Existing approaches in early years science and mathematics education in Europe: Comparison between policy and teacher surveys

Sari Havu-Nuutinen, University of Eastern Finland, Finland

Esme Glauert, Institute of Education, University of London, UK

Fani Stylianidou, Dimitris Rossis, Ellinogermaniki Agogi, Greece

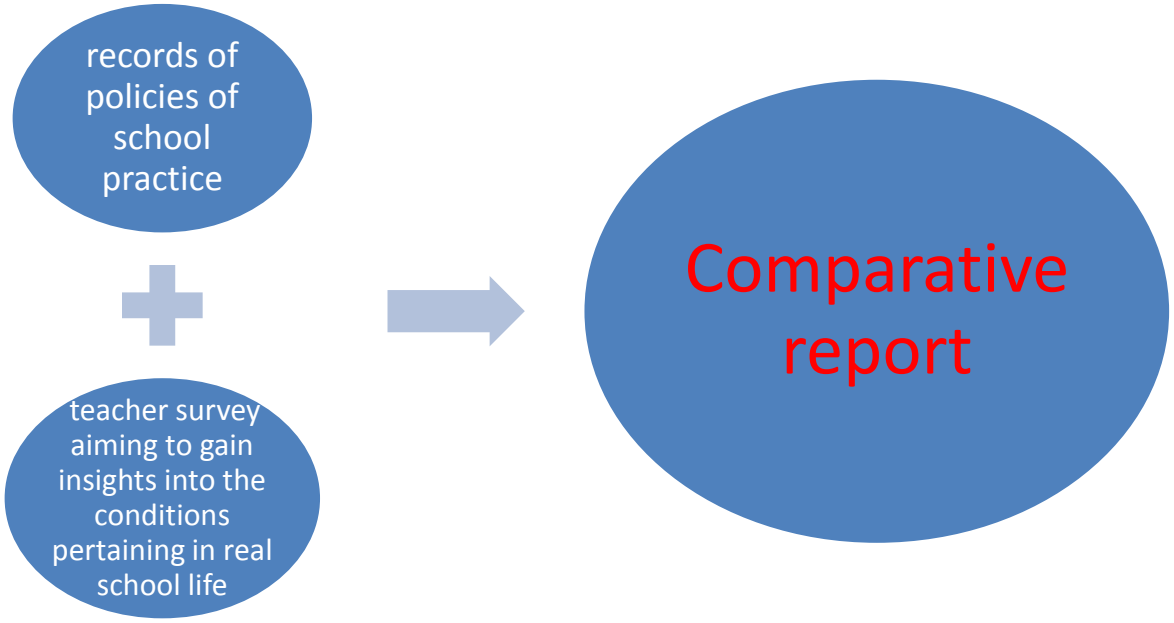
http://bit.ly/1fuIfxL

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Aims of Work Package 3

The work package 3 seeks to

map and comparatively assess existing approaches to science and mathematics education in early years education



The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Research questions of the projects

1. How are the teaching, learning and assessment of science and mathematics in Early Years in the partner countries conceptualised by teachers and what role if any does creativity play in these?
   - comparing the similarities and differences between:
     - policies and teachers
     - the countries
     - preschool and early years education
     - science and mathematics education

2. What approaches are used in the teaching, learning and assessment of science and mathematics in Early Years in the partner countries and what role if any does creativity play in these?

3. In what ways do these approaches seek to foster young children's learning and motivation in science and mathematics, and how do teachers perceive their role in doing so?

4. How can findings emerging from analysis in relation to questions 1-3 inform the development of practice in the classroom and in teacher education (ITE and CPD)?

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Strands and dimensions from the Conceptual Framework (1)

Conceptual Framework Strands	Dimensions linked to Curriculum Components 'The vulnerable spider web' van den Akker (2010)
Aims /Purpose/priorities	Rationale or vision: Why are children learning?
	Aims and Objectives: Toward which goals are children learning?
Teaching, learning and assessment	Learning activities: How are children learning?
	Pedagogy: How is the teacher facilitating learning?
	Assessment: How to measure how far children's learning has progressed?

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Strands and dimensions from the Conceptual Framework (2)

Conceptual Framework Strands	Dimensions
Contextual factors	Content: What are children learning?
	Location: Where are children learning?
	Materials and resources: With what are children learning?
	Time: When are children learning?
	Grouping: With whom are children learning?
Contextual factors TEACHERS	Teacher Personal Characteristics
	Teacher General Education and Training
	Teacher Science and Mathematics Knowledge, Skills and Confidence
	Initial teacher training
	Continuing Professional Development

Methodological principles of comparisons

Similarities

Differencies

- Each partner provided a comparative summary about the main findings of their national surveys.

