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Investigating design-based learning ecologies

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ABSTRACT

In this article we argue that, for educators in design, urbanism and sustainability, the responsibility of connecting emergent design practice and changing societal needs into pedagogical activities demands that attention be given to ecologies of learning that explore the interplay between what is and what might be. As such, this futuring imperative brings into play a mix of modes of situated learning experience, communication and tools from design and learning to query the planned and built environment as a given, while offering alternate future visions and critiques. In this article, we argue for agile pedagogy that enables students to co-create as citizens in public spaces, through agentive multimodal construction

of their identities and modes of transformative representation. Our core research problematic is how to develop, enact and critique design-based pedagogies that may allow designer-educator-researchers and students alike to co-create learning ecologies as dynamic engagement in re-making the city. This we take up within the wider context of climate change and pressing societal and environmental needs within which design and urbanism education increasingly needs to be oriented. Our inquiry is located within a shared practice of design pedagogy across two continents, and climatic and disciplinary domains between the western cape in South Africa and the far north of Norway. The main finding of this research is that pedagogies that are enabling of and attentive to the interplay of an assemblage of relational context-sensitive modalities can be conducive to sustainable and futuring design-based urban engagements.

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INTRODUCTION

As a growing global population rapidly moves to live in cities, how we approach learning in the city and from the city becomes increasingly imperative. In this article, we address the potential dynamic between the pedagogical, design and the urban through four case type contributions from South Africa and Norway. They are part of an overall argument on the conceptualization of learning futures (Facer 2011) and learning ecologies (e.g. Cope and Kalantzis 2017) that are centred in a developmental and socioculturally framed perspective on the transformative character of learning as activity (e.g. Wertsch 1998) yet reach towards more relational, assemblages of knowledge making.

The cases are located ‘from Cape to Cape’, that is from the southern tip of Africa to the northernmost territories of Norway. The material included is drawn from completed projects as well as joint research underway: co-creation, collaborative inquiry and shared composition of research being a key feature of the work. Including cases from such diverse socio-economic and political contexts opens up an expanded space to understand and critique the core concepts in this research.

Against such a backdrop, the development, enactment and critique of sustainably oriented pedagogies for and through design need to situate students in relation to different knowledge forms and modes of communication. In following a relationally framed concept of learning ecologies we explore an ecosystem view that considers distributed agency and resource potentials beyond the individual, and bounds of siloed territories of academia, business, government and community. Hence ‘symbiotic learning’ seeks mutually beneficial learning partners ‘across old institutional and organizational borders’ that may enliven and enact tacit processes that show up new possibilities for design action (Eikeland 2013: 114).

Overall, we offer an account of how negotiating difference matters in shaping relationally positioned transformational ecologies for learning. We have adopted a wide frame of situated, experiential and embodied cognition

within which designers, educators and researchers, together with students and civil society have explored ways of 'learning the city'. Especially for students, this has embodied new social practices of developing design-based means to co-create as citizens in public spaces, agentive multimodal construction of their identities, and modes of transformative representation (Cope and Kalantzis 2009). We approach this through the notion of 'futures literacies' (Miller 2007) in design pedagogy, but provide a more specific design focus than prevailing learning and future studies ones, gesturing towards the importance of design pedagogies for survivable and sustainable futures.

DESIGN-BASED PEDAGOGY

Inherited design educational practices

Pedagogical practices in many design schools – incorporating various domains of design, urbanism, architecture and landscape architecture – have been strongly influenced by studio-based learning (Boling et al. 2016). Located in the Bauhaus model of design education involving solution based and developmental creative productive practices (Cross 1983), these approaches are supported by close tutoring and peer learning that typically results in presentations and 'crits'. With the advent of digital media and its pervasive reach into contemporary society, much design-based education may be understood as taking place within a 'digital bauhaus' (Ehn 1998). This is a pedagogy that is increasingly related to rapidly changing economic contexts (Friedman 2012) and material world settings including digital, online and socially mediated ones.

As transdisciplinary frames of design and urbanism expand and enfold, increased attention has been given to the dynamics of learning and the types of reflection in and on action (Schön 1983) that such pedagogy may support (e.g. Salama 2009). Mewburn critiques Schön's reflective practice as being inadequate today and suggests a 'more supple theory of pedagogical action' (2010: 372) that emphasizes a performative dimension. Interested in how 'peoples, policies, tools, representations, learning environments and the rest – make possible different teaching and learning practices' (2010: 372), she proposes that design pedagogy becomes 'responsive and attentive to what is going on *as we act*' (2010: 378, original emphasis).

Snaddon et al. (2017) have suggested three inter-related concepts when co-creating design learning spaces for sustainable futures. These are that educators attend to the *locative* as the changing context of learning activities, the *nomadic* in learning as it moves out into the world and takes that experience back into universities and work practices, and the *performative* aspect of students enacting their emergent identity and agency in relation to complex real-world contexts. Attention to the *affective* may also be added to this list and highlights that we need to be engaged in noticing and ways of paying attention to the psychological, emotional and sensory.

Situatedness and systemic design learning

Our task as designer-educators then is to bring co-created design dispositions to the fore by engaging students, actively and productively, in taking part in the agentive shaping of their own learning futures (Morrison et al. 2019a). In both design and educational terms, these challenges are systemic and situated (e.g. Lave and Wenger 1991; Meadows 2009), yet they are for each student a

negotiation of self in a wider societal and environmental frame (Gee 2008). Students are exposed to a variety of design disciplines and abductive alignment with others beyond design in complex real-world environments (e.g. Costandius and Botes 2018). Agency goes beyond localization within individuals and considers agentive entanglements for human and non-human entities that may be generative of futuring literacies (Barad 2007; Miller 2018). Marking a shift from traditional instrumental design school pedagogies responds to Findeli's (2001) challenge that design education should be less reactive and more proactive in exploring the future profile of design professions.

Design learning ecologies

The concept of design learning ecologies resonates with how design practice is becoming enmeshed in systems and ecologies, requiring us to connect things and 'to think and act in terms of whole systems' (Dubberly 2017: 7). The dynamics of such a shift highlights the importance for students to make their own connections in 'weaving between different knowledge processes' inherent within content, context and devices in a mode of situated and lived experiential inquiry (Cope and Kalantzis 2009: 187).

