

## Article

# Using “Live” Public Sector Projects in Design Teaching to Transform Urban Green Infrastructure in South Africa

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**Abstract:** Urban green infrastructure is not acknowledged in the Global South for the critical social and ecological functions it can provide. Contextual design solutions and innovative approaches are urgently needed to transform the status quo. University-local government collaboration could be a way to encourage new thinking, new roles and design skills to develop solutions to these complex problems. This paper presents a case study analysis of such a collaboration. Qualitative research was conducted to establish the degree to which the exposure to real-life projects stimulates postgraduate design students’ transformative learning. The researchers also inquired into the benefits of the collaboration for the municipality. The participants’ reflections were recorded by means of anonymous questionnaires. The findings show that the live project created a municipal setting for seeking alternative solutions in design processes and outcomes. For the students, the project created rich social dynamics and an interplay of familiarity and uncertainty, which aided transformative learning. The students’ deeper learning indicates greater social empathy, reconsidering the role of the profession, greater design process flexibility, and learning and valuing skills across disciplines. The findings hold promise for a more just and sustainable future built environment through collaborations that transform the design professionals involved, the outcomes they pursue, and the processes they follow.

**Keywords:** Global South; local municipality; urban green infrastructure; ecosystem services; students; live projects; design; experiential learning; spatial transformation; built environment



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## 1. Introduction

In several parts of the Global South, high biodiversity, alongside rapid urbanization and a lack of basic infrastructure, dominates [1–3]. The nature of spatial expansion, the prevalence of informal economies and settlements, combined with the demographic profiles of cities, increase risks [4,5]. These social and environmental challenges will worsen as the effects of climate change progressively manifest [5–7]. Built environment practitioners need to be trained to engage with informality, urban poverty, infrastructure and service provision, land management and local governance [5]. Staying within planetary boundaries [8] (which entails net-zero emissions, avoiding biodiversity loss and stopping land-system change), while meeting basic needs for all, will require some profound shifts in how cities are built, maintained, and operated. This calls for a reimagining of service and infrastructure provision, including harnessing green infrastructural solutions instead of “grey” solutions that contain embedded emissions and other ecological costs. Design skills are ever more critical to develop innovative responses to the current multifaceted challenges [9].

The inclusion of urban green infrastructure (UGI), as part of the infrastructural services of urban development, remains incidental in the Global South [6,10]. The UGI requires purposeful planning, design, and managed interventions to provide a network of green spaces that are accessible, multifunctional, and of high quality [11,12].

African cities are still shaped by historic (colonial) planning traditions [13]. For example, African Anglophone cities tend toward urban sprawl, which contains newer developments with less intense land use and a more irregular layout [13]. This is because colonial and native sections developed without an overall plan and coordination [13]. These legacies result in the perpetuation of township layouts, plot sizes, and building typologies that are often disconnected from current urban realities and how people actually live [14], including informal economies and settlements [5]. Similarly, building forms that are promoted internationally seldom relate to the local needs, climatic conditions, plot size and layout, land tenure, and rules [15].

In a neoliberal market, developers, planners, and municipalities often favor land-use types that provide direct economic benefits for some [16,17]. In so doing, they often disregard the welfare of the poor and the fragmentation of ecological areas [18]. While planners in general show a low to moderate knowledge and awareness of ecological aspects [19], the public sector is additionally tested by a lack of capacity and governance [20]. Due to competing interests and a shortage of funds, green areas and conservation plans that are included in open space planning frameworks do not always influence site development plan decisions on the ground [3]. Combined with a lack of service delivery, informality becomes the norm. Green spaces are therefore often unlawfully occupied for living [21] or used for illegal dumping. Development or densification almost inevitably happens on available, well-located land. When recreational green spaces form part of these formal developments, the requirements for high use, low cost and low maintenance result in a small palette of tried and tested design solutions and a lack of innovation [22].

Several authors discuss the importance of partnerships between different stakeholders (including transdisciplinary work) in contributing to improved UGI planning [23–25] to ease institutional and capacity constraints, overcome the divide between science and practice, and bring about systemic change [26–28]. Roux et al. [28] offer an excellent case study analysis for transdisciplinary researchers that provide lessons to improve the chances of project success for systemic change. Their examples are of academic research collaboration with the community and the public sector, and include postgraduate research students [28]. Their study highlights the role of students as “bridging agents” due to their neutrality and genuine interest in local issues [28], but does not consider how the engagement shapes the professional formation of the students as part of the required systemic change. Another study, by Jabeen et al. [29], focuses particularly on approaches to build the skills of architectural design students. It considers community collaboration as a way to improve the students’ design ability to be rational, creative, and more socially responsive. This study describes the design outcomes of students in dealing with a challenging socio-ecological context as an explicit process of critical reflection, but does not inquire into the students’ extrarational development. A study by Sara [30] considers live projects for architectural design students. It considers both rational and extrarational learning, but without contemplating the relation of the findings to the context for systemic change. Our study combines ambitions from these former studies by focusing on postgraduate planning and design students in collaborative partnerships as future professionals that need to learn the skills to bring about the systemic and intuitional changes required to manage particular risks and operate within planetary resources.

Design faculties increasingly aim to broaden design relevance beyond aesthetic self-expression and originality [29,31] and prepare students to deal with global and contextual challenges [9]. Although good planning and design “value” standards exist, designers do not always have the opportunity or inclination to utilize them [32]. Furthermore, in the Global South, design challenges are more complex, involving poor communities located in ecologically vulnerable areas such as flood plains and steep slopes [3]. Case study evidence of UGI integration in mainstream African urban planning and design practice exist [33,34], yet empirical evidence in the literature remains scarce [19]. Education, training, and professional development initiatives must help forge a common language of risk-conscious, greener alternatives for future spatial planners and designers [6,35,36].

To co-evolve their understanding of a socio-ecological issue [26], built environment designers could benefit from participation in live projects in the public sector during their education [29–31]. Specifically advocated for vocational education in architecture, live projects have been used as a successful way to bridge education and practice [37]. The real-world conditions of live projects foster experiential learning that could be deep and transformative [30,38,39]. The educational benefits include adapting to a fast-changing world [40], bridging the science-implementation gap [27] and improving participants' understanding of themselves and their professional aspirations [29,31]. However, planning and design guidelines do not manifest during experience; they must be inferred through questioning preconceptions and critical reflection on the consequences of action [30]. For this reason, live projects and experiential learning for designers have been criticized for diminishing creativity when a reflective process is absent [41,42]. Live projects can also hinder problem-solving abilities if insufficient guidance is given to participants [43], while the project and outcomes are harder to control and predict, entailing greater risks for educators [30].

