

Dear referee,

Many thanks for the time you have taken reading and commenting on this submission. In order to make our response more focused we have provided comment (in red) directly to each point:

Thanks for the opportunity to review this work. The paper presents Living Labs as an important pedagogical tool for higher education learning, outlines strategies for framing activities following this approach, and provide examples of activities carried out in a living lab environment at Keele University since 2006. While the authors introduced the concept of “living labs” thoroughly and provide interesting examples to show how it can be used in education, they do not investigate the concept of living labs or any of the mentioned activities vigorously, and therefore, do not report substantial new results and conclusions. The manuscript, in its current form, reads like a report on “living labs” and not like a scientific investigation of “living labs”.

The focus of the submission is the concept of the Living Lab as an educational environment – how we have used it and how others might design similar learning environments. The ‘new’ results are the framing of education within a living lab (using Living Lab Principles) and the sharing of the framework we used to do this. Living Labs are commonly used to test new ideas and technology, but rarely are curricula embedded within them. Like all education interventions we have used the Living Lab to fit a particular need/purpose (i.e, to provide students with authentic assessments in an environment where they are empowered to learn, is spontaneous, is open etc.) The “evidence” that this has worked are the case studies themselves (our experiences). We hope the submission acts as a dissemination of best practice that will allow other who would like to explore embedding Living Lab Principles into their curriculum can use.

To improve this study and make it publishable in GC, I encourage the authors to consider:

1. Carrying out a qualitative and quantitative assessment of the living lab concept. For example, consider evaluating one or two of the activities already mentioned in the paper for their effectiveness in teaching and learning of specific concepts. Consider comparing them with other forms of “outdoor” activities such as fieldwork or educational fieldtrips.

We appreciate that the submission doesn’t contain data commonly found in many other types of papers – however it is relatively common for pedagogic papers exploring concepts and frameworks to be based on author experience, case studies and examples. Indeed, gathering data around many of the Living Lab principles in an educational setting would be wasted effort – e.g. we could ask students if they find gathering and analysing near-surface geophysics data to be more “realistic” or “spontaneous” (for example) than analysing pre-gathered data – but the answer is already plain – and we hope our experiences and dissemination of this would make this clear. Referee 1 suggested more emphasis on skill-based education was acknowledged, which we agree with and believe will help emphasise why education within a living lab is different from other fieldwork (because it is skill based within a real, spontaneous environment that is student led). It would be possible to design such activities outside of the Living Lab too (elements such as continuity and ownership might be a little harder to embed)– this can be emphasised.

2. For each case studies, include the accompanying data, methodology, results, and discussion of results, and consider taking an analytical approach to synthesize the individual case studies into a framework. I also agree with Anonymous Referee #1 that the framework should be applied to the case studies to show readers how to use it.

We agree that the framework (and the Living Lab Principles) need better signposting/integration within each of the case studies (please see the response to ref1). It might be interesting to consider a project comparing student experiences in the Living Lab, at different levels, from different disciplines, with differing amounts of time spent in the Living Lab etc. But we feel this would certainly be another study itself.

I also have a few minor edits and comments, all listed below.

Line 12 – Spell out high education once in the paper (HE)

Line 42 – Please give 1-2 examples (with references) of the innovations that provide platforms for efficient/effective learning environments.

Line 128 – When using terms such as “our student body” and “we”, are you referring to a specific group of people or are you using these terms more generally? From how this is written, I take the former to be true. Also, the reference (Ofs, 2020) does not appear in the reference list.

Line 134 – Check grammar: “...are well documented...”

Line 144 – Informal language, consider revision: “...the experiment/test isn't compromised...” – change to “the experiment is not compromised” – same issue in line 537

Line 149 – check grammar: “...but lends itself moreover to effectively transdisciplinary working...”

Table 1 should appear earlier (page 4, for example).

Line 190 – Define FHEQ – not everyone is familiar with this abbreviation. Same with MJCA in line 191. All abbreviations should be defined at least once in the paper.

Line 390 – Not clear why this case study is called “COVID-19 fieldwork” when the actual topic is Climate Change.

The topic of the field course that was switched to run on campus as a response to COVID-19 restrictions focusses on Climate Change.

Line 515 – “Education in these areas...” which areas? Needs clarification.

Line 533 – Give 2-3 examples of the inclusivity/diversity issues mentioned in this sentence.

Line 535 – The sentence needs a verb.

Thank you for these – we can action them all.

Again, many thanks for the time you have taken to read and comment on the submission, we can understand your concerns around the lack of quantifiable data but we would argue that the submission provides the dissemination of a useful (and effective) innovation based on the experience of the authors. The intervention is framed by pedagogic theory.