A study on teaching statistics on Mathematical High School Texbooks in Vietnam

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Outline of presentation

- Research questions

- Term *Activity* in Mathematics textbooks at High School

- Exemples of Statistical Activities

- Activities characteristics

- Concluding remarks

Research questions

- Comparative study

+ Study relative mathematical knowledges in each institution

+ Study teaching and learning practices in each institution

That means

+ Study similatiries and differences of relative mathematical in each institution in 3 levels

+ Study the comment teacher and student tasks

Somes theorical points (Carl Winsloz 2017)

Object of LS (what it is "about")
- *Teaching, by teachers* (more specifically, a lesson)
- *Learning by students*

Objective of LS : to promote
- *Learning, by teachers, related to the previous two objects.*

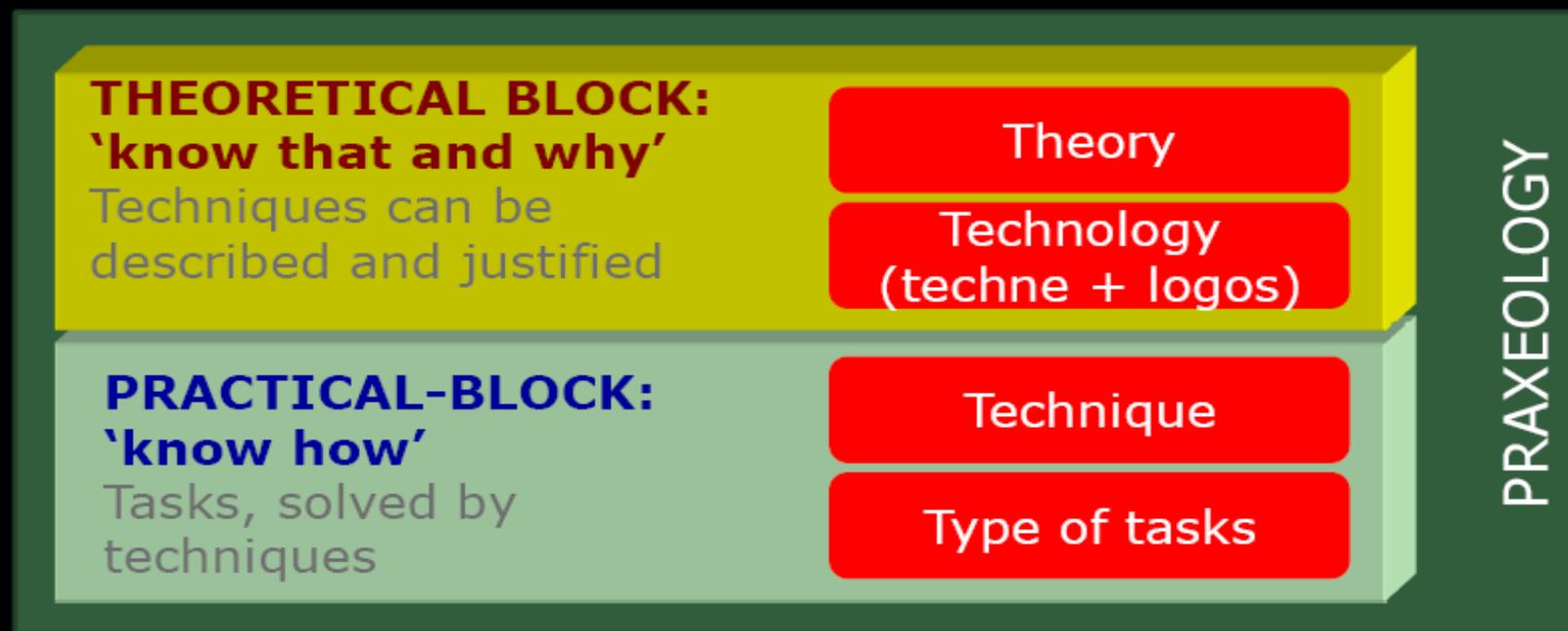LS thus is about *very specific forms of human practice and knowledge:*
- *Mathematical Practice and Knowledge* (by students, teachers)
- *Didactic Practice and Knowedge* (by teachers)

Here, "didactic" refers to the act of teaching or, more broadly, "inducing others into a certain practice / knowledge".
"Didactic practice" is fundamental to *all* human practices!

