Creativity in Science and Mathematics Teaching in the Romanian Early Years Educational System

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

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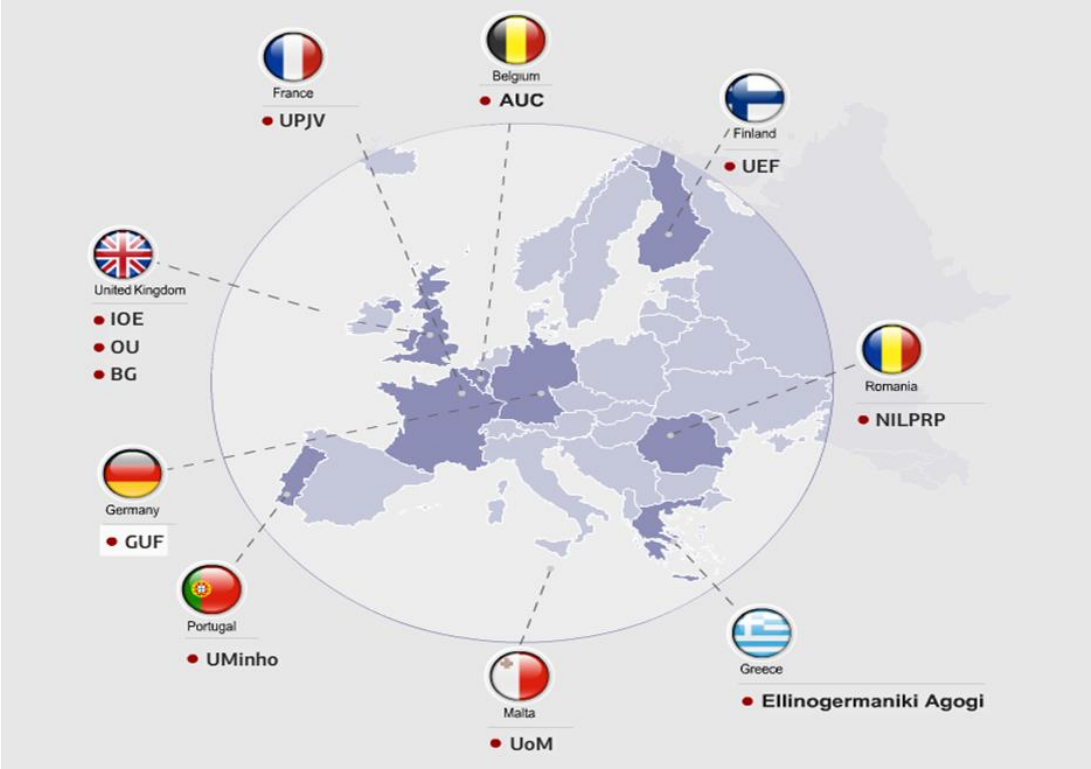
Creative Little Scientists - Enabling Creativity through Science and Mathematics in Preschool and First Years of Primary Education

The project partners



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Target group: children from 5 to 8 years old

Project partners: Belgium, Finland, France, Germany, Greece, Malta, Portugal, Romania, and the UK

Partners' core competences:

- science and mathematics education in early childhood;
- creativity in education;
- cognitive psychology;
- comparative educational studies;
- teacher training.

Coordinator: Dr. Fani Stylianidou, Ellinogermaniki Agogi, Greece

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The project goals

- to evaluate the way creativity and science and mathematics teaching are inter-linked and conditioned as reflected by the European education policies;
- to analyze teachers' perception and practice in relation to these subjects;
- to provide a comparative assessment of these issues among the nine participating countries;
- to propose guidelines, curricula and exemplary materials for relevant teacher training in various European contexts.

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Tools used

- literature review on inquiry-based teaching and learning, creativity, science and mathematics teaching in Early Education;
- teachers on-line survey;
- focus groups stakeholders;
- filed research in education institutions (pre-schools and primary schools).

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Goals of the reported research

In the frame of the “Creative Little Scientists” project we run a survey at national level in relation to teachers perceptions on the links existing between science and mathematics teaching, creativity development and inquiry-based teaching and learning.