Lemke (1997) speaks of 'micro-ecologies of situated activities' (1997: 5) and emphasizes that 'how we play our parts in these micro-ecologies depends not just on what the other parts do to us, and us to them, but on what these doings mean for us' (1997: 2) and how our 'identity-in-practice' (1997: 3) develops as a result. The concept of learning ecologies acknowledges such complex notions of emergence and 'because the parts are interconnected, the behaviour of every part is shaped by feedback loops' that can maintain stasis or promote growth and change in the system as a whole (1997: 27). In this, feedback loops can be forces promoting growth and change (positive feedback) and also ones that resist change (negative feedback loop) (Meadows 1999). Design-based learning ecologies are thus learning spaces where designing as doing, knowing and becoming for a student and others can be seen and understood to be relationally dynamic.

Learning as transformation

Transformative learning has its origins in emancipatory pedagogies of democratic change (e.g. Freire 1973) and ones concerning dynamic change processes in adult and life-long learning (e.g. Mezirow 1991). We understand transformative learning as also being about what propels us out of present modes of habitual and socially reinforced norms in need of critical re-imagining (Braidotti 2006). Our four case studies deal with pedagogical interventions that collaboratively (with multiple stakeholders) aspire to enable learning and yearnings for change in positive and creative ways. These are transformational not only for the individual knower in changes in their own experience but can reciprocally transform the world in which the knower lives. This notion of reciprocity resonates ecologically in how collaborative and context-sensitive learning within urban settings might be shaped.

Concerning urbanism, notions of transformative learning have been taken up for example, by the Learning Cities Network that has been concerned with fostering responsive and responsible urban stewardship to ensure sustainable and inclusive urban transformation with active citizen participation. In the context of the Learning Cities perspective supported by UNESCO, African

scholars have argued that conscientization (Freire 1973) is central to citizens' arriving at actions and adaptations in transformation of their own cities – psychologically and physically – that are connected to related governance (Biao et al. 2013). The UK Cities of Learning project was part of a wider global initiative with key features such as discovery, means and motivation oriented to 'learning as the city learns' (Painter and Shafique 2017). Changes in conceptualizing 'learning the city' (McFarlane 2011) as an 'educational urbanism' have been presented as a matter of 'tying together new spatial imaginaries of educational spaces' (Banerjee 2010: 6). McFarlane views learning the city as understanding a set of assemblages that need to be untangled to 'expose, evaluate and democratise the politics of knowing cities' and that learning is central to such urban debate (2011: 75).

Transdisciplinary perspectives on learning cities

In the recent *Seeing like a City*, Amin and Thrift (2017) argue that cities can only be partially known as they are in flux and are complex assemblages of interests, formations and perspectives. Considering urban design and theory, this has extended to seeing the city as not only a built environment, to be planned and studied, but one that is experienced from the street upwards. In the editorial to a special issue on 'learning cities' Facer and Buchczyk (2019: 155) argue that growing international agenda of this movement needs to be connected with the daily realities, lived experience and complex materialities of learning in cities to understand how a city learns.

We too see a need to recast learning and cities in regard to the dynamics of embodiment, movement and dwelling (e.g. Ingold 2011), lively infrastucturing (Amin 2014) in schools and with communities (not socio-technical 'smart city' ones), and assemblages of alternate actions and sites of engaged pedagogy and practice (Morrison et al. 2019a). Contributing to that same special issue, we illustrated how the notion and practice of agentic learning may be enacted by a diversity of participants (young migrants in Oslo or design students in Cape Town) in their critical encounters with cities.

Design and sustainable futures literacies

Such interactions may be understood in part also as 'futures literacies' (Miller 2007; Miller 2018) that are realized through mediated meaning making for exploring mobile and locative technologies for their communicative potential as resources for learning. This is an anticipatory learning perspective where spatial and temporal shifts between the present and the imagined city may be explored and conveyed to others. Urban settings are 'multiple entanglements associated with materializing the "not yet" now' (Brassett and Marenko 2015: 12) for students working in complex contexts with unfolding dynamics, relating to climate change and learning to work in sustainable design-based futures.

Recently, it has been argued that greater attention be given to exploring the prospective in unpacking relations between Futures Studies and Design (Celi and Morrison 2017). Despite transdisciplinary influences (e.g. cultural geography, multi-sited ethnography), this article accentuates the need to unpack relations between learning and cities articulated through co-designing and within design-centred inquiry.

CONDUCTING THE INQUIRY

Methodological matters

Over the past five years, our design, teaching and research has involved collaborative and individual research and education projects in and between two countries at the southern- and northern-most reaches of Africa and Europe. Methodologically, we have drawn on qualitative inquiry to investigate dynamic and situated characteristics of a perspective on design learning inclined towards dialogue, emergence and agency (Morrison et al. 2019a). Consequently, the research has included a mix of ways to conduct inquiry to connect teaching and learning, framed through a productive-critical interplay in a mode of research through design (e.g. Stappers and Giaccardi 2017). This has ranged from the formative and constructive (Koskinen et al. 2011) to the imaginary and speculative (Lury and Wakeford 2012).

Our approach to design inquiry encompassed a four-way enactment of means (crossing between distinctions and sets of inter-relations) through which design inquiry may be understood, practiced and critiqued. Based on shared interests and experiences, we have positioned this as part of connecting qualitative inquiry in the social sciences, including education, with ones enacted in design making that involve knowledge production through embodied, situated and material production. We have labelled these four aspects: research methodology, research methods, design techniques and design tools (Morrison et al. 2019b). In the four cases presented below, the investigations included co-design and participative research, working within, between and across disciplines, and studies of design learning in formal and informal places and contexts (see Table 1).

Methodologically, this has meant adopting a shared view between students and designer-researchers on the status of design and learning as a dynamic activity of finding and forming ways of knowing that are inventive and prospective (Wilkie et al. 2017) rather than ones of only solving immediate known needs.

