. Figure 3 (below), shows an example of this.
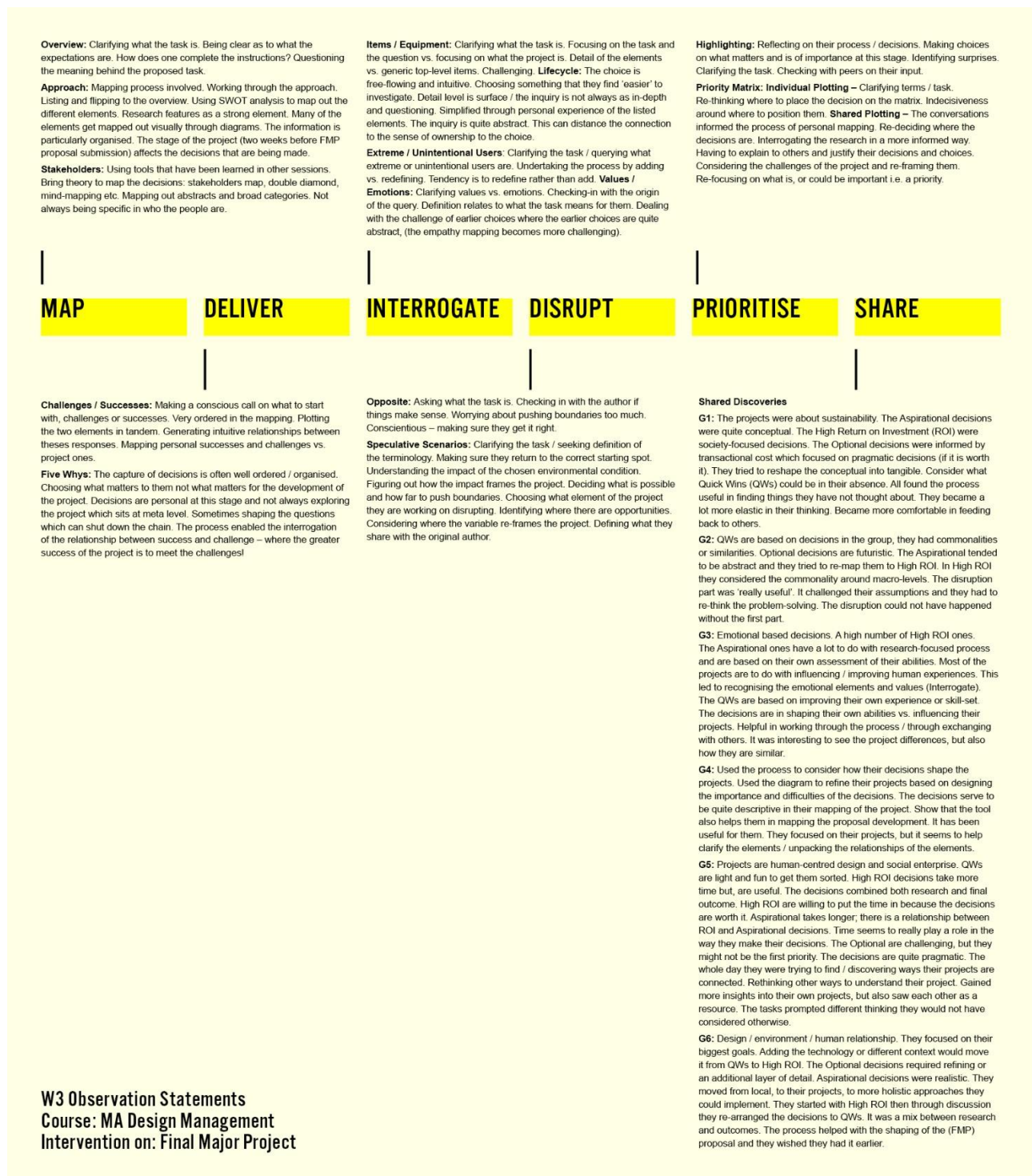

Overview: Clarifying what the task is. Being clear as to what the expectations are. How does one complete the instructions? Questioning the meaning behind the proposed task.