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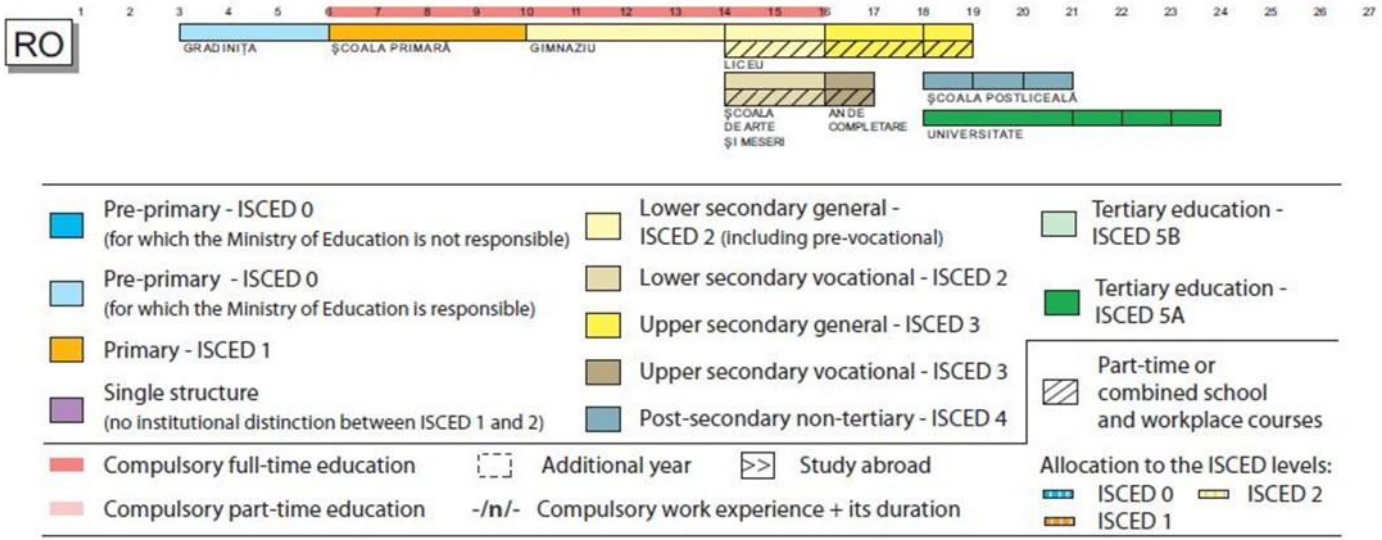
Romanian educational system

The structure of the Romanian educational system according to the UNESCO's "International Standard Classification of Education", EACEA P9, 2009. Eurydice Key Data on Education in Europe Education, Audiovisual and Culture Executive Agency, ISBN 978-92-9201-033-1, DOI 10.2797/1715.



Source: Eurydice.

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Project frame

The backbone of the research is represented by the "Conceptual Framework" set by the project team with the main focus on two major components of basic questions:

a) approaches to teaching, learning and assessment (rationale or vision; aims and objectives; content; learning activities; teacher role/location; materials and resources; groupings; time; assessment);

b) approaches to teacher education (initial teacher education; continuing professional development).

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National context

- the Romanian education system had undergone important changes as a new Law of National Education was promoted (2011) and came into effect.
- according to this Law, a pre-school preparatory class was added to the primary school education and a new vision on Early Education emerged.
- a new paradigm of teaching and learning in early years is promoted, shifting from knowledge transfers and reproduction towards understanding of the surrounding world, development of key competences, active participation of the leaner, individual learning planning, inter-disciplinary approach, applied mathematics, formative assessment.

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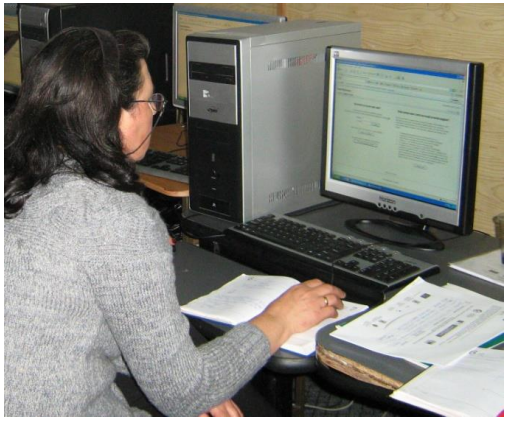
Method of investigation

Online survey based on a questionnaire designed and recommended by the project coordinator and agreed with partners.