Somes theorical points (Carl Winsloz 2017)

The notion of *praxeology* (praxis + logos) (Chevallard, 1999)

THEORETICAL BLOCK:
'know that and why'
Techniques can be
described and justified

Theory

Technology
(techne + logos)

PRACTICAL-BLOCK:
'know how'
Tasks, solved by
techniques

Technique

Type of tasks

PRAXEOLOGY

Example of a mathematical praxeology:
- Type of task: find *all x satisfying* 1 1¹ 1 11 1 1 (for given 1,1,1)
- Technique: computation based on 1 1 $\frac{111 \sqrt{1^1 1 111}}{11}$
- Technology: explanation of formula (how, when, why,...))
- Theory: algebraic definitions, rules, etc. to justify

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Somes theorical points (Carl Winsloz 2017)

Mathematical and Didactic Praxeologies

Mathematical Praxeology (MP):
this is what the students should learn; we can model it with the precision we need for a given research project
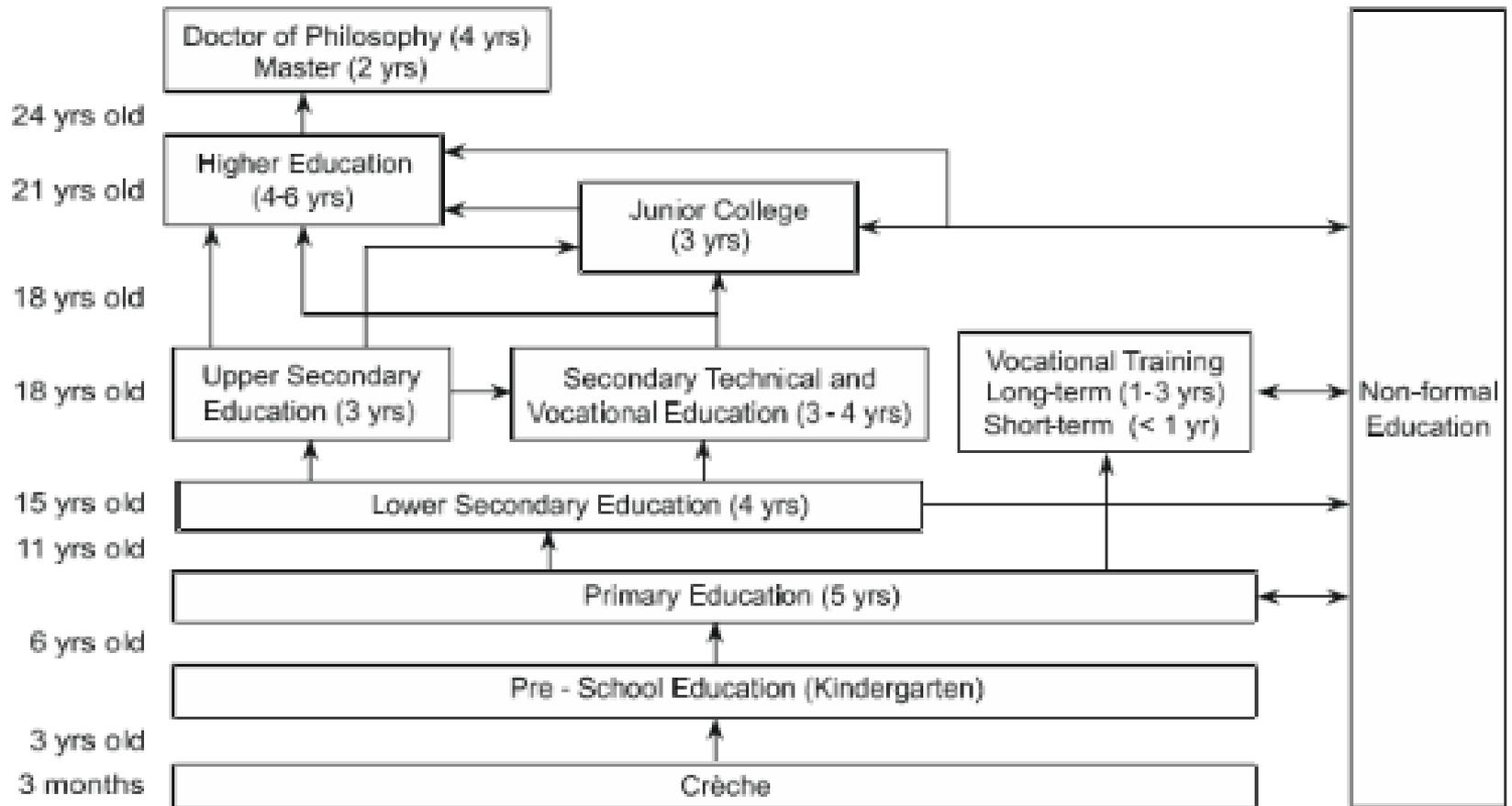
Didactic Praxeology (DP):
1. the didactic *practice* (tasks and techniques) can be observed:
    - tasks of teaching (related to some MP)
    - techniques (what the teacher does to some those tasks)
2. the corresponding *didactic technology* and *theory* is not observable in the classroom – the teacher (normally) neither explains nor justifies his practice there.

