Results of Romanian Teachers Survey on Assessment in Early Education

Dan Sporea and Adelina Sporea

***Abstract*—In the frame of the European Union funded project "Creative Little Scientists" our team conducted a national survey among preschool and primary school teachers in order to provide radiography on teachers perception and practice in relation to the development of creativity along with science and mathematics education, in the context of inquiry-based teaching and learning. The survey included more than 40 questions, each divided into additional sub-questions. Over 275 Romanian teachers took part to this survey. The present contribution reports the results of the survey for the evaluation of teachers practice as it concerns the assessment methods they use in science and mathematics teaching at preschool and primary school level (3 to 8 years old children).**

***Index Terms*—Early education, learning assessment, science and mathematics teaching, teachers evaluation through survey, teachers practice and believes.**

I. Introduction

Students' assessment is considered to be a tool for [1]-[3]:

- the estimation of their learning progress (assessment of learning);
- the collection of data on the results achieved at a specific moment of the teaching process;
- their classification according to the results obtained;
- the evaluation, according to specific criteria, of their achievements as they are considered to belong to a group at regional, national or international level;
- the appraisal of newly developed curricula materials or teaching aids
- lessons planning and development in special educational programs (assessment for learning);
- the design of educational policies.

Various assessment methods were suggested, depending on the teaching strategy used or students age [1], [4]-[12]:

- summative assessment;
- formative assessment;
- diagnostic;
- readiness assessment;
- achievement assessment;
- self-assessment;
- peer driven assessment.

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The present paper refers to some of the results of a national survey focused on the assessment purpose and the means Romanian teachers use to evaluate children progress in learning science and mathematics, in Early Education.

The Center for Science Education and Training–CSET [13], the educational department of the National Institute for Laser, Plasma and Radiation Physics in Bucharest, Romania, is partner in the FP7 funded project "Creative Little Scientists", which aims to bring together creativity and science and mathematics in preschool and first years of primary education (up to the age of eight), from the point of view of the inquiry-based science education (IBSE) approach [14].

The project research activities include: a) *four comparative literature reviews*, dedicated to science and mathematics education in preschool and early years of primary school; creativity in education; teacher training for early years educators and primary teachers; comparative education); b) the development of the project "*Conceptual framework*"; c) a *teachers survey*, to assess teachers perceptions and believes; d) a *field work* research to evaluate teachers practice in the classroom.

In this context, we organized a national survey to assess Romanian teachers' perceptions and practice in using creativity in science and mathematics teaching, in relation to inquiry-base learning. Based on the findings, a national report was prepared.

II. Research Approach and Methodology

A. Research Question and Objectives

The research question this study has to answer in relation to assessment of learning is [15]: "How to measure how far children's learning has progressed, and how the teacher is using this information to inform planning and develop practice?" From the assessment practice point of view, the objectives of the survey highlight: "the main similarities and differences in how the assessment of science and mathematics in early years are conceptualized by teachers", "the main similarities and differences in the approaches used for the assessment of science and mathematics", "the main similarities and differences in early years teachers' knowledge, skills and confidence in the assessment of science and mathematics".

B. The Sample and Participants

According to the "Creative Little Scientists" project objectives and target groups, the survey respondents in Romania were preschool and primary school teachers. The survey was organized at national level, as school teachers from around the country were invited to participate. The survey respondents in Romania were preschool teachers

("educatoare") and primary school teachers ("invatatori", institutori" or "profesori pentru invatamantul primar").

The invitation for participation was addressed to the following groups:

- teachers participating to national and European projects coordinated by 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.

Those categories were invited directly as they are on CSET announcement mailing list. Apart from these participants other teachers were asked indirectly to participate, as the survey was advertised through counties school inspectorates, Teachers' Training Centers (Casa Corpului Didactic) and, in very few cases, "Palatul Copiilor" (educational units in charge with out of school educational programs).

