AN IBSME APPROACH TO TEACHING IN IN-SERVICE EDUCATION

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Abstract

In both Portugal and Denmark we have developed teachers' professional development courses (TPD courses) with an IBSME approach to teaching focusing on guiding the teachers in the process of designing his or hers own approach to the concepts or units introduced at TPD courses – taking into account the learning abilities and preconceptions of hers or his students. A core in these courses are IBSME units and generic guides – and in Denmark also video sequence showing implementation in class. We draw on experiences from workshops in Spain, Portugal, Germany and Denmark.

TPD courses - aspects that we share

In developing TPD courses both the Portuguese and Danish teams are working in a dynamic process switching between trying out new ideas in pilot schools, using feedback from the teachers at these schools and developing / redeveloping TPD courses and units for implementing in schools as illustrated below.



In selecting the scientific or mathematical content of the units both countries assign a high priority to working on genuine problems: The teachers should not already know the answers or the problems have more than one simple solution.

Examples from TPD workshops in Alicante Spain, Elmshorn Germany and Lisbon Portugal



How to design the fastest sailing boat? How to construct a seed disperser? How to test the insulation characteristics of cork?

These topics all have a low threshold and a high ceiling and can therefore be used in TPD courses as well as being implemented in classes by the teachers.

Portugal – designing and developing teachers' professional development courses (TPD courses)

In Portugal organizing the workshops involved planning the sessions in close interaction between the content experts (trainers) and the project coordination team. This strategy helped all that the trainers to get familiar with the IBSME approach and design the course session accordingly. Taking part in the courses was a 3 step process: it involved teachers attending the sessions, planning and carrying out activities at school, observing students' reactions and sharing results with peers (end of school year). The calendar of the course was planned keeping in mind the need to allow time for teachers to carry out activities at school. In the last session of the courses, each teacher presented the results of their work, shared successes and difficulties with peers and the coordination team. The activities carried out at school by teachers, based on the TPD course, were also used as an inspiration for the end-of-the-year events for parents.

The teachers' professional development courses worked as the starting point for the development of materials (worksheets and simple materials) to be used as a support for carrying out activities at the schools. The project website (<u>www.cienciaviva.pt/fibonacci</u>) was used to publish and disseminate worksheets and videos. Besides, there is the possibility for teachers to borrow simple, complementary support materials.

Portugal - Strategies to involve and support teachers

The positive response of teachers to the courses was due to the fact that contents (topics) identified were integrated in the curriculum and respond to teachers' needs and interests.

The selection of teachers to take part in the courses was based on a manifestation of interest and a compromise to carry out activities at school.

The sessions were planned to allow teachers experience the IBSME methodology. In order to achieve this, teachers were involved in investigations and were challenged with problems leading to group discussions. Attention was paid to the teachers' needs, their previous experiences as well as their difficulties with science and mathematics concepts. The relaxed atmosphere of the sessions

stimulated teachers to carry out activities, exchange ideas with peers or express doubts and difficulties.

The course worked as a stimulus for teachers to plan and carry out activities with their pupils. Before carrying out activities at school, teachers discussed their plans with the coordinators. When needed, they also got support from content experts.

Providing support materials (simple materials for experiments, worksheets, guidelines, videos for carrying out activities at school was a complementary support offered to teachers. Visits to schools, involving class observation and meetings, was part of the support to teachers who considered this strategy very helpful.

Teachers implementing an IBSME approach in Fibonacci schools

Portugal - using ideas from the TPD course leading to activities at school

An example from a Portuguese school: After taking part in a session on geology (rocks) and geometry concepts (symmetry), two teachers from one of the schools in the project involved their classes in an investigation on symmetry based on Portuguese pavement.

Beforehand, teachers planned the activities, discussed their ideas with the coordinators and the teacher "trainer" as a basis to organize the class activities.

The work with kids started with a city trail with their parents to observe pavement patterns. Class activities followed, during which pupils studied symmetries and worked in group to create a design for the pavement in front of the school. The activity involved a lot of discussion in the groups before coming to final decisions. The best proposal was chosen from among all the several plans and was presented to the local council for implementation, thus letting kids realize the importance of their work.



