From Instructed Experiment to Self-Organized Experiment
----An Idea of Experiment Course Design

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Acknowledgment

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- **NSFC- Project of the talented students training- Condition construction**
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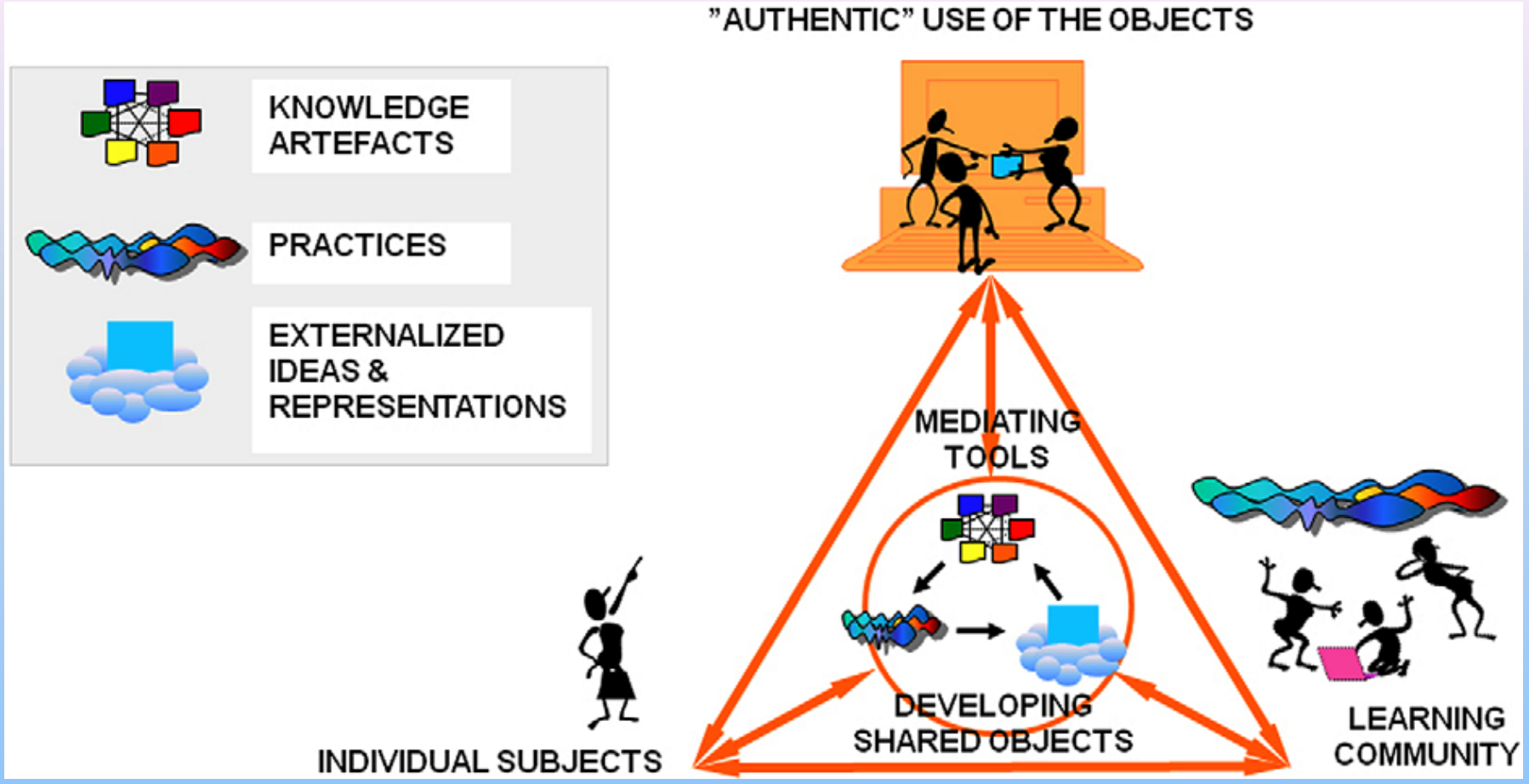
Match point
Regulation & Innovation

