Challenges and opportunities for visual learning spaces for fieldwork in Urban Planning: lesson from Bhopal and Trondheim

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ABSTRACT:

Via the strategic funding received from the Architecture and Design faculty, a project to explore the role of visual and digitalization tools in fieldwork-based learning experiences was set up, bringing together researchers, students and teachers from both the urban ecological planning and design as well immersive technologies research. While the use of visual methods within the participatory approach have been ongoing since the start of the UEP fieldwork in 1999, recent technologic developments have provided innovative opportunities for citizen engagement, ranging from mobile ethnography, app- and web-based data collection, geospatial data-collection and use of video and moving image to immersive technologies and the use gaming to build prototypes. In this paper, we explore how visualization and digitalization can facilitate this learning process as well as the challenges and opportunities related to it.

1. Introduction

In this essay, we present and discussion the project *Visual Learning Spaces for Fieldwork in Urban Planning* (VLF-BY). VLF-BY was a collaboration between students, researchers and teachers at NTNUs VR lab, the study program Urban Ecological Planning, Smart Cities and Communities and the Department of Design. While user-centered visualization has been driven need-based in previous fieldworks, teachers and students at the immersive technologies lab have expressed the will to explore real-life implementation possibilities of the technologies. Through this project, researchers, teachers and students have together explored digital and analogue visualization in fieldwork-based teaching and ways to integrate this in the future classroom.

Urban Ecological Planning offers a unique international master program which core strength is intensive, educational fieldwork in urban informal areas of the global south. By fieldwork we mean here project-based learning that takes place in the context where the real problem is located, and where the problem owners, in this case the citizens, are. Field work typically entails a large degree of tacit knowledge, that students develop through one-to-one tutoring combined with experience and problem solving in groups. Students at the Department of Design also work through participatory design and human centered problem solving in the field both in Norway and in Nepal. Basic learning in fieldwork at NTNU is today not sufficiently discussed and documented, so that its learning potential can be maximized both during and after the field work, among and beyond the participants of the fieldwork. Also, students out-of-field have the need to be better connected with each other and to learn about what the students in-field are learning, reflecting on and observing. Visualization, using video, photo and new digital technologies can enhance the fieldwork learning, as it can offer new perspectives. Visual methods such as video in design, visual anthropology, mobile ethnography and video documentation, and use of video in design, architecture and urban planning are well known approaches.

In VLF-BY we have discussed and brought together researchers, students, teachers and practitioners of design and photo, to discuss whether drawing, modelling, video, and new technologies such as VR, AR and ER, can benefit fieldwork-based learning.

In this paper we use the documentation from the discussions during these workshops to ask whether visualization, including everything from drawing to the immersive technologies VR, AR and ER, can play a role in the future fieldwork-based learning. We present the findings from the three VLF-BY workshops, analyzing the 2017 and 2018 fieldworks and discussing challenges and opportunities related to the combination of conventional participation methods and new technologies. Can video and VR bridge the 'gap' between field and classroom, and can it enhance theoretical discourses on fieldwork methods, teaching, learning and reflection? Can drawing and visual storytelling bridge the 'gap' between academic exercises and urban reality, allowing students to engage better with citizens and the 'real world'? We present the frames developed in collaboration with the participants, for how the value of stationary and mobile visualization techniques can be introduced to enhance the UEP study program. Visual tools not only enhance learning and reflection abilities, but also open up to new research questions and teaching methods.

2. Background

2.1 Fieldwork based learning

Active learning has developed as an educational theory believing that students absorb knowledge actively, in contrast to the hydraulic model where a teacher can pour its own knowledge into the heads of their students. The 'student active learning model' in Norway assumes students learn best by taking an active role in the learning experience, in line with the idea of Herbert Simon that *Learning takes place in the minds of students and nowhere else, and the effectiveness of teachers lies in what they can induce students to do [1].* This idea transforms educators into facilitators of the independent thinking and learning process, rather than mere instructors. In line with this idea, the Kolb model of reflexive learning shows how concrete experience results through reflective observation into a learning experience through abstract conceptualization which through active experimentation leads to new experiences [2]. These educational concepts form the base of learning 'in the field'.