Research methods, design techniques and tools

In terms of qualitative research, we drew together a range of methods applied in the human sciences (Kelly et al. 2008) and related studies of interdisciplinarity with a focus on processes and the dynamics of shaping knowledge (Lury et al. 2018). This extended to the interplay of digital and situated ethnographic methods (Hjorth et al. 2017) and design pedagogy located within practices of co-design and co-creation (Sanders and Stappers 2008). Participant observation, situational photography, student diaries, open discussions, semi-structured interviews and course evaluations were taken up.

A medley of design techniques and tools were applied. These allow the educator and researcher to focus on means used in making that also reveal how design is not only developed, produced and even shared but also what we may know about a context and its inhabitants and the views of member participants in case-based experiments and interventions. In the four cases these included design sketches and prototypes, fictive narrative scenarios, putative personas, visual urban 'scenography' and collages, and evidencing. These design techniques and tools were further realized on site, through collaborative learning activities as well as by ways of students' individual design production. The cases include visual mediations of this work, contrasting in

Case 1	6-week practice-based learning and participatory design action research Cape Town city centre on social and natural systems 5 design educators, 70 multidisciplinary undergraduate and bachelors design students
Case 2	3-month emergent process connected to studio on urban design Longyearbyen, Svalbard unscripted multimodal fictive narrative on potential climate change futures five volunteer master's urban studies students and researcher
Case 3	Whole semester studio Norwegian arctic border town on potential urban development undergoing a shift from mining extraction master's urbanism students, classroom and on-site urban experience
Case 4	3-year participatory design action research dialogue informal urban settlement in Cape Town on service delivery processes between students, educators, local government and community members

Table 1: Summary of cases.

purpose, style and participation. The array of work is given to suggest some of the variation that may be connected in developing and enacting design-based learning ecologies.

Case-based research

The inquiry centred on case-based research which covers a range of inquiry and disciplines. It provides ways of locating specific interests and change in relation to contexts, typical and particular (Stake 1995; Shrank 2006; Swanborn 2010). Our cases are included from a wider set of heuristic case-based design teaching and research into what may be called designs for learning and learning designs (see also Morrison and Aspen 2013; Hemmersam et al. 2015; Hemmersam and Morrison 2016; Snaddon and Chisin 2017).

CASE STUDIES

Case # 1: Design, transformative learning and urban change

Project: Biomimicry in the urban fringe

This case study presents a project module 'Developing collaborative design process through a biomimicry-inspired curriculum' in a Design and Informatics Faculty at the Cape Peninsula University of Technology (CPUT), South Africa. Located in the District Six precinct within which the campus is situated, the

challenge was to use newly introduced biomimicry thinking as a lens and methodology to conceive future scenarios inspired and modelled on natural ecosystems.

The main focus was to immerse students experientially in environments where they could directly observe and reflect on contextual dynamics of urban change, and then apply this learning to a set of design challenges. The central question was how a design learning intervention could provide stakeholders in the city with innovative ideas for energy-use, social regeneration, retrofitted products and ways to green and re-imagine the economy through creative use of existing resources.

Design, learning and the city

The campus, located in District Six where apartheid era forced removals took place has had a chequered past in its relations with local community groups. Starting from when the university was built by the apartheid government on land where homes and businesses had been demolished, concerns have grown over potential gentrification of areas with historical character and established businesses.

Initiatives by CPUT executive management and staff have attempted to bridge divides by instigating projects that are inclusive of community stakeholders. A pedagogy of learning positioned as part of urban change has produced speculative student proposals that have challenged the status quo and posed difficult questions on how this area can be more inclusive and engaging for its diverse populace. Two guiding conceptual perspectives were taken up.

The first was the mobility of learning communities, enabling a view of the city as a learning resource, and the offer of students being a learning resource for the city (Wenger 1998; Rudd et al. 2006). Through the involvement of academia in local outreach activities with anticipatory processes prompting and informing innovative social upliftment initiatives, learning extended beyond the bounds of academic inquiry to involve local stakeholder networks in a situated and participatory manner.

The second conceptual perspective concerned biomimetic pedagogy as creating conditions for learning characterized by cross-fertilizing strategies for reading the new and unfamiliar, including the role of diverse agency (human and non-human) within the meaning making process. Pedagogically, this starts with an immersive, spatio-temporal shift of register that decentres and leads students away from what they have already seen in the built environment, to natural ecosystems where relational interdependency can be understood through deep observation (O'Sullivan 2001). Learning with rather than from or about nature is enabled through attending closely to evolved strategies by organisms within an ecosystem. The possibility of emulating natural forms, processes or systems can then be explored. This is essentially a trans-disciplinary move that exposes students to expertise from domains other than design, bringing about collaborative learning processes characterized by openness to difference.

Growing the city

This project sought to 'fold in pedagogic moments across the urban fabric' by enabling 'learning pathways' within 'physical, social, urban, virtual and de-territorial spaces and places' (Banerjee 2010: 7). Guest talks including city

planners provided students with an enlivened sense of the intricacies of an urban visioning project with all attendant complexities. This entailed a vision for the area as a design and innovation hub, where quadruple helix activity involving academia, business, government and community could thrive (Carayannis and Campbell 2012). Walkabouts and a talk by a water activist generated a space for curious enquiry, where exposure to a wider set of mediational processes animated an emergent and shared community of practice for all participants.

Momentum gained through this initial phase built anticipation among students for an introduction to biomimicry, its embodied practice and methodology, which followed on the third day at the Kirstenbosch Botanical Garden. The aim of this was to immerse students within a living natural ecosystem before exposing them to the deeply complex challenges of the District Six precinct. Immersion in close proximity to a functioning ecosystem heightened students' observation skills and revised personal conceptual schemas. Biomimicry would become an inclusive design methodology through which multi-disciplinary groups could work towards sustainable design proposals within the urban fringe area with its highly visible poverty, pollution, decaying buildings and vacant land. Observations of 'natural champions' served as inspiration that could then be abstracted from and emulated within the built environment of District Six.

