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**Paper**

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**Short bio (150 words max):**

**Indira van der Zande** is Director of Education at the University of Groningen, the Netherlands. In this position, she co-developed the cutting-edge Bachelor of Science in Global Responsibility & Leadership, with a curriculum entirely inspired by the UN Sustainable Development Goals. Her research focuses on responsible leadership and fair inclusion in education, with a particular focus on real-world connections with stakeholders. She is currently coordinating the Global Engagement Module for the ENLIGHT consortium.

**Title:** Student perceptions of Living Lab research internships in the COVID-19 pandemic – a Dutch case study

**Abstract (maximum of 150 words):** To effectively generate solutions to today's complex challenges, cooperation between governments, industry, civil society and academia is essential. To prepare students for collaboration across academic and non-academic disciplines and stakeholders, Living Labs (LLs), unique research internships have emerged in the educational systems, which are focused on generating insights for society while embedding student learning in both practice and academia. To legitimise the LLs as a method of education in the academic curriculum, it is necessary to evaluate the experience of and potential benefits for students' development of their academic, professional and personal skills. Through self-reported pre-and post-questionnaires into students' confidence levels, this paper aims to investigate the outcomes of participating in LLs from the student's perspective via a case study at the University of Groningen in the Netherlands. A secondary aim is to evaluate the influence of the COVID-19 pandemic on the learning experience of the students.

**Key words (up to five):** Living Lab, transdisciplinarity, research internship, student experience

**Text of paper (1,000-3,000 words, excluding references):**

Introduction

Today's challenges reflect the dynamic and complex state of world affairs and cut across various disciplines. Solutions can no longer come from isolated improvements in one single area. They can

only be addressed jointly by government, industry, civil society and academia: the quadruple helix. Collaboration between these stakeholders requires a shift towards inter- and transdisciplinary education and research: a learning environment where partners from various academic and non-academic backgrounds break down traditional boundaries and collaborate across fields to produce knowledge and innovation with social relevance ([Klein, 2004](#); [Nowotny et al., 2001](#); [Carayannis and Campbell, 2009](#)). Future professional success of students in this changing labour market requires that they not only develop themselves intellectually, but also build future-proof and lifelong transversal competencies such as collaboration, creativity and leadership ([Sá and Serpa, 2018](#); [Rourke et al., 2018](#)). Higher education institutions across the world have responded to the call to prepare future citizens for and provide training beyond transferrable content knowledge, for example through stimulating collaboration with societal partners in civic or global engagement projects ([Grad and Van der Zande, 2022](#)), or by the more recent focus on institutionalising graduate attributes. One increasingly emerging way in which the current educational system often aims to integrate theory and practice is through internships (here defined as gaining work experience at an organisation) or research internships (here defined as conducting research on behalf of an organisation). The newest trend in the area of experiential learning is coined Living Labs (LLs), which are particularly focused on generating insights for society while embedding student learning in both practice and academia ([Hawk et al., 2012](#)). In essence, LLs aim to integrate the learning experience of both traditional and research internships, thereby creating a unique opportunity for students to follow an inter- and transdisciplinary academic approach to address societal challenges. LLs aim to establish embeddedness of student learning in both practice and academia. Indeed, the goal of the LLs is to not only advance practise or professional skills but also academic knowledge and student learning.

Research points towards the importance of collaboration between universities and businesses as an important tool to foster innovation and as a source of new ideas ([Bravo-Biosca, 2020](#)). At present, studies that have been devoted towards the investigation of LLs is, however, limited and mostly directed towards the benefits for firms and organisations. Such benefits for example include a superior match of innovations with user needs ([Leminen et al., 2012](#)), avoidance of path-dependencies and lock-ins in innovation ([Niitamo, 2006](#)) and enhanced collaboration between stakeholders ([Fahy, 2007](#)). Benefits accrued to students, who are at the centre of the LLs, have not yet been investigated. To gain insight in this, a specific LL case study at the University of Groningen in the Netherlands is evaluated. This LL programme links students to research and practice over a period of 5 months, with the aim to foster co-creation between stakeholders to find novel solutions to societal challenges. The case study took place between February 2020 and July 2021, in which the LL programme was carried out twice.