Ample evidence of the benefits on student learning through fieldwork exist since long [3] but also at NTNU, research acknowledges the importance of long and intense assignments exists, for example through 'live projects' at the architectural faculty [4,5]. The concept of transformative learning builds upon the acquisition of threshold concepts, specific for each discipline [6]. Urban realities are, like architecture, defined by a rising complexity due to social, economic and ecological challenges, competing values and ill-defined problems while at the same time requiring a more and more interdisciplinary approach from practitioners [5].

Both the department of design as the master of Urban Ecological Planning (UEP) have been taking their students out for extensive fieldworks to learn about human-centered, bottom-up approaches in urban planning and design. The type of intensive fieldwork allows students to develop tacit knowledge by defining the challenges and assignment themselves during the learning-by-doing, team based learning exercise, stepping away from a pre-chewed framework into a highly contextualized learning environment. This approach is in line with the values of UEP, that, amongst others believes in contextualized, area-based and territorial planning, bottom-top approaches and the planner as a facilitator [7]. This exercise, which started in 1999, has taken place in different cities in Nepal, Uganda, India and since 2018 also in Norway, allowing students to immerse into a real-life complex urban environment. The students undertake a contextual analysis and propose strategic interventions through community and stakeholder involvement using participatory methods. This learning trajectory allows for a transformational learning experience which brings the students coming from a variety of geographic and disciplinary backgrounds through the acquisition of threshold concepts in the discipline of urban ecological planning.

2.2 Visualization

Visualizations are anything we create, a technique, to communicate a message that can be both abstract and concrete. People have throughout history used visualization such as images, diagrams and models to communicate and tell stories. While the most significant benefit of visualization is the ability to communicate complex issues and to ensure mutual understanding, the same characteristic is the most challenging. As visualizations can include large amounts of information, it can be interpreted in multiple ways. The world-view of the viewer can impact the interpretation to a large extent, depending on the type of visualization and the background information given. However, in field-work, each student or researcher also perceives the surroundings, the interactions with people and context of data collection differently, meaning that the potential of visualization, and visual representation of the process and fieldwork context may be able to convey a more open-minded transfer of the fieldwork experience that is relevant for learning and reflection. In visual anthropology, visual media is used to learn more about people. As digitalization and new technologies make digital visualization techniques accessible to everyone, the skillset and potential for students and research participants to collaborate through visual, not only verbal, accounts, can be perceived as limitless.

2.3 Immersive technologies

At the same time, the students of the master in Simulation and Visualization develop a wide range of methods for simulation and visualization, developing skills in immersive technologies such as, but not limited to, VR, AR and ER. Often the implementation of these technologies is linked to resourceful high-tech industries like the shipping or oil and gas industry. The growing interest in immersive technologies goes hand in hand with the idea to make its use more mainstream, accessible and needs-based. With the extreme development within wearable electronics (smart phones, smart watches, tablets etc.), these technologies are becoming very accessible and affordable. Fieldwork in urban planning and design, can provide meaningful real-life implementation of virtual, augmented or mixed reality technologies, integrated into user-centered projects.

3. Methodology

We organized three workshops bringing together students and researchers from different disciplines, mainly from the fields of Smart Cities, Urban Ecological Planning, Design and Immersive Technologies, but also practitioners in the fields of, among others planning and interaction design. Participants discussed methods of visualization and digitalization both from the perspective of student learning in fieldwork and citizen engagement in urban projects, challenges and opportunities related to visualization and digitalization. Also, some of the ethical questions related to these methods were discussed. These explorations build both on the extensive visualization experience of the researchers involved in immersive technologies as on the fieldwork experience of various participants. The aim of these discussion was to create interdisciplinary student projects to explore the integration of digitalization and immersive technologies into the fieldwork learning. We applied design thinking as a process to facilitate a co-creation process between students, teachers and researchers in Trondheim and NTNU to develop new ways of conducting field work with the use of visualization techniques, including immersive technologies.

4. Visualization and digitalization in fieldwork - methods
- Visual card games, sorting and ranking by use of icons

Facing challenges related to language and trust to engage citizens, students decided to produce card decks with icons representing main topics in the semi-structured interviews. Students valued the use of a prepared set of visual cards with icons in combination with questions or matrices as an effective method to engage citizens beyond normal semi-structured interviews. The preparation of a set of icons

