CEYS Teacher Induction Workshop

Authors: *Bea Merckx, Jozefien Schaffler - Artevelde University College*

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Contents

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1 Introduction

The aim of Intellectual Output O1 was to organise a series of Induction Workshops in the participating countries. The Induction Workshops served a dual purpose for the CEYS project. They would, very early in the life of the project, validate the training modules developed after the training needs analysis. Secondly, they would serve to identify the 'lead' schools/practitioners of the project, and train them in fostering creativity in their science teaching.

Based on the intellectual outputs O1-A1 (Training Needs Analysis), O1-A2 (Development of Induction Workshops) and O1-A3 (Implementation of Induction Workshops), the induction workshop was adjusted to become a useful and realistic scenario of use. This scenario of use can be used to achieve the following aims:

1.	To introduce participants to the rationale and objectives of the CEYS project.
3.	To let participants experience fostering creativity in science teaching, and debate the use of creative approach (CA) and inquiry based science education (IBSE) in their own classroom activities.
4.	To let participants discuss the synergies between creative approaches (CA) and inquiry based science education (IBSE): they can discuss how creativity in early years science can be fostered, based on the Curriculum Design Principles (CLS D5.2).

2 Organisation

The workshop is spread over a whole day, and contains several phases:

09:00 – 09:30 Welcoming and introduction to the CEYS project
09:30 – 09:45 Inquiry activity: explanation of the assignments
09:45 – 10:30 Inquiry activity 1
10:30 – 10:45 Coffee / Tea break
10:45 – 11:30 Inquiry activity 2
11:30 – 12:00 Cleaning up + presentation of the processes and results
12:00 – 13:00 Lunch
13:00 – 14:30 Meta-reflection
14:30 – 14:45 Coffee / Tea break
14:45 – 15:30 Didactical translation to classroom applications

3 Induction workshop: scenario of use

Legend of symbols per phase:

Title of phase		
Timing	Aims	Materials needed
Projection or notes on flip chart	Important reminder for facilitator	

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3.1 Welcoming + introduction to the CEYS project

30’	1	- Brochure CEYS project - Attendance list - Name stickers - Coloured dot stickers
Ppt	The (assistant) facilitator welcomes the participants. Their names are noted, the participants sign the attendance list, and they get a name sticker marked with a coloured dot: - Red: preschool teacher - Blue: early primary school teacher - Yellow: other school staff (e.g. school principal)	

Organisation

The 25 participants sit down, facing the front of the room, where the facilitator welcomes the teachers.

The room is already organised for the following activities: one material table in the back of the room, and 4 tables for 6 or 7 persons each. The participants take place at the tables, facing forward.

Role of the facilitator

(1) The facilitator welcomes the participants and introduces him-/herself. The participants present themselves.
(2) Each participant gets a coloured sticker, according to his/her role. This will facilitate composing heterogeneous groups during the workshop.
(3) The facilitator explains the purpose of the induction workshop, and what the participants can expect during the workshop.
(4) The facilitator presents the CEYS project.

3.2 Inquiry activity: Winnie The Pooh in trouble

135’	2	- Task description assignment 1 (x4) (appendix 1) - Task description assignment 2 (x4) (appendix 2) - Worksheets for structured and open inquiry (appendix 3 & 4) - Materials for the inquiry activity (appendix 5) - Paper and pen for every group - Material for assessment: paper, pens, camera or tablet,…
Ppt	The (assistant) facilitator divides his/her attention between all the groups. When there are 2 facilitators, one person can guide the open inquiry, the other can guide the structured inquiry.	

Organisation

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The room is setup with one material table in the back of the room, and 4 tables for 6 or 7 persons each. The (assistant) facilitator places the task descriptions on the tables (2 tables with task description assignment 1, 2 tables with task description assignment 2, 2 copies per table). After 45', the participants clear out the table. Then they exchange assignments.

At each table a heterogeneous group of people (preschool teachers, early primary school teachers, school staff members) take a seat. This can be obtained by pointing out the colours of their stickers. In order to let everyone participate actively, the 25 participants will be divided in 8 groups of 3 or 4 people each, which means 2 groups per table.

Role of the facilitator

(1) The facilitator sets the context for the workshop, explaining that the teachers will experience a hands-on inquiry activity, in a small group. The facilitator points out that there will be two different approaches, that they will both experience.