The need for a more experimental approach through “learning-by-doing” has been newly emphasized by UGI designers [44,45] and the public planning sector [7]. This approach requires a willingness for risk taking [7], adapting to change, uncertainty, and ambiguity [45], exposing participants to diverse values and insights, and establishing environments where learning is directed at relevant and meaningful problems [29,31]. Adult learning consists of modifying, transforming, and integrating knowledge and skills [46]. For adults, experiential learning could foster transformative learning if learners are led to self-examination to become contextually aware [30,47]. This psycho-social approach to learning replaces technical content with personal transformation as the driver of learning [48]. Experiential learning entails experiences in the context of others and reflection [40], while transformative learning is a shift in consciousness in terms of beliefs and practices [49]. This dual process could lead to the development of much-required new roles, relationships, or actions [49] to transform the current way cities are planned and built.

This paper focuses on the combined quest of local municipalities and future professionals (students) to improve UGI planning and design. Design students at postgraduate level are trained to scrutinize value standards and explore creative solutions. As one possible, partial solution to institutional inertia, we bring together current and future professionals—with the support of academics—to explore creative solutions for UGI. We believe this can open the horizons of current municipal staff who are exposed to new ways of thinking and have access to creative alternatives. It can also equip students to deal with 21st-century systemic challenges, including those involved in navigating municipal bureaucracies. This paper responds to two research questions: Is there value for municipalities in a Global South context to involve postgraduate students in live projects for UGI design? To what degree does the specific learning environment created by the live project and its context stimulate transformative learning processes for the students (as future professionals)?

To answer these questions, we present a case study analysis of a collaborative live project in eThekweni, South Africa. The case study context presents many of the typical African and Global South UGI challenges, along with a municipal ambition to improve both the state of social livelihoods and ecological infrastructure. We then present the live project objectives, the student design project and the research design. We continue by conveying and discussing the findings and offering some reflections to assist future collaborative partnerships.

## 2. Method

### 2.1. Study Context and Challenges

South Africa's urban population of 66.4% in 2018 is projected to reach 79.8% by 2050 [2]. Most of the urbanization is taking place in the form of informal settlements where people are living in poverty and where basic facilities and services are missing [50]. Added to these are biodiversity hotspots [51] and projected climate change, manifesting as extremes

in temperature and flooding patterns [52]. The task of professionals and local government to manage trade-offs between social livelihoods and ecological infrastructure is complex. The legacy of former Apartheid planning still dominates urban areas in South Africa [18], manifesting as an unjust distribution of green assets across race and income [12]. Planned as dormitories, former “townships” still need mobility and green infrastructure to turn them into well-connected, healthy mixed-use neighborhoods [53]. Township areas under Apartheid planning had few developed green spaces, while vacant space operated as a barrier to planned racial and economic opportunity [53]. Open spaces are therefore often still perceived and experienced negatively by the communities in which they are situated, and green spaces do not feature greatly in academic, policy, and civil society discourse [54]. The lack of substantial change in the inefficient and inequitable spatial layout of cities is largely due to institutional inertia, economic forces and weak spatial management [55]. Municipal management responsibilities for UGI are not well coordinated, while development funding is scant [20]. Better integrated city-level decision-making, municipal leadership, and improved technical capabilities could lead to much-required change [55].

This situation persists, while the socio-economic importance that quality open spaces offer could be significant for surrounding developments and could be catalysts for economic development [4]. In addition to a great need for well-designed, multifunctional UGI [23], existing recreational green spaces are not meeting community needs [56]. Recent calls appeal to private planning professionals and authorities alike to address UGI injustices by promoting activities and representations of an urban nature that reflect residents’ world views through more inclusive planning and design processes [12,18,53].

#### Case Study: KwaMashu, Durban, eThekweni Municipality

The eThekweni Municipality, which encompasses the city of Durban, lies within the KwaZulu-Natal Coastal Belt vegetation type, with high rainfall (up to 1200 mm) and temperatures (mean maximum 32 °C and minimum 5 °C) [57]. Originally occupying subtropical forested areas, the vegetation today is affected by an intricate mosaic of sugar cane fields, timber plantations, and urban development, with interspersed secondary grasslands, thickets, and patches of coastal thornveld [57]. Durban was the first city in South Africa to apply a Metropolitan Open Space System (MOSS) approach in city planning [58]. Subsequently, the city has built a reputation as a leader in developing a climate adaptation strategy [59].

The eThekweni Municipality’s good reputation is based on a community and ecosystem-based adaptation (CEBA) approach [60]. The strong and early focus on adaptation sets the city apart from many other urban climate change initiatives globally [7]. In 2015, the Municipal Council approved the Durban Climate Change Strategy [7]. It aims to provide locally based solutions that not only reduce climate change vulnerability, but also address the socio-economic challenges faced by residents in developing green jobs and improving people’s livelihoods [60]. Consequently, several CEBA-focused projects have been initiated. These have followed a “learning-by-doing” model of development and implementation, and show a “willingness to experiment” [7].

Nonetheless, the eThekweni Municipality, similar to other local municipalities, has had to admit that current policy, law, governance, and environmental management efforts have been inadequate to prevent the degradation of the UGI [61]. The municipality is facing various challenges around open space.

These first entail the open space legacy of Apartheid. Second, the present-day poor management and maintenance of open spaces encourage crime, littering, and dumping. Third, detailed accurate spatial information on open spaces is hardly available, which leads to vacant spaces without ownership. Furthermore, there is a lack of assigned responsibility within departments to assess and address service delivery gaps, synchronize open space service delivery across departments, and develop and activate open spaces [55,62]. Despite



these challenges and shortfalls, dedicated individuals in the municipality remain solution driven and realize significant feats.

The Bridge City KwaMashu Open Space Project follows the CEBA approach and stresses the importance of UGI for sustainable township regeneration in the KwaMashu Urban Hub Regeneration Project, with the newly developed Bridge City in its heart. The project received significant funding from National Treasury with a grant that aims to stimulate private investment in former township areas [63]. The Open Space Project leverages the large built infrastructure projects related to the Bridge City development. The Open Space Project within the Regeneration Project aims to bring about social and environmental sustainability and resilience [60].

KwaMashu is one of the many township areas created during Apartheid through forced removals and the relocation of people [60]. The precinct faces several challenges, such as poverty and a high unemployment rate [60]. Moreover, it has been identified as a crime hotspot [60].

The KwaMashu Urban Hub Regeneration Project covers approximately 1500 ha with about 135,000 inhabitants (see Figure 1). The population size of the Regeneration Project is similar to urban centers in sub-Saharan Africa (less than 250,000) that accounts for 140.7 million urban dwellers [64], thereby providing scope for learning by other African urban centers of similar size and deprivation levels. The greater project area houses nearly one million inhabitants, which is almost a quarter of the greater eThekweni's marginalized resident population [65]. The Regeneration Project includes visions for a consolidated commercial node and enhanced public transport interchange zone, along with existing residential and industrial precincts [61]. Officially launched in 2007, the Bridge City development is still on its way. Key grey infrastructure, such as a train station, as well as a mall and a hospital, have been built and are meant to attract further investment.



