

# Enhancing Student Engagement in Large Higher Education Settings: The Plickers Approach

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**Sofia Rodriguez de la Vega, Leonidas A. Kontos**

*Sofia Rodriguez de la Vega - Department of Educational Studies, University of Edinburgh, Scotland; Leonidas A. Kontos - School of Computer Science, University College Dublin, Ireland*

## **Abstract**

*Class response systems allows for just-in-time teaching (JITT) assessments and quizzes. Unfortunately, most of them require students to have an electronic device and do not allow for students to participate and engage in critical thinking. Plickers, on the other hand, is an alternative class response system which does not suffer from the previous disadvantages and can stimulate debate and discussion during the class which as a result may enhance learner motivation.*

*I assessed the effect of using Plickers on the engagement and participation of the students by having a questionnaire at the end of the course with questions related to the Plickers application and what students thought about it. Results were positive and it seems that students felt that the application enabled them to measure the understanding of the subject and they were more involved compared to courses that were not using Plickers.*

*Overall, Plickers could be a potentially useful tool for classrooms, and it has yet to be evaluated in empirical research. The lack of research with this application leaves a potentially vital absence in the literature that may improve both learning and teaching with the use of this new technology.*

**Keywords:** *active learning; class response systems; teaching.assessment; large class*

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## **1. Introduction**

Plickers (“paper clickers”) is an application that allows for just-in-time teaching (JITT) assessments and quizzes, and requires only a sheet of paper for each student and for the lecturer to have a phone (or a tablet) to scan the student answers. The idea for this study came to me when students were coming by my office to ask me questions and I realised that they were able to solve exercises and answer tutorial questions but (some of them) were not able to critically reflect on the ideas behind the course. Every time I asked them to explain in layman’s terms the reason why we follow this statistical procedure and what we want to achieve at the end, they were struggling. I have already used this for the tutorials of the previous academic semester, as a formative assessment, not just for assessing what students know and have a problem with but also to let them decide what material they would like me to revise and spend more time on.

The applications requires only a sheet of paper for each student and for the lecturer to have a phone (or a tablet) to scan the student answers. Each card is different when held up in the four different orientations, and there is a letter (A, B, C and D) and a student number at the top of each orientation. In this study I was giving out the Plickers

cards to the students every time they came to class to ensure that every student was getting a different student number every time and ensure anonymity. To be more specific, Plickers is a set of unique printable QR codes (see Figure 1). After I guided them through the multiple-choice question, the students could hold up their card so that their answer is at the top of the QR code.

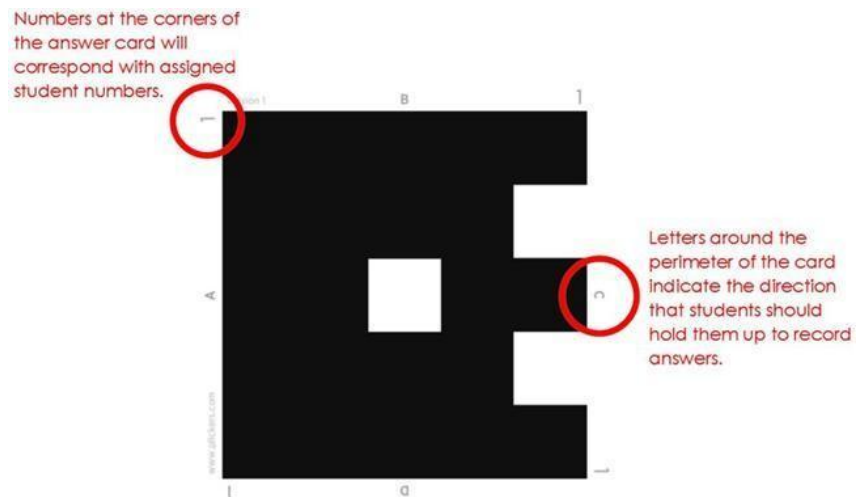


Figure 1. Close up of a Plickers card.

