

# Recent Innovations in University Physics Teaching; Activities of Japanese NEP (Networks for Physics Education) Group and Physics-JAVA-Mailing-List\*

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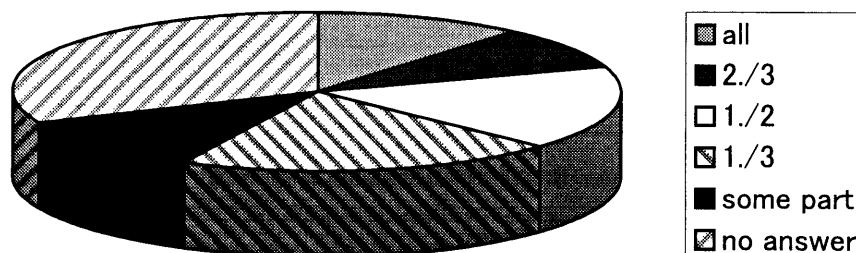
## I Current Status of University Physics Teaching in Japan

At first, we report some typical results of investigations via about two hundreds replies from contact persons of each universities to our questionnaires on **University Physics Teaching** in Japan.

Following investigations are only small parts of “**The Investigation on the Present University Physics Education in Japan ... Interim Report**” [1] on going under Committee on Physics Education of JPS (Japanese Physics Society).

### 1. How many part of students have difficulty in University Physics Learning.

How many part of students have difficulty




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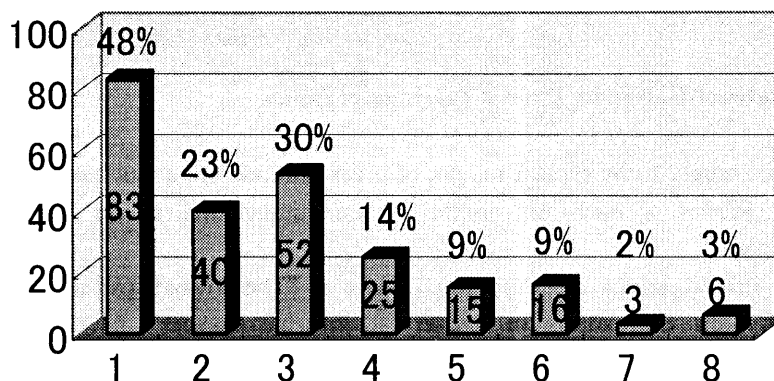
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As shown in this Figure, many lecturers feel difficulties in University Physics Teaching, i.e. in the 57% cases lecturers do feel difficulties for more than one third of students in a class.

## 2. What kinds of counter plans have been tried

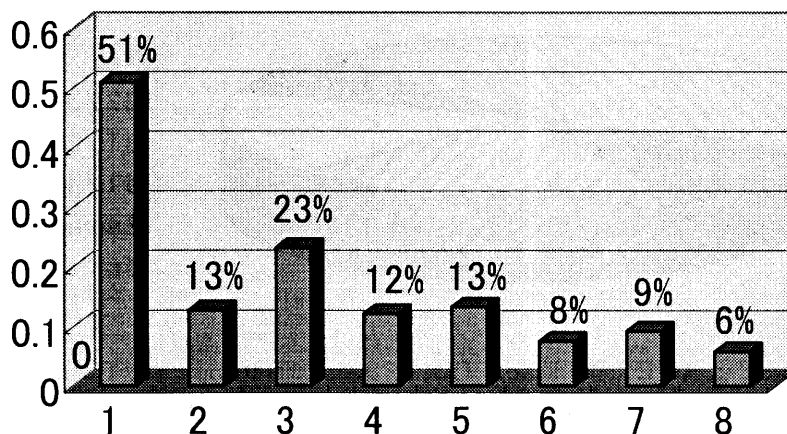
In Fig.5c1, we show the relative ratios (%) of answers for 'What kind of counter plans have been tried', where each numbers means; 1 As if all are Beginner's of Physics, 2 Courses by the skill occasion, 3 Introductory course, 4 Physics clinic, 5 Independent guidance course, 6 many suitable courses, 7 Only standard course, 8 no answer.

5c1 Counterplans



## 3. What kinds of counter plans will be tried

5d1 Counterplans in future



Results for 'Counter plans in future', given in Fig.5dl, are also very similar to those for the 'Counter plans tried already' and indicate serious problems of Japan.

Many contact persons point out that the important origin/backgrounds for the above problems are as follows; (1) increasing numbers of student in scientific major not taken physics at high school, (2) decreasing numbers of children, (3) decreasing physics classes in high school (those are not needed in entrance examination of many Japanese universities). Now, such difficulties originate from miss-connection of Physics Education between high school and university is becoming serious problems in Japan.

Therefore, recently many attempts have been tried to reform **University Physics Teaching** and some group studies have been carried out for developments of **Network for Education of Physics** in Japan.

## II NEP Project and JAVA Mailing List

We introduce some typical attempts and collaborative works to make University Physics Education more attractive and more active learning by making modularized educational materials using Internet & JAVA simulation.

We are now constructing collaborative activities in Japan by NEP (Network for Education of Physics) [ 2 ] and JAVA-mailing-list group [ 3 ] here NEP is a group of the both physics researchers' and educators' in order to improve the way of physics teaching and also to develop the 'active learning' teaching method.