**Figure 1.** An aerial photograph showing the Bridge City KwaMashu Open Space Project as a “regional park” that is located within the KwaMashu Urban Hub Project. Source: [61].

The Bridge City development is located on the ridge above the adjacent Piesang’s River valley within the historical Apartheid “buffer zone” [60]. Apartheid planning took advantage of the natural separation of areas through topography and riverine systems to enforce racial segregation. The name “Bridge City” was chosen to stress the concept of bridging this divide (see Figure 2).



**Figure 2.** View from the KwaMashu residential area towards the new Bridge City development taken across the Piesang's River flood plain. Only the train bridge crosses the vast wetland that has become an insurmountable barrier to pedestrians. Source: Gesellschaft für Zusammenarbeit (GIZ), 2018.

One of the challenges for the Bridge City development has been precisely the crossing of the Piesang's River flood plain [61]. Over a length of nearly 2 km, there is no pathway or pedestrian bridge over the Piesang's River to allow the population of old-town KwaMashu to safely cross the river and steep slopes to reach the facilities of Bridge City [65]. Additionally, part of the protected biodiversity of the Durban MOSS green space is in a state of neglect and is perceived to be a dangerous, no-go area (see Figure 3).



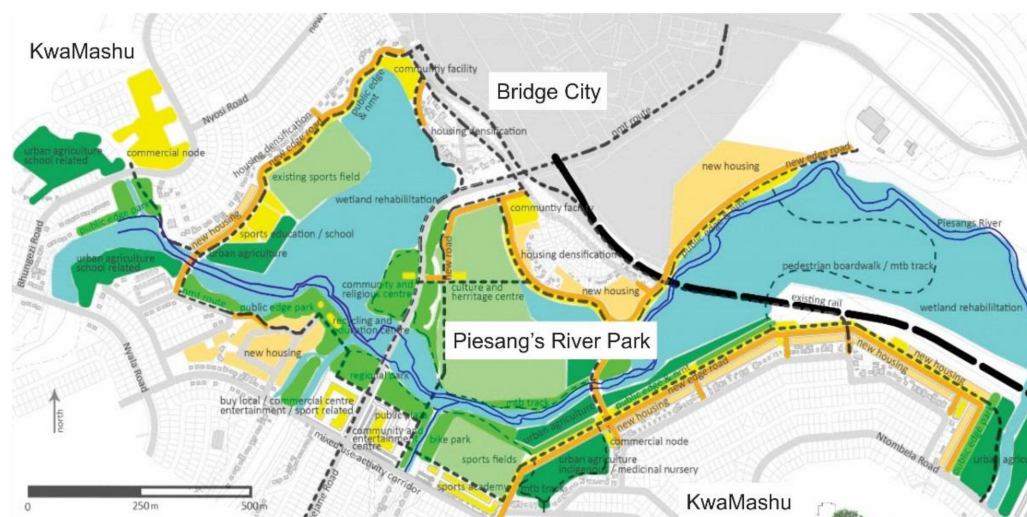
**Figure 3.** The Piesang's River flood plain, viewed from KwaMashu towards Bridge City. Urban agriculture can be seen in the foreground, with the cemetery in the middle left. Source: GIZ, 2018.

As in other sub-Saharan cities with urban expansion into flood-prone areas [3], the Piesang's River valley is one of the largest of a few remaining patches of open space in the KwaMashu area. Nearly the entire valley falls within the 100-year flood line [66], which needs to be respected in any design solution for recreational use. A delineation and assessment of the wetland found the flood plain wetland system to be critically modified



as a result of the transformation of catchment hydrology [66]. These impacts have resulted in major losses in ecosystem services, and riverine and wetland habitat. The majority of the flood plain currently comprises dryland alien thicket [66]. The flood plain's current potential is mainly the provision of regulating services of flood storage capacity, as well as enhanced downstream water quality, but it needs intervention [66]. As carbon offset, the open space has the potential to provide a range of additional ecosystem services if it is properly designed.

The Open Space Project aims to develop the Piesang's River valley into a major park, which needs to respond to regular flooding and has a reinstated and protected wetland in its center (see Figure 4). The rehabilitated wetland would improve the above-mentioned regulating services and add additional supporting services of habitat and increased biodiversity. New and sometimes conflicting uses are required. Cultural services include safe spaces for sports, rest and recreation for the surrounding communities, and infrastructure for pedestrians and cyclists, such as pathways and pedestrian bridges to reach Bridge City. The design would require intangible aspects such as respect for the cultural heritage (e.g., cemeteries) to retain the urban identity and foster a sense of place [67]. Provisioning services required include designated allotments for urban agriculture and food security. A Spatial Framework Plan (Figure 4) and subsequent spatial designs were developed to encourage sustainable and affordable non-motorized transport and support economic opportunities and green jobs.



**Figure 4.** The Spatial Framework Plan for the proposed Piesang's River Park. Pedestrian connections are essential for the functioning of the system. Source: [61].

To steer the planning process, the eThekweni Municipality set up an interdisciplinary team with members from various departments, assisted by private consultants. Significant experimental CEBA approaches were developed and tested within the planning process. This included a partnership with the Durban Green Corridor (DGC), a registered non-profit organization that aims to see communities thrive in balance with the habitats around them for execution [68]. It includes the development of plans and innovative concepts, such as a process of rethinking green space management in cooperation with the Sihlanzimvelo community-based stream management program. This program receives significant funding through the Cities Finance Facility (CFF) [69] and identifies various international alternative funding sources, such as the offset strategy [70], for the open space project. The team established one of the first Go! Durban bike parks.

An opportunity for collaboration between the University of Pretoria and the eThekweni Municipality on the conceptual design of the development of the Piesang's River Park was an additional way to bring a fresh perspective to the project's design.

## 2.2. Live Project Aim and Objectives

A case study analysis is presented on the pedagogical practice of a live project, which fits into the transformative pedagogy model [30]. The case study was selected because it is representative of the challenges of UGI design in the developing world. The research aim was to extract important insights on the value of collaborative real-life projects in transforming how young and established professionals deal with UGI design challenges.