## Methodology

To investigate the outcomes of the LLs for students, this study applies an evaluation research approach through benchmarking ([Peischl, 1995](#), [Jurow, 1993](#), p. 120). In the case-study, we applied benchmarking by conducting a pre-questionnaire on self-reported confidence levels in three areas; namely personal, professional and academic skills. These three categories emerged based on the overall programme learning outcomes of the study programme and the subsequent course specific learning outcomes of the Living Labs, which were then categorised in the three areas by the researchers. After engagement in the LLs, comparative self-reported post-questionnaires were subsequently used and evaluated against the benchmark to investigate the perception of the LLs.

#### Data collection and sample

Data was collected through self-administered questionnaires which were distributed to second year students of the bachelor programme [Global Responsibility and Leadership](#) of the University of Groningen in the Netherlands. Students in this programme follow an interdisciplinary liberal arts and sciences curriculum in which the LL is a mandatory 10EC course which runs for 20 weeks in the second half of their second year. Students are allocated to research questions of host organisations on the basis of their preferences and work in groups of 2–4 throughout the entire LL, supervised by at least one scientific staff member from the degree programme and at least one supervisor from the host organisation. The host organisations span a wide range of stakeholders, as illustrated in [Table 1](#) (see below). A total of 54 respondents filled in the pre-LL questionnaire and 38 the post-LL questionnaire. After deleting non-responses, the final sample consisted of 35 respondents and 18 respondents respectively. Demographic characteristics are outlined in [Table 2](#) below. The main focus of analysis is therefore on the qualitative outcomes of the self-reported questionnaire, while the quantitative analysis serves as a secondary measure (all measures can be found in the supplementary material).

#### Results

Below, we present and describe the findings per skill-set. In addition, [Figure 1](#) provides a visual overview of how each skill was ranked in the pre- and post-questionnaire.

#### Personal skills

##### Pre-questionnaire

In the pre-questionnaire, students rated their personal skills the second highest ( $M = 2.58$ ,  $SD = 0.93$ ) in comparison with academic and professional skills. Interestingly though, only two students focussed on personal development when asked about expectations in the open starting question of the questionnaire. Here, one student expected to “improve planning skills (dividing work over six months with two people), meet new people with similar interests who are further in their career” (S 9).

#### Post-questionnaire

In the post-questionnaire, students continued to rate their personal skills the second highest and additionally reported a decrease of their personal skills ( $M = 2.48$ ,  $SD = 0.93$ ). Most students mentioned that teamwork and collaboration was challenging, but that they felt it improved anyway: "I believe this project has shown me another side of teamwork I had never encountered before and therefore brought me out of my comfort zone in some settings" (S 53). Besides the challenges of collaboration itself, students also found it sometimes challenging to balance different interests and personalities: "challenging teamwork has at least the advantage that you learn from it and learn to work together with all different kinds of characters" (S 52). And: "It can be hard to work on a project where multiple stakeholders are involved, as they have different opinions on the project" (S 42). Lastly, students indicated the LL had helped them to develop their networking skills, as is illustrated in the following quotations: "Cooperating with my fellow students has led to the development of my communication and networking skills"; "My networking skills have gotten a good boost" (S 38).

#### Professional skills

##### Pre-questionnaire

Visual inspection of the means reveals that before starting with the LL, students overall evaluated their current professional skills highest ( $M = 2.59$ ,  $SD = 0.84$ ). From the first open question about expectations of the LL, it could be observed that students mainly expected to gain practical experience and knowledge of working in a "real-life" organisation. For example, one student replied to the question about expectations that they hoped to gain "Practical experience, connecting themes from class to real-life applications ..." (S 7). Others made reference to specifically working with an organisation, as illustrated by the following two quotations: "To get a taste of how it is to work with a real organisation" as well as: "Exciting experience to get an idea of the real working-life and environment" (S 38).

##### Post-questionnaire

The post-LL evaluation indicates a slight decrease in the confidence students have with respect to their professional skills (pre-questionnaire:  $M = 2.59$ ,  $SD = 0.84$ , post-questionnaire:  $M = 2.42$ ,  $SD = 0.66$ ). Mostly, students described their experience with regard to the importance of communication: "It has made me realise how much work it is to communicate everything and keeping people up to date" (S 39). And a number of the students made specific reference to the importance of communication in a predominantly online environment:

During these corona times, communication was harder between me and my partner, which had an impact on both of our motivation. Additionally, there was hardly any communication between us and the host organisation, which also contributed to the loss of motivation. Therefore, it has taught me to keep up communication at all costs, even if you have the feeling that you would not need to speak to the supervisor, small updates can boost motivation already. (S 42).

