Dear editor,

I was very pleased with the positive evaluation of the manuscript. The issues that were raised by the reviewers were used to improve the manuscript. The comments from the reviewers will be addressed below in a point-by-point reply and all changes are highlighted in the manuscript.

**Reviewer #1:**

Goedhart presents an educational article on how to collect and store data collected during practical cell biology courses that he refers to as “studentsourcing.” Two cases are used to support this method. The first is applicable to the resources that most biology classes would have, while the second addresses a use case for more advanced studies. The manuscript suggests that data collected from both instances are helpful for teaching and possibly the greater scientific community.

The author does an excellent job providing code and data (GitHub) for others to reproduce and/or customize for their practical lab courses, as well as examples of how to put it into practice. “Use case 1” is accessible to any science class with access to a microscope. It provides good data to (1) address data visualization, (2) experimental design, (3) data processing, and (4) evaluating accuracy.

In “use case 2,” the author provides a more advanced laboratory class example that teaches students about technical replicates as well as how analysis methods can affect measurements.

I thank the reviewer for a good summary of the manuscript and the encouraging words.

**Minor Issues**

* Goedhart suggests that data could be useful for the scientific community. More information on the instrument and imaging parameters needs to be provided to be reused. Along with the measurement data, metadata would need to be provided. Framework for what needs to be included can be found with the “MicCheck App” (<https://rebecca-senft.shinyapps.io/MicCheck/>) Including this in the GitHub repository would allow the greater scientific community to re-use the data confidently. Montero Llopis et al. 2021 does a good job explaining why.

That’s a good point and I have extended the metadata and I added separate sections named “Microscopy” with the information.

* The manuscript is in English, but the examples in Figure 1 are in Dutch. It would improve the clarity of the figure if the "record" part of it were changed to English. However, I don't think it's necessary to change the screenshot of the form.

I do agree and changed the entire figure to English.

* The article suggests that the broader scientific community could re-use the data collected by classes en masse due to the large sample size. There is no data or example in the body of the text to support this. Therefore, this should be in the discussion, and it would be of benefit for the author to suggest some ways in which the data might be used.

That’s a fair point also mentioned by Reviewer #2. I have added “An emerging field where a lot of data is required is that of neural networks that are used for artificial intelligence. Particularly the training is resource intensive [@laine2021] and therefore a studentsourcing approach to distribute the workload would be a potential application.”

And I also added: ““In the design of the current course, the groups (A-D) do identical experiments, but it would be straightforward to assign different perturbations (e.g. drug treatments) to different groups and aggregate these data to study effects of perturbations. The perturbations can be done in a blind fashion. After all experiments are completed, a statistical analysis can be performed and the students can discuss the results in their report.””

**Reviewer #2:**

The author introduces a workflow for collecting and re-using data from higher education courses. This tool allows interactive data visualization and quantitative analysis enabled by data collection over multiple years. Data collection is also made easy through Google Forms. The manuscript contains two case examples to highlight these features of the tool. Overall, the principle will be helpful to and teach students about data collection, statistics, and experimental design. This approach has great potential, although its use is currently restricted to one specific course.

**General comments:**  
Studentsourcing is a variation of other outsourcing approaches, including citizen science projects. It would be helpful if the author introduced other initiatives occupying this space.

-I agree and I have added a reference to make this clearer: “As such this approach fits in the larger field of citizen science [@silvertown2009].”

The workflow is very specific to the data collected in the author's course. The experiments are also very simple (measuring nuclei size). The manuscript would benefit from an explanation of if or how other teachers could implement this tool in their teaching so that other types of data could be used.

-The main purpose of the use cases is to illustrate potential ways in which the aggregated data can be used. To clarify, I added to the discussion: “This approach is generally applicable and I hope that the use cases provide inspiration for the implementation of studentsourcing in other courses.”

The discussion would benefit in speculation of how this tool could be used to produce actual biological results that would benefit the science community. Could samples from a research group be used in the future to provide new data? This could be integrated into the course in the future.

-That’s a good suggestion and I added to the discussion: “In the design of the current course, the groups (A-D) do identical experiments, but it would be straightforward to assign different perturbations (e.g. drug treatments) to different groups and aggregate these data to study effects of perturbations. The perturbations can be done in a blind fashion. After all experiments are completed, a statistical analysis can be performed and the students can discuss the results in their report.”

It would also be helpful for the author to discuss the limitations of this approach.

- I added to the discussion: “The studentsourcing approach as implemented here has limitations. One limitation is that the outliers or mistakes in the data cannot be traced back to the origin since the data is anonymous. Therefore, providing dedicated feedback is not possible. Another limitation is that the amount of data that can be uploaded through Google forms is limited. Therefore, uploading of larger datasets (e.g. images), would require a different approach.”

It would also be helpful if the author discussed their view regarding authorship when the collected data are used in publication.

-Since the contributors are anonymous and contribute on a voluntary basis, it is impossible to add contributors to the author list. However, I think that the best solution is to thank all contributors in the acknowledgements (as I did in this manuscript).

**Specific comments:**  
The very beginning of the abstract would benefit from some more introduction. For example, "Hundreds of students participate in cell biology courses every year as part of their curriculum. Data generated in these courses is not centrally stored and therefore often lost…"

-I added: ” Practical courses mimick experimental research and may generate valuable data. Yet,”

The data is collected using Google Forms, asking for a group (A-D). It needs to be clarified how these groups are defined. Are the students in one course divided into four groups? I suggest that the author include a sentence explaining that the students were divided into four groups of 10 if that is the case.

-I added a bit more background information on the structure that explains the groups: “The use cases presented here are part of the same practical course that runs annually at the University fof Amsterdam as part of the BsC programme "BioMedical Sciences". In a typical year ~120 students are enrolled and these are randomly assigned to four different groups (A/B/C/D) that take the course at different days. The students perform the experiments in pairs. Except in 2021, when due to COVID-19 regulations, the students did the experiments individually.”

Figure 4 legend could be extended to include information about the measurements. This graph contains multiple measures between the automated and manual quantification of the percentage of cells in the S-phase. It would be easier to visualize the data entries if color coding were used.

-The legend was very short, so I extended it. The main purpose of the plot is to show that, despite individual differences between the automated and manual analysis, the average values are similar. To make this more clear, I have made the average values more visible (instead of using color as the reviewer suggested).

**Reviewer #3:**

In the present work, the author presents a resource for the aggregation and analysis of experimental data harvested in practical courses in undergraduate teaching in microscopy and cell biology. They demonstrate this on an example of measurements of cell size and nuclear size and another experiment where the fraction of cells in S-phase is counted manually and through a semi-automated analysis in image J.

The work is an excellent example of systemic thinking that can improve the productivity of academic science and at the same the efficiency of teaching as important concepts are introduced to the next generation of scientists on simple experiments.

This reviewer greatly enjoyed reading the manuscript, although it seems to be apparently written somewhat hastily, as a number of typos are present and the discussion could be more elaborate on an interesting topic.

Overall, this is a useful piece of work and I support publication in PLoS Comp Biol.

I appreciate the enthousiasm of the reviewer and I have taken care to identify and correct typos.

As reviewer #2 suggested several items that can be discussed, I have extended the discussion based on these suggestions (see replies to Reviewer #2 for specific points).