The following two points characterize aspects of ecologies for learning within this project:

1. Students found the deep observation methods of biomimicry to be beneficial to their mapping and noticing of relational activities in the urban fringe. One remarked on how the time spent on the streets revealed many 'broken systems edged alongside each other without communication [...] [and that] they could benefit from one another in well-optimised relationships'. The learning experience took them into spaces where they engaged deeply with all levels of socio-economic activity in the area, through a variety of times and weathers to detect multiple layers of activity taking place. This process challenged preconceived notions by opening up students to unexpected encounters, some positive and some negative. Walking and learning the city in this way enabled students to notice patterns and relationships previously unseen, and to hear first-hand what the aspirations of historically marginalized communities might be. These communities consisted of informal traders with their unwieldy mobile stalls, homeless and jobless vagrants, a wide range of local business owners, school children cutting across the area on the way to school, and students from several private/public higher education institutions. Engagement with these different groups shifted preconceived notions of who belongs and who contributes towards an urban economy, and helped establish an ethical and valuative stance.
2. The project outcome yielded twelve proposals that were presented to an audience of stakeholders including academia, local government, Biomimicry SA, and an NGO.

The performative expression of these presentations to an audience from beyond the bounds of academia enabled learning not only for students, but also for the invited stakeholders who in turn drew inspiration that was then

shared with their networks. Students learnt that their design imaginaries, which visualized alternative scenarios based on how natural systems enhance the wellbeing of all in a balanced and symbiotic manner, could engage the attention of planners and local business. The latter realized the value of engagement with academia in serving their civic mandate and how the relationship showed up surprising possibilities unforeseen within institutionally bound practices and approaches.

One offering, titled 'Greening Harry' (Figures 1 and 2), proposed a scenario in Harrington Street that has now come to pass. The area has now transformed into the creative precinct that was envisaged and a key factor has been the work of one particular individual, a business owner who was inspired by the student work that was presented six years ago. The 'Mayor of Harrington Street' as he is known has been a catalyst in the area that has promoted open and shared practice through a ground level 'garage space' that houses a coffee shop and eatery with work space for hire. The combination of these activities with an entrance that opens onto the street (the 'Mayor's' office) has activated



Figure 1: An alleyway transformed (Images: Steven Harris).



Figure 2: The 'Mayor's' office after activating the creative community (Images: Steven Harris).

a creative design community that attracts a range of businesses and activities catering to Cape Town's creative design industry.

Many young design students and early career designers continue to use the shared workspace to meet and collaborate on joint projects. CPUT design educators have made use of the space for off-campus supervision of students during times when the campus has been forced to shut down due to #fees-mustfall student protests (Langa 2017).

Reflections

This case illustrates how agentive and performative learning in spaces and places that are socially and politically contested was productive of networked knowledge that has influenced evolution of a real-world context. Immersing students within the lived dynamics of particular settings, activated dormant relationships through the speculative, imaginary and performative aspects of the design process. Through an ecology for learning that drew disparate networks together, the relational connections between these groupings were invigorated. Student project presentations acted as communicative catalysts in how the creative design proposals prompted civic responses. What seemed futuristic and fantastical in the student design proposals came to be through a mutual process of agentive learning for students and local stakeholders – a shared social imaginary that created new possibilities for inhabiting the urban fringe (Fendler 2013).

Case #2: Projecting fictional urban futures

Project: Longyearbyen 2050

Engaging people creatively and critically in looking into urban futures in the wider context of climate change is a difficult task. Urbanism has a considerable legacy of imaginary, visionary and purely conceptual projects geared towards reimagining the city (e.g. Amin and Thrift 2002). In courses in urbanism and interaction design students may be encouraged to engage creatively in their responses to the immediate world and to work towards and into the conjectural (e.g. Lim 2017). For us this has been a matter of making space for connections between futures studies and design that is concerned with prevailing needs and emerging complexity (Celi and Morrison 2017). This case takes this up in pedagogy of design urban fiction as part of a wider argument for examining further design literacies (Sheridan and Rowsell 2010).

Design, learning and the city

Design fiction has blossomed in the past decade as a mode of speculative inquiry that works with imagined future scenarios that are positioned as means to critique present contexts, especially technologies and policies often framed within a humanities perspective that is prospective (Morrison 2017a). This has extended to critiques of the 'smart city' and prevailing ideologies centred on techno and infrastructural determinism. Drawing on traditions of science fiction imagery and writing, a design fiction innovation and open experiment was devised as an adjunct to master's in urbanism studio at the Oslo School of Architecture and Design (AHO). Called 'Urban Design: Arctic City – Longyearbyen', the studio took place in Longyearbyen, the main town of Svalbard with a population of around 2000 workers, students, scientists and increasingly eco- and experience-driven tourists. As physical

resource exploitation of the archipelago of Svalbard shifts – from coal mining to satellite data mining, and climate monitoring and prediction – the social and economic conditions of this northernmost inhabited urban settlement are under transformation.

This studio invited students to learn about Arctic urban zones connected to emerging futures and matters of sustainable living, planning and development. They engaged in field work, held meetings with local authorities, commercial and community actors and developed a variety of projects. An open invitation was made to the students to participate in a related, parallel project outside the frames and deliveries of the curriculum, about developing visions of a future urban arctic via design fictional work during and after their visit to Svalbard.

Called *Longyearbyen 2050*, the project drew in twelve individual submissions. These offerings, together with those of the researcher motivating this experiment, were then presented at the related research project *Future North's* open seminar including urbanism and landscape students and researchers, as well as at international conferences on design and futures (e.g. Morrison 2017b). This was done in relation to what was termed a 'para-pedagogy' that engaged students in drawing on and slipping off the frames of the given curriculum and deliverables. The invitation was taken up and enacted variously through dialogue in cafes, by way of display and discussion of draft visualizations, and through individual production and annotation. The material generated covered a variety of visual styles, scenarios and thematics, from hand drawn and computer generated images to collages of future streets and waste management and prowling polar bears and overhead daylight lighting in former mines. The results were unexpected and varied, involving a mix of genres from a scribbled shopping list to a hand-drawn elaborate pen and inked bird's-eye view of the entire town, part of it submerged. Each student contribution asked viewers to read and to look into freshly generated creative mediations of alternative urban futures.