Students additionally indicated that it was not only the communication with the organisations that was harder than expected, but also that at times their collaboration with peers proved to be more challenging than expected: “It can also be quite difficult working together with your colleague student. Of course we work together in this study a lot in different courses. However, for such a long period of time it was definitely difficult to keep spirit and motivation high (S 43)”.

#### Academic skills

##### Pre-questionnaire

In the closed questions, students evaluated their current academic skills the lowest ( $M = 2.30$ ,  $SD = 0.62$ ). In the open questions, students indicated that they hoped that the LL would enable them to link theoretical knowledge from class with real life situations: “link academic work with the ‘real’ life and especially public administration” (S 5), “connecting themes from class to real-life applications” (S 7) and “applying theoretical knowledge to real world problems” (S 9). Expectations regarding specific research skills were not mentioned frequently, only one student expected that the LLs would be helpful to develop research skills: “to learn how to research and solve real life problems independently” (S 10).

##### Post-questionnaire

After completion of the LL, students scored their academic skills higher than the other skills ( $M = 2.49$ ,  $SD = 0.63$ ). This is the category for which students perceived the biggest improvement (from  $M = 2.30$  to  $M = 2.49$ ) and which is now more in line with the other two skill categories. In the open question about academic skills, students reported that they especially improved specific academic skills and felt more confident in applying certain research techniques such as conducting interviews, coding and report writing, or conducting questionnaires: “The Living Lab has contributed to the advancement of my academic writing skills. Also, conducting the survey and working with real data was a very interesting and exciting thing to do!” (S 38).

Additionally, students indicated they did not only learn how to apply a certain technique but also how to apply it for different stakeholders: “I have learned not only how to interview people with political functions but also to adapt the interview guide in a way that it effectively helps asking the right questions needed for the research” (S 36).

#### Influence of COVID-19

The pandemic often came back in the post-questionnaires. Students mentioned that it influenced communication with LL partners and that it was hard to ensure alignment with students and LL partners: “During these corona times, communication was harder between me and my partner, which had an impact on both of our motivation” (S 42). In addition, students mentioned that it was hard for them to stay motivated throughout the mostly online project and that the pandemic

influenced their commitment and mental health: “Due to COVID-19, we were not able to meet any host supervisors, participants or other stakeholders in real life until now. However, also by online communication I was able to develop professional communication skills” (S 49).

At the same time, some things were also perceived to be easier due to the pandemic, such as organising meetings and not losing time on travelling to the host location. Additionally, the data collection sometimes was easier. For instance, one student mentioned that they changed their research from qualitative to quantitative research and were able to gather more data online. Nevertheless, the online environment in the end negatively influenced the fun of the project: “It was easier to do all the interviews quickly, as everything could be done by phone. The fun of the project was kind of taken away” (S 36). Another student indicated the same, while explaining that COVID-19 resulted in having to change from a field study to a questionnaire:

The Covid-19 crisis changed the way we collected our data. Therefore, it was not as interactive and lively as it would have been without Covid-19. I was really looking forward to collecting the data on the street. However, the digital form of data collection has made it easier and more numerous. We received far more replies than we would have gotten if we would have collected the data on the street’ (S 38).

## Discussion

Our study is one of the first studies that aims to better understand LL's from the student perspective, by investigating their personal, professional and academic skills. Students in a research-based Living Lab experience seem to train their transversal personal and professional skills, while also improving their academic skills. This outcome is of importance to legitimise the participation of students in LLs as otherwise it will remain a concept of which the outcome to its participants (i.e. students) will remain unknown. By being one of the first studies to investigate outcomes accrued to students, this study enriches literature and also aims to make LLs a more legitimised concept in academia. In addition, it became clear that the COVID-19 pandemic highly influenced their overall experience of participating in a research internship. This is an important contribution to literature as well as to practise as previous research has not examined students' perspective on their LL experience. Throughout the LL experience, students remained confident with regard to their personal skills, although a small decline was reported (pre-mean: 2.58; post-mean: 2.48). This development mainly occurred due to the fact that students perceived the LL as challenging, confirming that for growth to occur, students must step outside of their comfort zone into their growth zone ([Blekkingh, 2015](#)). This growth may also be stimulated further by the challenges posed by the COVID-19 pandemic which may have pushed students out of their comfort where they would do things on automatic pilot and instead push them towards a creation motive. In this creation motive they are encouraged by their environment to develop new personal skills that lead them towards their goal