Approach: Mapping process involved. Working through the approach. Listing and flipping to the overview. Using SWOT analysis to map out the different elements. Research features as a strong element. Many of the elements get mapped out visually through diagrams. The information is particularly organised. The stage of the project (two weeks before FMP proposal submission) affects the decisions that are being made.

Stakeholders: Using tools that have been learned in other sessions. Bring theory to map the decisions: stakeholders map, double diamond, mind-mapping etc. Mapping out abstracts and broad categories. Not always being specific in who the people are.

Items / Equipment: Clarifying what the task is. Focusing on the task and the question vs. focusing on what the project is. Detail of the elements vs. generic top-level items. Challenging. **Lifecycle:** The choice is free-flowing and intuitive. Choosing something that they find 'easier' to investigate. Detail level is surface / the inquiry is not always as in-depth and questioning. Simplified through personal experience of the listed elements. The inquiry is quite abstract. This can distance the connection to the sense of ownership to the choice.

Extreme / Unintentional Users: Clarifying the task / querying what extreme or unintentional users are. Undertaking the process by adding vs. redefining. Tendency is to redefine rather than add. **Values / Emotions:** Clarifying values vs. emotions. Checking-in with the origin of the query. Definition relates to what the task means for them. Dealing with the challenge of earlier choices where the earlier choices are quite abstract, (the empathy mapping becomes more challenging).

Highlighting: Reflecting on their process / decisions. Making choices on what matters and is of importance at this stage. Identifying surprises. Clarifying the task. Checking with peers on their input.

Priority Matrix: Individual Plotting – Clarifying terms / task. Re-thinking where to place the decision on the matrix. Indecisiveness around where to position them. **Shared Plotting –** The conversations informed the process of personal mapping. Re-deciding where the decisions are. Interrogating the research in a more informed way. Having to explain to others and justify their decisions and choices. Considering the challenges of the project and re-framing them. Re-focusing on what is, or could be important i.e. a priority.

MAP   **DELIVER**   **INTERROGATE**   **DISRUPT**   **PRIORITISE**   **SHARE**

Challenges / Successes: Making a conscious call on what to start with, challenges or successes. Very ordered in the mapping. Plotting the two elements in tandem. Generating intuitive relationships between theses responses. Mapping personal successes and challenges vs. project ones.

Five Whys: The capture of decisions is often well ordered / organised. Choosing what matters to them not what matters for the development of the project. Decisions are personal at this stage and not always exploring the project which sits at meta level. Sometimes shaping the questions which can shut down the chain. The process enabled the interrogation of the relationship between success and challenge – where the greater success of the project is to meet the challenges!

Opposite: Asking what the task is. Checking in with the author if things make sense. Worrying about pushing boundaries too much. Conscientious – making sure they get it right.

Speculative Scenarios: Clarifying the task / seeking definition of the terminology. Making sure they return to the correct starting spot. Understanding the impact of the chosen environmental condition. Figuring out how the impact frames the project. Deciding what is possible and how far to push boundaries. Choosing what element of the project they are working on disrupting. Identifying where there are opportunities. Considering where the variable re-frames the project. Defining what they share with the original author.

Shared Discoveries

G1: The projects were about sustainability. The Aspirational decisions were quite conceptual. The High Return on Investment (ROI) were society-focused decisions. The Optional decisions were informed by transactional cost which focused on pragmatic decisions (if it is worth it). They tried to reshape the conceptual into tangible. Consider what Quick Wins (QWs) could be in their absence. All found the process useful in finding things they have not thought about. They became a lot more elastic in their thinking. Became more comfortable in feeding back to others.

G2: QWs are based on decisions in the group, they had commonalities or similarities. Optional decisions are futuristic. The Aspirational tended to be abstract and they tried to re-map them to High ROI. In High ROI they considered the commonality around macro-levels. The disruption part was 'really useful'. It challenged their assumptions and they had to re-think the problem-solving. The disruption could not have happened without the first part.