At that point, I used the Plickers application in my iPad to scan the class, and get real-time anonymous and formative feedback. For a more thorough description of the technology behind Plickers one can look at Wood et al. (2017). In the same paper the authors also point out that Plickers quizzes encouraged their students' learning in the class and that almost 90% of the respondents said that other classes and instructors should implement Plickers. Similar surveys with positive results, on high-school students, can be seen on Thomas et al. (2016) and McCargo (2017).

## 2. Purpose of Study and Reason Behind using Plickers

The class was comprised of 35 fourth-year students in an applied Statistical course (titled Advanced Data Analysis) on which I employed flipped classroom techniques. Students were receiving the material a week earlier and there was one meeting during the week where we could discuss the material and prepare for the weekly lab session. Thus, Plickers was a good way to initiate the discussion since it was really helpful in letting me (and the students) know what were the difficulties in their learning.

The main purpose of this study was twofold:

1. to assess the effect (if any) of using Plickers in the classroom and
2. to assess if students are engaging and participating in learning without feeling self-conscious.

I tried to assess the aforementioned issues by having a questionnaire at the end of the course with questions related to the Plickers application and what students thought about it.

It is important to note that the participants' vulnerability assessment was an important matter regarding this study; specifically when answering the questionnaire that assesses the helpfulness and usefulness of the Plickers application. I mitigated the dependent relationship the students have with me (as their lecturer); by having a PhD student giving and also receiving the filled questionnaires while I was not in the class at that time. Furthermore, I made clear multiple times during the class that students do not have to take part in this study.

If any students decided not to take part they would still be part of the class in exactly the same way and would take part in normal learning activities with the rest. If, after students had started to take part, and changed their minds, they could still stop using the Plickers cards and not answer any questions at all. The questionnaire included 11 statements that the students could choose one possible answer out of five (these were on the Likert scale) and two open-ended sentences that each student could write any comments they might have had regarding Plickers.

The benefit of using technology such as Plickers in the classroom eliminates the need for teachers to collect student response data on paper which can easily get lost or use other response systems that require students to have an internet connection also. Plickers can also store the student response data online for both the teacher/researcher's and students' benefit.

Not only will this make things easier for the teacher, but the students will be able to see the response results on the screen immediately while keeping the answers anonymous. I chose the Plickers application as a JITT tool for two reasons. First, there is no need for the students to have an electronic device. Thus, there weren't any problems with students' devices not being able to connect to the network or students being distracted by other things e.g. Facebook, Twitter, etc). In addition, the application is really fast and can collect the answers from 40-50 students scattered throughout the lecture theatre in (no more than) 5 seconds. The second reason why I decided to go with this particular application, is that I feel that the way Plickers works (with each student having his/hers own unique card) will make it more fun for students to participate and engage in critical thinking.

### 3. Results and Conclusions

For this study there were 24 students that completed the questionnaire. Figure 2 visualises the data from the survey with stacked bar charts. The three percentages, from left to right, refer to the respondents that disagree (strongly or not), are neutral, and agree (strongly or not) with each statement. These are ordered by the statements with the highest percentage on the (strongly or not) agree statements. It is reassuring that the final three statements of the questionnaire are on the bottom of the graph.

