The Context-Dependence of Students’ Views on Learning

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Context-dependency of learning

- Many research show that the learning of content-knowledge is highly context-dependent (Gauld, 1988; Kind, 1999; Linn, 1983; Millar et al., 1994; Munby et al., 1998; Palmer, 1997; White, 1985).

- Model analysis was developed to use content-specific contexts as the fundamental variables to analyze students’ conceptual understanding of physics (Bao and Redish, 2001).

- In our investigation on students’ views on learning, we assume that the development of such student views is also context*-dependent.

* The context here refers to content of knowledge, learning environment, and subject.
Research Questions

- Do contexts involve in development of students’ views on learning physics?

- If yes, how do they involve in students’ views on learning physics?
Methods

- Participants
  - 13 graduate students (3 female, 10 male) from physics education seminar course
  - 4 undergraduate students (3 female, 1 male)

- Date collection
  - Web-based surveys (Graduate)
  - Student Projects (Graduate)
  - Individual interviews (Graduate, undergraduate)
Key issues of analysis

- **Sub-topic areas in learning and teaching**
  - **Learning**
    - motivation, metalearning, learning approach/strategies/habits, factors that affect learning, expectation of other students’ learning
  - **Teaching**
    - teaching plan, expectation for their instructors

- **Context variables**
  - **Content of knowledge**
  - **Learning environment**
    - course format
    - learning and teaching situation
  - **Subject**
Examples of Questions

Q: Learning approaches

- Give 3-5 examples of the types of strategies/approaches/habits that you often use in learning physics.
- Recall your experience taking physics courses and discuss your learning approaches used: different content topic
  - Introductory mechanics
  - Introductory E & M, etc.

and used: different time and course format
  - undergraduate courses
  - graduate courses etc.
Results on context-dependency of students’ views

*We have observed context-dependency of students’ views with different context variables:

- **Contents of knowledge**
  - A single student used different learning approaches in learning different content topics

- **Learning environment**
  - A single student used different learning approaches by course format.
  - A single student employed different views in consideration of learning situation vs. teaching situation.

- **Subject**
  - A single student expected other students from different majors would use different learning approaches in their learning.
Different learning approaches in different content topics

S #5:

- **In learning mechanics,**
  “I thought a lot about examples from personal experience and I found it was very helpful. After having this course I could explain many examples in my experience.”

- **In learning E & M,**
  “I tried to think about examples from experience. But there were not many examples from ordinary life. I did a lot of mind experiments. It helped me to solve problems.”

S #10:

- **In learning Quantum mechanics,**
  “It was against my instinct, I didn’t understand anything. Old student told me ‘you will learn it the day give up to understand it’…I only focused on the mathematical tools and didn’t care about the meaning of the problems…it worked for me.”
Different views between learning and teaching situations

S #5: Although this student recognized the importance of students’ naïve model, he did not apply this idea to his teaching plan.

**On learning**

“Usually students’ difficulties in learning physics are due to their naïve models and they have these difficulties very often during solving problems”

**On teaching**

“..lecture, seminar, lab experiments, and homework will be given. Lecture will give students an opportunity to develop listening approach and learn content from lecturer”
Students’ views affected by course format

S #1:
“My learning approaches are basically focused on getting good grade even I have tried to understand the concepts. Sometimes there is not enough time to think about the meaning of basic concepts. **In the context of traditional instruction I don't see that there is much in the students' power to do to improve their learning of physics.** ... but that takes a lot of time that may not be available at the speed that courses often go in order to cover all the material.”
Different expectation of learning approaches of students in different majors

S #D:
“Students who major in physics learn physics. That means they tried to do **conceptual understanding**. However, students who major in non-physics subjects are **just going on basic concepts**. It is to study physics”
Conclusions and Implication

- Student results support our assumption about context-dependency of students’ views on learning.
- We identified three context variables and observed how students’ views were changed according to contexts.
- Our results suggest that in order to make more accurate measurement of students’ views, we should systematically investigate context-dependency of students’ views and integrate this into assessment.