G3: Emotional based decisions. A high number of High ROI ones. The Aspirational ones have a lot to do with research-focused process and are based on their own assessment of their abilities. Most of the projects are to do with influencing / improving human experiences. This led to recognising the emotional elements and values (Interrogate). The QWs are based on improving their own experience or skill-set. The decisions are in shaping their own abilities vs. influencing their projects. Helpful in working through the process / through exchanging with others. It was interesting to see the project differences, but also how they are similar.

G4: Used the process to consider how their decisions shape the projects. Used the diagram to refine their projects based on designing the importance and difficulties of the decisions. The decisions serve to be quite descriptive in their mapping of the project. Show that the tool also helps them in mapping the proposal development. It has been useful for them. They focused on their projects, but it seems to help clarify the elements / unpacking the relationships of the elements.

G5: Projects are human-centred design and social enterprise. QWs are light and fun to get them sorted. High ROI decisions take more time but, are useful. The decisions combined both research and final outcome. High ROI are willing to put the time in because the decisions are worth it. Aspirational takes longer; there is a relationship between ROI and Aspirational decisions. Time seems to really play a role in the way they make their decisions. The Optional are challenging, but they might not be the first priority. The decisions are quite pragmatic. The whole day they were trying to find / discovering ways their projects are connected. Rethinking other ways to understand their project. Gained more insights into their own projects, but also saw each other as a resource. The tasks prompted different thinking they would not have considered otherwise.

G6: Design / environment / human relationship. They focused on their biggest goals. Adding the technology or different context would move it from QWs to High ROI. The Optional decisions required refining or an additional layer of detail. Aspirational decisions were realistic. They moved from local, to their projects, to more holistic approaches they could implement. They started with High ROI then through discussion they re-arranged the decisions to QWs. It was a mix between research and outcomes. The process helped with the shaping of the (FMP) proposal and they wished they had it earlier.

W3 Observation Statements
Course: MA Design Management
Intervention on: Final Major Project

Figure 3 – Example of Workshop Observation Statements

MAP

The discourse analysis of observations captured during the *map* stage indicated students' response to be focused on offering quick outlines and keeping project details quite abstract. Reference to "using SWOT analysis to map out the different elements" (W3) or "bring theory to map the decisions: stakeholders map, double diamond, mind-mapping" (W3) pointed to students' reliance on previously learnt tools to conduct the mapping. The discourse analysis also evidences the impact of previously acquired ways of learning on engagement at this early phase. Where students are used to passive learning strategies, statements such as 'very broad or abstract choices' (W4) or 'resistance to writing things down' (W6) shape the discourse around students' engagement.

Our learning intentions for the *map* stage were to prompt students to unpack their projects factually, gaining a solid foundation in understanding these as valuable entities beyond assessment criteria, from which future questioning can occur. The discourse analysis of observations of students' engagement with the task revealed how much this stage is influenced by students' prior learning routines. The discourse illuminated that these routines can provide an indicator of their engagement with the workshop, sign-posting to teaching staff the level of scaffolding required.

DELIVER

The discourse analysis offers insights on how the *deliver* stage shapes a learning environment that asks students to consider their relationship with their projects not just as authors, but also as citizens who have a vested interest. The discourse evidences this through four themes, as students:

1. Position themselves in relation to the project ("choosing what matters to them not what matters for the development of the project" (W3)).

2. Develop their standpoint concerning feedback loops ("identifying what matters to me, versus what matters to others" (W1) or "one's own value judgement" (W1)).

3. Embed personal aspirations within the project ("the process enabled the interrogation of the relationship between success and challenge – where the greater success of the project is to meet the challenges!" (W3)).

4. Focus on process, not outcomes ('being more comfortable' (W6) in responding to ever more challenging tasks).

These themes point to the learning experience creating room for students to consider how they relate to what they are authoring and how they believe their projects will play-out (however not quite prompting them to question their assumptions). Comparing the discourse analysis of the *map* and the *deliver* stages, the former sometimes results in more passive learning, whereas the latter helps shift the dynamic into a more active learning experience. The discourse analysis suggests that the *deliver* stage with its focus on process, enables students to perceive this part of the workshop as more familiar, and therefore safer to experiment within.