- Regulation
  - Authority
  - Philosophy
  - Physics
  - Communication
  - Description
  - Quantitation
- Innovation
  - Scientific Spirit
  - Engineering Philosophy
  - Experimental Method
  - Trialogical Learning
  - ◦ ◦ ◦ ◦ ◦ ◦



Source： Paavola and Hakkarainen (2009). From meaning making to joint construction of knowledge practices and artefacts – A trialogical approach to CSCL. In Computer supported collaborative learning practices: CSCL2009 Conference Proceedings, ed. C.O'Malley, D. Suthers, P. Reimann, and A. Dimitracopoulou, 83–92. Rhodes: International Society of the Learning Sciences.

Self-organized practice

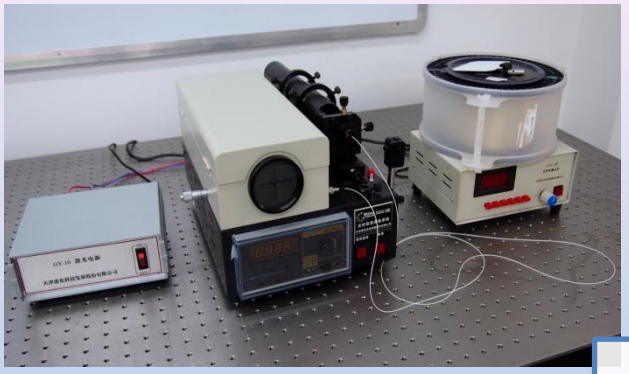
-Mold unloading

Cooperation establishment

- Shaping

Individual training

- Into the mold



GPL 3 semi-self organized experiment

Principle, instrument manual,

self designed procedure, research notebook, scientific report

GPL 2 Explore in experiment

Condition based instructed, selective materials,

open questions, semi-self organized report

GPL 1 Regulation of experiment

Measurement, uncertainty analysis ,

significant digits, tables and graph, oriented discussion, formatted experiment report

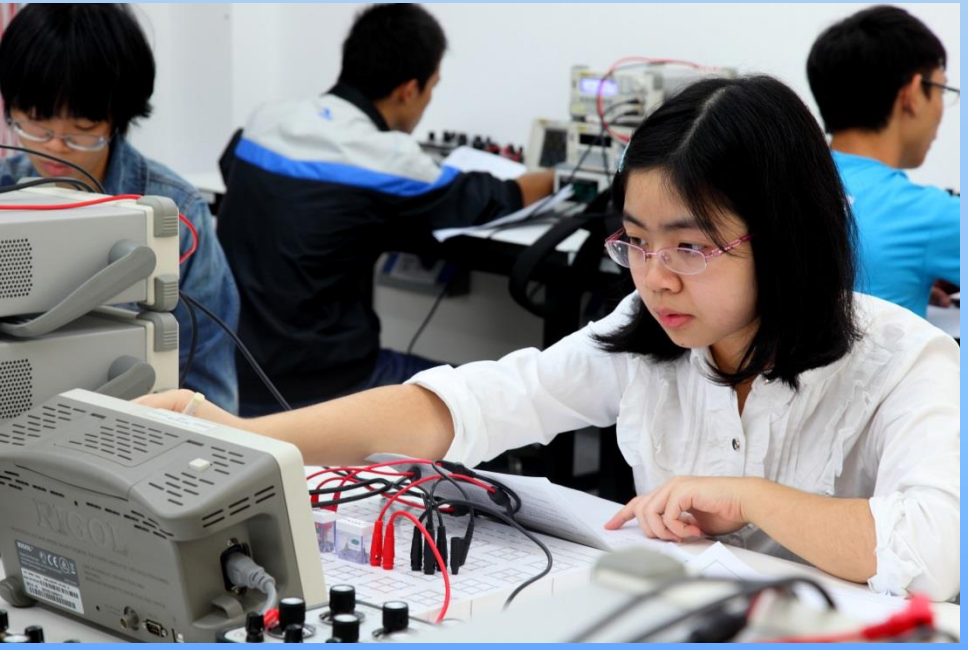
GPL 1 (3/13)