Over the survey lifetime, 270 teachers enrolled to the survey, while only 258 answered all questions.

The conclusions of the national report represent the opinions of a pool of teachers, the great majority (99.2 %) being women, aged between 30 and 39 years old (68.8 %), having at least a Bachelor degree (91 %, 31 % of them attending a higher level of education), who spent more than 11 years (84.9 %) in teaching (45.5 % more than 20 years). Their teaching experience covers almost evenly the age span of children from 3 to more than 8 years old. So, from this point of view it is a representative sample for the project target group. The great majority of participants are teaching in public schools, with 200 to 500 children enrolled in courses, schools located in localities with "100,000 to about 1,000,000 inhabitants" (30 %), "fewer than 3,000 people" (21 %) or "15,000 to about 100,000 people" (24 %). The vast majority of respondents studied science and mathematics either at the "upper secondary education (vocational)" or at Bachelor level. Most of the participants studied in addition quite extensively: pedagogy (88 %); developmental pedagogy (81 %); children developmental creativity (78 %); creative teaching approaches (70 %).

C. 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 being registered to the National Supervisory Authority for Personal Data Processing under No. 15407. By registering on the "Monkey Survey" site, the participants consented to voluntary participation and agreed their answers to be used in the research analysis.

D. The Instrument

Participants had to answer 44 questions organized in three major sections:

- conceptualisations of teaching, learning and assessment;
- approaches to teaching, learning and assessment;
- teacher education.

The questionnaire referred to in this study includes Likert scale questions and target the assessment process in early education, in relation to science and mathematics teaching.

The estimated time required to complete the task was one hour and a half. Data gathering was organized by using the "Monkey Survey" site. Questions were those provided by the project coordination team, translated into Romanian. The survey is anonymous. Participants were asked to provide identification details only if they are interested to further participate to the project and to receive more information on the project activities.

The survey was active between May 20, 2012 and June 30, 2012. No major complains were received concerning the way this action was organized or concerning the content of the survey.

III. Finding and Analysis

As it concerns the assessment process, the survey questionnaire was structured to facilitate the analysis of several aspects such as: the purpose of the learning assessment, teachers' priorities in assessing children progress in science and mathematics and creativity learning, pupils' participation to the assessment practice, the role played by affective aspects in child-teacher interaction, the balance and tensions existing between formative and summative assessment, differences existing between preschool and primary school approaches of assessment, means to carry out the assessment.

TABLE I: Teachers Priorities in the Assessment Process

	1 (Not important)		2 (Rarely)		3 (Quite often)		4 (Very important)		Total respondents
	n	%	n	%	n	%	n	%	
a. Knowledge and understanding of scientific ideas (facts, concepts, laws and theories)	9	3,9	34	14,8	76	33,0	111	48,3	230
b. Knowledge and understanding of scientific processes	1	0,4	23	10,0	81	35,1	126	54,5	231
c. Competencies necessary to carry out scientific inquiry	4	1,7	34	14,7	83	35,9	110	47,6	231
d. Understandings about scientific inquiry (e.g. how science and scientists work)	10	4,4	44	19,2	112	48,9	63	27,5	229
e. Positive attitudes and increase of interest in science	0	0	7	3,0	42	18,3	181	78,7	230
f. Positive attitudes and increase of interest in learning science	0	0	3	1,3	46	20,1	180	78,6	229

Teachers' responses to these concerns are organized according to the four major questions, for which alternative answers to be selected from are provided.

In the case of the fifth question, teachers can express freely their opinions on the assessment process.

The paper reflects this aspect too, as open communication can provide interesting insides of teachers practice.

For each question we provided several answers, in some cases with the possibility to select between the weights the respondents associate to each possible response. The Tables include the number of the respondents for each answers, as well as the total number of participants, while in the Figs are represented graphically the percentages of responces.