INTERROGATE

During the *interrogate* stage, the discourse analysis of the observations highlights how students break their projects down to deal with the complexity of the task. The depth to which students are prepared to examine their projects is shown via observations such as: "they paused more or hesitated" (W5) or "more crossing out or re-drafting" (W5). Interestingly, the discourse evaluation isolates instances where students struggle due to a lack of detail in previous stages. The analysis also reveals some preoccupation with the task directives, with students' querying: definition of the task, redefinition of chosen stakeholders, or definition of values they might encounter as part of the project. Terms such as "dealing with the challenge of earlier choices where the earlier choices are quite abstract" (W3) point to an emerging need for students to question their learning experience.

During the *interrogate* stage we intend for students to begin recognising that their impact and influence can be intentional rather than inevitable. The discourse analysis suggests that students tackle this stage by:

1. Moving between project perspectives, from detail to overview ("working at helicopter view versus local understanding" (W2)).
2. Beginning to see complex systems at play in the design process ("managing the complexity of what is involved" or "developing relationships between elements of objects" (W2)).
3. Recognising interrogation as a learning curve in itself ("staying safe versus challenging norms" (W1)).

In doing so, students begin to realise that their projects have broad and unintentional effects, via the wider systems their designs inhabit, though they are only just beginning to consider how they can act strategically to redefine their outcomes and manage the associated impact. The discourse analysis reveals that how students make sense of and process this impact can be affected by cultural contexts and prior learning ("simplified through personal experience of the listed elements" (W3)).

DISRUPT

In the *disrupt* stage, discourse analysis points to the learning environment prompting ideation, lateral thinking and sharing ideas, alongside seeking familiar reference points and recognising opportunities. But there is also evidence of some students finding radical re-imagining challenging. Observations such as: "how one develops difference is problematic" (W4) or "struggled with more nuanced opposites" (W5) highlight this.

The discourse of the observation statements illuminates processes of selectiveness and openness, whilst still holding on to frameworks established in earlier stages. Two themes surface:

1. Engagement with the limitations of the current projects ("deciding how to bring the imposed limitations to creative options" (W2).
2. Identification of opportunities for creative re-imagining ("deciding what is radical in the context of the proposal" (W2)).

The discourse analysis suggests that this disruptive stage enables students to consider the potential scale of their projects beyond their original thinking. However, observations such as "seeking clarification on what the task is and how to manage it" (W2) flag some students' need for reaffirmation of direction – a valuable insight for scaffolding learning.

During the *disrupt* stage we also observe the students' relationship with change, evidenced as follows: "recognising the exponential influence of change" (W1) or how "imposed change pushed for more creative solutions" (W1). As with the *interrogate* stage, these insights point to students' arising awareness of consequence as designers. However, this is also connected to their concerns about how far engagement with change will impact their projects and potentially derail them, as evidenced by the following observation "worrying about pushing boundaries too much" (W3), reflecting some fear of risk when managing change.

Our intention for the *disrupt* stage is to agitate the design process. The discourse analysis suggests that the workshop prompts students to recognise new perspectives derived from the re-imagining process and/or peer exchange. Moreover, it highlights to the students that engaging with change defines the boundaries of their projects as more permeable and flexible than originally considered. Drawing further insights from the discourse analysis from across workshops, we believe that the timing of the intervention i.e. the project interruption point, plays a significant role, affecting both the opportunities (early stages) and willingness to consider change (later stages).

PRIORITISE

The *prioritise* stage discourse analysis reveals that students are more comfortable with design decisions, and the responses to tasks are faster and focused. Terms such as " ...seemed a lot more confident in the process in comparison to earlier stages" (W6) illuminate this positive engagement. However, the observation statements also highlight some basic-level questions that students find more challenging, such as identifying design process decisions versus the outcomes of those decisions ("recognising links between different decisions" (W2)). The discourse suggests that this stage prompts students to review and respond to the workshop process in relation to their project development ("some decisions are … about getting the project done; some decisions are about practical 'tips' and how to make them happen" (W5)). Interestingly, the discourse analysis also reveals how the observations document students' undertaking a process of self-editing, which could stem from growing confidence in the learning experience. Students also consider how others might perceive their projects, the observation "having to explain to others and justify their decisions and choices" (W3) exemplifies this.