([Blekkingh, 2015](#)). In relation to the LLs, this may indicate that students were pushed to develop their personal skills as the situation required other ways of networking, team working and communicating.

Contrary to our expectations, students rated their professional skills before conducting the LL higher than after completing the research internship (pre-mean: 2.59; post-mean: 2.42). One explanation could be that students have become more aware of their skills and potential room for improvement during the course of the research internship as they realise how a professional setting is different from what they were used to at university. Hence, participating in an LL may offer a unique opportunity for students to become aware of the professional skills that are needed later on in the professional field and that are traditionally not taught at university. Another explanation might be related to the fact that the LLs took place during the COVID-19 pandemic. As such, not only the LL itself was a new concept for students, the way in which the LL was conducted was new as well. Due to this, students' professional skills were required to develop in a different setting than anticipated (virtual versus physical). While students expected an onsite LL hosted by a local host organisation, most communication and collaboration with companies was conducted online. This online setting required a different professional skill set than they were used to. Additionally, the online setting might also have led to challenges for the organisations to optimally collaborate, connect and communicate with students. The COVID-19 pandemic has led to an accelerated and unplanned digitisation process in many companies which resulted in major transformations regarding companies' communication and collaboration tools ([Almeida et al., 2020](#)). While these changes are already challenging internally, it also spills over to external collaboration and communication with external partners like students, and scientific staff members, participating in the LL. Hence, this technological disruption and changed professional setting may have posed a challenge on the development of professional skills of students participating in the LL.

Finally, students reported their academic skills as the lowest of all three categories before completing the LL. This is an interesting finding, as the LL is a research concept and students have been trained in academic courses and research techniques before starting the LL. Of course, the LL is the first practical application of the student's academic skills so a potential explanation might be that they report them as rather low because they have never applied their research skills in an LL setting. Additionally, one could argue that, as the traditional teaching of universities is focused on academic skill development, students have the most realistic idea of the status quo of their academic skills. Furthermore, while academic skills were reported as the least developed before conducting the LL, they did in fact develop the most as compared to the other skill-sets after (pre-mean: 2.30; post-mean: 2.49). This indicates that there is a lot to gain with regard to academic skill development when applied outside of the academic curriculum and in practical environments like an LL. They allow students to successfully link theoretical knowledge from academic teaching with practical

research and implement in-class taught methodologies and techniques like interviewing, coding and reporting. This emphasises the importance of the research-based element of the LLs as compared to traditional internships.

Research about traditional internships mainly focuses on the outcome for students in relation to professional development ([Beck and Halim, 2008](#)) and what the implications are for their employability ([Gault et al., 2000, 2010](#); [Silva et al., 2016](#)). Moreover, current research on skills acquired during internships can be divided in three skill domains namely cognitive domain, intra- and interpersonal domain ([Pietro Di, 2022](#)). The development of these skills in these domains have been reported to bring similar results as we have found in our professional and personal skill set, such as communication, cooperation and planning skills ([Pietro Di, 2022](#)). The additional value from co-creation in LLs is the academic skill set gained by students. These skills have not been recognised by traditional internships. As shown in [Figure 1](#), LLs contribute in a positive way to students' perception of their academic skills and which in fact increased mostly in our research. This indicates that there is a huge potential for students to develop their academic skills in LLs, when such academic components are embedded in the LLs. Our study therefore contributes to and extends previous research on Living Labs by showing how academic student learning can be improved via transdisciplinary research internship. This is not only of importance to research but also for practice. Before a new practice can be legitimised it is important to know its potential benefits. The current study has confirmed that participation in LLs can greatly contribute to students' development and therefore can legitimise the concept of LLs in academia.

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