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Method of investigation

- The survey was active between 20.05.2012 and 30.06.2012.
- During the survey run one call for participation was launched on 17.05.2012.
- Over the survey lifetime, 270 teachers enrolled to the survey, while only 258 answered all questions.

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Method of investigation

- Data gathering was organized by using the “Monkey Survey” site.
- Participants had to answer 44 questions organized in 7 sections.
- The estimated time required to complete the task was one hour and a half.

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Method of investigation

Based on the survey a national Report was prepared. This Report facilitates comparison between existing approaches in real practice and their illustration in public policy documents and described in Deliverable D3.2 - **Report on Mapping and Comparing Recorded Practices**, towards the synthesis of the **Comparative Report** (D3.4).

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Groups of participants

- teachers participating to national and European projects coordinated by Center for Science Education and Training – CSET;
- former attendees to courses delivered by CSET on inquiry-based science education (IBSE);
- teachers involved in various science related activities (Science Days, science fairs, contests for children, conferences and symposia);
- members of the National Primary School Teachers Association;
- participants to a national action focused on combating early years school abandon.

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Ethical issues

- Participants' identity to the survey is not disclosed in this study.
- Data provided by the participants are used only for research and statistical purposed.
- The Institute is registered to the National Supervisory Authority for Personal Data Processing as a personal data controller under No. 15407.
- By registering on the "Monkey Survey" site, the participants consented to voluntary participation

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Analysis

- In the case of single answer per question, data are reported as a percentage of the total number of respondents to that particular question.
- In the case of questions to which participants can select several options the reporting takes the form of number of responses.
- The analysis of the participants feedback is done either for the highest rank (e.g. “very often”, “strongly agree”) or, according to the case, considering the combined results of the highest ranks (e.g. “quite often and very often”, “agree and strongly agree”).
- From all the 40 questions we selected for this study only three questions with close links to creativity.

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"How often do you use the following learning/teaching contexts and approaches in your SCIENCE teaching?"

Open/unstructured play	Building on children own experience
Role/Pretend play	Encouraging different ways of recording
Drama	Encouraging problem finding
Teaching science from stories	Encouraging problem solving
Using history to teach science	Encouraging children to try out their own ideas
Working in small groups	Fostering classroom discussion
Physical exploration of materials	Fostering imagination
Using outdoor learning activities	Relating science with every day life
Taking children on field trips	Using questioning
Integrating science with other curricular areas	Using digital technologies
Fostering autonomous learning	

SEVENTH FRAMEWORK PROGRAMME

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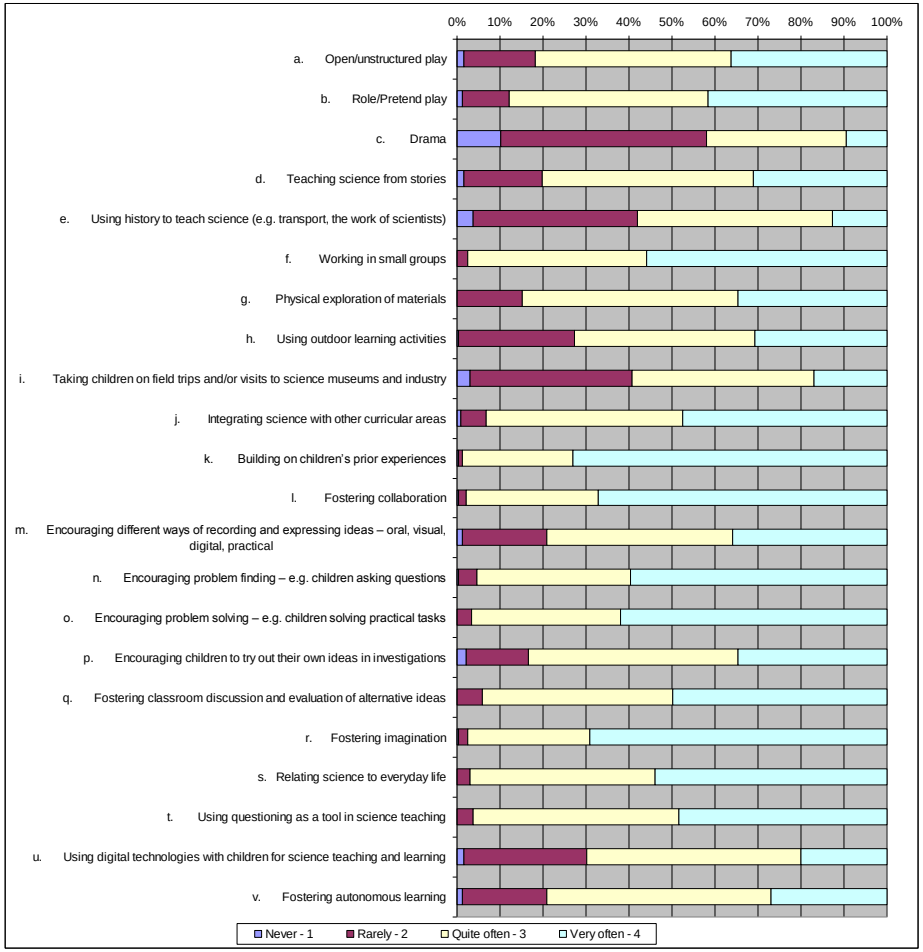