SHARE

The discourse analysis of the *share* stage observations reveals that many students believe that their relationship with their project has shifted, been challenged or reimagined. Terms such as "opening up the project to other audiences" (W2) or "discovering new spaces and opportunities to explore in the project" (W2) evidence a discourse demonstrating an acknowledgement of how the workshop has expanded

perspectives and opportunities. There is also evidence of students gaining confidence from peer exchange: "became more comfortable in feeding back to others" (W3) or "moving decision priorities because of input of others" (W4), or "50% of the decisions have been informed by the views of others" (W5).

The discourse analysis also points to students' focusing on the practicalities of production ("being informed by materials" (W1)), to real-world engagement with others – suggesting a greater awareness of the strategic and practical aspects of the design processes. The observation "recognise the need to go out of their comfort zone" (W2), demonstrates an emergence of discourse capturing students' reflection on their learning, in particular the effects of their own biases and the benefits of external input. Observations also show students recognising the importance of a staged design process: "the disruption could not happen without the first part" (W3) or "process helped with the shaping of the proposal and they wished they had it earlier" (W3) as evidenced in these statements. However, the analysis does also reveal some sceptical voices as highlighted by the statement, "has not considered what the options are despite the process" (W2).

Our intention for the *share* stage was to create an opportunity for students to identify their discoveries and share them with others to create room for learning reflection. The discourse analysis of this stage confirms that students have reshaped their relationships with their projects, either through:

1. Reconsideration of the stakeholders ("considering users they would have not considered before" (W5)).
2. Reflecting on production choices ("reconsidering the materials involved in the project" (W2)).

More surprisingly, the collected observations, when discourse evaluation is applied, illuminate students' emerging awareness of their decision-making within the design process: "recognising the impact their choices have" (W2), or "changed the ordering of the decisions as the result of the reflection process" (W2).

It is clear from the discourse analysis of the collected observations that the staged and facilitated learning experience elicits a range of learning engagement processes and opportunities. However, following workshops 1 – 3, a need to seek direct feedback from the participants became apparent. We issued a form for workshops 4 – 6, to gain students' responses to emerging themes and to enable us to triangulate our discourse analysis insights with students' perceptions of the learning experience. This analysis is captured in the next section.