Three categories

1. Confirmatory experiment
2. Designing experiment
3. Research experiment

	Experiment	Contents	Category
A1	Experiment error and uncertainty	1. Length, mass； 2. Data processing	Confirmatory Report

A2	Surface tensions of liquids	1. Method of measurement 2. Measure surface tension of liquid 3. Find the relationship between the tensions and temperature	**Research**
A10	Experiment on Optic table	1. Optical adjust 2. Design of microscope and telescope 3. Setup and calibrate	**Design**



GPL 2 (4/17)

Four categories

1. Confirmatory experiment
2. Synthetic experiment
3. Designing experiment
4. Research experiment

	Experiment	Contents	Category
B1	Measurement of Plank's constant	1. Photonic quantum; 2. Einstein theory; 3. The cut-off frequency	**Research**

B3	Michelson （non-laser）	1. Monochromatic light 2. Wavelength and thickness measurement 3. Coherent length measurement	**Synthetic** **Report**
B13	single slit diffraction	Measure the intensity distribution of single slit diffraction；	**Confirmatory**
B6	Modularized spectrometer	Principle of grating spectroscope (GS)； Assemble a set of GS； Scaling and give the resolution of GS；	**Design**

GPL 3 (3/6)

	Experiment	Contents	Hours	Category
C1	Millikan's oil drop	Measure dropping and rising time; Calculate the charge; Find the elementary charge	8	**Synthetic**
C3	Virtual Instrument @ **LabVIEW**	Design a function generator and a oscilloscope to monitor the signal (time domain and frequency domain).	8	**Design** **Prepare** **Report**
C4	Spectrum of luminescence	Measure the spectra of different materials and analyze corresponding photo luminescence. Study the relationship between the solution density and the absorbance.	8	**Research**

Summary

Mold loading
GPL 1

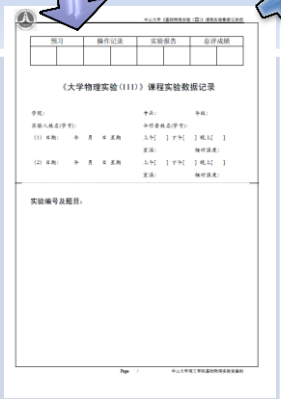
1. Formatted report
2. Detailed preparation materials
3. Online demo of experiment
4. Regularity of operation and measurement
5. Certain overall training related to re-organization

Shaping
GPL2

1. Report with question open and only operation suggestion
2. Reorganized of steps and self –organized report under main instruction
3. More steps and processes need more consideration

Mold unloading
GPL3

1. Outline of directed topics
2. Manual of instruments
3. Target oriented works
4. Self-organized Scientific report
5. More selective works



Free style

1. Self-organized experiment (36 hours)
2. Physics club activities
3. B-E-S-T center
4. Scientific projects of Physics Talented Project of NSFC

