

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:

Dear Authors,

Thanks for the opportunity to read and review your work on living-labs. The papers case studies and framework for using a living-lab will be of interest to educators and practitioners in the field. Although I am supportive of the paper and can see its potential, I do have some comments and suggestions that I outline below. These are intended to make the paper stronger, not detract you from sharing your work in this area.

Many thanks, we agree that there are areas that can be strengthened and pleased you can see the submissions potential.

1. Living Labs - There is a short definition of living labs in the introduction and a broader discussion later in the introduction. I feel this needs to be expanded. The initial definition you use Hossain et al (2019) contains a number of discrete elements, space, societal challenge and stakeholder involvement. However, it is hard to see the explicit links between all of the case studies and this definition alone, a broader discussion on living labs, encompassing other viewpoints may address this. For example, why is the drone case study simple not a outdoor practical / field work? what make it distinctively a living lab? I think the difference between living labs and other pedagogical approach that take place outside (field work /practical's) is one to emphasis.

The definition of Living Labs are generally similar – with the elements you highlight as the common themes. To better emphasise each of the case studies positioning within the Living Lab we propose linking the individual activities to explicit parts of the Living Lab principles (continuity, openness, realism, empowerment of users, spontaneity). By linking the various activities to elements of the Living Lab this will explain how each activity is situated as part of the Living Lab. Similarly we can link the conceptual framework to each of the case studies (comment 3 below). This could be done by introducing a table marking each case study against the Living Lab Principles, and the framework (plus things like each case studies Intended Learning Outcomes, assessment type etc) used to create them).

Ultimately these ARE fieldwork/outside practicals; it is the positioning of them within the Living Lab which provides the authentic, student led, congoing activates. “Traditional” outdoor work often has a very specific aim where the exact outcomes and/or observations are “known” by the instructor in advance, and where data collected doesn’t “fit” into an ongoing stream of data creation. The difference between work in the Living Lab vs other types of field work and practical work can be emphasised.

2. Case studies - On their own the case studies are all of interest, but they are also all feel quite different narratively. The comment above (comment one) applies here about making sure the 'living lab' elements are specifically identified, for example what is the

societal challenge in the drone and crime scene case studies. The case studies seem to have varying approaches to the amount of detail they include on the approach / activity (such as between case studies 2 and 4), it would probably enhance readability to be a little more consistent here. It is not always clear what the situational context of these case studies are they in-curricula / extra-curricula? are they assessed formally (noting the emphasis on authentic assessment in the introduction). Finally, there appears to be a very strong emphasis on skill development in several of the case studies, if this is indeed a major purpose for their use. I feel that this not fully explored in the introduction or discussion.

The linking of case studies to Living Lab principles (response to comment 1) will hopefully make the link between each case study and the Living Lab explicit. There will be variety here – the drone example is, for example, a far smaller/more specific exercise than the Environmental Baseline Study. All studies are in-curricula (we can add a sentence in the intro to emphasize this, there are some extra-curricular aspects to some – e.g. photo contest for the drones), they are linked to different assessment roles (most are formally assessed), this can be made clear in each case study. Very good point on skill development – this needs to be made more explicit as it is one of the major purposes of these learning activities (the learning/use of skills and equipment within a Living Lab are what allows data generation etc. to be spontaneous and realistic and even allows for activities to go ‘wrong’ whilst skills are still taught!).

3. Framework - The discussion includes a framework for the use living labs. These are framed as a series of questions. I would suggest that this is either not presented as a framework or adapted. Firstly, as this is presumably the authors work some commentary on the pedagogic development of this framework would be useful. Secondly seeing it applied to the case studies in question would also help the reader understand its execution, at present the questions you are ask are not explicit in all the case studies. It is possible these could be introduced before the case studies as the conceptual framework you used in their design.

As indicated above linking the framework to each case study in a table (or similar) would help emphasise how each case study fits into both the Living Lab Principles and into the framework we include. Agree that its introduction before the case studies would help readers understand its execution.

4. Principles - Linked to the above, you introduce the living lab principles in the introduction. As well the direct expression of these in the case studies (see previous comment) how do these principles inform / feed into your case study design (explicitly) and then how to they link to the framework?

The principles can be linked into the framework – moving the framework to come before the case studies would help integrate these two components making it clearer how the principles manifest within the framework.

5. Discussion - The discussion moves to some broader discussions about design and the framework, but I feel there is lots more to be unpicked here. Firstly, the authentic

assessment narrative and learning lab principles from the introduction are not explored fully in the discussion. There is some links to the individual case studies, but I feel there is more to discuss here, for example case study uses PBL and flipped-classrooms how does the intersection of these pedagogies apply to a living labs context. I feel more critical evaluation of the living lab examples would be useful for the reader. Finally beginning line 415 is very Keele specific can this be generalised for a wider readership and, the paragraph beginning line 492 feel disconnected from the living lab discussion that precedes it.

Authentic assessment and the principles can be included in the discussion. Our experience has been that any pedagogies that are applied in labs/practical setting/outdoor learning translate well into the Living Lab – it is the environment, authenticity, ownership, realism (basically the Living Lab Principles) that the Living Lab provides – we can expand on this in the discussion.

Yes – can reword to be less Keele-centric.

Many thanks for taking the time to provide this constructive and thoughtful review.