In the selected two examples (Figure 3) we see two blueprint-like visualizations of a future Longyearbyen. In the upper image, Wai Fung Chu presented a front facing sectional drawing of an underground city scheme, one she also annotated with a series of questions and possible scenarios. Benjamin Astrup Velure created computer-generated line drawings from the future in 2050 overlaid on a photographic vista of the contemporary city. Luminous in both time scales, the past and the future appear synchronic yet distanced, his intention to create a sense of potential, and an etched vision of a potential city scene of a vista of the future city with high rise buildings and extensive lighting and transportation. These two urbanism students are clearly familiar with visualization and point of view devices as part of their emerging repertoire of disciplinary and professional literacies.

The next two examples (Figure 4) differ considerably in style and tone, one ludic and inviting and the other hypercritical and challenging. Veronica Gallina presenting an urban game for *Longyearbyen 2050* in plan view centred on the competition to be the best planner of the future right now, though with an already altered main street, suggesting that the present might indeed already be in the future. In his collage Minh Tin Phan hacked the iconic WW2 image of US flag raising at the battle of Iwo Jima, transposing it to a future Longyearbyen occupied by Norway. His accompanying written text described how Norway has supplanted its (current) custodial role with one of appropriation, grey military might lurking in the unfrozen waters of the future.



Figure 3: Longyearbyen 2050. (Top) An underwater future city (Image: Wai Fung Chu); (Bottom) Projected urban infrastructures (Image: Benjamin Astrup Velure).

For these four students, finding a stance from which to engage their core interests was central: their contribution connected the motivation of different views and the different styles adopted to convey them. The submissions revealed rich multimodal and collaborative futures multiliteracy of urban change and future potential, covering the utopian and the dystopian. The overall work is being revised as a larger design fiction with non-linear storylines.

Reflections

This case was an instance of an expanded classroom (Erstad and Sefton-Green 2013) but one that shifted into the conceptual and conjectural, including focus on abandoned mines, geo-politics, climate change and food security within this unique Arctic archipelago. Design fiction provided means to developing informal practices of co-creative inquiry and agentic learning

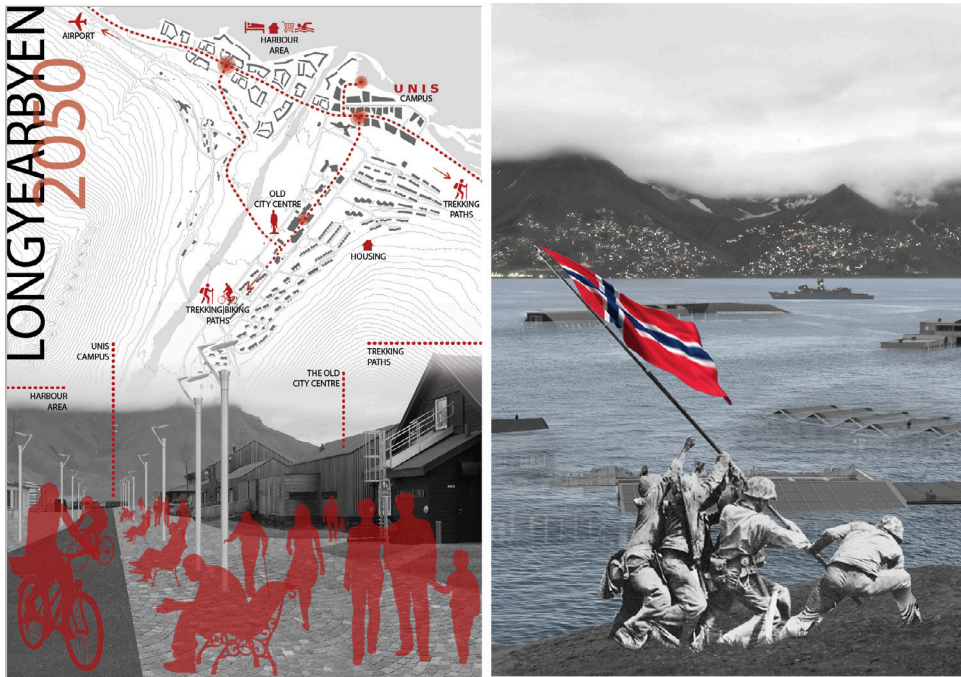


Figure 4: Longyearbyen 2050. (Left) An urban game (Image: Veronica Gallina); (Right) The occupation of Svalbard (Image: Minh Tin Phan).

in liminal spaces (Morrison 2017a: 8). We developed *Longyearbeyen 2050* out of the central principle of situated learning but propelled this outward and onwards into a setting of projected and eventful climatic and social change. We engaged in a mode of what we term ‘future situated learning’.

Case # 3: Learning ecologies and the Arctic city

Project: Urban Design – Arctic City: Kirkenes

Kirkenes on the Russian/Norwegian border is, as many Arctic communities, rapidly reconfiguring its economy, identity and demographics. Its iron ore mine has closed, and this former industrial town has to re-imagine its future, including a process of urban learning. In this reorientation, urban planning and design proposals by students of architecture and landscape architecture align with urban learning in various ways.

Design, learning and the city

Kirkenes is reinventing itself in a process of urban learning in formal or informal arenas, including town spaces (Banerjee 2010; Candy 2003). How then may spaces and configurations of social relations become enabled for learning through urban design and planning, when ‘knowledge, resources, materials and histories become aligned and contested’ (McFarlane 2011: 1)? Understanding such alignment is essential to appreciating how urbanism is constituted in any location, particularly in rapidly transforming Arctic communities.

In 2017, an international group of students of architecture and landscape architecture, in association with researchers at AHO, studied Kirkenes in the context of the research project *Future North* into future Arctic landscapes and a related three year one called *Arctic Cities* that investigated place-specific urbanism for sustainable communities in the Arctic. In this studio students developed urban design proposals that engaged ongoing transformation processes relating to urban space, industry, shifting demographics, cultural mutations, as well as a changing climate. The studio aimed to engage in local urban contexts and everyday life in ways that make evident and challenge the dominant conceptions of Arctic cities. The Arctic is a paradigmatic and urgent case of economic globalization with new trade routes opening up, fragile ecosystems being exposed by new industries and vulnerable indigenous communities being exposed to new economies and transient populations (Kampevold Larsen and Hemmersam 2018). To address local conditions rather than meta-narratives, the studio was based on fieldwork and fieldwork methodology. The case addresses urban learning on three levels, each of these is illustrated below in a successfully completed student project.