NOTICE:
- A DP is always *intimately related* to a MP (for math. teaching)
- technology and theory of DP ~ *core of teacher knowledge*
- The tendency of didactic technology and theory to be "personal", "non-shared", fragmented etc.

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Vietnam education system

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Activity in textbook

- Since 2006: new curricula introduced in high school in order to modernize the learning content and to renovate the teaching method.

- Term ''activity" appears officially for the first time as means to underpin active teaching methods.

- This term has been motioned in seminars and conferences in Secondary Education across Vietnam.

But:

- In teaching textbook for teacher **this term is not defined**.

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Activity in textbook

- What is an activity?

- What are the characteristics of an activity?

- Which kinds of activities are introduced?

- What are the objectives of these activities?

- Are they related to other non mathematical contetx?

Activities in Statistics in Vietnam?

Activity in Statisctics

- Mathematics curriculum at High school consisting of separate subjects [Algebra](#) (year 10 only), [Calculus](#) (year 11 and 12 only) and [Geometry](#) (both year 10, 11 and 12)

- Statisctics are taught at grades 5th, 7th and 10th

Activity in textbook

- According to Nguyen Vinh Hanh (2006), an activity in textbook is a learning task satisfying the following conditions:
  - In accordance with the program;
  - Do not be too simple, too easy such that students performed in a few minutes, but also not too hard to get the students to think for too long or can not be resolved;
  - It is clearly presented, easy to understand for all students to participate.

Remarks

- In most guide books for teacher and in lesson given by teacher: **what students are doing is considered as activity**

- Instead of saying *example* as before, now textbooks are adding the word "activities":
  - Definition of the concept known as "defining activity";
  - Check the knowledge of previous lessons called "inspection activities";
  - Give an counter-example is called "consolidation activity";
    - Questions for testing, reminding… are activities.

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Activity in Statisctics

- In primary school (from Grade 1 to Grade 5): Descriptive statistics are organized **into one lesson** at the 2nd semester at the grade 3th in mathematics program

- Lesson: "Getting to know the statistics"
  Objectives:
  - Helping students become familiar with the sequence data.
  - Knowing how to deal data and setting of data.
  - Understand the basic concepts of statistics table: rows and columns
  - Knowing how to read data from a table.
  - Knowing how to analyze the data of the table.

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Activity in Statisctics

Lower secondary school (from grades 6 to 9)

In the 7th grade mathematics program, descriptive statistics are first organized into separate chapters in the second semester. Content is presented in section four, and all with the review of the 10 periods are distributed as follows:
§ 1. Collecting statistics, frequency (2 periods)
§ 2. Table "frequency" values (2 periods)
§ 3. Chart (2 periods)
§ 4. Mean, mode (2 periods)

1 period for review and 1 period for test.

Activity in Statisctics

- Descriptive statistics appear in 10th grade math program, in the chapter V-Statistics programs in both standard and advanced programs.

- Content in the advanced program includes 3 lessons carried in 9 periods and is distributed as follows:
  § 1. Introduced concepts (1 period)
  § 2. Presenting data patterns (3 periods)
  § 3. The specific number of data samples (3 periods)
  There are 1 period for reviewing and 1 period for testing.

Remarks

- It can be seen that for the current high school math program, descriptive statistics are important part of knowledge, accounting for a amount of 9 periods on 94 periods in Algebra of advanced programs, and 7 periods on 66 in Algebra of standard programs.