A. Question 1: Please Indicate Your Views about the Importance of the Following Priorities of Children's Assessment in Science Education

Table I indicates the ranking of teachers answers reflecting different priorities they have in assessing children achievements. Answers are ranked from "Not important" (1) to "Very important" (4). For each rank the number and the percentage of respondents are given.

In Fig. 1 is illustrated the chart of the answers distribution for the options specified in Table I. In each case, the number of teachers who selected a specific answer is indicated, too.

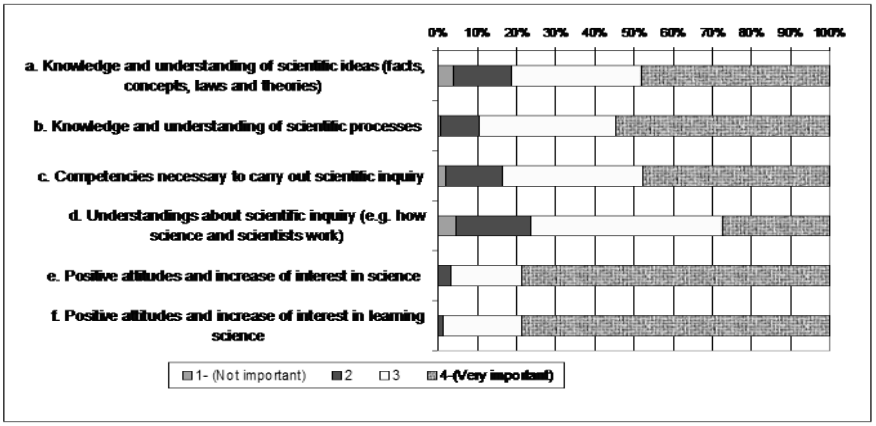

Fig. 1. Teachers' ranking of children assessment in science education. Number of respondents: a – 230; b – 231; c – 231; d – 229; e – 230; f – 229.

TABLE II: THE MEANS TEACHERS USE IN THE ASSESSMENT PROCESS

	1 (Not important)		2 (Rarely)		3 (Quite often)		4 (Very important)		Total respondents
	n	%	n	%	n	%	n	%	
a. Using checklists to record observations of children	10	4,4	64	28,2	122	53,7	31	13,7	227
b. During classroom interaction	1	0,4	12	5,2	114	49,4	104	45,0	231
c. Evaluating children's pictures, graphs etc which show their scientific reasoning	2	0,9	29	12,6	119	51,5	81	35,1	231
d. Evaluating children's relevant gestures or physical activity	18	8,0	57	25,2	96	42,5	55	24,3	226
e. Marking their homework	50	22,4	58	26,0	70	31,4	45	20,2	223
f. Using authentic problem-based tasks	15	6,6	29	12,8	124	54,6	59	26,0	227
g. Asking each child to reflect on their own learning and progress	18	8,0	80	35,7	97	43,3	29	12,9	224
h. Using closed question tests	41	18,4	102	45,7	62	27,8	18	8,1	223
i. Using open question tests	14	6,2	39	17,3	124	55,1	48	21,3	225
j. Using questions in context	7	3,1	36	15,8	126	55,3	59	25,9	228
k. Using portfolios (collection of evidence of children's work and progress)	3	1,3	18	7,9	95	41,7	112	49,1	228
l. Children correcting each other's work and giving each other feedback	7	3,1	43	18,9	105	46,3	72	31,7	227

For the Romanian teachers it is "Very important" to assess "positive attitudes and increase of interest in science" (79 %). Almost equally they are interested to evaluate "positive attitudes and increase of interest in *learning* science".

On the second place, teachers consider to be "very important" to assess children "knowledge and understanding of scientific processes" (55 %).

The evaluation of children "knowledge and understanding of scientific ideas (facts, concepts, laws and theories)" and "competencies necessary to carry out scientific inquiry" are considered to be "very important" by almost 48 % of the participants. "Understandings about scientific inquiry (e.g. how science and scientists work)" rank the last on the scale based on "very important" criteria (28 %).