allowed the students to translate their observations into recognizable icons. The process of simplifying ideas and concepts into icons helped them to (re)structure and prioritize their thoughts and observations about the area, helping them to build new links and challenge their previous understanding. Testing the cards allowed both for testing of assumptions, of cultural appropriateness of icons while at the same time leaving flexibility for the creation of new icons. The use of these cards was indicated as a good conversation starter and base for storytelling. Indeed, the relatable icons allowed for a quick and less threatening engagement, where the participants felt they were in control. Moreover, the repeated use of the same cards and icons in different individual stories with each its specific links and connections, allows students to build rich and meaningful knowledge structure, which is a requisite for deep and future learning [8].
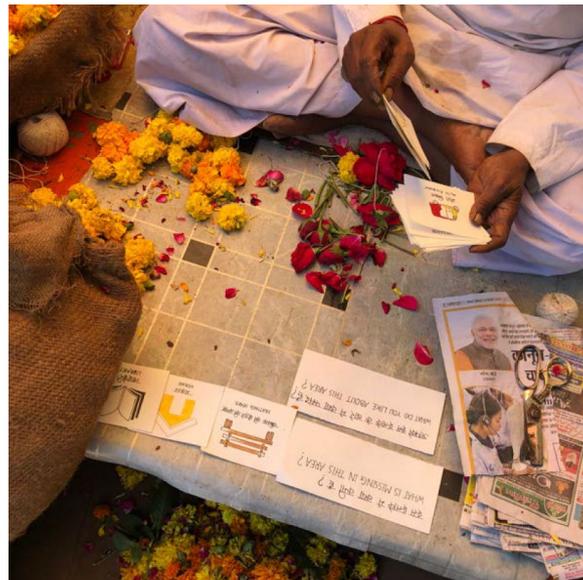

Figure 1: A citizen using icon cards to answer questions in a semi-structured interview. Photo by Guro Blikås

- Video

Building on the experience of the 2017 fieldwork of a student video reflection, students were asked to produce a short video about their fieldwork. The purpose of this video was to reflect and communicate on the work the students were undertaking. The students took this as an opportunity to look at their work from a distance. During a workshop, some students indicated that this has helped their group to structure and focus their fieldwork as it helped them to reflect on their work. This is in line with the learning principle that *How students organize knowledge influences how they learn and apply what they know* [8]. Indeed, the new links brought forward by and the reflective process through the video, allowed students to reach a deeper learning.

- Mobile ethnography – photo voice + recorded interviews

Mobile ethnography uses technology-based devices *to capture and explore mobilities and social phenomena in boundaryless dynamic settings and allows researchers to co-create knowledge with their participants* [9]. Through this method, the participants are invited to capture data over a longer period on a mobile device. Some of the student groups used mobile ethnography in the form of photo-voice and recorded interviews. While students indicated challenges related to the insecurity of citizens to engage, they appreciated the active voice given to citizens through this method.

> *We discovered that the camera in some situations was actually less intrusive than the pen and paper we had been carrying earlier. Everybody could watch and comment on what had been recorded of them, but only some would be able to read the words in our notebooks and the finalized report.* (Student report, 2018)

- Co-design workshop – testing prototypes

Through the organization of co-design workshops, the students invited the communities they worked in to participate in the learning-by-doing process. During these workshops, the students invited the neighborhood to present some of their findings and ideas, but most importantly they developed some prototypes to test with the community, as part of the design thinking process the students facilitated with their respective community. Each event used different visual tools and representations to collect feedback on the proposals the students developed based on the situational analysis. Some of the groups decided to prototype events or activities, such as a performance by a local puppeteer group or the painting of a wall.