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"Which of the contexts mentioned below do you consider as MOST LIKELY to contribute to the development of children's CREATIVITY?"

Open/unstructured play	Working in small groups
Role/Pretend play	Physical exploration of materials
Drama	Using outdoor learning activities
Teaching science from stories	Taking children on field trips
Using history to teach science	Integrating science with other curricular areas

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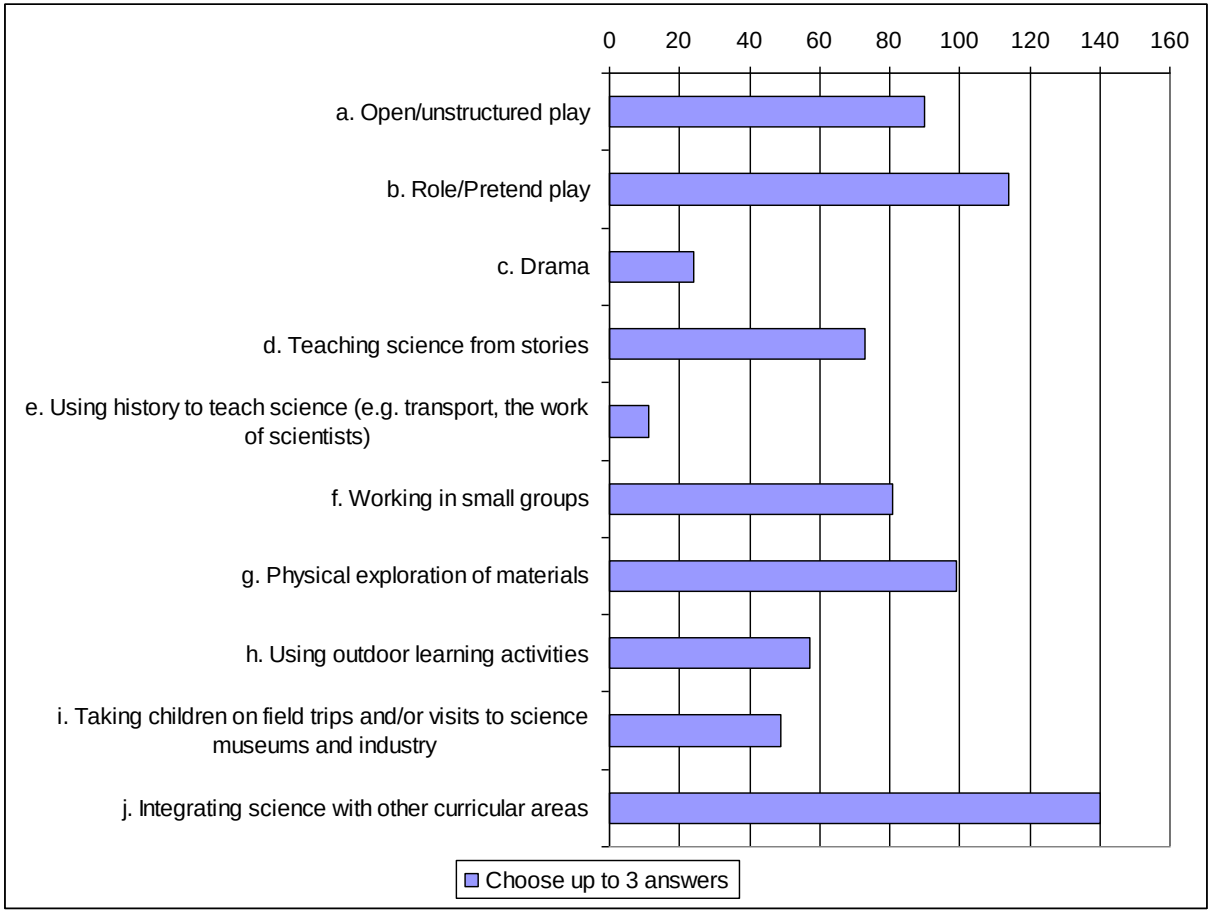