- The content focuses around three main problems:
  - Read data.
  - Present data : the frequency distribution tables and diagrams.
  - Calcul characteristics of data: moments (mean, median, mode), a measure of dispersion (variance and standard deviation) and its meaning.

Activity in Statisctics

"Hình 5.1 là biểu đồ tần số hình cột thể hiện bảng 4 với cách vẽ như sau:
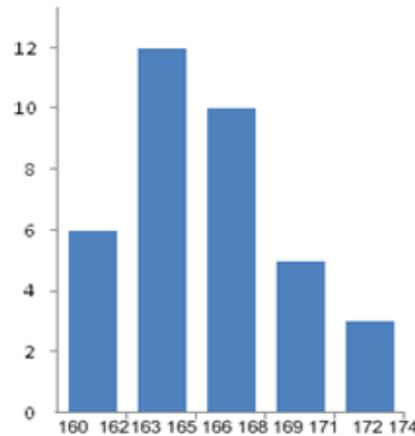
o Vẽ hai đường thẳng vuông góc.

o Trên đường thẳng nằm ngang (dùng làm trục số), ta đánh dấu các đoạn xác định lớp, bắt đầu từ đoạn [160 ; 162] cho tới đoạn [172 ; 174].

o Tại mỗi đoạn, ta dựng lên một cột hình chữ nhật với đáy là đoạn đó, còn chiều cao bằng tần số mà đoạn đó xác định.

Hình thu được đó là **biểu đồ tần số hình cột.**"

[SGK1, trang 165]

A guide for student to build a effective bar diagram

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Activity in Statisctics

1. Hoạt động tr.113/

Cho các số liệu thống kê ghi trong bảng sau

Tiền lãi (nghìn đồng) của mỗi ngày trong 30 ngày được khảo sát ở một quầy bán báo.

| 81 | 37 | 74 | 65 | 31 | 63 | 58 | 82 | 67 | 77 | 63 | 46 | 30 | 53 | 73 |
| 51 | 44 | 52 | 92 | 93 | 53 | 85 | 77 | 47 | 42 | 57 | 57 | 85 | 55 | 64 |

Hãy lập bảng phân phối tần suất ghép lớp với các lớp như sau

[29,5;40,5); [40,5;51,5), [51,5; 62,5), [62,5; 73,5), [73,5; 84,5), [84,5; 95,5)

From the above table, student has to build a new table where data is groupped in class

Activity in Statisctics

2. Hoạt động tr.116/

Cho bảng phân bố tần suất ghép lớp sau

Nhiệt độ trung bình của tháng 12 tại thành phố Vinh từ 1961 đến 1990 (30 năm)

Lớp nhiệt độ (^{0}C)	Tần suất (%)
[15; 17)	16,7
[17; 19)	43,3
[19; 21)	36,7
[21; 23)	3,3
Cộng	100(%)

Hãy mô tả bảng 6 bằng cách vẽ biểu đồ tần suất hình cột và đường gấp khúc tần suất.

Student has to build a frequency bar diagram and fequency line diagram

Activity in Statisctics

4. Hoạt động 2 tr.121/

Trong bảng phân bố tần số, các số liệu thống kê đã được sắp thứ tự thành dãy không giảm theo các giá trị của chúng.

Hãy tìm số trung vị của các số liệu thống kê cho ở bảng 9.

Số áo bán được trong một quý ở một của hàng bán áo sơ mi nam

Cỡ áo	36	37	38	39	40	41	42	Cộng
Tần số (số áo bán được	13	45	126	110	126	40	5	465

Student has to dertemine the median from data.

Concluding remarks

- The task of calculating average, mode, median represent a very important part 72,7% (28/31 and 13/18 questions-activities)

- The descriptive statistics are present in the current mathematics program (applied since 2006): graddes 5th; 7th and 10th and is built through each level from primary school, primary school and high school with specific content and presented in a chapter.

Concluding remarks

- There is almost no direct relationship with the other programs and mathematical knowledge used are very basic.

- Most of activities in the textbooks is not active textbooks according to given definition.

Questions

- How do things happen in others countries?

- In term of DP "What are student tasks?"

- In term of MP "What are statistics knowledge taugh"

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Thank you for your attention

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