The original quantitative data was combined to enable comparisons by countries

Preschool and primary school data was considered separately.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Rationale or Vision

- The largest coherence between teacher survey and policy survey
  - high importance on developing socially, environmentally aware and responsible citizens
  - developing important attitudes and dispositions as a foundation for future learning
- The largest difference between policy documents and teachers' views focus on *aims and objectives*
  - the cognitive aspects are emphasised in policy while the social factors more by the teachers

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Rationale or Vision

- The differences between preschool and primary school can be found from the emphasis on the cognitive and social dimensions of learning.
- The most relevant difference between science and mathematics education is related to the nature of the subject area.
  - Science is often considered to be a part of a wider subject area.
- Creativity identified with the development of skills of inquiry and social and affective factors

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Learning activities

- The largest coherence between teacher survey and policy survey across countries
  - Observing and asking questions are seen as significant.
- Larger differences can be found from cognitive activities and role of creativity
  - Planning
  - Conducting investigations
  - Using equipment

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Learning activities

- In preschool the activities are often play orientated and at the primary level, more inquiry orientated.
- There are no apparent differences between the learning activities of science and mathematics.
- Creativity associated with questioning, observing and investigation.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Pedagogy

- Both policy and teacher survey emphasis role of play in pedagogy in preschool and problem solving and finding at primary school
- The largest difference between policy documents and teachers' views fall on
  - Use of stories in teaching science
  - Value social and affective approaches
  - Role of ICT

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Pedagogy

- In preschool child-centeredness comes across in pedagogy, but in primary education role is more to promote the children's learning
- There were no significant differences between science and mathematics education
- Creativity was mostly associated with play and problem solving.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Assessment

- Ways of assessment are consistently evident in both policies and teacher practices.
- Assessment priorities differ between policy documents and teachers' views.
  - Cognitive factors are more emphasised in policy documents and affective in teacher responses
  - Assessing pupils' competencies to carry out scientific inquiries is considered less important in policy documents than by teachers
  - The role of creativity does not explicitly become evident in the partner policies, but teachers do highlight creative attributes in assessment.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Assessment

- Main differences between preschool and primary school
  - preschool is more focused on general learning skills and social and affective factors
  - formative assessment can be seen to be more appropriate for preschool, while summative approaches are used at primary school

- Differences between science and mathematics stayed on a low level.
  - Varied approaches are used for assessment in both subjects.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Comparisons: Contextual factors

- Clear agreement between policy and teacher surveys
  - Contents of science learning
  - Location of learning
  - Grouping of learning
- Different orientation can be found from
  - Materials and resources
  - Time allocation (only primary level)

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Context-specific aspects between policy and practice

- In pedagogical approaches, problem solving is not emphasized by polices in UK England, although teachers often use them.
- Drama and pretend play is emphasised in French policies, but teachers rarely use these in preschool.
- In preschool in Germany and Romania coherence exists between policy and teacher survey in the use of portfolios as a way of assessment.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Context-specific themes

- Finnish teachers rarely seem to use inquiry and ICT tools in science at preschool.
- France, Germany, UK Scotland and UK Wales have more hand on exploration materials than other countries.
- The trends in Rationale and vision were exceptional in UK England compared with those in other partner countries.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Implications for developing school practices and further research

- There is a need to focus more carefully on the role of appropriate diversity in settings and in particular cases
- To probe more deeply and provide insight into teachers' conceptualisations and practice regarding playful experimentation
- To clarify the coherence between cognitive and social and affective aims
- The role of priorities and ways of assessment; how creative attributes are used in assessment

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

- Potential for inquiry and creativity in early years science and mathematics
- Complex relationships between policy and practice and between different dimensions of policy
- Areas for further exemplification and support include
  - social and affective dimensions of science learning
  - planning investigations and evaluating ideas and explanations
  - nature of science
  - approaches to assessment
  - mutimodal approaches to representing and expressing ideas
  - scope for autonomy – for both children and teachers

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Acknowledgements

Presentation based on Work Package 3: http://www.creative-little-scientists.eu

Coordinator Ellinogermaniki Agogi, Greece: Dr. Fani Stylianidou

Lead partners for this Work Package

D 3.1 University of Eastern Finland, Sari Havu-Nuutinen

D 3.2 Institute of Education, Esmé Glauert and Andrew Manches

D 3.3 Ellinogermaniki Agogi, Greece, Fani Stulianidou, Dimitris Rossis

Contributing partners

Open University, UK: Anna Craft, Teresa Cremin, Jim Clack; Bishop Grosseteste University College Lincoln, UK: Ashley Compton, Jane Johnston, Alison Riley; University College Aarteveldehogesschool, Belgium: Hilde Van Houte, Kirsten Devlieger, Marike De Smet; Goethe University Frankfurt: Annette Scheersoi; University of Minho, Portugal, Manuel F.M. Costa, Paulo Varela; National Institute for Laser, Plasma and Radiation Physics: Dan Sporea, Adelina Sporea: Université de Picardie Jules Verne, France: Olga Megalakaki, Soren Frappart ; University of Malta: Suzanne Gatt.

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.

Thank you for your attention!
http://bit.ly/1fuIfxL

For further details of this presentation , please contact

sari.havu-nuutinen@uef.fi

The project CREATIVE LITTLE SCIENTISTS has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289081.