Beliefs, positionings and the development of analytical competences

Lindenskov ; Hetmar ; Andresen

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Find 5 000 000 Danes and 43 000 square kilometres



Education system

All teaching in Danish - to preserve language

- Daycare 1-6 year old. Payment 350 US\$
- Grade 0-9 compulsory. Public are free. Private school fee 300 US \$
- Upper secondary academic or vocational: 3 year long. Free. Student are funded from 18 year.
- Short or long further education. Free. Students are funded 800 US\$ - 1600 US\$. Second chance – fees.
- High income tax up to 60%. Most children leave home 19 years old

Mathematics

 National goals at the end of grade 3, 6, 9
 Teachers from grade 1 are trained as math teachers

 From 2009 goals are partly described as competence

> the eight math competences, constructed by Mogens Niss, mentioned in PISA

National exams and tests

Very few repeaters
End of grade 2, 3, 4, 6, 8 Danish, math, science national tests MAYBE !!!
End of grade 9 national exit exams. Some written some oral. YOU CANNOT FAIL.

 Group examinations with individual marks
 MAYBE AGAIN ///

Interest, enjoyment in math PISA 2003



Weakest interest and enjoyment



Strongest interest and enjoyment



In the research we aim at

- Develop theoretical constructs for core competences
 - > In workplace
 - As responsible, critical citizens,
 - regional and global
 - In family and other social relations

 Develop instructional models providing opportunities to learn better for more students

Framework (as verbs)

Students' developing their sense of what it means to be and act as a doer

Students' doing math in learning environment

Framework (as constructs)

Student's beliefs

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Student's analytical competence

Framework (as spheres)

Reflection in practice

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Practice

A study of the interplay

• students' identities as doers

 according to their statements replying to teacher's questions

Agr. 8 class with 19 students





Oral questions. Written essays

What is mathematics?
What is mathematical thinking?
How to solve a mathematical problem

 The teacher collected data. (She is not educated in qualitative research.)

 Researchers documented, analysed, compared with test, PISA, exam results

First analysis step

 Highest performing: systematic, simplifying, thinking, carefull planning, like music, intelligence

 Middle performing: logic, logical, rules, one right result, calculate, difficult, boring, intelligence

 Lowest performing: logic, logical, rules, one right result, caluculate, difficult, boring, intelligence

Second analysis step

- High performers: M. seeing of things, thinking in units, reducing complexity, listening to the music in M
 - Position themselves as self-confident doers
- Low performers: intelligent people are capable, I am not
 - Mathematical thinking is to understand what they mean
 - Position themselves as engaged in discoursefor-others

Third analysis step

• Looking critically from the point of view of belief theory and positioning theory

- Belief theory need to be developed as a framework fertilised with in-depth small-scale longitudinal investigations
- Positioning theory sees identity as (re)constituted through various discursive practices, and concerns oral concersation, classroom communication, written products. We extend it to a basic analysis category for students' statements

Fourth analysis step

 Analytical competence is theoretically constructed as

- > Operating in formal-logic systems
- Creating models
- > Practicing sociological imagination

Competent doers of math?

- High-performers express themselves fully and detailed on operating in FL- system
- Low-performers don't

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- don't see (with) the mathematics in Viking Ships, which they don't
- express no sociological
 express no sociological

Co-development of competences

 Focus on communicative competence development can enhance teaching and the development of analytical competence

 It has long been recognised that focus on ICT-competence development can enhance teaching and the development of other competences.

Conclusion

- Invite to further experimental research on teaching-learning processes focused on reasoned ways of reading, writing and communicating in the classroom.
- Invite to let positioning become important element of a framework for competence development in LLL-perspective.
- Invite to bridge the gap between human and economic regimes
- Invite to see new demands for competence as tigthly interwoven with demands for new identity.