Live projects characteristically engage external collaborators. Students leave the classroom for this engagement and produce something of value to these collaborators [30]. In 2018, at a national conference, the eThekweni Municipality presented the framework development of the Piesang's River Park in KwaMashu. Due to previous experience in engaging students in service learning and live projects, the university lecturer identified the Piesang's River as a potential learning site for engaging the fourth-year design studio in ecological design. In 2019, the Department of Architecture at the eThekweni Municipality and the Landscape Architecture program at the University of Pretoria agreed to collaborate on the conceptual design of the Piesang's River Park.

Typical of a live project, the remit of the project was worked out cooperatively [30] to gain joint benefit for the municipality and the University's students. In line with the two research questions stated in the introduction, the live project objectives were to expose students to a real-life project to comprehend the complexities of ecological design; to include municipal staff to provide guidance to the students to gain an understanding of the municipal agencies and processes; to obtain feedback from the students on the value of real-life projects for their learning and professional formation; and to receive report from the municipality on the benefits of the engagement for them.

### 2.2.1. Live Project Activities

As part of an existing design studio course, students could elect to form part of the eThekweni ecological design studio. As a design project, they had to choose one of six earmarked areas within the Piesang's River Park framework on which to focus (see Figure 5). In line with a typical live project development [30], two municipal staff members actively engaged with the lecturer in writing the student brief. The student brief identified key considerations for the Piesang's River Park based on the Open Space Framework (described above). Each site came with a brief explanation of the "design program" or intended uses and amenities to include.



**Figure 5.** The Piesang's River flood plain area, indicating the six sites for the students' design projects. Source: Author, 2019.



The municipal leaders for the project and the University's landscape design studio staff managed the students' design stimulus activities and provided continuous guidance. Experiential learning requires action and reflection, which can be stimulated through participation in activities, dialogue and written feedback [40]. To open up the likelihood of transformative learning experiences for students, the lecturer purposefully allowed the project to embrace aspects of risk by introducing the unexpected, spontaneous and unknown [71]. These elements were enhanced by traveling to an unfamiliar context. With funding from the University, the students were able to visit eThekweni and KwaMashu—an 800 km drive from Pretoria—for a six-day field trip. The first day and the evenings were for socializing and reconnaissance. The coastal subtropical environment, along with the urban social setting, offered an exciting prospect of new experiences for the students.

To assist students to identify key design factors to respond to, the eThekweni Municipality arranged a five-day technical workshop. On the first day, several consultants and municipal staff presented environmental and demographic information that gave direction to the framework they had developed. For example, the main routes and transport networks were explained and how people typically commute to work opportunities. The assessment of the ecological state of the wetlands was presented, as well as proposals for its phased rehabilitation. This information, including digital aerial photographs and specialist reports from consultants, was made available to the students for their use.

As part of the workshop, two site visits to the Piesang's River and KwaMashu (see Figure 6), on-site engagement with the residents under the guidance of the municipal team (see Figure 7) and guided visits to two examples of best-practice urban parks in Durban were conducted. Private and public consultants explained the challenges of each example to the students and discussed the design decisions they had selected to respond to them and how successful or unsuccessful these decisions were. Students could then physically inspect the project and take note of how activities and amenities were grouped and what materials and construction details were used. The students spent the last two days working on conceptual design ideas and presented these to the municipal staff for initial feedback.



**Figure 6.** Meaningful field trip activities, such as site and case study visits, arranged by the municipal staff for the students during their visit to eThekweni. Source: Author, 2019.



**Figure 7.** Workshop activities and discussions between the community, municipal staff, and students during the student visit to eThekweni (top) and back in Pretoria (bottom). Source: Author, 2019.

The Department of Architecture at the University of Pretoria operates within a studio-based design learning paradigm where critical discussions are used to point out the strengths and weaknesses in the students' work. Precedent studies are also used as a way to find possible solutions that must then be adjusted to the local social and environmental context. On return to Pretoria, the responsible lecturers gave weekly critique to the students on their design progress. Midway through the design process, staff from eThekweni came to Pretoria to provide their input to the students' design developments (see Figure 7).

Being more aware of local contextual realities and municipal processes and frameworks, the municipal feedback—representing the client—would focus on different aspects to that of the lecturers. The two municipal staff members were also present during the project's final examination (see Figure 8). They selected and awarded the project that was most responsive to their expectations. All the final projects were made available to the municipality digitally for their use and further development. Extracts from two of the final design projects can be seen in Figure 9.

### 2.2.2. Research Design

The authors made use of a participatory action research approach during the live project. Action research involves the investigation of complex, real-world questions, and makes use of cycles of action followed by critical reflection. It typically uses qualitative data and focuses on clarification for specific situations [72]. Action research allows for participant observation [73], involving post-action discussions and critical reflection between the authors. Together with the written feedback questionnaires, these methods allowed for triangulation.

The ten postgraduate architecture and landscape architecture students that formed part of the studio volunteered to participate in anonymous feedback questionnaires. The sample was representative of students from different cultural backgrounds, and the gender divide was equal. The two staff members involved in the studio from eThekweni were also asked for their feedback on the benefit of the intervention to the municipality. The lecturer used anonymous questionnaires to reduce the potential influence of personal contact on the responses provided. The students' written feedback is a method to stimulate the reflective processes required in design thinking [30,74].





**Figure 8.** Students, questioned by external examiners, defend their design proposals on the Piesang's River Park in the presence of the lecturer and municipal staff during the final examination for the quarter-year project. Source: Author, 2019.



**Figure 9.** A collage with selected design work from the students that was shared with the eThekweni Municipality. The top left and middle images feature a linking market space on a steep slope to Bridge City. The top right and bottom images feature a pedestrian bridge crossing the Piesang's River with recreational lookout points. Source: University of Pretoria, Department of Architecture, 2019.



Students completed questionnaires manually on four occasions during the seven-week project period. The students were prompted with open-ended statements they had to complete in their own words to reflect on their experiences. The survey questions inquired broadly about the physical environment, social engagement, and the students' learning process. Working within a psycho-socialist school of thought, the questionnaire sought to identify extrarational sources that are more intuitively or emotionally based [48]. Therefore, specific prompts were included to identify memorable aspects, challenges, emotions experienced, and any changes in perspectives that would indicate areas of transformative learning [47,75]. However, the research was undertaken inductively to develop understanding rather than test existing theory. The initial questions are outlined in Table 1. The questionnaires were adjusted slightly throughout the seven weeks to stay in tune with the design process and types of activities, for example, leaving out the initial three questions about the reasons for choosing the studio and asking about the field trip or the studio engagement activities more specifically.

**Table 1.** Guiding questions contained in the research questionnaires to the students.

Tick the applicable option:
1. This studio is my first choice.
2. I had to take this discipline-specific studio.
If you chose this studio, please explain why:
Please complete the following statements (if they apply to you):
1. What made a great impact on me in this project (so far) was ...
2. What I really enjoyed/liked was ...
3. I really disliked the fact that ...
4. What I found memorable about the week was ...
5. (Cross out what does not apply): Something that surprised/angered/excited me was ...
6. The following experience(s) influenced my learning process in the following way ...
7. I feel/I don't feel ... that I now think differently about things (because ... )

Source: Author, 2019.