Denmark – the TPD inspire the teachers to create a learning environment that encourage the students to inquire

We have questions posed by the students themselves as one of the main foci in our TDP workshops. [1] We have been engaged with finding ways of creating a classroom environment that would further the students posing their own questions and still enabling the teacher to select in advance the science and mathematics concept relevant for the class at the specific level / matching the curriculum. The challenges have been to avoid closed ended frame settings. At the TPD workshops we discuss with the participating teachers ways of creating a learning environment taking into account the preconceptions and concept already introduces in their classes – and how to ensure the questioning of the students in an open and creative atmosphere. Inspired by Doris Ash (learner.org. US) thoughts on 'Setting the Stage: Creating a Learning Community' [2] we and the teachers from the Danish Fibonacci school have developed several different approaches for 'setting the stage'. These can be divided into the following categories with briefly described examples:

- A resource person visits the class and presents a real life problem: The cleaning lady needs a device to help to sweep the floor to avoid back ache
 A narrative: A children's book (Ole and the Pinecone People they need help to cross a small stream) or historical memoires (The memoires of a Cabin Boy from 1804 used in our unit on ships) [3]
 - 3. A film (youtube video showing non-migratory birds searching for food in winter) [4]
 - 4. An observation of natural phenomenon's in class or the natural surroundings of the school
 - 5. Science artifacts /materials and experiments: a globe or map looking for bridges

6.Visits to local facilities: weather stations or museums (marine museums, science museum) etc.



The six categories mentioned to a give a picture of variability in the many ways of 'setting the stage'. In process of selecting surroundings and materials for 'setting the stage' we have also been inspired by the pedagogies of the Reggio Emilia in Italy where materials for the teaching are selected with great care and consideration wanting to ensure the materials will both make them wonder, take them by surprise, amuse and fascinate them. [5]

Denmark - The innovative nature of the practice described

The units we have developed and used at the TPD workshops include videos and guides. [6] The videos show lessons at the pilot schools. In the process of selecting our foci for recordings we have been inspired by videos from Le Main a la Pâte [7] and the American Webpage <u>www.learner.org</u> [8]

As part of the workshop, video clips with students at the pilot schools are shown both to familiarize with an IBSME approach to teaching and a range of didactical methods which can be included in an IBSME teaching sequence. To our experiences using video clip showing students working on the unit creates recognisability and transferability to the teachers' own classes which is essential for the teachers to open up to new ideas and approaches to their teaching – like IBSME. We attach

importance to underpinning that *learning in science is not a step-by-step progression through a predetermined hierarchy of activities and skills* [9] and the lessons shown are mainly for inspiration and having a common background for discussions. In the discussions a range of strategies and a number of potential gains for teaching and learning through this approach are identified and can be exemplified and illustrated through the video material.

Portugal - Dissemination

The materials created within the scope of the courses are disseminated on each country's websites, thus allowing teachers in the project as well as those not in the project. In Portugal, materials were published on the Ciência Viva as well as on the Ministry of Education websites, thus reaching a wider audience. [10]

Denmark – Dissemination

Being a nationally spread project challenges both the creation of sustainable network groups and the dissemination process. We have organized regionally based network groups meeting for TPD courses. These groups hopefully develop into communities of practice [11] characterized by the common agenda of the participating teachers to share experiences and ideas adaptable to their own school practice.

As an important part of the dissemination process the schools participating in the first year of Fibonacci Project made fairs to share with the new teachers their experiences in a dialog based manner allowing questions and reflection of matters of possible changes

Nationally projects and units are being presented on our webpage and in newsletters [12]

At the TPD workshop the teachers are encouraged to design their own approach to the unit or topic, to tailor it to their students' needs and to consider progression in both activities and skills.

An example of a teacher developed cross curriculum unit combining science and mathematics disseminated on our webpage: The students are given a wide variety of balls and asked to phrase questions; design experiments with different types of balls testing selected the characteristics. [13]



Notes

1. Elstgeest, Jos: The right questions at the right time In: Primary Science, Taking the Plunge by Harlen Wynne

2. Inspired by Learning Science through Inquiry; Produced by Thirteen/WNET New York in collaboration with the Education Development Center (EDC). 2000 <u>http://www.learner.org/workshops/inquiry/support/index.html</u> and <u>http://www.learner.org/resources/series129.html?pop=yesπd=1452</u>

3. http://www.fibonacci-project.dk/in-english/materials/units/78

4. http://www.youtube.com/watch?feature=player_embedded&v=FuyTF4nlZGE

5. Giudici, Claudia; Rinaldi, Carla; & Krechevsky, Mara (Eds.). (2001). Making learning visible: Children as individual and group learners. Cambridge, MA: Project Zero; Reggio Emilia, Italy: Reggio Children.

6. http://www.fibonacci-project.dk/in-english/materials/units/82

7. http://www.lamap.fr/

8. Please see note 2

9. Wendy Saul and Jeanne Reardon (1996); Beyond the science kit. Inquiry in Action. Heinemann, Portsmouth p 24.

10. Ciência Viva: www.cienciaviva.pt/fibonacci Ministry of education: www.portaldasescolas.pt

11. Communities of practice: learning, meaning, and identity. By Etienne Wenger, Cambridge University Press, 1998. and http://www.ewenger.com/theory/

12. www.fibonacci-project.dk

13. see the description of the project on the port folio page of the school: <u>http://www.fibonacci-project.dk/deltagende-skoler/ankermedets-skole-skagen</u>