- 1 NEP project on physics education in university through internet was started in 1996, by the members of the Physical Society of Japan (S. Miyawaki and Y. Hara et. al.) supported by the Grant-in-Aid for Scientific Research of ME, which is a joint project of many universities to make global networks connecting modules of physics teaching materials and networking various resources for science education.
- 2 In January of 1997, we also started a new collaboration with JAVA-ML (Mailing List) for physics education. By exchanging useful information's using this JAVA-ML, many collaborative activities of this group have been started to develop interesting JAVA simulations and CAI for physics written in JAVA.
- 3 NEP members of the physics educators are now collaborating to develop new types of networking system for physics education using Internet, Multimedia and JAVA Simulation.



## The Network for Education of Physics NEP

The web server for the network for education of physics (NEP) is now in operation for evaluation. The server for the maintenance.  
Japanese version will be accessible, if you click [HERE](#).

- [What is the NEP .....? \(in Japanese\).](#)
- [BBS for the NEP. \(in Japanese\).](#)
- [Curricula for the Education of Introductory Physics in University. \(in Japanese\).](#)
- [D](#)

[in University. \(in Japanese\). NEW](#)

- [Column. \(in Japanese\).](#)
- [Physics Education Mailing List. \(in Japanese\).](#)
- [CAI for physics written in JAVA. \(in Japanese\).](#)
- [Information System for the NEP.](#)

Now we show some Web-materials those are made cooperatively and those have English abstract.

- **Live Text on Physics** at <http://www.nep.chubu.ac.jp/v17/v17-147.html>

Byon Chol So, Faculty of Engineering, Kinki

The live text on physics is a new kind of medium for learning physics by computer. Every formula is numerically evaluated whenever numbers are put in. Figures can easily be redrawn for any parameters, and time-evolution can be animated. The live text is produced by a software system for doing mathematics by computer, named Mathematica, which handles numerical, symbolic, and graphical computations.

- **Search for the Modules Corresponding to the Syllabi of Introductory Physics Education,** at <http://www.nep.chubu.ac.jp/v17/v17-177.html>

Osamu Aono<sup>A</sup>, Kay Kohn<sup>B</sup>, Kenji Hayashi<sup>C</sup> and Yasuo Hara<sup>D</sup>,

A Jichi Medical School, B Waseda University, C Kitasato University, D University of Tsukuba

Listed are titles of syllabi and their modules searched or collected. There are modules for lectures, exercises, laboratory experiments, and demonstration experiments.

- **Systematization of Modules for Demonstrations in Physics Lectures**, at <http://www.nep.chubu.ac.jp/v17/v17-189.html>

Kisei Kinoshita<sup>A</sup>, Toshio Hyodo<sup>B</sup>, Hideo Fusaoka<sup>C</sup>, and Shohei Kashiwamura<sup>D</sup>, A Kagoshima University, B University of Tokyo, C Aichi Medical University, D Nagoya University

Short time experiments for the demonstration in physics lectures are elaborated and systematized into modules useful for university professors including theorists unfamiliar with experiments

- **Report of the Working Group to Produce Modules on Contemporary Topics in Physics**, at <http://www.nep.chubu.ac.jp/v17/v17-199.html>

Yasuo Hara<sup>A</sup> and Katsumi Sakurai<sup>B</sup>,

A University of Tsukuba, B University of Tokyo,

Activities of the working group 3 are reported. (1) a lab. experiment to measure light-velocity using a semiconductor laser, and (2) a module on elementary particles have been completed.

We also show some list of typical results on Web-page made by these collaborations using Internet and JAVA simulation.

- CAI for physics written in JAVA (<http://www.nep.chubu.ac.jp/~nepjava/>); Sun-Earth-Moon System by Kato (<http://www.nep.chubu.ac.jp/~nepjava/javacode/SolarSys/SolarSys.html>)
- NEP member's PAGE (<http://www.nep.chubu.ac.jp/pvt/index.html>).
- Web Page for Evaluation (<http://www.nep.chubu.ac.jp/pvt/NEPTop.jp.html>)
- Modules (<http://www.nep.chubu.ac.jp/module/index.jp.html>)

### III New usage of Information Technology

Finally we show some examples for new usages of Web technology in teaching historical development of science, i.e. Copernicus-Kepler world, Galilee-Newtonian Mechanics, Relativity, as shown in [ 4 ].

Following URL's are the Web pages collections made by our Science Education Group, where we have presented the typical JAVA simulations useful in Physics Education and also web pages of the Interesting Science Experiments.

- Jean Bernard Leon Foucault, <http://kakuda.ed.niigata-u.ac.jp/semi/niwata/science/java/foucault/foucault.html>
- JAVA simulation on historical development of Relativity from Galilee to Einstein, <http://kakuda.ed.niigata-u.ac.jp/semi/java/program/hikari2/soutai3.html>
- JAVA Simulation, <http://kakuda.ed.niigata-u.ac.jp/semi/java/index.html>
- Collections of Experiments Presented by the Members of Science Education Classes, <http://kakuda.ed.niigata-u.ac.jp/semi/semi.html>

## References

- [ 1 ] A.Kobayashi, Y.Turuoka, S.Naoe, S.Miyawaki, H.Fusaoka, “The Investigation on the Present University Physics Education in Japan-Interim Report”, Presented at JPS (Japanese Physics Society) Meeting at IWATE, 24 September 1999, <http://kakuda.ed.niigata-u.ac.jp/99-924M4/24aM4.html>
- [ 2 ] <http://www.nep.chubu.ac.jp/>
- [ 3 ] <http://www.nep.chubu.ac.jp/~nepjava/>
- [ 4 ] <http://kakuda.ed.niigata-u.ac.jp/semi/semi.html>