An "Evidence-Based" Professional Development Program for Physics Teachers Focusing on Knowledge Integration

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Design, implementation and study of **A long-term professional development program for physics teachers**

and its influence on **teachers' knowledge, views and practice, and students' learning**

The Program

Evidence-based

Teachers examine their teaching
and their students' learning,
share their findings and reflections
with peers,
summarize the process in
"evidence-reports"

Focusing on knowledge integration (KI)

Through introducing short generic activities
- KIRs - that guide the students to connect
between their learning experiences

Lab ⛓ ***Theory*** ***Problem*** ⛓ ***Principles***

Formula ⛓ ***Physical meaning***

Each KIR is carried out in five phases:

- *Individual work*
- *Group work*
- *Whole-class discussion*
- *Homework*
- *Individual reflection*

Supporting student-centered practice

**Integrating face-to-face meetings
with on-line interactions**

Transforming "The usual once a month meeting workshop to a 9 month workshop"

The Study

Design and implementation of the program

Q1: ***How were the Strategies of the Evidence-Based and Blended-Learning Approaches Carried Out in the Program?***

Design principles

- ***The KI and evidence aspects were acquired simultaneously in an integrated Manner***
- ***The guidance of the teachers followed the principles of cognitive apprenticeship both in the evidence and the KI aspects.***
- ***The teachers experienced the KIRs as learners***

- ***The program promoted continuity of learning through a structured "Blended Learning" approach***

Design and implementation of simple online tools encouraging teachers' reflective discourse between the face-to-face meetings

- *"Your Comments"*
- *"Hot Reports"*
- *"Hot Polls"*
- *"Smashing Sentences"*
- *"Mini Research "*

Quote, please, the most meaningful sentence from your students' reflection

The influence of the program on the teachers' views and knowledge

Q2a: ***How did the evidence-based approach influence the teachers' professional development?***

Content analysis of the teachers' reflective discourse in the face-to-face meetings

Identifying

Predefined categories → **KI, Evidence**

Emerging categories → **Student-centered pedagogies**, **Reasoning patterns**

Continuous learning?

Q2b: How did the blended-learning approach influence the continuity in the teachers' professional development?

Content analysis of the on-line postings

Searching for

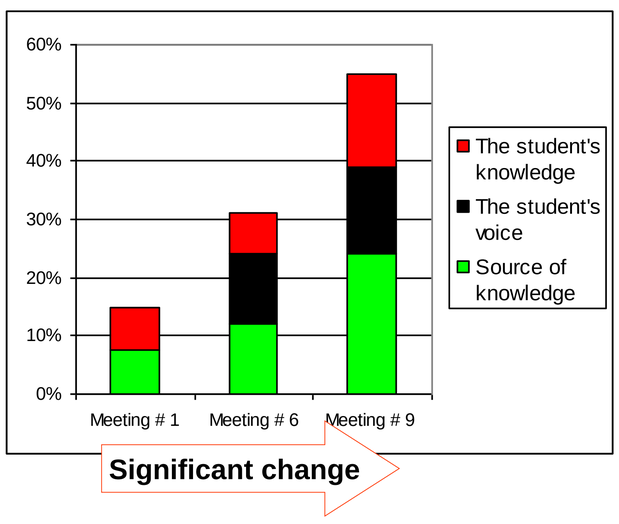
Ideas about → **KI, Evidence, Student-centered pedagogies**

Reasoning patterns → ***•Contrasting facts with expectations*** ***•Generalizations***

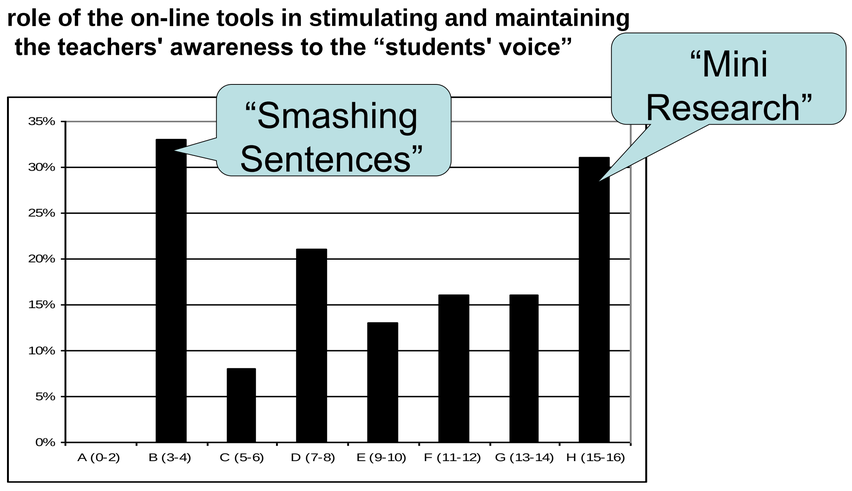
Results

- **Progression in the teachers knowledge and views about KI, evidence, and student-centered pedagogies**
- **Reasoning patterns – mechanisms leading to professional development**
- **Discussing the same ideas in the face-to-face meetings and on-line postings**
- **Use of the same reasoning patterns in the face-to-face meetings and on-line postings**
- **A flow of teachers' ideas between face-to-face and on-line environments resulting in extension of ideas**

"Student - centered" units along the program (N=163)



The role of the on-line tools in stimulating and maintaining the teachers' awareness to the "students' voice"



The percentage of the posted units relating to "students' voice" (N=70)

The influence of the program on the teachers' practice and their students' learning

Q3a: ***What did Teachers Report about the Initial State of their Students' Knowledge and About the Changes in this Knowledge As A Result of Working with the KIRs? How did the Teachers Interpret their Findings?***

Content analysis of the teachers' evidence reports

Teachers identified

Deficiencies in the initial state of their students' knowledge

progression in the students' knowledge while advancing with the KIRs' phases

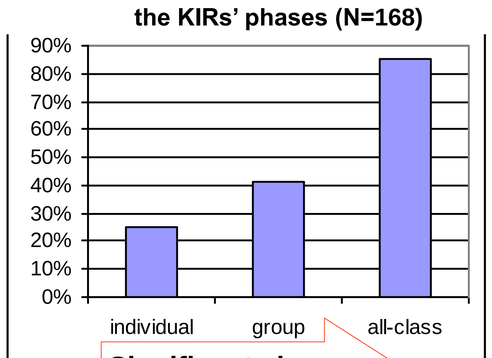
Teachers' interpretations related to their current practice, the nature of the KIRs' tasks and their structure as composed of five phases

Q3b: ***What can be Inferred from the Students' Work about the Initial State of their Knowledge and about the Changes in this Knowledge as a Result of Working with the KIRs?***

Independent analysis of the students' worksheets

Teachers' evidence reflect reality

Distribution of correct answers while advancing with the KIRs' phases (N=168)



Q3c: ***What did Teachers Report about the Changes in their Practice and How it was Influenced by Working with the KIRs?***

Content analysis of the teachers' evidence reports and discourse

Observations in classes

Shift of practice to more student-centered pedagogies

Recommendations