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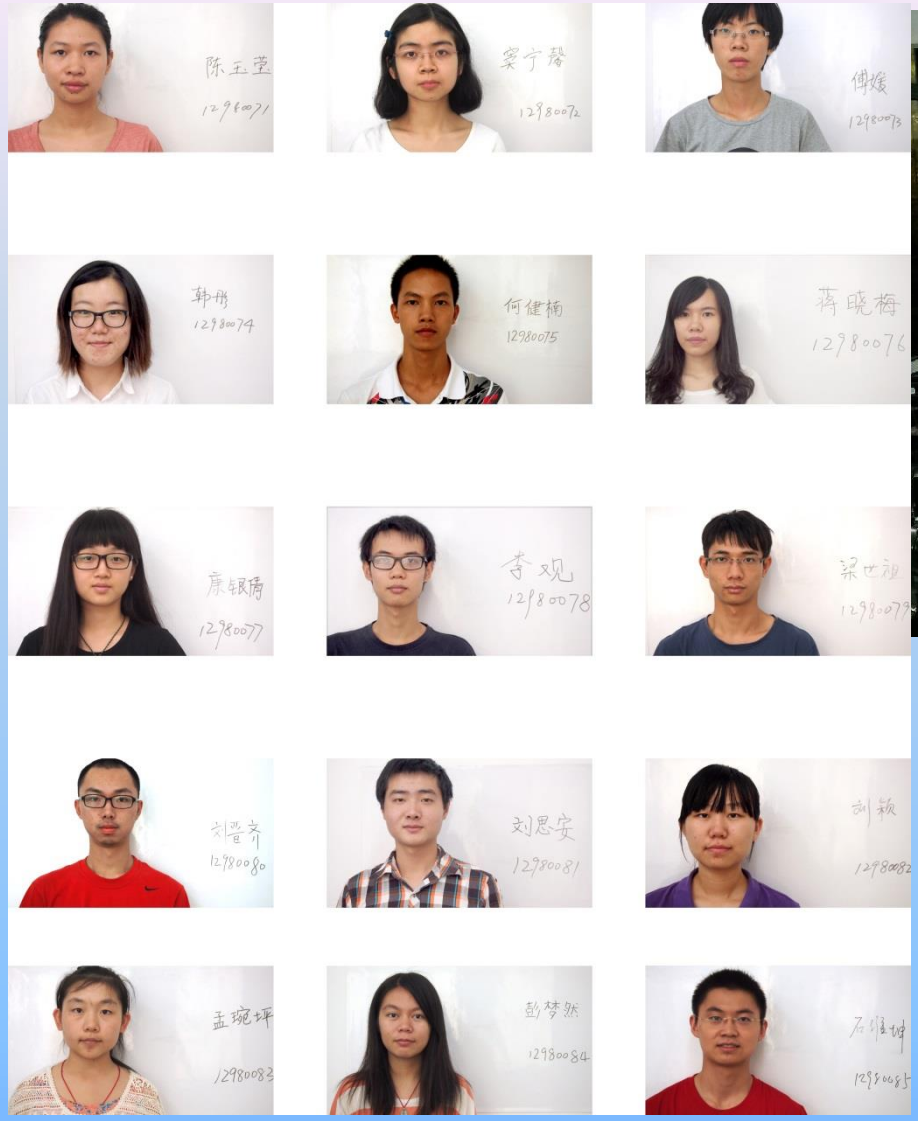
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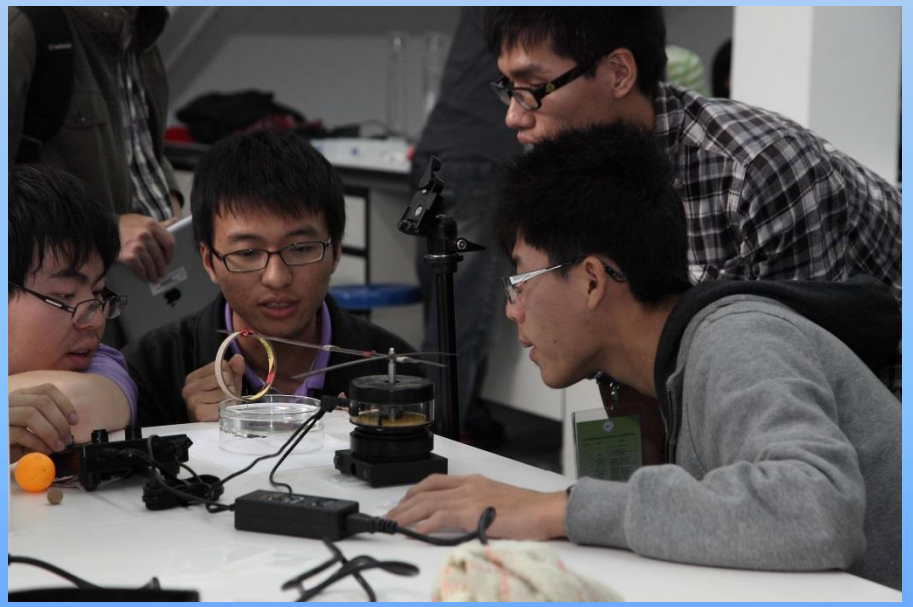

With the wings birds can fly,

Under sunshine seeds can sprout,

Into a proper mold, shaping makes them strong,

to ensure a sustainable growth on their academic road.

Thank you!

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