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"Which of the teaching approaches mentioned below do you consider as MOST LIKELY to contribute to the development of children's CREATIVITY?"

Building on children own experience	Fostering classroom discussion
Encouraging different ways of recording	Fostering imagination
Encouraging problem finding	Relating science with every day life
Encouraging problem solving	Using questioning
Encouraging children to try out their own ideas	Using digital technologies
Fostering autonomous learning	

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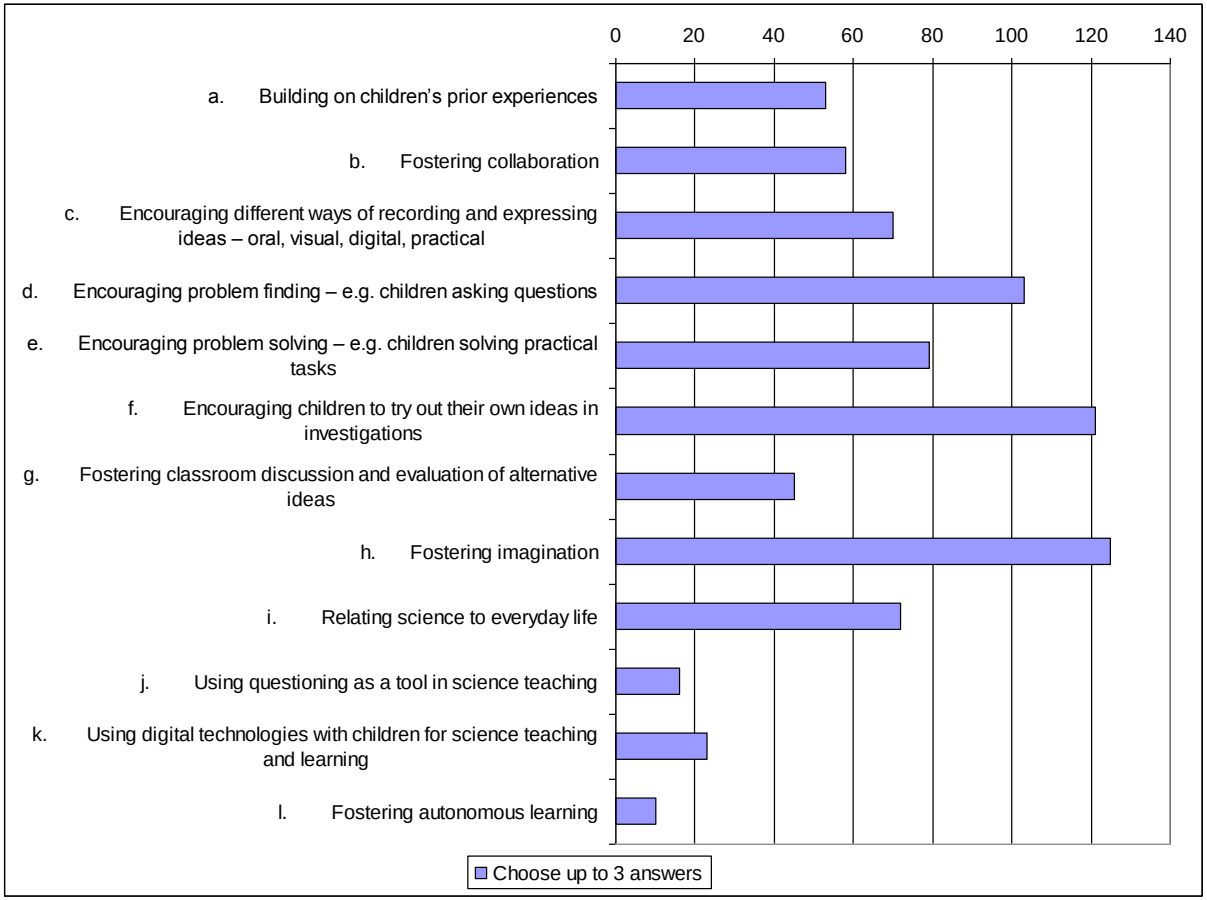