An open-ended questionnaire, inquiring about the benefits derived from the student engagement, was sent to the participating municipal staff at the end of the project. With a low response rate, the municipal feedback was mainly collated through the participant observation of the relevant author. This entailed the observation of all project activities and discussions with the municipal team members [75]. However, the limited direct feedback from municipal staff members is a limitation of the study that would require further research to substantiate the findings.

The 40 questionnaire answers from the students were transcribed and qualitatively analyzed and coded with Atlas TI (Version 7) software [76], using the interview question themes as initial deductive coding categories [77]. The codes were grouped into six families: reason for selection of the studio, learning/learning experience, memorable aspects, challenges, emotional experiences, and transformation/change. In line with the transformative pedagogy within which the questionnaire was conceived, the analysis focused on identifying extrarational sources and personal attributes [48] rather than technical competencies in learning. Saliency regarding the number of times themes were articulated in the total body of the data was recorded [78]. This included the repeated articulation of themes in response to different questions by the same person on the same feedback form. The saliency is indicated in brackets in the findings as a reference.

The ten students involved in the case study had a fair representation of culture and gender. The sample size is comparable to similar studies, such as a study [30] that involved 15 students per case study, interviewed as three focus groups (not individually), giving a total of 30 participants and six focus group interviews. In our study, the questioning of the same participants throughout the four different phases of the studio project provided four responses per person. The inquiry resulted in rich personal descriptions, which are considered a valuable basis from which to draw findings concerned with deep learning. In

line with the psycho-socialist school of thought, qualitative research is mainly concerned with the quality and depth of the feedback received [76]. Similar to Sara [30], our study included evaluative feedback from those managing the project in the dataset, and made use of educational literature to further interpret and contextualize the findings.

### 3. Findings

#### 3.1. UGI Design Project Outcomes and Municipal Benefits

In response to the first research question, we present a summary of the observations and discussions with the author as part of the municipal team. The benefits from the engagement were evident in two areas: the planning and design process, and the design work outcomes.

##### 3.1.1. Critical Evaluation of the Planning and Design Process

###### Reviewing, Questioning and Adapting Municipal Ideas and Solutions

Within the eThekweni Municipality, the collaboration with the University of Pretoria was done as part of the municipal project evaluation process. The municipal project team used the five-day technical workshop with the students to reflect on the work process and the results achieved after a four-year planning period. Working in an interdisciplinary team representing roughly 10 different line departments within eThekweni Municipality meant rotating staff, and dealing with conflicting interests, and posed interpersonal and logistical challenges. Under these circumstances, the technical workshop allowed the members of the steering committee to reflect together on the project status. It also allowed the interdisciplinary team to focus on and rethink the approach taken thus far, and to explain and review the project scope and outcomes.

Following an experimental approach, the municipal team of professionals needed to be prepared to think beyond the conventional, consider unexpected problems, and constantly evaluate and adjust their actions. There is no international best practice to duplicate. Specific local community-driven answers needed to be developed within the specific neighborhood. The municipal team showed an eagerness to share their “on-the-ground experience”. At the same time, they were challenged by the students’ honest critical questions. By sharing, they assisted the students to understand the various challenges experienced in the real-life eThekweni environment. As mentioned by the staff, “the students were able to provide some strong design solutions for the nodes and came up with fresh ideas”.

###### Creativity, Experimentation and Inspirational Ideas and Solutions from the Students

Students are typically free to experiment and are slightly naïve. They lack the firm inhibitions and value biases that are often found in long-standing professionals and can therefore bring creative and inspiring ideas to the planning process. The feedback from the municipal staff was that “it is important for departments to be open to innovation and academic views”. This comment indicates a desire to embrace theoretical, conceptual, and more speculative thinking. The students’ presentations provoked an in-depth discussion among the different departments. Based on the students’ design results, conflicting views were expressed and deliberated in a solution-driven way. The profound discussion about the design challenges that the students faced helped reveal weaknesses in the Piesang’s River Park’s aims and ambitions, and forced the team to consider alternatives.

##### 3.1.2. Macro-Level Design Outcomes

At the time of the student engagement, the planning process for the Piesang’s River Park was still on a generic framework planning level. For most of the sites, the students’ design work was the first exploratory design to be undertaken and captured in drawings. Based on the Piesang’s River framework, the students’ proposals included functional UGI aspects, such as agroecology and wetland rehabilitation, while also creating opportunities for social interaction and economic activities. Other students provided the necessary infras-

structure associated with the UGI such as recycling centers, pedestrian bridges, and markets with day care facilities. The students were ambitious to include various considerations of user comfort and wellbeing into the functional programs they were provided with, along with sustainable design initiatives. For example, the residents' social and physical connection to the river environment and views towards it were exploited in the river boardwalks and recreation areas. The proposals allowed for nature experiences and didactical aspects, along with sustainable practices such as stormwater capture for infiltration or re-use.

The project team was impressed with the students' well-reasoned "strong design solutions". Creative and innovative thinking resulted in "fresh ideas", which is a key component of a successful experimental CEBA-focused approach. The students' design proposals were more conceptual, speculative, and risky than the typical proposals received from consultants that were well versed with practical constraints, such as cost, durability, and maintenance. Although the students' proposals lacked technical refinement, they presented conceptual ideas that went beyond mere problem solving. They combined various social and ecological design functions with the creation of places for social encounters and environmental experiences that were not impossible to execute. In that way, the proposals challenged the status quo in both process and outcomes—which are very necessary steps in transforming the current state of the built environment.

The University's collaboration process was included in the intermediate project report. All design work delivered by the students was incorporated into the status quo project sheets. The students' work will serve the practical role of stimulating the design scope beyond the conventional when it is included in the municipality's future design briefs. Professional consultants will develop these conceptual design proposals when funding becomes available for implementation. The feedback received recommended packaging the students' work in A4 booklets, rather than physical pin-up or digital presentations, to make it more accessible for future use.

### 3.2. *Students' Transformative Learning Ascribed to the Specific Learning Environment*

In response to the second research question, we identify the transformative learning that could be ascribed to the specific learning environment created by the live project, as well as the context for the students, with saliency indicated in brackets. In line with the research design, we gave preference to the findings that were more intuitive or emotionally based.

#### 3.2.1. Learning Environment and Context

There is ample evidence that the environment created by the project stimulated the students' learning. The project's real-life nature (33) was mentioned most frequently by students, as illustrated by this response: "dealing with a real-life scenario hindered my creative process a lot [ . . . ] because the real constraints actually pushed me to new ways of thinking creatively".

