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IPS Notebooks, Two Alternatives

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One of the more daunting aspects of *IPS*, for neophyte and veteran teachers alike, is the amount of time required for correcting students' laboratory notebooks. Let's assume that students' notebooks are collected for grading at least twice during a nine- or ten-week marking period. Then, in each marking period, an *IPS* teacher with five classes should expect to spend two to three hours each weekend correcting a set of laboratory notebooks.

Of course it is imperative that students maintain a complete and accurate record of their activities in the laboratory. However, it may not always be necessary to collect students' notebooks in order to verify this. I would like to suggest two alternative approaches that are used by the *IPS* teachers in our school.

For many years, *IPS* teachers in our school have been alternating notebook collections with notebook tests. These tests accomplish the same purpose as the notebook collections, i.e., they allow teachers to determine whether students have included key points in their laboratory notebooks. Of course, students are permitted to refer to their notebooks to answer the questions on the tests.

Notebook tests may contain a range of question types. For example, for the Density of Solids experiment, there might be a question such as, "What were the dimensions of the slab and the volume that you reported?" This question assesses whether the student is aware that the volume of the slab is reported with two significant digits, while that of the cube is reported with three significant digits. The tests may also contain simpler questions that ask students to write the purpose or the class conclusion for a particular experiment.

The tests developed at our school contain about 20 questions. We have found that this number is more than enough to evaluate all the experiments for a chapter. Even teachers new to this approach will soon be framing questions that address the major points they look for when reading students' notebooks. An example of a test for Chapter 5 is shown below.

NOTEBOOK TEST CHAPTER 5

Section 5.1

1. What is the odor of the original mixture and fraction 1?_____ / _____

2. What evidence did you have that the original liquid was a mixture?

   _____

   _____

3. What was the correct volume of each fraction?

   _____ / _____ / _____

4. What was the reason for making the graph in part B? _____

   _____

5. When did you know to switch collecting tubes to collect fraction 2?

   _____

   _____

6. Show the data (all numbers) you used to find the density of fraction 2.

   _____

   _____

7. What is special about fraction 1?

   _____

   _____

8. Sketch the graph you made for fraction 2.

9. How did you know that fraction 3 was a single substance? _____

   _____

Section 5.4

10. Why were you able to separate this mixture of solids?

    _____

    _____

11. Why were you asked to wash the precipitate with 10 cm^3 of water?

    _____

    _____

12. Would the methods you used in this experiment separate a mixture of sand and sugar? Explain.

    _____

    _____

Section 5.6

13. What do the results of filtering the ink tell you about two possible causes for the color of the ink?

    _____

    _____

14. Describe the appearance of the liquid collected when you boiled the ink.

    _____

    _____

15. What does your graph tell you about the liquid in the ink?

    _____

    _____

A second approach that I have used involves peer review of notebooks. When I use this procedure, I am targeting specific experiments rather than seeking an overview of a student's notebook for a chapter. I begin by asking students to swap notebooks with a student other than their lab partner. I then provide them with a checklist (see below) on which they simply check *yes* or *no* depending on whether the notebook they are reading contains the correct information.

Before students use the checklist, I review with them the correct results for each step, so that they will look for the appropriate information. After the students have completed the checklists, they record the total number of *yes's* and *no's* on the sheet. The checklists are then returned, along with the notebooks, to the notebooks' owners. The students spend a few minutes reviewing the checklists to see whether there are any disagreements, and then the checklists are collected. It's a good idea to look at a couple of notebooks to

ensure that the procedure is being followed properly. Since the students who complete the checklists write their names on them, you will be monitoring their work also.
There is no substitute for a teacher's carefully reading students' laboratory notebooks and writing comments in them. When there isn't time to do so, teachers may find the suggestions described above to be valuable ways to provide students with feedback.

NOTEBOOK CHECKLIST
EXPERIMENT 6.2, THE DECOMPOSITION OF WATER

Name _____
I checked _____ notebook on _____.

YES	NO	
_____	_____	States the title and number of the experiment, and the date started.
_____	_____	Includes a diagram.
_____	_____	Purpose is correct.
_____	_____	Observations describe what happens before and after sodium carbonate is added.
_____	_____	States the amount of sodium carbonate added.
_____	_____	Splint tests were done correctly.
_____	_____	Notes specify which gas was produced at which electrode.
_____	_____	Gases are correctly identified.
_____	_____	Data chart shows volumes of both gases.
_____	_____	Data chart shows masses of both gases.
_____	_____	Shows math work done to compare volume ratios.
_____	_____	Shows math work done to show how mass of gas was obtained.
_____	_____	Shows math work done to compare mass ratios.
_____	_____	Includes correct volume and mass ratios.
_____	_____	Answers question about amount of sodium carbonate added.
_____	_____	Defines electrolyte and catalyst.
_____	_____	Includes an individual conclusion.
_____	_____	Class conclusion includes a word equation.

TOTAL: Yes _____ No _____