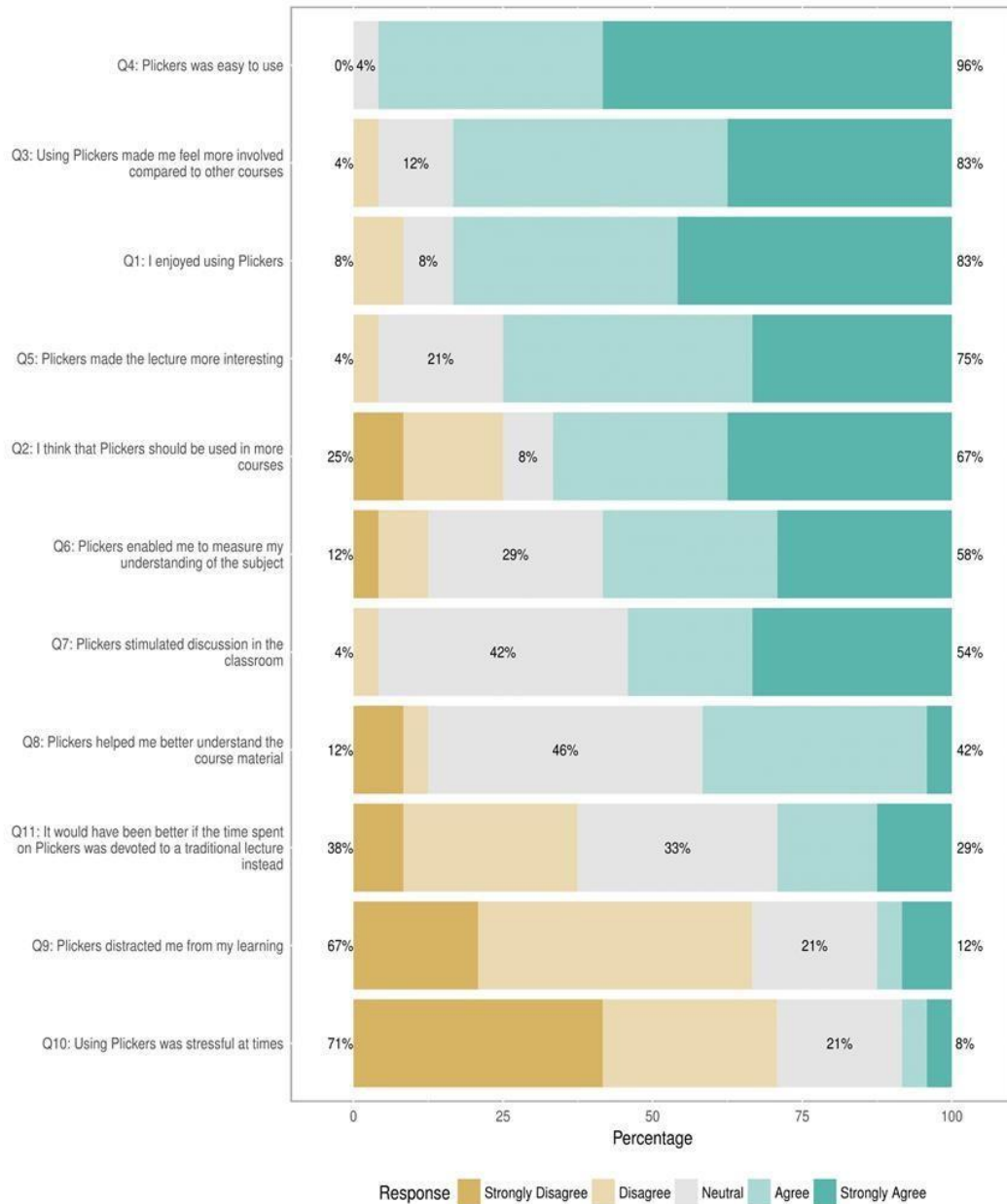


Figure 2. Stacked bar charts. The three percentages refer to the respondents that disagree (strongly or not), are neutral, and agree (strongly or not) with each statement.)

#### 4. Reflections on Analysis

Even though the results seem to be mainly positive there are a couple of issues that need to be addressed. First of all, the number of the participants is not high enough to start feeling really confident about the use of Plickers in class. Having said that, I expected a number like that since the class is comprised of 35 students in total and I asked for feedback on the last week of the class where 24 of them were present. Furthermore, it was really rewarding to see that almost all the students were using the application during the semester and that the majority of them were actively participating and appreciated that the class was a bit different than others.

Finally, the findings show that Plickers was effective in the classroom and that it made students participate in class without feeling self-conscious. I feel that students are open to trying new technologies in the classroom and appreciate having the power to drive the conversation of each week's class. There were a lot of times that students who asked me why their answer was wrong, were answered by other students who explained it to them during the class. I plan to use Plickers again next year but maybe try a mix of the traditional lecturing approach with Plickers. I hope that, this would make it a smoother transition for students who do not feel ready yet to actively participate in class. In addition, I plan to include a "Don't know" answer as a possible answer for the questions in class, since I currently can not tell how many students did not answer a question or answered it just because there wasn't a "Don't know" possible answer.

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