(1) *Mapping and design briefs*: The fieldwork mapped a wide range of issues including physical dimension of urban space, historical development and future plans, and mental urban images and aspirations of locals. We call these processes of inquiry-based learning and project emergence ‘building the brief’ (Hemmersam et al. 2018). (2) *Design approaches to the study of place*: The studio was linked to research on cultural landscapes of the Norwegian-Russian borderlands by Ph.D. student Morgan Ip (2018) in his design of a social digital and Public Participatory Geographic Information Systems platform to map urban aspirations and desires for urban futures across national boundaries in the region. (3) *Learning moments in urban space*: The urban design proposals developed by students in the studio were connected to how they cast light on how learning takes place in the everyday urban space (McFarlane 2011).

Examples of student projects include Zarina Belousova’s proposal for a redesign of the library (Figure 5) as a continuity of the town centre urban space by opening up the ground floor to enable pedestrian flows through the building, and even extending library function in buildings across the main square from the library. Increasing the public interface of the building, and including functions such as a tourist information, enhances the social relevance of the library as a meeting space in contrast to its receding role as a book repository. It thus became a ‘knowledge space’ (Dvir 2006). This student learned that concern for, and stewardship of, the public realm as public space exists in embryonic forms in institutions such as the municipal library. Concerning urbanism, learning for her included situated understanding of the agency of architecture when framed in an urbanist discourse.

The project by Femke Peters is an ecosystem-based transformation of a potential post-industrial site on the harbour front of Kirkenes (Figure 6). Designed as a park, it consists of trees of the local biome where climate change is advancing. This proposal builds on the unique location of Kirkenes, just south of the circumpolar boundary between the boreal taiga and the treeless tundra. At the same time, it preserves elements of the industrial structures of the site, thus documenting the maritime industrial heritage of the town. This

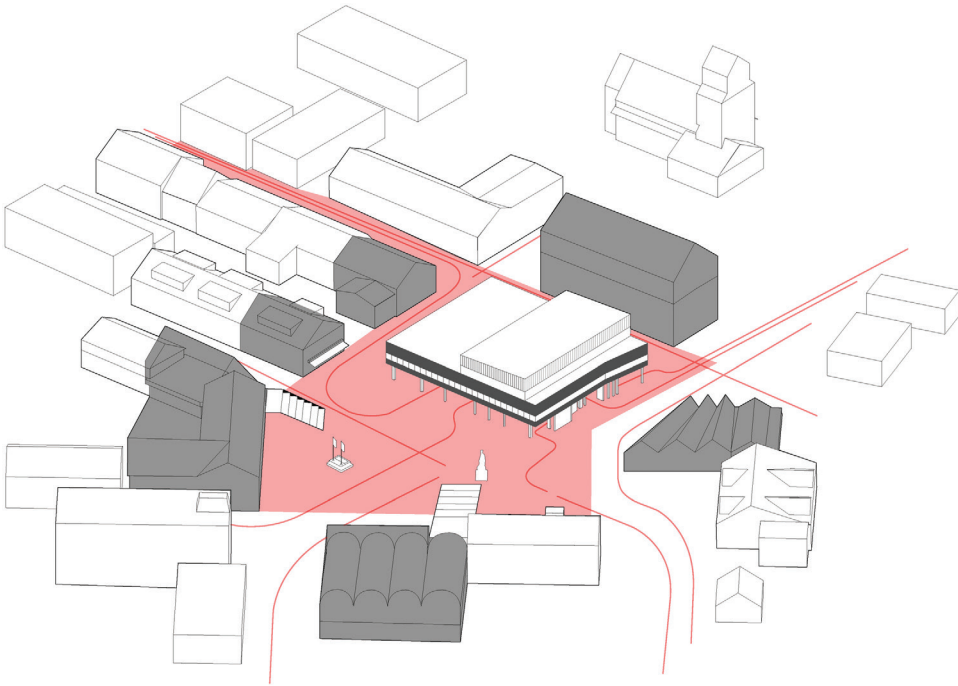


Figure 5: The ground floor of the library is opened up, enabling pedestrians to move through the building to the square or to the books in the levels above (Image: Zarina Belousova).



Figure 6: 'The Arctic Edge'. The unique site between city and subarctic nature provides opportunities for a new connecting urban space in the form of an Arctic experimental arboretum (Image: Femke Peters).

student learned that locals have a clear understanding of where 'nature' starts, and that the urban edge is an important feature of the town as the transition to nature and outdoor life. Learning urbanism for her included widening the scope of design conceptualization beyond traditional planning and landscape design parameters to include cultural perspectives and conflicting aspirations and concerns of groups and individuals.

The final project by Kristine Skarphol is a landscape-based approach to revealing and re-activating the many subterranean structures from the fortification of Kirkenes during Second World War (Figure 7). Through a variety of physical interventions and programmatic additions, they are transformed into social spaces in the town such as parks or small retreats. A prominent example in a residential district is the Andersgrotta, an air raid shelter converted into an improvised museum. Tracing the outline of the underground shelter on the surface by exposing the bedrock and other interventions in private gardens, the historical fragment literally resurfaces as a recreational space and a tourist attraction. This student learned that certain identities (such as the underground history) can play a minor role in the sense of place, while for outside groups they dominate the perception of a location (such as the online subcultures that view Kirkenes as an outstanding example of a Second World War fortification worth visiting and exploring). She learned to articulate place



Figure 7: 'Rediscover Dark'. Kirkenes is home to an extensive dark infrastructure: caves, underground military installations, bunkers and evidence of its mining history. The project reveals this heritage and complicates the reading of urban space (Image: Kristine Skarphol).

specific urbanism based on linking mapping and architectural conceptualization in ways that move beyond dominant formats and models of urban space.