Other aspects mentioned that influenced learning were the new/different context (19), the interdisciplinary nature of the studio (18), social engagements (14), and combined environmental and social engagements (14). Specific activities mostly referred to social engagement and people-aided learning, such as the feedback from the municipality (13), engagement with the community (12), the examples given by the municipality (12), the lecturer (10), theoretical work reviewed (9) and the "expert" consultants involved (9). Examples of specific references to the environment are: "going to site and experiencing real-life issues practically," and social aspects such as thinking differently about "community engagement because . . . it is the core of design and should always be a priority."

The real-life project specifically impacted on design thinking: "I need to link my solutions more closely to reality and community" and "It helped me understand aspects of the design better than I could really grasp before."



### 3.2.2. Memorable Aspects of the Project Environment and Learning

The students were specifically questioned about what they found to be memorable. In their responses, they most recurrently mentioned social interactions (19), for example: What I find memorable/meaningful in terms of my learning: “The contact with potential users of the space helped me better understand who I would be designing for.”

Other aspects that were mentioned were the context (7), elements of the environment (5), and a combination of social and environmental engagement (4). The students mentioned memorable aspects of their learning as their own skills development (3) and thought development (3). Thought development is indicative of transformative learning.

### 3.2.3. Emotional Experiences that Shaped the Learning Environment

The students were prompted to express the emotions they experienced and the reasons for these emotions. The most frequently mentioned emotions were degree of uncertainty (13), as illustrated by the response to the question: How did you experience the site visits? “I was nervous to go into the wetland, but I never felt unsafe or in danger.”

The second-most frequently mentioned emotion was personal passion (5). Students also expressed empathy towards the social/human condition (4) of others, as well as feeling challenged (3). There were also expressions of feeling enabled, having fun or being inspired (3). Emotions was also indicated as part of social experiences.

### 3.2.4. Perception of Inner Change or Transformative Learning

Students were asked whether they felt or thought differently about anything. The response was most recurrently that their basis for design decisions (13) had changed, as expressed by the response to the question: I feel that I think differently about: “Material choices in design projects because . . . there are so many other factors that can be considered in the choice of materials other than aesthetics.”

They also expressed changed thoughts on the role of the profession (10) and the design process (6). Some confirmed the importance of aspects of prior learning (5), the importance of an interdisciplinary approach to design (4) and exposure to new things (4).

Examples of reported change in students’ thinking are in response to the question: I now think differently about things because: “I can understand that we have a role to play in making tangible differences to people’s lives as opposed to existing in an ‘ethereal artistic, unattainable’ realm”; I now think differently about design because: “Architecture does not necessarily have to be glamorous and flashy. Simple, practical architecture impacts real people’s lives more, especially in the township context.”

### 3.3. Other Dimensions and Challenges of the Student Learning

The data were analyzed for *what* students reported they had learned. This included how to focus design (7), the importance of ecology (6), new design approaches (5), and the role of the professional (4). The experience thus seems to have made students think specifically about design and their professional role, as expressed in this response: “Architecture is not building/a physical building—it’s about space and people and the environment and how this all comes together.”

The students indicated several reasons for their selection of the studio: the environmental focus (5) and the fact that the studio was different from previous studios (3), as expressed in the response: “I don’t know anything or much about ecology and I think it’s a necessary field to study within the context of architecture, given the upheaval that our craft tends to cause in the natural environment.” The unfamiliar context was an important reason why students selected the studio. The new context was strongly articulated as part of the learning experience and was the second-most memorable aspect expressed. The context was often responsible for students’ emotional experiences, such as uncertainty, challenges, fun, and excitement. The students also expressed exposure to a new context as a reason for changes in the way they thought and felt, as can be seen in the response to the question: What I really enjoyed/liked: “Experiencing a different context, which opened my

eyes and perspective. We went to various sites to understand the overall context”; What I found memorable was: “Community interaction and a new context experience. New thinking processes came about.”

The students were asked to express “challenges” they experienced. Among these, time constraints (22) featured greatly, which is not uncommon for design studios. A student revealed how time limitations had perceived effects on their learning: “The speed of the quarter made for fast learning processes . . . this was both good and bad. Retention may not be great, but design decisions were made quickly.” Another recurring “challenge” expressed was uncertainty (13) at different moments of the process. Some of this was due to the different expectations (4) they perceived from role players, as stated in the response: “There was confusion between what is expected of us by the eThekweni Municipality and our academic outcomes.” Students felt challenged in retrospect because the community engagement (9) and site engagement (4) they had during the six-day visit to Durban was not enough, as expressed in the response: “The community interaction was great, but I feel that we needed to have much more interaction and representation from them.”

#### 4. Discussion

##### 4.1. *Improving Local UGI Planning and Design*

The eThekweni Municipality follows an experimental CEBA approach in UGI planning [60]. This approach encourages the municipality to develop specific solutions within the local context. Although not everyone has bought into this approach, a culture has been created to think creatively and critically reflect on the outcomes during the entire planning process. In this context, university engagement resulted in being a valuable tool, since it assisted the municipality with the above ambitions that are part of the institutional culture. Not all local municipalities have a culture to work experimentally or creatively. We speculate that these municipalities might benefit more from student engagement, but the real impact and perceived value of engaging students might be lower. Roux et al. [28] warn that, in the public sector, successful collaboration is often hampered by prejudices or established beliefs, capacity limitations, and an inability to traverse power inequalities among those involved. We concur with former studies that there should be appropriate incentives for the different partners involved in collaborations [79]. It is further important to be cognizant of how the objectives of public sector partners differ from those of academics and to make sure that the student work is provided in a useful format.

Roux et al. [28] have indicated that an active agent should be embedded within an institution that has a primary interest in implementing the desired change. Our experience confirms that having active champions in both the university and the municipality that had similar ambitions determined the short-term operationalization of the learning ideals pursued in the collaborative project. Since the collaborating author left the eThekweni municipality three months after the completion of the student design studio, it was not possible to verify the long-term impact of the collaboration on the municipal processes or the Piesang’s River project as such. The duration, timing, and continuation potential of the project limited the findings, confirming research lessons by Roux et al. [28] on successful systemic change. Longer-term monitoring is required to gain a more detailed understanding of the municipal processes and potential uptake of ideas as a result of student collaboration.

