

HYPOTHESIS–EXPERIMENT CLASS (*Kasetsu*)

Classroom Management Guide

The Association for Studies in Hypothesis–Experiment Class

What is Hypothesis–Experiment Class?

Hypothesis–Experiment Class (HEC) is a fun class for introductory science. HEC was proposed in Japan by Kiyonobu Itakura in 1963¹⁾ and embodies the central proposition that "all scientific recognition can only be established by experimentation in the sense of purposeful questioning of the subject."

HEC is designed to teach the basic concepts and principles of science using HEC Classbooks, which give due consideration to children's cognitive processes and serve as both a textbook and a notebook for the students and an instructional guide for the teacher.

The Association for the Studies in Hypothesis–Experiment Class (ASHEC) continues to research and develop HEC Classbooks and related teaching materials in various fields, and a list of these publications is available on the association's website²⁾.

1) Itakura, K. (2019) Hypothesis–Experiment Class (Kasetsu): With practical materials for fun and innovative science classes, Funahashi, H. *et al.* (Ed.). Kyoto University Press, Trans Pacific Press

2) The Association for Studies in Hypothesis–Experiment Class <https://www.kasetsu.org>



Before Class

HEC is a fun class for introductory science

1. Preparation for Using HEC Classbook
2. Preparation of necessary items
3. Perform a preparatory experiment

How to Proceed with HEC

1. The teacher reads aloud the HEC Classbook
2. Students choose the options for their expectations
3. The teacher tabulates and presents the expected distribution
4. Ask students to present the reasons for their expectations
5. Discussion
6. Changing the choice of the Expectation
7. Experiment
8. Reading

After Class

9. Ask the students to write down their impressions of the class.

Before Class

HEC is a fun class for introductory science

The teacher should create a relaxed atmosphere in the classroom so that each student can enjoy thinking freely. HEC Classbooks are designed to help students acquire basic concepts and rules of science through the sequential experience of a series of problems. Some Classbooks consist of several Parts. In such cases, the teacher may use only one Part but must implement all of the content of the Part. Do not simply pick and choose the 'interesting' problems from the various Parts.

1. Preparation for Using the HEC Classbook

When beginning HEC, the teacher should not present the Classbook to the students all at once. In Hypothesis–Experiment Classes, always be prepared to distribute or show the Classbook to the students one page at a time, following the sequence of problems and readings in the Classbook. The Classbook pages may be presented to students by, for example, distributing printed pages, showing or posting flips, or displaying them on a monitor.

2. Preparation of necessary items

Please check the Classbook to ensure all the required items, prepare the experiment equipment and tools necessary for the Experiment, and any items the teacher will have to show the students for each Problem in advance.

3. Perform a preparatory experiment

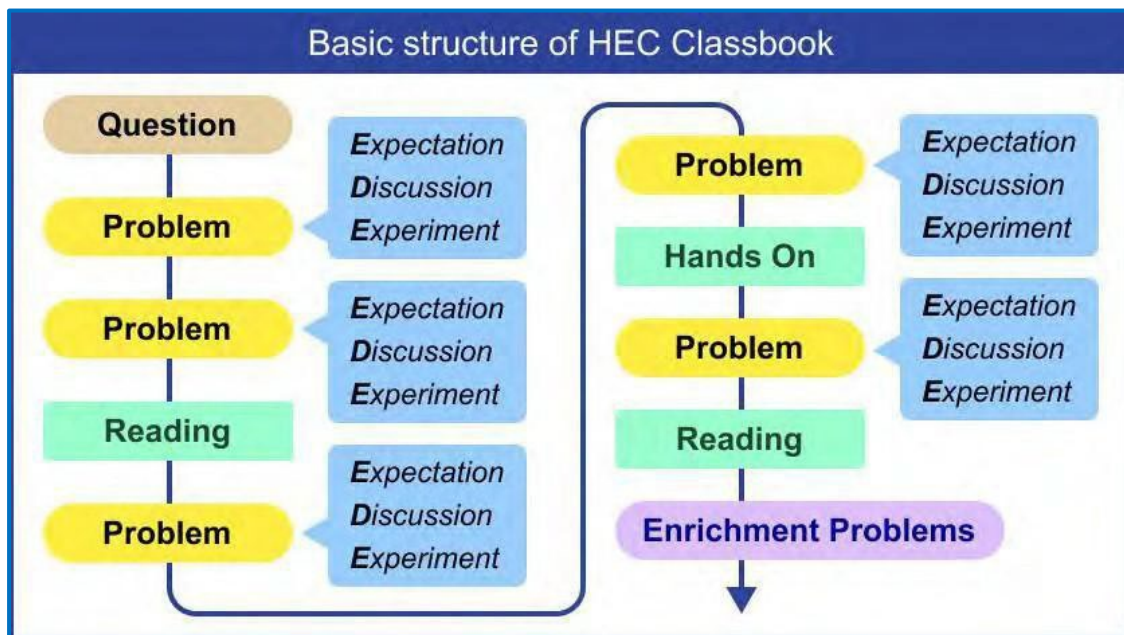
In Hypothesis–Experiment Classes, the teacher should perform the Experiment to show the results clearly. If possible, the teacher may allow students to perform it, but the teacher should always show them the Experiment first.

