仮説実験授業提唱原著論文英訳選集刊行

The first English edition of the collected papers of Dr. Itakura, HEC advocate

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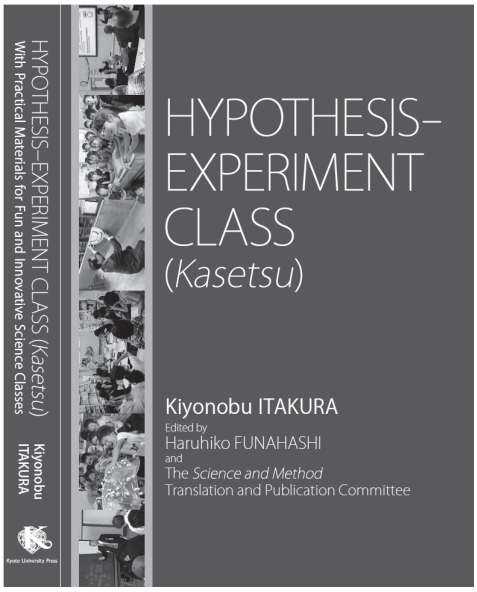


従来型の一斉授業への反省に立ち、各国のいろいろな科学教育研究の取組みが国内に紹介され注目されているが、日本に仮説実験授業という独創的な授業科学の理論と実践がある[1]。仮説実験授業の海外への紹介は、波多野誼余夫ら[2]による認知心理学の立場からのものや授業実践の報告などがこれまでにもいくらかあったが、仮説実験授業提唱の原著論文の英訳公刊は本書『*Hypothesis–Experiment Class* (*Kasetsu*)』[3] が初めてである。海外からの原著訳出の要望にようやく応えることが出来た。

仮説実験授業は、板倉聖宣によって提唱された「科学的認識の成立過程」の理論に基づく「科学の最も一般的基礎的な諸概念・諸法則・諸理論を体得させると共に科学的認識を発展させる方法を体得させようとする科学教育」の内容と方法である。その核心は、問題→予想→議論→実験の過程を積み上げ、概念・法則を学んで行くと共に、考え方自体も身に付けて行く点にある。具体的には《授業書》と呼ぶ 教科書・ノート・読み物と教師用ガイドも含む統合的な教材に従って授業運営される。完成までに多くの実験授業を重ね、再現性のある成果を得るまで検討し、仮説実験授業と不可分の《授業書》となる。

本書は、仮説実験授業提唱の原著論文と位置付けられるべき「科学的認識の成立過程」と「仮説実験授業とは何か」の2編(初出『理科教室』1966 年)の英訳文を中心に構成され、この2編によって仮説実験授業の理論と方法論が詳述される。 果たしてその授業を行うとどうなるのか、仮説実験授業の初期の実践に基づく重要な知見に触れた「民主主義教育としての仮説実験授業」と「仮説実験授業についての覚え書」の2編を合わせ、計4編の論文集となっている。さらに、《力と運動》など代表的な授業書の英訳版も付録に例示し具体的な理解を助けている。

仮説実験授業は、「科学的認識の成立過程」に示された認識論＝“すべて認識というものは，実験によってのみ成立する”に基づき、「仮説実験授業とは何か」に示された《授業書》という方法論によって再現性を問うことが出来るようになり、〈授業という現象〉を研究対象に扱う科学＝授業科学を確立した。科学的な実験結果としてその成果が蓄積されている。本書刊行により、海外の科学教育関係者も原著論文に立ち返って、仮説実験授業を検討・継承することが可能になった。

参考文献

[1] 板倉聖宣(1969)『科学と方法』季節社
[2] Inagaki, K. & Hatano, G. (1977) ‘Amplification of Cognitive Motivation and Its Effects on Epistemic Observation’, American Educational Research Journal, 14, (4), 485-91
[3] Itakura,K. (2019) *Hypothesis–Experiment Class* (*Kasetsu*), ed. Funahashi,H. *et al.*, the joint publication of Kyoto Univ. Press and Trans Pacific Press, ISBN: 9784814002108

Contents

1 The Process of Establishing Mental Recognition in Science

1.1 Conditions for establishing mental recognition

*Recognition** (of a physical object or scientific truth) is established only through testing and experiment.

Here we use the terms 'testing' and 'experiment' in general to refer to human activities that act on an object or event with investigative intent, and 'experiment' specifically to refer to any activity that aims for recognition of the object or event itself.

The above proposition is our attempt to distinguish *recognition* from mere 'perception.' When the retina produces an image from light bouncing off an object, we could call this 'perception' but not 'recognition.' True mental *recognition* of an object requires the perceiver to conduct some action with intent to confirm something about the object.

For example, many people gaze up at the Moon but probably do not consider or wonder about how it waxes and wanes. They may stare at the Moon and perceive its shape, but if they do not try to

* Translator's Note: The idea of 'recognition' central to the author's thinking does not connote the meaning 'praise from or acceptance by peers' but is epistemological in nature and refers to the cognitive process of perceiving something and knowing what that something is. We have occasionally translated it as 'scientific knowledge' when the context allows for it to clearly indicate the epistemological nature of 'knowing' and there is no danger of the phrase being interpreted to mean 'current scientific facts.'

2 What is the Hypothesis–Experiment Class? History and Classroom Management

2.1 About the name HEC

Hypothesis–Experiment Class (*Kasetsu–Jikken Jugyō* in Japanese, hereafter HEC) refers to the science education materials and method based on the theory proposed by the author in 'The Process of Establishing Mental Recognition in Science.'

This type of class is called *Hypothesis–Experiment* because it fully embodies the philosophy previously introduced that hypotheses and experiments are the foundation of scientific knowledge.

It is further called a 'class' and not a 'program' because scientific knowledge is social in nature, as stated in 'The Process of Establishing Mental Recognition in Science.' That is our foundation for crafting the Hypothesis–Experiment concept as a group-based 'class' for science education in school and not as a 'program' for an individual learning science.

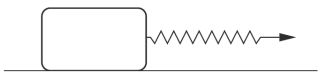
Lastly, HEC classes are not simply a classroom 'method,' because they require specific content about which students can hypothesise and subsequently investigate in experiments in order to discover some general theory for themselves. Furthermore, this type of class is made possible by the *HEC Classbook*

Force and Motion

Part One: Force and Acceleration

Problem 1

Here is a block weighing ____ g.



How many gram-force (gf) do you need to move the block horizontally on a smooth desk?

Expectation

a. It will take a force of exactly _____ gf.
b. It will take a force greater than _____ gf.
c. It will take a force less than _____ gf.

Discussion

Why do you think so? Share your thoughts, then do the experiment.

Results

仮説実験授業提唱原著論文英訳選集『*Hypothesis–Experiment Class* (*Kasetsu*)』の紙面の例