Reflections

In accentuating the shift from the industrial worker to the knowledge worker, this case study articulates the transition from modernist, instrumental forms of urban planning towards postmodern forms in which information and knowledge are challenged, and the legitimacy of planning is uncertain (e.g. Beauregard 1991). In this context, moving beyond preconceived notions of urban space is critical to begin conceptualizing how urban space can become integral to urban learning in the exposed and rapidly changing Arctic community.

Case #4: Citizen-based participatory design

Project: Doornbach community – Solid Waste Management

Contemporary urban South Africa is experiencing great stress on urban housing due to massive migration from rural areas (and neighbouring countries) into cities since the fall of apartheid in 1994. In the Western Cape, this is exacerbated by a constant inflow of people whose work and residency were previously restricted along racial lines. For design students and educators this presents a complex scenario for understanding and working towards social innovation and sustainability in a public sphere founded on futuring design practices and participatory design pedagogies.



Figure 8: Street view of Doornbach informal settlement (Image: Andrea Couvert).

Design, learning and the city

Set against the backdrop of Cape Town's World Design Capital designation in 2014, an initiative was established for CPUT to lead a collaborative co-design project with a peri-urban community and local government. The main focus was to apply participatory design methods in exploring service delivery challenges relating to solid waste management (SWM) processes within the informal settlement of Doornbach, located on the urban fringe of Cape Town (Figure 8). At issue was the policy that services cannot be provided by government to people who occupy private land illegally (Futerman 2015). Such a setting presented a considerable challenge in navigating the sociopolitical landscape in a city run by the minority opposition party (Democratic Alliance) with ward councillors supportive of the dominant ANC party in SA.

The aim was to engage and build trust between all stakeholders over time, thereby improving a process of service delivery that is severely hampered by the haphazard growth of high-density housing (Figure 9). Participatory design pedagogy opened up a space that could allow a variety '[...]' of voices and mutually vigorous but tolerant disputes among groups united by passionate engagement', in a place marked by structures of past and current hegemony (Björgvinsson et al. 2012: 129). To this point one participant commented that communication and '[...]' negotiation has possibly been the most time-consuming process, negotiation with city, negotiation with the various power structures' (Futerman 2015: 167). Careful attention was given to how mutual learning would be enabled through a process of respectful engagement entailing walking the site repeatedly, work-shopping with photographic documentation, sketching and prototyping over time.

So as not to inflate expectations for the community members, great care was taken to communicate how the project aimed to discover what the existing systems relating to SWM were in order to leverage and augment what was already working. No initial promises were made that any particular designed product would be delivered. It was important to build trust with a small group



Figure 9: (Left) Doornbach, a high-density informal settlement housing 5033 people (Image: City of Cape Town); (Right) Collaborative workshops enabled a shared community of inquiry (Image: Andrea Couvert).



Figure 10: Evidence of house-proud residents (Images: Andrea Couvert).



Figure 11: Before and after the participatory design process (Images: Andrea Couvert).

of community members (through a local Council member) and for everyone to learn from the participatory process of understanding what the real needs and particular design challenges were on the ground.

An example was when photographic evidence was exhibited at a local crèche of how some community residents were organizing and beautifying their front yards (Figure 10). This positively affirmed what was working well. Community members animatedly identified the houses and commented on the different approaches to separating, storing or managing waste through growing vegetable and flower gardens.

The expression of shared emotion through noticing positive actions in the poverty-stricken environment enabled shared agency for community members and the project group. This sparked continued dialogue on how this existing community momentum could be leveraged in the design process. Once consensus had been reached around the development of a waste bin to suit the cramped informal settlement pathways, the design prototyping process began to ascertain its shape, size, positioning and functionality; a final moulded prototype was arrived at (Figure 11). A batch of twelve were then produced and delivered to homes for user testing, culminating in local

government finally advertising the tendering process for mass production of these bins.

Reflections

The emergence of a collaborative learning space was largely driven by the pace of participant activities rather than city or academic timeframes. This was enabled and mediated through developmental processes, designed artefacts and tools over time, showing ‘how the future can unfold [and] [...] be made visible, performed and debated’ (Björgvinsson et al. 2012: 127–28). What became visible through shared experience reinforced the value of participatory processes and ownership of solutions for community members even in a setting where people do not legally own their houses. This led to a final design ‘solution’ of one bin per house that people would ‘own’ and take care of, rather than communal or mobile ones open to abuse and vandalism. An ecology of learning emerged through pedagogic processes that illuminated intersectional and relational possibilities for designing in ways that reveal assumptions and blind spots within the wicked problems of everyday lived experience in contested contexts.

DISCUSSION

Towards design learning ecologies

Landscapes and ecologies are apt metaphors to describe complex domains such as learning and design. They are useful insofar as they are able to incite action and offer some comfort to educators and students as they journey forward into uncertain futures. Through the diverse cases presented we have shown that when multiple learning pathways coalesce in project-based learning settings to ‘create, draw upon and steward collective knowledge resources’ (Facer 2011: 103), the outcomes may be understood as propositions and perspectives of sustainable futuring scenarios that can be realized in time. Such a pedagogical approach supports the development of futures literacies through project-based co-creation with civic partners, and as preparation for transdisciplinary professional work that will require resilience, flexibility, openness and empathy. Learning in and with the city (e.g., Amin and Thrift 2017) is exploratory of speculative spatial imaginaries of where and when education occurs, and for and with whom it might happen.

Design-based conceptual findings

Drawing on the cases, we suggest that a design-based perspective on urban learning ecologies may be understood by way of an assemblage (McFarlane 2011) of six nested learning modalities with four learning perspectives (see Table 2) that can be read multi-directionally.

Our main contribution, embodied in this modal assemblage, is to show the relational amongst these modes and their associated qualities of design learning through being, doing and knowing. Importantly, the pedagogical emphasis is on how design-based approaches can explore, enact and articulate such relationality, in the moment and as developing of futures literacies that capacitate students as materializers of the ‘not yet’ now’ (Brassett and Marenko 2015: 12). In this we advocate for agile design pedagogy as a nomadic modality that, through designing practices of making can bring to the surface and support an array of speculative and pragmatic context-specific articulations.