ANALYSIS OF POST-WORKSHOP FEEDBACK

The following section presents the analysis of students' written responses (via feedback forms) on the learning experience. The form consists of five questions that focus on: discerning what matters to self versus others, recognising design outcomes as complex systems of components that require identification and impact evaluation, awareness of one's own decision-making within the design process, highlighting discoveries and 'take-aways'. Figure 4 shows examples of students' responses and reflections from across the workshops. The remainder of this section captures evaluation of the feedback and insights this provided.
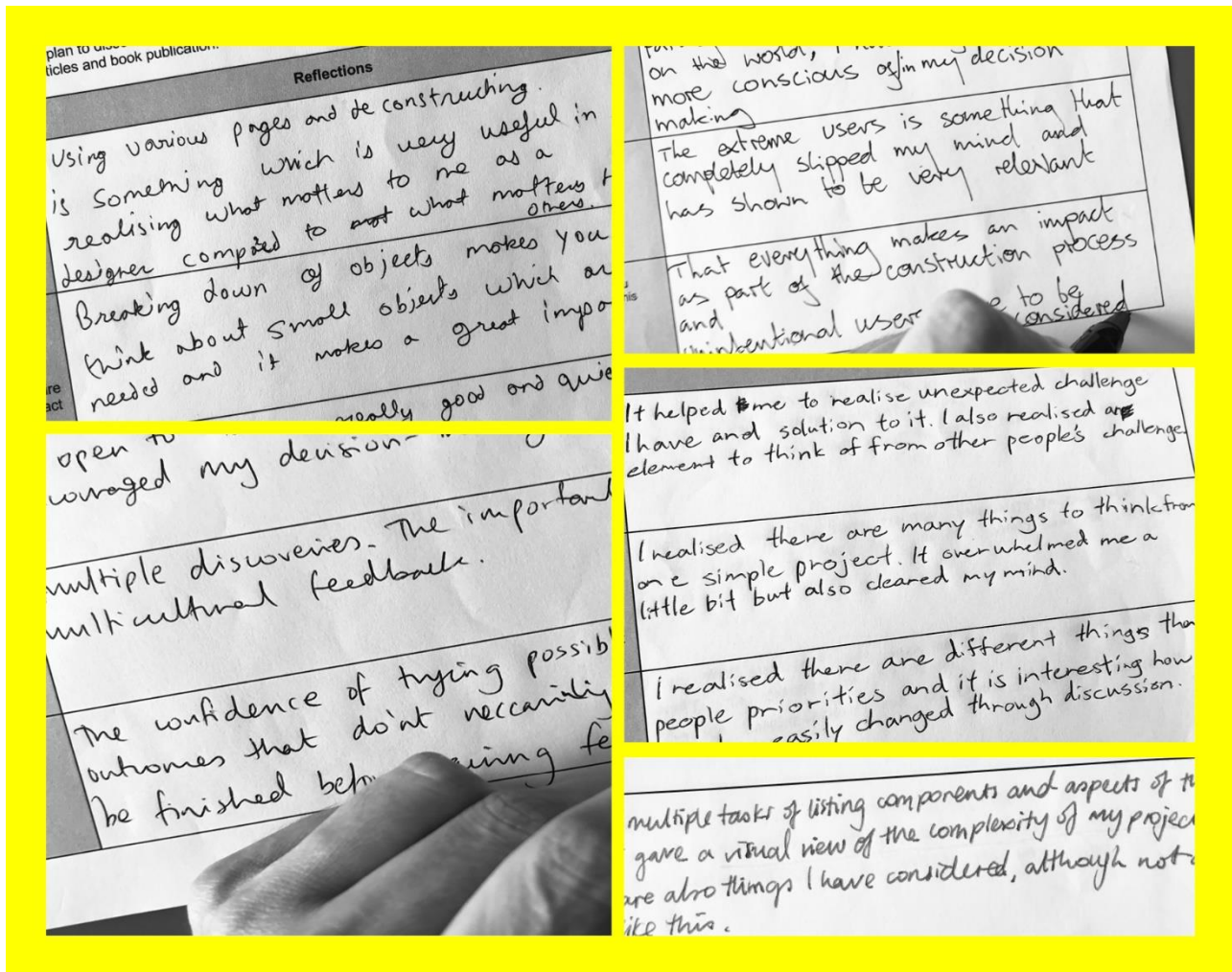
Figure 4 – Examples of Workshop Feedback Forms

IDENTIFYING WHAT MATTERS TO SELF VERSUS OTHER

Responses evidence that the workshop learning environment creates awareness and value of multiple perspectives (student/designer, peers, stakeholders) with many students communicating an understanding of self versus other: "deconstructing was useful in realising what matters to me as a designer, compared to what matters to others" (W6). Feedback suggests that peer-to-peer activity is seen as a beneficial aspect of the workshop, eliciting alternative viewpoints and highlighting classmates as a useful resource going forward. The responses also demonstrate that the learning environment appears to enable students to question their individual approaches (on a micro-level): "made me reconsider my own unconscious bias…" (W5), and the very purpose of their design project (on a macro level). It also appears to initiate focus around potential areas for review, exploration and development: "allowed me to consider elements I would not usually evaluate" (W4).

