Instructions for "What affects the period of oscillation of a simple pendulum?"

After the apocalyptic disaster of the cooling of a cup of coffee lab on which students were asked to investigate the cooling of a cup of coffee, which they did with all the scientific savvy of robots the instructor had the students reread the IB section entitled "The internal assessment." In fact, to ensure that it was read, he read it to the students- several times and included portions of it on quizzes- which the students demonstrated knowledge of to varying degrees.

The instructor also discussed graphing a function such that a linear trend could be observed, in particular, the graphing of height that an object falls "h" against the time squared "t^2 " in order to show a linear relationship (this is outlined in the IA assessment of the IB book).

The instructor also pointed out to the class that the actual relationship between two variables can be determined to some extent through empirical knowledge and "dimensional analysis." As a n example, the instructor reviewed the homework pertaining to the speed of a wave on a string held under tension and its frequency as a being proportional in some way to the tension and inversely proportional in some way to the linear density. The students had enough empirical knowledge of guitars to understand this. Knowing that the units of the speed needed to come out in terms of m/s and knowing the units of tension and linear density, it was easy to see that the square root of the tension over the linear density gave units of speed

Therefore, it was encouraged that the students used their empirical knowledge of seeing pendulums move, their intuition, and dimensional analysis to hypothesize what the relationship there is between controllable variables (mass, length, initial angle of release) and the dependent variable (time)

At this point the students have a good grasp of
- Independent vs. dependent variable
- Constants
- making data tables

Their understanding of the following is good but still undeveloped, especially in terms of the discipline of physics

- % uncertainties
- number of trials to get reliable data
- number of times to change the independent variable
- graphing
- spreadsheet

In particular, what I generally observe with students at this level is that they time one oscillation instead of timing five or ten and then dividing by the number to get a lower % uncertainty. Of

course this is in part due to the fact that the do not know if the angle affects the period (since the angle decreases on each oscillation the students tend to assume that the period will change)