(2) The facilitator gives the assignment
The participants are challenged with a problem: Winnie the Pooh is on top of a mountain, but his friend Tigger, who is on the base of the mountain, needs him. He can use the slope of the mountain (a wooden shelf), but how can he come down safely, comfortable and as quick as possible? Can you make him something?

The facilitator asks the participants to record the process. Every group receives a worksheet to fill in. Supplementary they can choose to take pictures, to draw, to film, … using tablets, smartphones, …

The facilitator gives a timing on the inquiry activity, and divides the participants into 8 groups: 4 groups with a structured inquiry activity (assignment 1), 4 groups with a more open-ended inquiry activity (assignment 2). The participants can find the assignment on the tables.

(3) Guidance by the facilitator (and assistant facilitator)

Assignment 1 (structured inquiry): Make a vehicle that transports Winnie the Pooh down in a safe and comfortable way, as fast as possible, following the instructions. Next, examine the variations as presented.

The instructions show how every group can make the same vehicle, using a cardboard box, 2 wooden skewers and 4 caps as wheels. They are asked to test the effect of the steepness and the surface of the slope, and the mass of the vehicle on the speed and safety of the bear in the vehicle.

The facilitator helps to clarify the instructions when needed, and makes sure every group has the same vehicle, so comparison is possible.
Then the facilitator stimulates to test the vehicle. The aim is not to change the vehicle, but it must be tested to make sure the wheels turn, and it is stable. He/she also stimulates to write down (and film, photograph,…) what they examine and what they discover on the worksheet.
The facilitator encourages participants to change the variables. Possible questions are: what happens if you change the steepness of the slope? Does the surface of the slope make any

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difference? Have you noticed…? What happens if…? What is the difference between…? Can you find a way to…?
Attention is drawn to the criteria:

- Speed: does it go faster or slower?
- Safety and comfort: does the bear stay in the vehicle or does he fall out? Does the vehicle stay upright or does it roll over?

The facilitator asks the 2 groups at one table to examine the same variable, and to compare the variations e.g. the first group makes the slope less steep than the second group, and they both release the vehicle at the same time. They test which one goes faster, and if both ways are still safe and comfortable. To exclude the possible influence of the differences between the vehicles, both vehicles are tested on both slopes.

Assignment 2 (open inquiry): Make a transportation system that helps Winnie the Pooh to come down in a safe and comfortable way, as fast as possible.

In the instructions the participants are asked to start with a brainstorm, followed by a drawing of the design on the worksheet. Next, they can explore the materials and start making the transportation system. They can use the slope to test their design.

The facilitator encourages the participants to test the vehicle to see if it meets the criteria, and to let them refine it. In this phase, the role of the facilitator is of high importance, to make sure the participants remain critical and are not instantly satisfied. The facilitator makes sure that the participants don't stay focused on the designing phase, but that they focus on analysing the variables. The design can always be made better, faster, safer, and more comfortable to meet the criteria, therefor the variables have to be tested. The facilitator stimulates to record the process on the worksheet.

Per table, two transportation systems are made. When the facilitator feels the participants are somewhat satisfied with the result, they can start comparing. The comparison is based on the criteria. Who has the fastest, safest and most comfortable transportation system? How did you come to these decisions?

The inquiry activity ends with cleaning up the tables. Then every group presents the process they went through to end up with the final result during both inquiry activities. They reflect on the variety of the designs. Participants are asked to talk about what they observed, what patterns they noticed, what they changed before repeating the tests, how they recorded the process and why,...

The facilitator refers briefly to the science in the activity:

- **Friction**: the surface of the slope and wheels influences the speed of the vehicle.
- **Steepness of the slope**: the steeper the slope, the faster the vehicle goes down.
- **Mass**: the mass influences the speed of the vehicle.

This workshop does not have the goal of explaining the science behind gravity, friction, mass, … This is complicated and not the aim of this workshop. The main purposes are to investigate different factors influencing the speed, to stimulate questions, to stimulate observation, … This will help them to gain some insights in the science behind it, without explanations.