The following figures summarize the discussion on the challenges and opportunities of visualization throughout the fieldwork. Figure 2 illustrates the potential connection between field and out-of-field learners with a number of future ideas, while students tell the chronological story of the field exercise linked to challenges and benefits in figure 3.
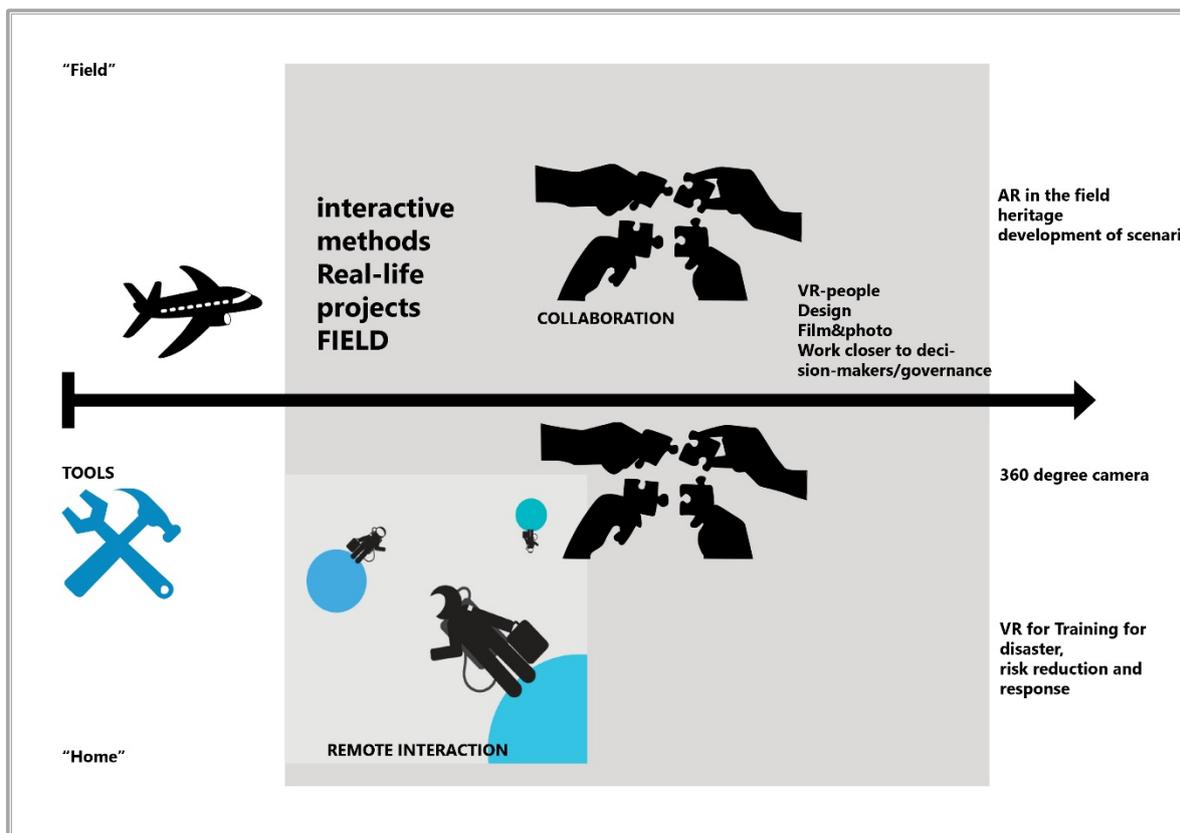

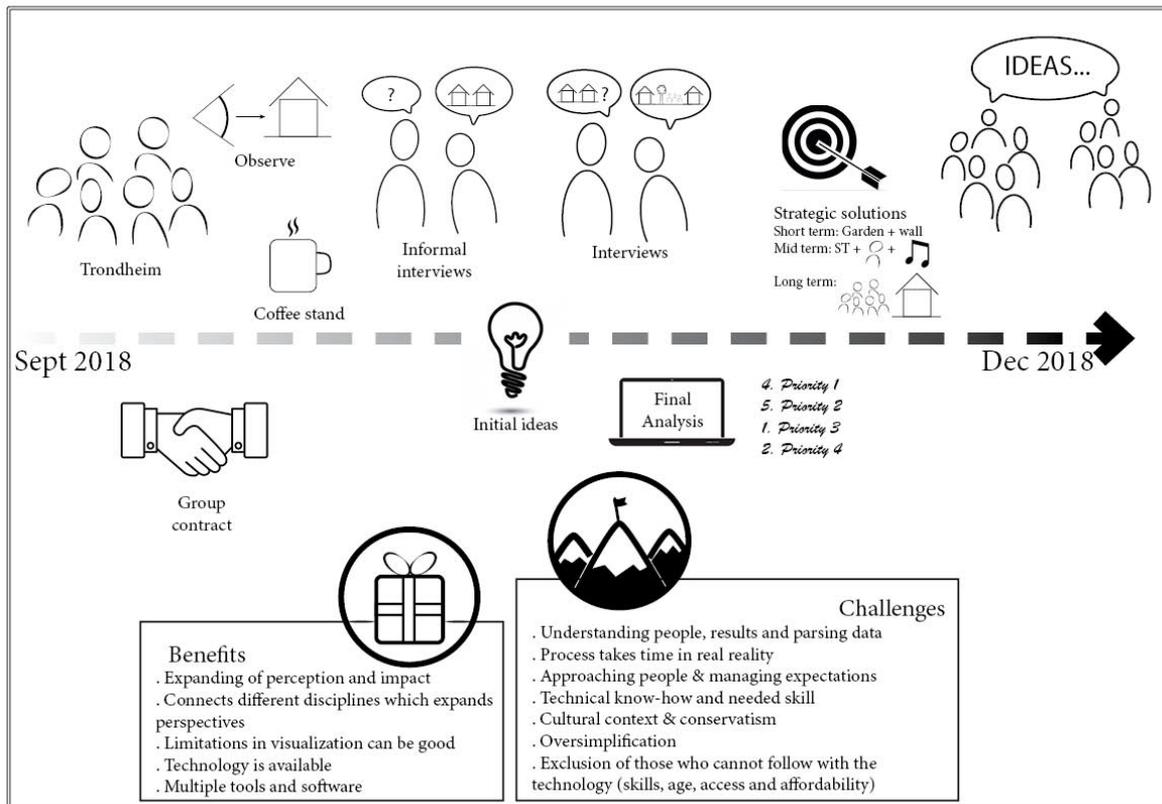*Figure 2: Outcomes discussion workshop 1 VLY-BY (December 2018)*

