

Pre-service science teachers' authentic instructional tasks in a PDS setting

Reforms to the teacher education in Aarhus (DK) have recognized the role professional development schools (PDS) can play in stimulating student teachers' inquiries. This is in line with various research-based approaches to educating (science) teachers, which emphasize the benefits of placing student teachers in authentic settings. The study will examine how the PDS setting can frame first year pre-service science teachers' inquiries and the affect of authentic instructional tasks on learning. Findings from the study will be used to further develop the local PDS initiative.

This study is based on an understanding of PDS as both a place and an idea (Mule, 2006):

- PDS-schools (a place) are involved in reforms, collaborate with teacher educational institutions and are assumed to base their practice on research and local inquiries to a higher degree than the average school: to model exemplary practices.
- As an idea PDS aims to ensure teachers' continuing professional development in-service as well as pre-service. PDS-schools are important as frames for student teachers' (STs) inquiries.

Involving STs inquiries in authentic settings is in line with research-based approaches to (science) teacher education (e.g. Korthagen, 2001; Loughran, 2006) - acknowledging that to a high degree teachers' knowledge is situated.

Recent studies recommend rethinking approaches to pre-service training. Microteaching is one example. With this approach the focus is on creating manageable experiences. Such experiences aim to include *authentic instructional tasks* that meet the following **five criteria**:

1. **routinely performed by teachers,**
2. **involve school students in a classroom,**
3. **promote knowledge of practice,**
4. **involve self-reflection and**
5. **serve formative purposes**

(Iverson, Lewis and Talbot III, 2008; Fernandez, 2010)

Research Questions:

In the context of first year pre-service science teacher education in a PDS-setting the questions are:

- *How can authentic instructional tasks be designed?*
- *What are the self-reported learning outcomes from involved student teachers?*

Method

The action research (Cohen, Manion and Morrison, 2007) involved a class of 35 first year pre-service science teachers enrolled in a four year integrated University College (UC) professional bachelor program, their college professors and teachers from a local PDS-school. Repeated interviews were carried out with 10 main 10 main informants. Data analysis were following the principles of constant comparison..

Camp School



Results

Two cases are reported as examples with reference to the 5 criteria of an authentic instructional task:

Example 1, Camp School: The camp school inquiry came after three weeks of teaching at the UC. At college the theme was outdoor education and science theory related to ecology (*knowledge of practice: working with teaching concepts, theory and application*). The student teachers' task in the PDS-setting was to plan and subsequently teach the school students in small groups at the camp school on a small island for two days (*involves students*). The student teachers were responsible for the entire experience: pitching tents, campfire cooking, teaching, entertainment etc. (*In DK camp school is a task routinely performed by teachers*). The student teachers' used observation, note-taking and photos in their inquiry. The experience was assessed through discussions and dialogues on site to promote reflection and revision (*formative assessment and self-reflection with an iterative dimension*).

Climate - Exploratorium



Example 2, Climate Exploratorium:

The STs task was to set up an Exploratorium (*a task routinely performed by teachers*) as a part of a feature week at the PDS-school. All classes at the PDS-school worked with this theme (climate science) for the full week and each class had 1 lesson in the student teachers' Exploratorium (*involves students*).

The activities in the week at the school were videotaped and time was set aside between each class visit for assessment and refinement (*formative assessment and self-reflection with an iterative dimension*). After finishing the Climate Exploratorium at the PDS school the STs back at college presented video excerpts, shared experiences with a focus on their own learning and worked with analyzing the collected artifacts (video, school students' concept maps etc.).

Student teachers' self-reported learning outcomes:

Level 1: Student teachers' learning concerning pupils learning

1a	1b	1A	1B	1Ba	2	2a	2b	2c	2d	3a	3b	3b1	3b2	3c	3d	3e	3f	3g	3h	3i	4a	4b	4c	4d	4e	4f
WHAT PUPILS ARE LIKE					PUPIL LEARNING (observing pupils learning process)					TEACHING PROCESS										TEACHERS PROFESSION/ TEACHERS ROLE						
A: As individuals, what children are like at 12.																										
B: As a group or a class																										

Level 2: Student teachers' reflecting on their own learning

6a	6b	6a1	6a2	6b1	6b2	7a	7b	7c
TEAMWORK IN THE GROUP OF PEERS		LEARNING FROM INVOLVED TEACHERS OR MENTORS				LEARNING FROM THE INITIATIVE: AUTHENTIC INSTRUCTIONAL TASK		

Analyzing the interview data it appears that STs reflect on two levels.

At one level the STs refer to what they have learned about pupils' learning. This involves concrete examples of the school students' approach to activities e.g. that they were really interested in cooking shrimps (quote below) and less interested in looking for seals. Furthermore STs reflected on the importance of hands on as well as minds on science for pupils' learning.

At another level the STs use these concrete examples and narratives to express how they see their own learning. They refer frequently to learning to cooperate with peers and learning to involve pupils in dialogue. Referring to both cases the STs reflects on how the small groups of pupils they taught offered the possibility to get on the same wavelength as the pupils and so gain insight into how children think about science issues. Especially in reference to the climate Exploratorium they note the iterative dimension, the importance of formative assessment and using this to refine their teaching directly.

Interview Question:
Were you surprised about anything?

"The thing about boiling shrimps was absolutely the most interesting. The thing about watching seals in the binoculars was not easy to do because they were so far away sometimes we could not see them at all".
(Quotation)

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