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Note as background information for the facilitator:
In theory, in vacuum and without friction a light and a heavy vehicle will go down at the same speed. However, when air and surface friction are present, mass does have an influence on the final speed of the vehicle. Since, in the latter case the equilibrium of different forces is considered, the resulting downward speed will be influenced by the mass. The bigger the mass, the higher the resulting speed.

3.3 Meta-reflection

90'	2 / 3	- Paper for all participants - Model of Barrow 'Essential features of inquiry and their variations' for all participants (appendix 6) - Marker
Flip chart or board Ppt	The (assistant) facilitator draws 2 columns on the flip chart labelled open inquiry and structured inquiry. The (assistant) facilitator supports the groups during the discussion to help them gain a deeper understanding.	

Organisation

The room is setup with 4 tables for 6 or 7 persons each. The (assistant) facilitator asks to change the composition of the groups. This way, there are participants who started with the open-ended inquiry and participants who started with the structured inquiry in every group.

Role of the facilitator

The facilitator explains the goal of the next phase of the workshop: to make explicit what they experienced on an implicit level. This thinking on a metacognitive level will help in visualising the role of the teacher, and the way he or she can encourage creativity within scientific inquiry.

Step 1:

Each group starts with discussing the inquiry activity they just experienced. They start with individually writing down their experiences for both approaches before discussing it:

→ how they felt during the activity (scared, insecure, enthusiastic,…);
→ if and how their creativity was provoked;
(e.g. the kind of questions the facilitator asked, the fact that the assignment was left open, the way the facilitator stimulated their curiosity by reacting curious him-/herself, the fact that they got time to explore the materials, the feeling that they could choose what they wanted to investigate, they felt ownership,…)
→ what it was that stimulated them to investigate;
→ which ordering of approach they think they prefer and why:
open→structured or structured→open;
→ how did you assess the process? What can be the benefits of assessment? (e.g. it can help us to improve the process in the future)

Step 2:

The facilitator invites the groups to discuss the inquiry activities they just experienced. The facilitator asks the participants to list the main characteristics of the open-ended and structured inquiry activities (e.g. very engaging, made me feel anxious, clear expectations,…). This is discussed with the

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whole group, the facilitator writes down the main characteristics of both approaches on the flip chart. Does everyone agree? If not, why? What are the main differences?

Step 3:

The (assistant) facilitator draws the attention to the role of the teacher. The participants are asked to describe and discuss in detail the role of the teacher in the different approaches. The facilitator underlines the role of questioning, evidence and communicating results, the interaction with the participants, the nature of the instructions, teacher interventions, …).

Step 4:

The assistant facilitator distributes the model of Barrow and explains the features of inquiry and the possible variations. This model can support the participants' reflection on both approaches. The participants get time to read the information, ask questions, and then mark on the model where they would put the two different approaches. They can discuss this in the small group, before it is debated plenary. The facilitator asks the participants to explain their choices, to discuss the profile of the different approaches, and how these have an impact on the opportunities for developing creativity and on children's learning more generally.

Step 5:

After discussion in groups, the main characteristics of the open and structured approaches are written down on the flip chart.

Based on the previous steps, participants can compare the key features of open and structured inquiry. Do they think the different types of inquiry have a different impact on the opportunities for developing creativity?

Step 6:

The facilitator presents the synergies between inquiry based and creative approaches and gives background information of the CLS project. The participants try to link the synergies to the approaches they experienced.

- Play and exploration
- Motivation and affect
- Dialogue and collaboration
- Problem solving and agency
- Questioning and curiosity
- Reflection and reasoning
- Teacher scaffolding and involvement
- Assessment for learning
  (More information about the synergies: p.3 and CLS deliverable 2.2)

Step 7:

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The facilitator presents the model of Nature of Science[1]. The participants reflect on the analogies between the two approaches in the workshop and the way scientists work in reality (= Nature of Science). Which approach is similar to the way a scientist works? Expected response: an open approach is more similar to the actual way a scientist works. He/she doesn't have a road map, starts from a research question and has to design every step in his/her research.

3.4 Didactical translation to classroom applications

45'	2	Three templates linked to IBSE (selected from CLS D5.3) Video
/	/	

Organisation

The participants work in 4 small heterogeneous groups (preschool teachers, early primary school teachers, school staff members), which can be obtained by pointing out the colours of their stickers.