DEALING WITH COMPLEXITY

It seems that the learning environment of the workshop helps students to engage with complexity and the connected situatedness of the designs they are proposing. Feedback demonstrates understanding of the value of considering the range of components and process within their projects at varying levels ("from thinking in

general to specific" (W5)) and interrogating their projects' connections and associated impact. In particular, students referred to the benefit of considering components from different aspects at the same time and how creating "a 'visual view' of the complexity of the project" (W4) helps make sense of it: "I realised there are many things to think of in one simple project. It overwhelmed me a bit, but also helped clear my mind" (W4). Students also explain that the depth and breadth of the workshop pin-pointed overlooked areas. Significantly, students commented that the tools adopted within the workshop enabled them to tackle the complexity they had mapped by establishing a hierarchy of actions: "It helped me a lot with systemic thinking on the process, equipment and time" (W5).

DECISION-MAKING

Feedback repeatedly indicates that the dynamic learning environment created by the workshop helps students to make more informed decisions, because it enables them to dissect and manage efficiently, and to prioritise effectively: "Quick-thinking approaches (opposites, scenarios, audience)… helped to focus" (W6). Student feedback also demonstrates how the collaborative nature of the workshop informs and transforms participants' attitude to decision-making, shown in responses such as "the workshop gave me the courage to be open to other opportunities, and encouraged my decision-making" (W5) and "I realised that there are different things that people prioritise and it is interesting how these can be easily changed through discussion" (W4). Student comments also highlight self-awareness of the impact of their decisions on others, ("... the whole environment around it and who it impacts" (W5)) and their role in shaping decisions leading to real-world outcomes under eco-social extremes.

DISCOVERY

It appears that the workshop learning environment enables a range of discoveries to occur. Often responses relate to individual participant projects, offering practical actions or modifications as a result of considering processes, people and planet. Many students cite new areas of consideration, informed by suggestions from their peers: "I liked the way other people imagined different scenarios for my own project. I can then think of different possibilities for it" (W6). Student comments also highlight an understanding of the benefits of 'design-orienting scenarios' in terms of creativity: "I am impressed that I now have many alternatives which are more creative and interesting ways to achieve my aims" (W5) and sustainability: "The (fictional) scenarios were an interesting part of the workshop, that prompted me to think about environmental aspects like water and electricity" (W4).

ADDITIONAL INSIGHTS

The feedback capturing any additional students' insights highlights the value they place on learning very practical methods (on how to map, dissect, evaluate and prioritise) and that these processes could be reapplied to the same project or future ones, becoming "... a cyclical exercise" (W5). Student feedback also demonstrates the positive benefits of a shared and collaborative studio experience: "[t]he confidence of trying possible outcomes (that don't necessarily need to be finished), before gaining feedback" (W5).

Finally, the workshop appears to create a positive and proactive attitude towards embracing new approaches and perspectives: "[t]o occasionally stop to 'disrupt' my own thoughts, to get a fresh perspective" (W5).

The feedback from students on how they perceive the experience echoes that of the gathered observations. Both data sets indicate how the learning opportunities facilitated by the workshop intervention, enable students to commence questioning their design processes, and that the structured format and interwoven peer-reviewing appear to free-up their learning, enabling participants to be collaborative, bolder and open to ideas. Moreover, the analysis across observation statements and student feedback points to a curriculum design that can affect students' engagement with complexity, disruption and change, as well as increase awareness of their potential impact as designers.

CONCLUSIONS AND FURTHER RESEARCH

The focus of this paper has been to investigate a particular teaching intervention with the aim of understanding how the learning experience might trigger consideration and awareness of responsible design practices. We have set out to design a curriculum that enables students to navigate complexity and to consider the systems their designs might populate.

Our data reveals that the experience creates a learning environment that prompts students to incorporate breadth and to add detail; to expand and question their approach and stakeholders; to filter and prioritise their processes. Furthermore, it enables students to develop a clearer connection with their sense of self – their value-sets and judgements. This greater self-awareness, combined with a growing understanding of action and consequence, we argue, is a starting point for making more responsible design choices.