Cilliers [36] advocates that, in South Africa and Africa, UGI must be considered as an integral spatial issue. This compels public spaces to be designed to reflect context-specific needs and challenges in long-term planning strategies for the improved provision of UGI [36]. Our findings confirmed that, during the collaboration process, the students’ difficulties with some of the site planning, conflicting instructions from different stakeholders and community interests revealed profound design challenges brought about by the proposed municipal framework. The municipal team understood the complexities of UGI design better, but is conditioned by simple solutions. Roux et al. [28], warn that the attraction of simple solutions often retains the status quo. This pitfall needs to be consciously

avoided. The live project process and students' attitudes created a fertile environment for seeking solutions that went beyond the status quo. We concur with Roux et al. [28] that students are good bridging agents because they are truly interested and candid, while being perceived as neutral. Not all the design challenges could be fully resolved during the live project, but it is important to note that many questions and trade-offs were grappled with, which led to changes in how students and municipal staff discern the desired solutions to these design problems. The design proposals that attempted alternative UGI outcomes could serve as a good foundation and inspiration for the future detailed design of the selected sites. If and how the municipality will take these ideas forward was not verified as part of the research.

#### *4.2. The Role of Real-Life Projects in Design Teaching*

Although the students performed well in the studio, it could not be said that they reached above-average technical design outcomes. The complexity of the design problems they were faced with was high. Our experience has indicated the multidisciplinary nature of UGI design solutions that would greatly benefit from insights from stormwater engineering and urban design students or professionals, among others, in future studios. That being said, technically refined design resolution was not the main goal of the project, but rather responses that reflect deeper-seated value changes through confrontation with the diverse social and environmental challenges that form part of the complex system of design in the Global South. Cockburn et al. [27] point out that one of the reasons for the science-action gap in sustainability challenges is that technical knowledge management solutions receive far more attention than social learning-based approaches. The same has been argued in education, especially with regard to vocational professions that are focused on competencies. Newton [48] argues that, more than providing a set of required competencies, education should seek to create graduates who are mindful, able to deal with change and are socially responsible. A focus on knowledge transfer requires a process that differs from gaining the capacity to deal with adaptive challenges [48].

Dewey [80] emphasized the importance of the learning environment in encouraging and directing specific learning to take place. As can be seen from the findings, the "real-life" aspect of the project was by far the most articulated as part of the perceived changes in the learning process. This illustrates the stimulus of such an environment for transformative learning. The dynamic live project learning environment was responsible for the memorable aspects, challenges and emotional experiences mentioned. Emotions often reveal an underlying process of transformation [42].

Our findings indicate that the primary way in which the real-life project stimulated transformative learning was through social dynamics. The interactions included a diversity of new role players with a real-life interest in the project that, at times, resulted in conflicting feedback and ideas. For the students, this came in the form of confrontation between the academic outcomes of the design brief, the needs of the community, the municipality's functional requirements and budget constraints. Sara [30], in her findings, indicates how the contact with a real client and the perceived value the client has for the work become a strong motivation for students. This coincides with our findings, where the students expressed time limits for meeting the municipality's requirements and fully understanding the needs of the community as project challenges. The pressure they felt is indicative of their inner motivation to meet the client's expectations. Sara [30] points out that the challenges students raise around communication, negotiation, and empathy are positive indications of the development of valuable skills for professionals. Designers need to make value judgments and learn to respond sensitively and sensibly to the diversity of values that exist in the design profession, in society and between them [28,29]. We found that the social dynamics assisted students to become more socially aware and make more sensitive (and by implication sensible) value judgements.

Historic examples will continue to influence expectations about well-functioning and orderly cities, while students are enticed by aspirational (technologically advanced) exam-



ples of acontextual “smart” and eco-cities [14]. These historic and futuristic ideals are hard to reconcile with the on-the-ground realities in a Global South context, to which students are exposed in a real-life project experience. For example, students were confronted with the poor, homeless persons, and potential migrants and drug users. This is considered “problematic”. Historic and futuristic utopias formulate ideas of “appropriate public and proper behavior” in the interest of order and safety, which indirectly exclude people based on income, gender, age, ethnicity, and religion [81]. In South Africa, the desire for safety and order still conflicts with the ideals of accessibility and inclusion [81]. This paradox compels students to exercise greater social empathy, while actively considering local value and public safety in design solutions. In so doing, they define and translate green infrastructure in the local context [36]. Although limited community engagement was possible, the students still became aware that values should be captured and linked to beneficiaries, comprising both the community and the authorities [36]. This experience would make them cognizant of the importance of perception factors that are instrumental in the optimization and implementation of UGI in Africa [36].

The second way in which the real-life project stimulated learning was through emotions: creating a balance between the excitement and enthusiasm of the students, and uncertainty, the pressure of time constraints and the variety of contrasting expectations. Our findings confirm that of Sara’s [30], who found that students were motivated and experienced the live project as exciting. As mentioned, the higher levels of motivation were strongly linked to the involvement of real clients and the perceived relevance of the work. In addition, our findings emphasize the value of open choices, and how students’ own passion and identity were associated with these choices (to elect the studio and a specific site within the Piesang’s River Framework), creating meaning for them during the learning process. This aligns with educational literature, which indicates that free choice connects learners to their sense of self [46]. This intrinsic motivation could lead to superior learning achievements [82].

Issues of time constraints, also mentioned by Sara [30], are typical of design projects at university or in practice, compelling learners to make swifter decisions about design trade-offs based on the information they have at hand. Sara [30] found that the students became better at self-organization during live projects due to their motivation to take greater ownership. The perceived pressure resulted in them gathering the required information more quickly in order to take the necessary design decisions. Although time constraints were a challenge, our findings do not contain evidence of students’ improved self-organization.

In our findings, the students mentioned uncertainty numerous times during the learning experience. Ironically, this uncertainty was often created by the same ingredient that created motivation—the involvement of the client and the unfamiliar context. Tracey and Hutchinson [74] reason that uncertainty plays an important role in the design process. How designers experience states of uncertainty could be different, yet often lead to emotional experiences [74], which aid deeper transformative learning [47].

In sum, an interplay between the familiar and the unknown was created by ownership matched with a novel physical context and aspects of uncertainty. From this we propose that it is important to consider this balance as a factor that creates a “supportive yet charged learning environment” [49]. Based on our findings, we argue that these conditions also make the project more memorable, with the probability of longer-term transformation in students.

#### *4.3. Professional Relevance of Self-Reported Transformation*

The learning-by-doing educational approach has an implicit emphasis on informal learning [41], while transformative learning focuses on personal attributes [48]. From our findings, five areas were identified in which learning transformation occurred: the premises for design decisions, the role of the profession, confirmation of prior learning aspects, the design process, and interdisciplinary importance. Below, we consider their relevance

for 21st-century designers who must develop the skills of integrated decision-making, leadership, and technical capabilities.