Role of the facilitator

When it is clarified how the creativity of the participants was provoked, the facilitator lifts the discussion to a higher level: how can we provoke the creativity, curiosity and imagination of young children? How can we encourage and/or provoke the ideas, theories and questions of young children?

Step 1:

The assistant facilitator distributes three templates linked to IBSE (CLS D5.3). He/she refers to the website of CLS, in order to let the participants get acquainted with the website and the deliverables of CLS. The facilitator briefly explains the course of the activities, and sets the context. If possible, the facilitator shows some video fragments of relevant activities.

The facilitator asks the participants to discuss the approach in the templates.

Step 2:

Based on the discussion in the previous phase and the templates, participants discuss the scientific (and other) activities they use in their own class context. They discuss with the other participants of the group, how they can adapt the activity, to encourage more creativity, agency and opportunities for children's inquiry and decision-making.

The facilitator moves around between the groups, to listen, to ask questions, to give examples when needed.

Step 3:

At the end of this phase, the participants present their ideas plenary. The facilitator points out the implications for resources, design of activities, role of the teacher, assessment, …

[1] Akerson, V.L., Weiland, I. S., Pongsanon, K., & Nargund, V. (2010). Evidence-based Strategies for Teaching Nature of Science to Young Children. *Journal of Kirsehir Education*, 11 (4), 61-78.

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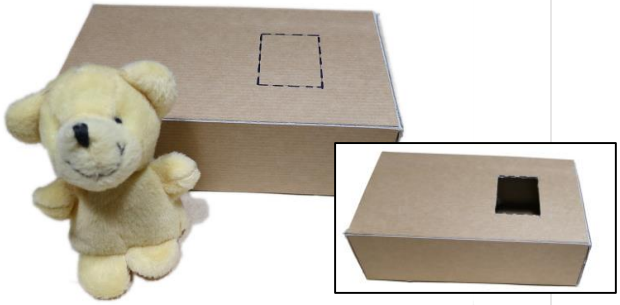
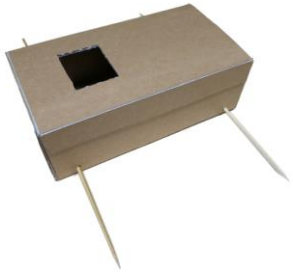
4 Appendices

Appendix 1: Task description assignment 1

Task description assignment 1: Make a vehicle that transports Winnie the Pooh down in a safe and comfortable way, as fast as possible, following the instructions. Next, examine the variations as presented.

Instruction: how to make the vehicle

1. Take a cardboard box slightly bigger than the bear, 4 caps and 2 wooden skewers. *(Let all participants choose an appropriate box or let them construct it according to the plan in annex 9).*	
2. Cut a rectangular opening for the bear to sit in.	
3. Punch 4 small holes in the side, for the axis with the wheels.	
4. Put a wooden skewer through the 2 holes in the front of the box, and the other skewer through the 2 holes in the back of the box.	

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5. Take 4 caps. Punch a small hole in every cap.	
6. Place a cap on each side of the 2 wooden skewers. Cut off the needless part of the skewers.	
7. Gently move around the skewers to enlarge the holes in the cardboard box. This will make sure the axis can rotate, so the vehicle can move forward.	

Instruction: how to test the variables

You can test the following variables, and examine if changing the variables has an effect on the speed of the vehicle, the safety and the comfort for Winnie The Pooh. Write down what you discover, and compare this with your neighbouring group.

1. Steepness of the slope
   Place one end of the slope higher and lower, by putting it on a tower of small blocks, boxes or books. Investigate the effect of the steepness of the slope on the speed of the vehicle. Make sure it remains safe and comfortable for the bear.

2. Surface of the slope
   Depending on the surface of the slope, there is more or less friction. Test this by putting different materials on the surface of the slope, and let the vehicle run down. Does it go faster or slower?

3. Mass of the vehicle

Put small weight units or other small materials in the vehicle. Examine the effect on the speed of the vehicle.

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Appendix 2: Task description assignment 2

Task description assignment 2: Make a transportation system that helps Winnie the Pooh to come down in a safe and comfortable way, as fast as possible.

Instruction: how to make a transportation system

Winnie the Pooh is a teddy bear measuring about 10 cm. Design 'something' to make him come down a certain altitude in a safe way. You can use the slope, but you may also examine other ways to make him come down safely and fast.