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Conclusions (1)

- The most interesting outcome of this set of questions resides in teachers' evaluation that the cornerstone of science education is "building on children's prior experiences" (73 %).
- In 70 % of the reported cases, teachers support a creative approach in science teaching by fostering imagination.
- The survey indicates that 62 % of the participants encourage "problem finding – e.g. children asking questions" and "problem solving – e.g. children solving practical tasks".

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Conclusions (2)

- The socio-educational context of science learning ("working in small groups") and the importance to connect science teaching to everyday experience of children ("relating science to everyday life") are ranked at the same level (57 %, and 55 % respectively).
- The collaboration takes in some cases the form of "fostering classroom discussion and evaluation of alternative ideas" with an occurrence of more than 95 %, under the "quite often" or "very often" conditions.

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Conclusions (3)

- The issues of "integrating science with other curricular areas" and "using questioning as a tool in science teaching" obtained 48 % of the votes as being the most often used approaches in science teaching.
- "Open/ unstructured play" proposed to children as a classroom activities is common in most of teaching practices (about 82 % participants use them "quite often" or "very often").
- Only 37 % of the participants estimate that very often they "encourage [children to use] different ways of recording and expressing ideas – oral, visual, digital, practical".

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Conclusions (4)

- No more than 35 % of the respondents are concerned about the value brought to science learning process by “encouraging children to try out their own ideas in investigations”.
- At pre-school and primary school level, “physical exploration of materials” is a frequent practice (35 % for “very often” versus 85 % for “very often” combined with “quite often” use).
- Methods such as “teaching science from stories” and “outdoor learning activities” have similar weights in science teaching practice in Early Education (32 % for the “very often” qualifier, and about 80 % for “quite often & very often” one).

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Conclusions (5)

- "Fostering autonomous learning" is an issue to Romanian teachers as 78 % of the answers point "quite often & very often" use of this approach. This statement has to be amended by the less than 30 % interest in applying this method as "very often".
- A surprising low number of teachers (20 %) are "using digital technologies with children for science teaching and learning" "very often". The number of those who base their science teaching activities on digital technologies "quite often and very often" represents 70 % of the respondents.

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Conclusions (6)

- In 60 % of the reported situations children are took to “field trips and/or visits to science museums and industry” in relation to science teaching (“quite often or very often” related answers).
- In 140 answers, the “integrating science with other curricular areas” solution was selected, representing the opinion of 59 % of the teachers. This can be interpreted as being a special context fostering ***creativity***.

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Conclusions (7)

- Almost 50 % of the involved educators perceive “role and pretended role play” as factors endorsing the development of ***creativity***. 42 % of the teachers support “physical exploration of materials” as a method to teach science.
- “Open/ unstructured play” is seen to be an important educational tool by 38 % of the educators, evaluation this pedagogical approach nurturing ***creativity***.
- Only 34 % of the teachers rank “working in small groups” as a condition of interest in supporting training for ***creativity***.

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Conclusions (8)

- Story telling in relation to science education is perceived as an opportunity for ***creativity*** to grow up (31 % of the answers). 21 %, respectively 24 %, of the teachers expect an increase of children's ***creativity*** through "field trips and/or visits to science museums and industry" and "outdoor learning activities"
- The respondents consider that drama use in science teaching can play a minor role in ***creativity*** build up (about 10 % of the teachers embrace this method in promoting science in school). Less than 5 % of the teachers refer to science history aspects when they teach science.

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- the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) through the contract EU 176.

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