We assert that the workshop learning experiences tap into a range of thought processes and that these align with those articulated in de Bono's Six Thinking Hats (1985). *Mapping* utilises the White Hat, seeking factual information known or needed. *Delivering* moves between the Yellow Hat, exploring the positives and probing for the benefit, and The Black Hat rooting out challenges. *Interrogating* makes use of the judgemental aspect of the Black Hat, revealing the complexity and spotting difficulty. *Disrupting* switches to the creativity of the Green Hat focusing on possibilities, alternatives and new ideas. *Prioritising* utilises the Blue Hat to make sense of the experience and to manage and order the thinking that has occurred. *Sharing* taps into the Red Hat, where emotion is most explicitly expressed.

We recognise the significance of student engagement with disruption. There are three layers of creative disruption at play within the workshop learning experience:

1. The interruption to course-led projects.
2. Peer involvement and swapping.
3. The project reimagining in response to fictional scenarios.

These layers help students clarify their objectives, make their choices explicit, enabling them to be more conceptually fluid and reactive – apt preparation for the role of a 'Citizen Designer', given as Heller and Vienne state, "[t]hey should be concerned with the unpredictable" (2018, p.14).

We reflect on how the timing of the intervention within a course project affects students' responses. Workshops delivered early in a project take longer to map/deliver/interrogate, (as ideas are not fully formulated), but are more open to embracing reimaging. However, students that are more progressed with projects find the mapping/interrogating simpler, but struggle with expanding/disrupting/reimagining, something they previously thought resolved. We believe an awareness of where the workshop is situated can be utilised to facilitate students' needs, from a 'just in time' approach to learning and teaching.

In summary, we argue that the workshop, situated as a localised intervention (but applicable across a wide range of design practices), facilitates the following learning opportunities: what are the facts, how to relate to them, how to use them for impact, how to influence change, what are the processes involved, and how to learn from this.

Framing the curriculum design from the perspective of enquiring into and understanding the current design state (ontology), rather than from acquiring 'better' design knowledge/skills (epistemology), has been essential in helping students make sense of their learning. However, we acknowledge the limitations of the intervention and have identified the need for course staff involvement in workshop facilitation and the exploration and co-design of follow-up methods/tools to support transformational learning.

Environmental and social responsibility within the curriculum has recently become part of a wider Design School directive, as well as a broader University mandate to make sustainability a required part of the student learning experience, through the introduction of relevant learning outcomes across courses. With this in mind, an essential part of our research development will be to consider how this evolving backdrop might affect students' engagement with the workshop as well as provide opportunities to progress and validate the awareness of 'impact and influence' it creates. Continuing to nurture a responsible design attitude through the curriculum is imperative, because as Perkins (2006) states, designers "...have the opportunity and the responsibility to put our system of basic values into action – to model the behaviour that we want to see in the world".

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ABOUT THE AUTHORS

Dr Noemi Sadowska is a Programme Director at Design School, London College of Communications, University of Arts London. She has extensive experience in higher education curriculum design and degree launch, with most recent success: MA Design for Social Innovation and Sustainable Futures. She teaches reflective writing, strategic design and research approaches for responsible design practice. Her work has been published as part of *01.AKAD,* Sweden; the *Encyclopedia of Gender and Information Technology,* USA; *Visual Tools for Developing Cross-Disciplinary Collaboration, Innovation and Entrepreneurship Capacity,* Australia*;* and most recently in *The Design Journal*, UK. Her current research investigates how to facilitate design students' sustainable decision-making, leading them to become responsible design practitioners.
Email: n.sadowska@lcc.arts.ac.uk
Website: https://www.arts.ac.uk/colleges/london-college-of-communication/about-lcc/design-school

Tara Hanrahan is a communication designer, creative director and educator. Her studio practice involves design and strategy that considers form, function, value and sustainability in equal measure. Her academic role is as a multidisciplinary Associate Lecturer. At London College of Communication she was Course Validation Lead for the new MA Design for Social Innovation and Sustainable Futures, is co-creator of the Design School's Responsible Design Framework initiative and is co-founder of the Conscientious Communicators Research Hub at University of the Arts London. She is a judge for the Creative Conscience Awards and is a signatory of the Creative Climate Coalition.
Email: t.j.hanrahan@lcc.arts.ac.uk
Website: thinkdostudio.com