Start with a brainstorm or by making a sketch. Discuss the different possibilities, and look for a design that meets the criteria.

Next, explore the materials, and start making the transportation system.

During the process, test and refine the design regularly. Is it fast, safe and comfortable? Can you make it faster, safer or more comfortable?

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Appendix 3: Worksheet for structured inquiry

Open versus structured inquiry worksheet

Name: _____

Date: _____

Type of inquiry: open / structured inquiry *(delete as appropriate)*

Materials needed:

Procedure:

Results:

1) Surface of the slope

Kind of surface	Time to reach the bottom of the slope	Observations

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2) Steepness of the slope

Steepness	Time to reach the bottom of the slope	Observations

3) Mass of the vehicle

Mass	Time to reach the bottom of the slope	Observations

Conclusion:

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Appendix 4: Worksheets for open inquiry

Open versus structured inquiry worksheet

Name: _____

Date: _____

Type of inquiry: open / structured inquiry *(delete as appropriate)*

Drawing of proposed solution:

Materials needed:

Proposed procedure to identify the variables:

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Results:

Conclusion + ideas for further observation and research:

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Appendix 5: Materials for the inquiry activity

Task description assignment 1: Materials (per group of 3 or 4)

Materials to make the vehicle	
1 small teddy bear (measuring about 10 cm)	A cardboard box slightly bigger than the bear (e.g. 16 x 9 x 6 cm).
2 wooden skewers	4 caps for the wheels
Perforating needle or screwdriver	A wooden or cardboard slope, about 60 cm long
Ruler	Scissors
Glue gun	Pincers
Pencil	Craft knife
Materials to test the impact of steepness of the slope	
Small blocks, boxes or books	
Materials to test the impact of surface of the slope (materials have approximately the same size as the slope)	
Felt	Candle (wax)
Bubble wrap	Sandpaper
Clingfilm	Soap
Aluminium foil	Tape to attach the materials on the slope
Materials to test the impact of the mass of the vehicle	
Small weight units, marbles or other small and heavy materials	

Task description assignment 2: Materials (per group of 3 or 4)

Materials to make the vehicle	
1 small teddy bear	Old cardboard or plastic boxes, empty plastic bottles, paper and plastic cups,…
Different kinds of glue: glue gun, white glue, super glue, glue stick	Different kinds of tape: narrow, broad, double stick tape, paper tape
Wooden skewers, drinking straws	Caps, corks, beer mats, …
Rubber bands	Paper clips, split pins
Perforating needle, screwdrivers, hammer	A wooden or cardboard slope, about 60 cm long
Stapler	Thumbtacks
Thread and wool of different materials and thickness	Scissors, craft knife
Felt	Candle (wax)
Bubble wrap	Sandpaper
Small weight units, marbles	Small nails
A slope, about 60 cm long (optional to use)	Different kinds of fabric
….	

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Appendix 6: Model of Barrow 'Essential features of inquiry and their variations'

(Barrow, L. H. 2010. Encouraging creativity with scientific inquiry. Creative Education, 1(1),p3.

Essential Feature	Variations			
	More.....Amount of Learner Self-Direction.....Less			
	Less.....Amount of Direction from Teacher Material.....More			
Learner engages in scientifically orientated questions	Learner poses a question	Learner selects among questions, poses new questions	Learner sharpens or clarifies question provided by teacher, materials or source	Learner engages in question provided by teacher, materials and source
Learner gives priority to evidence in responding to questions	Learner determines what constitutes evidence and collects it	Learner directed to collect certain data	Learner given data and asked to analyse	Learner given data and told how to analyse
Learner formulates explanations from evidence	Learner formulates explanations after summarising evidence	Learner guided in process of formulating explanations from evidence	Learner given possible ways to use evidence to formulate explanation	Learner provided with evidence
Learner connects explanations to scientific knowledge	Learner independently examines other resources and forms links to explanations	Learner directed toward areas and sources of scientific knowledge	Learner given possible connections	
Learner communicates and justifies explanations	Learner forms reasonable and logical argument to communicate explanations	Learner coached in development of communication	Learner provided broad guidelines to sharpen communication	Learner gives steps and procedures to communication

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