

Clickers in a Flipped Lab; Feedback to Enhance Engagement in First Year Science.

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Class Sizes:

12 Students

Discipline:

Laboratory activities for
Biology Module. Level 8
in Bio veterinary Science

Feedback Approaches

Automated Feedback, Informal feedback,
Peer feedback.

Technologies

Turning Technologies (turningtechnologies.com),
Moodle (moodle.org).

Challenge & Aim

Anecdotal evidence from lecturers engaged in teaching practical's is that there is very little if any interaction from the students with the pre-lab reading resources as posted on Moodle or in the laboratory manuals provided at the beginning of the semester. The lecturer must provide a pre-lab lecture which takes up valuable lab time. The lecturer in this instance identified a first year biology group to take part in the study. The students were introduced to the clicker technology and asked if they were willing to take part in the study.

The aim of this research was to determine the effectiveness of using a flipped classroom approach in laboratory sessions.

This involved using the clickers to conduct a short pre-lab quiz in place of the usual pre-lab lecture. This quiz tested student knowledge of the pre-lab reading material hosted on Moodle. It provided feedback to the student on their individual knowledge and the aggregate knowledge of their peers. It also provided feedback to the lecturer.

It was hypothesized that students would find the feedback useful and that the flipping would result in increased engagement with the Moodle resources and improved student preparedness.

Evidence from the Literature

There are many studies outlining the use of CRS in large classrooms (Caldwell, 2007), and the myriad of approaches that that can be taken. However, there is not as much information about using them in a practical laboratory situation and in particular the flipped classroom setting. In (2010) Johnson & Lilis from the University of Limerick carried out a study of Nursing students in a laboratory setting to determine their level of Knowledge retention. In a study involving first-year Psychology students in large lectures at the University of Bergen, Ludvigsen et al. (2015) reported that the use of a CRS allowed them to monitor their own learning. Students also valued the 'reflective space' provided by the question-response cycle. Fredericksen and Ames (2009) questioned 700 first year students at Cornell University on their experience of a CRS in a Biology module.

They found that students valued the prompt response from the system. They also valued knowing how their classmates voted and found the opportunity to discuss their responses with their adjacent classmates useful. Clickers have also been employed in creative ways in Chemistry laboratories in MIT (MIT, 2015). It was important for this study to look at the creative ways in which SRS can be employed in other third level institutions, but also to tailor it for use in our own setting.

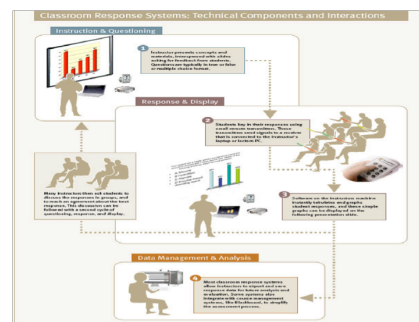


Figure 1
How the clickers work (Caldwell, 2007)

Feedback Approach

- Initially the students were introduced to the clickers and trained in their use. They agreed to participate in the research. 10% of the continuous assessment marks was assigned to quiz performance.
- The pre-lab reading resources was uploaded to Moodle in advance of each session. The pre-lab quiz questions were prepared and clickers paired with individual students.
- At the start of each of 10 lab sessions, clickers were distributed and multiple choice and true/false quiz questions posed via MS PowerPoint.
- The students voted after which the class response was displayed as a bar graph with the correct response highlighted.
- This usually provoked discussion and reflection. The lecturer had the opportunity to reinforce knowledge in response to the aggregate responses.
- At semester end, Moodle activity analytics measured the number of times the resources were accessed. A focus group was also conducted to gather student's reactions.

Outcomes

The lecturer found this approach to be a huge success. There was a very high level of engagement with the course material and the students were well prepared for the lab in terms of what they needed to do for each lab session. The lecturer also found that this was a very good way to initiate discussion. Another important outcome was that students were able to answer questions in a safe environment as the answers were anonymous to each other. Although the lecturer was able to see individual answers. This enabled them to view their own answers in the context of the class as a whole and made them more confident as a result. The number of times the Moodle reading resources were accessed increased hugely. Fig 2 compares the number of views from this cohort of students with a corresponding group where the clickers were not deployed.

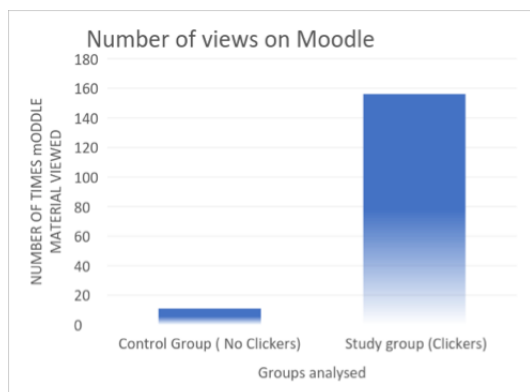


Figure 2
Total number of times Pre-lab material on Moodle was viewed by both groups

Student Response

From the students point of view they said that;
“it encourages you to prepare for the session and you actually know what you are doing that day”

They also felt that it;
“Made the learning more interactive and interesting, and that it was fun using them”

As one student put it
“You get to see how the class is getting on”

Recommendations

I believe that the Clickers be used in a number of ways such as Formative, quiz, flipped classroom, discussion, attendance etc.

I would recommend that any lecturer interested in trying clickers in their classroom, should first have a look at which of the above approaches might best suit them.

Aim for consistency.

References

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Contact



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