la main à la pâte

Training Teachers in Inquiry-Based Science Teaching. An Overview of Training Situations

Objectives of this workshop

- Find the specificities of two different training situations
- Analyze their benefits and their limits in order to plan complementary training activities
- Have an insight into how they can contribute to teacher professional development in the framework of inquiry-based science teaching

Progression of the workshop

Part I

- Experience analyzing a class video-recording in order to identify its training potential

Part II

- Characterize two different training situations :
  - Taking part in inquiry-based activities (“learning through inquiry”)
  - Analyzing class video-recordings

Part I

Precautions for use of videos

Presentation of the context of the video

- Primary school 5th grade (10 and 11 years old students)
- This session is an example of an inquiry-based activity without direct experiment. This is the last of a series of sessions meant for children to understand the relation between circulation and respiration. During the recorded session, student's knowledge acquired through previous activities is gathered. Students represent through drawings the lungs, the heart, the circulation of oxygen (dioxygen) during aspiration, and the path followed by carbon dioxide during expiration. Children take on this activity individually, then in small groups and finally with the whole class.

- "Blood circulation and respiration" (9'05 to 14'30)

- Watch the video and analyse the knowledge structuring (institutionalization) phase by identifying:
  - the various steps taken by the teacher
  - the place and role of the writing
    - possibility to watch the sequence again.

- Work in group : four participants *(15 min)*
  - Answer the assignment and discuss the interest of the different steps
- Collective debate *(15 min)*

Synthesis :

The different stages of the phase :

- collective work based on a silhouette pinned on the blackboard : schematization and verbalization in order to synthesize the knowledge built by the students
- confrontation of the knowledge constructed by the students with established knowledge
- individual writing phases : what the students retain and understand
- collective writing phases : an organised conclusion written by the teacher on the blackboard and written down by each student
  - during this session, two types of writing activities are used to formalise the knowledge gained throughout the investigation : a schematization in the first step and a written description in the last two steps.

Part II/Working instructions

- You have just experienced a training situation based on the analysis of a class video-recording.

  Yesterday, you took part in an inquiry-based science activity, which is also a strategy often used in teachers training.

- Identify (specify) the characteristics of each of these training situations (taking part in an inquiry-based science activity/analyzing a class video-recording) *(30 min)*.

- Use these questions to guide you:
  - What are the advantages for teachers of each type of training situation?
  - What are the limitations for teachers of each type of training situation?
  - How would you use each training situation in the framework of a continuing professional development plan (i.e.: how, when, for whom... how to complement each training situation)

Part II/Working instructions

- Each group will make a poster according to this model

Specificities of the training activity	Taking part in inquiry-based activities	Analyzing class video-recording
Benefits expected for professional training		
Limits perceived for IBSE training		
Example of use (who, when, how…)		

Part II/Working instructions

- Take a look at the work of the other participants *(10 min)*
- Discussion based on your remarks about the posters
- Synthesis concerning the two training activities *(35 min)*
- Conclusion

Participating in an inquiry-based science activity during training

Typology

- Simulation
- Inquiry-based activities adapted for adults
- Inquiry-based activities to go further into a training objective

Simulation

- The inquiry-based activity is almost identical to a class situation
- Prepare the class in an active and practical way
- Reinforce some knowledge
- Makes you want to put it in practice

- Ambiguous position of participants
- A reflexion on implementation with students is necessary
- Good for short training schemes

Inquiry-based activities adapted for adults

- Authentic inquiry
- The distance with class situation is ideal for questioning: role of mediator, importance of interactions, how to deal with error...
- Need to envisage transposition into class

Inquiry-based activities to go further into a training objective

- Ex. of training objectives: the notion of epistemological obstacle, measure, technological approach, variation of one parameter in a experiment, observing the living things, modelling...
- Conclusions from an adult experience need to be put in perspective with children’s learning

A few benchmarks

- Inquiry-based activities are not sufficient in teacher training, they need to be complemented :
  - Reviewing and analysing the inquiry process
  - Addressing didactic considerations
    - Conclusions from an adult inquiry experience need to be put in perspective with children's learning
- Plan a training activity based on a clear objective
- Privilege the diversity of approaches
  - Do not overestimate the impact of the empirical approach nor autonomous knowledge construction in inquiry-based activities for training.
- Inquiry-based activities
  - Are pleasant
  - Allows familiarization with inquiry
  - Provide good occasions to question the place and role of the teacher
  - Are an economic solution to review a scientific knowledge
  - Reassures, gives confidence, makes you want to put it in practice

Using videos in training

Synthesis concerning the use of videos in training

Analysis of class video-recordings are useful to:

- provide participants with a common reference for debate
- reflect on teachers' own practice by referring to that of the teacher on the film
- exchange among pairs through the mediation of the trainer

Some advices:

- Define clear objectives and then plan criteria for analysis in order to generate more interesting reflexions
- specify the context (real duration of the class session, place of the session within a learning sequence) in order to make teaching conditions explicit
- Remind the participants the deontological precautions before watching videos