Figure 3: Outcomes discussion workshop 1 VLY-BY (December 2018)

5. FINDINGS AND DISCUSSION

Together researchers and students identified and discussed opportunities and challenges reflecting on their field experiences and experiences from practitioners in design, immersive technologies and citizen engagement, as can be seen in figure 1 and 2. In the following section, we will discuss the identified opportunities and challenges of the use of visualization and digitalization within the field-based learning experience.

A first opportunity of visual methods in the learning experience in the field, besides being fun, engaging and inviting students to think out of the box, the use of visual methods in the fieldwork gives them the space to restructure their thinking and expand their perception. Thus, it becomes a tool for reflection and indeed a tool for transformational learning [5]. This furthermore allows students to build on previous knowledge and insights as the visualization activates prior knowledge. Moreover, this results in an aspect of mutual learning from each other as students come from different disciplinary and geographical backgrounds [8].

Another opportunity is the creation of a common language and understanding across disciplines through visual methods. Videos, prototypes and collages form a concrete, safe and quick way to start a conversation and test assumptions with various stakeholders. The students moreover indicated that the use of visualization increased their impact. Through the visualization of scenarios, they can facilitate discussions better and engage citizens better in the exercise.

A last opportunity lays in the wide availability of software and tools within immersive technologies. In combination with the previously mentioned visual tools, they have the potential to engage further with citizens and stakeholders, on the condition that they are adapted to the governance model and the aim of the participatory process. With the fast-developing technologies, the pedagogical importance lays not in the technology itself, but in the meaningful implementation and processes. These methods in the

field allow students to develop tacit knowledge about the general drivers behind these processes. By using these methods in the field-based classroom, the process becomes student-driven.

While students came up with a range of ideas for use of immersive technologies and more conventional visualization methods in the field, they also identified challenges. A first challenge relates to the technologic difficulties making the methods often resource-, time- and capacity demanding. While the creation of a digital twin of a city or neighborhood for example allows for a variety of uses with immersive technologies, it does require both the necessary data as the technical know-how and time to construct this model.

This technological advancement poses a second challenges to this type of work, being the accessibility for different learners. While it can be an opportunity as the product might take away certain barriers (confirm the video engagement versus pen and paper) it might also exclude those who do not master the technology and process or be met with conservatism.

A next challenge relates to the risk of oversimplification of a complex reality by visualizing it and the understanding of people, results and parsing data. While this can be an opportunity to prioritize the most important elements, there is also a risk to lose nuance through icons or visuals. This shows that the methods cannot stand on itself but work best when simultaneously capturing stories and connections, to differentiate between building sparse, superficial knowledge structures purely on the methods, or building rich and meaningful knowledge structures that will allow to support future learning and performance [8].

Finally, these methods bring forward new ethical questions for the learners to consider when approaching citizens. On one side, the use of cameras within a community and the use of (moving) images recorded, can have an unforeseen negative impact on the lives of the community or individuals involved, especially in the case of high levels of informality or insecure tenure. Moreover, immersive technologies have the potential to create environments in artificial reality that can be considered as a reality, which creates a risk of dismissing complex nuances that can be used for manipulation or create expectations.

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