Students reported both thought and skill development in their feedback, which are important for professional development and making design decisions. From the municipal feedback, there is also evidence that the student engagement triggered new ways for the staff to think about design solutions. Design is about problem-solving [29,31]. A designer's main task in complex systems is to weigh up the many possible ways a space can function and balance social, environmental, and economic benefits with cognizance and transparency of the trade-offs [83]. What constitutes a fair trade-off is a value judgment, based on personal and professional formation, but also influenced by contextual factors [84]. Our findings concur with Jabeen et al. [29] that the real-life confrontation with a variety of values and insights allowed students to reflect and make decisions about their professional values, reflecting greater empathy. For the municipal staff, the confrontation rather purposefully challenged the status quo and prevented defaulting on design solutions that are too simple.

Professional roles and responsibilities have constantly been redefined as social values have changed over the last century [85]. Levels of global warming, poverty, biodiversity loss, and other detrimental consequences of human action compel the moral improvisation of knowledge for improved design choices [33]. Students need to be confronted during their education to help them discern the choices of what kind of a professional they would like to become [29,31]. Many professionals, while operating within ethical boundaries, do not desire to change the status quo that provides them with a living. Built environment professionals who are not confronted with the shortfalls of current planning systems and urban realities will not be inclined or enabled to create a different future with alternative UGI solutions. Professionals must not only learn to respect other disciplines and the knowledge of unschooled community members, but must willfully desire to break out of silos to make relevant systemic connections and thereby create alternative futures. Our research findings show that a real-life project confrontation in a challenging environment could assist with such a decision about the role an individual decides to play. Newton [48] argues that, when students undergo such transformational change, it provides them with essential tools to become effective agents of change.

The aim of the real-life project is also to experiment and test the application of theoretical concepts [38]. Similar to findings by Sara [30], students reported testing what they had learned before by applying previous skills in a real-world setting. The reflection needed for this process to be internalized was aided by the feedback questionnaires [74]. The contextual complexities [9] and the learning environment [29,31] challenged students' conventional ways of doing ("hindered the creative process"). Students consequently adapted their design process and learned to become more flexible in how they apply theory.

The complexity of urban problems and the shortcomings of solutions that aim to deal with these problems in isolation have led to greater emphasis on interdisciplinary and even transdisciplinary engagement in research, design, and planning [86]. Multiple perspectives can more comprehensively document the context and significance of UGI to respond more directly to social wellbeing [36], while providing solutions that are more sustainable and resilient to local conditions. Our findings correspond to those of Sara's [30], indicating learning across disciplines. The architecture students specifically reported a greater appreciation of landscape architecture skills. The proficiency to work across disciplines is an essential skill for future professionals to improve design solutions [9]. Technical know-how of stormwater engineers or community insight from social anthropologists would have further assisted the students on the project to build competencies across disciplines.

Interdisciplinary engagements come with challenges. Students paired in groups of two across architecture and landscape architecture disciplines did not all work in synergy. Only one student group was successful with integrated decision-making across their disciplines, coincidentally receiving the award for the best studio project. At least two other groups experienced intense conflict in making joint decisions they were unable to resolve, leading to poorer design outcomes. It is important to acknowledge that designers notoriously

have strong egos, while individual creative conceptions are still highly valued within their disciplinary formation. This emphasizes the importance of the educational changes required, as advised by several authors [6,9,36,48]. The young professionals learned that all the solutions do not lie in one profession or one approach, but in different ways of knowing, which includes the knowhow of the community.

## 5. Conclusions

Collaboration between universities and local municipalities could improve UGI planning and design as far as it confronts preconceived ideas and acontextual applications with on-the-ground realities and conceptualizes alternative design processes and proposals. Collaborators can benefit from an experimental learning-by-doing approach to improve contextual, procedural, systemic, and transformative learning that could start altering conventional and institutionalized ways of approaching UGI challenges and cultivate innovative ideas for balancing trade-offs.

Our study has confirmed previous findings and elaborated on them in the following ways. We found that, for the municipal staff, the live project process and student attitudes and ideas created a setting for seeking solutions that went beyond the status quo. Familiar questions and trade-offs were reconsidered, with changes in how students and municipal staff formulated their ideas of “ideal” solutions to UGI design problems.

Live projects provided the exposure of young (and potentially adult) professionals to greater social dynamics, which developed their ability to more sensitive and sensible value judgements. Live projects created an interplay between the familiar and the uncertain, which is a fertile environment for transformative learning. This environment can be conceived by open choice and ownership, matched with a novel and/or challenging physical context. Transformative learning for designers through live projects was associated with greater social empathy in design decision, influencing choices about the role a young professional decides to play, creating greater design process flexibility and learning, and the acknowledgement of skills across disciplines.

Although collaboration and live projects cannot solve all the challenges of UGI in Global South countries, they do pose one possible way of transforming the people involved, the current processes followed and the outcomes pursued. When combined, these aspects hold promise for the radical shifts required to reimagine and create a more just and sustainable built environment. Our case study focused specifically on challenges for UGI in a Global South context, making the findings more applicable to these settings. However, we believe the findings remain equally valuable to all countries that aim to improve their ability to live inside planetary boundaries. Social empathy, self-activation, flexibility, and interdisciplinarity are valuable qualities for designers, regardless of their socio-ecological context.

Our study particularly had limitations in terms of the spectrum and depth of the feedback received from municipal staff. To gain a better understanding of the real uptake of ideas by municipalities and changes over time, a longer-term and more in-depth feedback process with a greater representation of built environment disciplines needs to be undertaken in future studies. Based on our experience, we offer some suggestions as guidance for future work.

Collaborative projects render benefits for those engaged in them through time spent either engaging with the site and local community or critically reflecting on and debating about fresh solutions to the status quo. Incentives for the academics and municipal staff must be aligned with the shared outcomes and deliverables expected from team members in the collaborative process. For example, educational outputs by students, if provided in the right format, could be taken further by the municipal staff or academic researchers involved to develop as institutional outputs.

Site visits are critical to assist in the comprehension of activities, users and environmental qualities that are present over time. Since there is mostly no guarantee that student projects will be implemented, caution should be exercised in creating expectations in the

community, while transparently communicating the potential lack of tangible outcomes through key figures and existing social structures.

A remote context seems to intensify student learning. Initial site visit experiences are very acute, but a remote context and its users become progressively more abstract as time passes. If there is not enough time and funding for site visits and community consultation, this could potentially counteract the objective of live projects to confront students with the realities on the ground.

Although feedback from different role players is an important part of the experiential learning process, adequate guidance of students is also critical. Incorporating a wider pool of disciplines in projects could be logistically challenging, but could broaden the learning experience and quality of the design proposals. Existing or additional coursework and lectures should be provided in the studio to explain new interdisciplinary concepts and provide guidance to students in terms of existing knowledge on these subjects.

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