Modalities	Associated qualities	Learning views	Exploratory positions	Knowledge activities
Decentering and transposing	Abductive leaps across codes and domains of design, urbanism, futures and biology	Nomadic, dedicated, discursive, accountable and materially embedded	Transdisciplinary and cross-boundary thinking	Doing and being is core for capacity to engage with wicked, systemic problems
Space and place making	Learning ecologies are spatiotemporal and context-sensitive	Learning spaces are enabled, allowing transitioning flow and reorientation	Opening up and making space for an ecology of place to come into being	Responsive to the nature of the learning happening in situ
Symbiosis	Mutually beneficial learning happens with, rather than for or about others	Open principles for process engagement and room for flexible negotiation	Emergent community of practice competence in relation to that of others	Socially distributed knowledge generation and distribution
Non-hierarchical and non-linear	Learning happens all the time in and out of formal conditions	Para-Pedagogy is outside of formal spaces, enabling questioning of current forms and processes	Speculative, conjectural modes of re-imagining the world in less instrumental pathways, openness to difference	All options from minor, under privileged, less known to dominant and obvious
Interplay	Dynamics of learning ecologies entails constant alignment and realignment	Between personal experience of own competence and through emergent community of practice	Through explorations and articulation in use	Interplay infuses and motivates wider learning actions in emerging learning practices
Mediation	Learning through dialogue, aspects of individual and group inter-change with wider communities	Realized materially and discursively through appropriate channels and situated contexts	Vital in driving feedback loops and enabling development via new ideas and processes	Part of a wider socio-culturally mediated communicative ecology

Table 2: Charting an assemblage of relational modalities in design-based learning ecologies.

Key to this then is a pedagogical attentiveness to the micro-dynamics (e.g. Lemke 1997) of what is emerging through processes of relational interplay in design-based urban learning ecologies.

In our cases, we have shown work that has moved beyond the given project task to be communicated beyond to include wider stakeholder groupings. The urban design fictions in the Norwegian cases have travelled to a diversity of conceptual and speculative learning and research contexts; in the South African cases, dormant relationships became activated and ownership of co-creation processes led to outcomes, e.g. the waste bins in Doornbach

are in production. We have aimed to show by reading these cases through the literature on transformative learning and learning ecologies, that when the modalities of such a design-based urban pedagogy become animated, we start to see the emergence of 'agencies in the massively plural' (Cope and Kalantzis 2009: 173).

Through our varied cases we found that their making and speculative material-discursivity (e.g. Mewburn 2010) helped design learning become more proactive (Findeli 2001). We further established how participants may work together to *release* and *realize* potentials in current project settings. Another key contribution of the research is demonstrating how what we term 'a pedagogy of attentiveness' may include processes of releasing inherent possibilities in institutional and informal settings (e.g. Erstad and Sefton-Green 2013). By releasing futuring possibilities in and through design-based techniques and tools of transformative representation, we see in these cases how alternative and sustainable futures may be realized in time. This extends the notion of futures literacies (Miller 2007), to a pedagogy of shaping sustainable design-based learning futures.

Ecologies are dynamic and self-regulating and always context dependent. In short we found that design-based learning ecologies can therefore be enabled through a pedagogy of care-full attentiveness to possibilities that are contextually mediated and released: through walking and mapping, speculative questioning and imagining, sketching and visualizing, playing with and in time, making and prototyping, communicating and researching. In this design-based learning ecology we emphasize attentiveness towards emergent micro-ecologies within such mediations and release, and point to relational emergence as potential for energizing and exercising the futures literacies our design students urgently require.

However, we see two main constraints. The emergent qualities of such experimentation may make it difficult to connect and strategize across disparate elements. Such emergent pedagogies may often demand investment of time and participation that do not fit easily into academic semester programmes. Design futures literacies may therefore need extended processes and the development of trust and engagement in and over the life of an emergent design-based learning ecology.

CONCLUSION

With transitions in design and urbanism away from dominant practice grounded in the disciplinary bound studio-based status quo, we argue that it is incumbent on design researcher-educators to actively explore pedagogy that leads students into learning opportunities where they engage in and co-create with dynamically emergent bodies of knowledge and critical re-imagining (Braidotti 2006). These intersectional and transpositional processes transverse knowledge in social, cultural, ecological and technical domains and are ones associated with participatory design research as part of the practices, commitments and histories of everyday activity of communities (Gutiérrez et al. 2016).

When new habits and habitats for learning, research and design practice intersect, away from formal institutional norms and settings, it is possible that emergent agency may come into being through recombination's of mediation processes and tools, diverse and dynamic learning partnerships, figurations and fabrications (Morrison et al. 2019a). As shown in the cases, agency concerns an individual's learning ecology as a habitat within which a person

can think, do and learn – and how such learning as a developmental, iterative process creates and contributes to wider ecologies for learning. What counts as value and meaning for the co-design group and for the individual student is emergent through symbiotic (Eikeland 2013), dynamic contextual reinvention and interplay.

Today, and augmented via social media, peer learning and membership of various groups impacts on design learning. Equally, curriculum renewal projects may enable student learning pathways to be located in commercial or community settings. Here students need to understand and work with formal leadership, management and teamwork practices alongside processes of bottom-up grassroots work with minimal material resources and demanding daily living conditions (e.g., Facer and Buchczyk 2019). In this sense, a conceptual framing of ecologies for learning reveals the political and hidden power relations in contexts, and examines how relational dynamics may be made apparent, become changed and translated into connected activities for alternate design infused futures.

These are processes that we have viewed in this article through the conceptual perspectives of ecologies for learning, transformative learning, learning the city, and framed as futures literacies that might propel students out of present modes of habitual and socially reinforced norms in need of critical re-imagining. We offer the above relational and navigable modalities as ways in which design educator–researchers might explore and chart possibilities in their pedagogy, and as an attentive way-in to noticing change as it emerges for and with students through ecologies for design learning and learning designs.

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