Please try the Experiment before the class to ensure the students can get a good look at it and its results.

How to Proceed with HEC

Structure of the HEC Classbook

A HEC Classbook consists of a carefully arranged sequence of problems, readings, etc. The number of Problems and Readings varies in each HEC Classbook. They may sometimes include hands-on experiences.



The teacher will distribute or present the **Problems**, **Questions**³, and **Readings**⁴ one at a time in order of the HEC Classbook. The following steps, 1. through 7. are repeated per each Problem.

1. The teacher reads aloud the HEC Classbook.

The teacher reads aloud the Problem or may have a student read it aloud. Here, the important thing is to ensure that all students understand the meaning of the Problem. The teacher may show the experimental apparatus or demonstrate the Experiment up to the stage before the result is obtained.

3) Question

In some HEC Classbooks, Questions are placed separately from Problems. 'Questions' are mainly about students' experiences and knowledge and do not involve discussion or experimentation. Students who wish to speak are asked to do so and then move on.

4) Reading

The teacher reads aloud, with additional explanations or some objects shown, if necessary for the student's understanding.

2. Students choose the options for their expectations⁵

Problems usually come with the options for the result of the Experiment. These options help the students understand the meaning of the Problem. The teacher encourages students to choose the option that best matches their ideas. The teacher should tell the students that they may express a change of choice at any time in the later stages as long as it is before the Experiment.

3. The teacher tabulates and presents the expected distribution

The teacher tabulates the students' expectations. For example, asking them to raise their hands for each option and presenting them to the students, as shown in the diagram.

Q5 The light bulb will	
a. turn on	28
b. not turn on	3
c. other	2

4. Ask students to present the reasons for their expectations.

The teacher encourages students to present why they chose the choices they made. If no students ask to present, the teacher may call on some students but do not force them to speak. Some students may present their reasons logically, others may not. Teachers should accept the statements as they are, even when they lack clear reasons.

5) Expectation Students can choose an option based on their naive impression or idea about the phenomenon without being given any prerequisite knowledge or analysis. We deliberately call this stage Expectation instead of prediction.

6. Changing the choice of the Expectation

Some students may want to change their expectations after listening to and discussing their classmates' ideas. Before conducting the Experiment, the teacher should check to see if any students wish to change their choices and, if necessary, revise the presentation of the prediction distribution.

Q5 The light bulb will			Final
a. turn on	28	↑↑	29
b. not turn on	3	↓	1
c. other	2		3

7. Experiment

The teacher demonstrates the experiment. The teacher should pay attention to the position of the experiment and its visibility to the students so that all students can observe the Experiment. The Experiment must be conducted so the students can see which option represents the result. After showing the Experiment, the teacher should declare the experiment's result and move on to the next Problem without explaining the result.

In Hypothesis–Experiment Classes, the explanations and summaries necessary for student understanding are given as Readings at the essential stages of the HEC Classbook.

8. Reading

Sometimes, there are Readings between Problems, such as explanations of the results of Experiments or definitions of scientific terms. Usually, the teacher reads it out loud. If necessary, the teacher can add some explanations. However, they should ensure that it does not interfere with the students' thinking when considering the following Problems.

After Class

9. Ask the students to write down their impressions of the class.

After completing the HEC Classbook, the teacher will ask each student to rate on a 5-point scale whether or not they enjoyed the class, using the following format. They will also be asked to write freely about their impressions of the HEC Classbook as a whole.

Please note that this feedback should not be used to evaluate the student's academic performance.

Were the lessons enjoyable?

- 5. Very Enjoyable
- 4. Enjoyable
- 3. Neither enjoyable nor boring
- 2. Boring
- 1. Very boring

Name:
Date:
HEC Classbook Title :
Rating: ()
Impression (Free text)

If most students answered that the lesson was enjoyable (5 and 4), even if some gave 1 and 2 as exceptions, the lesson is considered a success.

The teacher can review all questions and experimental results with the students and then administer a test to help them reflect on the lesson and assess their own understanding. The questions for the test will be taken directly from the Classbook.

In that case, have the students write their impressions after the test.

Dear Teachers,

We appreciate your interest in the Hypothesis–Experiment Class. If you conduct a class, we would appreciate it if you could provide the Association for Studies in HEC with a record of the class (the Classbook title, target age group, country/region, students' impressions, number of students on each 5-point scale*, your impressions as a conductor, etc.). Your record is valuable and needed to improve the HEC Classbooks. For queries, please email contact2ashec@kasetu.org

Thank you,

Association for Studies in Hypothesis–Experiment Class

* Example: Out of 56 students, 43 rated 5, 10 rated 4, 2 rated 3, 0 rated 2, and 1 rated 1.

Translation Project 2024

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