In any case, the great majority of teachers showed an unconditioned support for the assessment of children's "positive attitudes and increase of interest in learning science" and "positive attitudes and increase of interest in science". A lower back-up for the assessment of "understandings about scientific inquiry" indicates that Romanian teachers are not at easy with the inquiry-based teaching approach.

B. Question 2: How Often Do You Assess Your Pupils in Science in the Following Ways?

The frequency of the use of different assessment forms in science education is given in Table II and Fig. 2.

The most widespread form of assessment in science in Romanian Early Education system is done "during classroom interaction" (95 % of the cases, under the "quite often and

very often" conditions, while 45 % of the situations correspond to "very often"). Another frequently used method is "the portfolios (collection of evidence of children's work and progress)" (92 % of the responses with "quote often and very often" answers and 49 % corresponding to "very often").

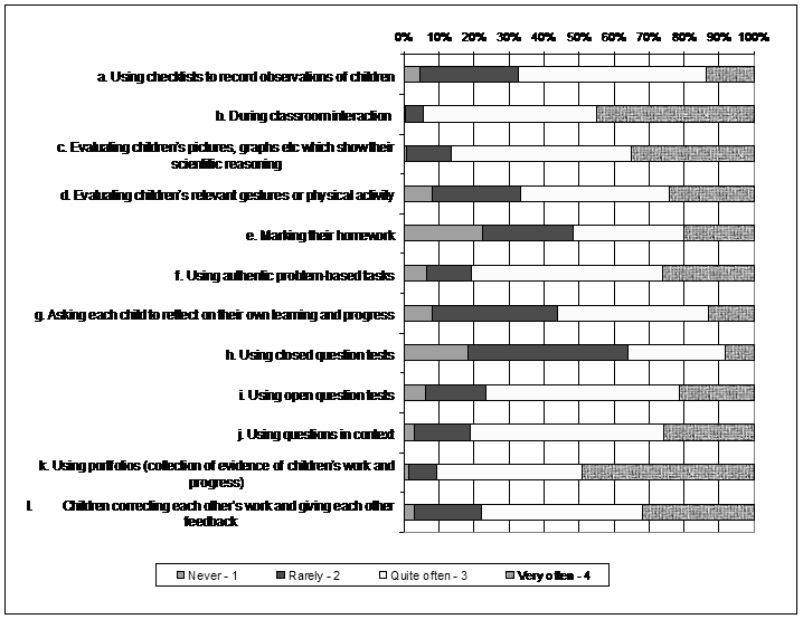

Fig. 2. The frequency of the use of different assessment forms in science education. Number of respondents: a – 227; b – 231; c – 231; d – 226; e – 223; f – 227; g – 224; h – 223; i – 225; j – 228; k – 228; l – 227.

TABLE III: CHILDREN ABILITIES WHICH ARE ASSESSED BY TEACHERS

	1 (Not important)		2 (Rarely)		3 (Quite often)		4 (Very important)		Total respondents
	n	%	n	%	n	%	n	%	
a. Sense of initiative	1	0,4	1	0,4	74	31,9	156	67,2	232
b. Motivation	0	0	9	3,9	93	40,4	128	55,7	230
c. Ability to come up with something new	0	0	6	2,6	53	23,0	171	74,3	230
d. Ability to connect what they have learnt during your lessons with topics in other subjects	2	0,9	10	4,3	69	29,9	150	64,9	231
e. Imagination	0	0	2	0,9	65	28,1	164	71,0	231
f. Curiosity	0	0	6	2,6	64	27,8	160	69,6	230

For 89 % of the participants "evaluating children's pictures, graphs etc. which show their scientific reasoning" seems to be a common practice for "quite often and very often" statement and only 35 % favoring the "very often" condition.

In almost 80 % of the classes, teachers base children's assessment on "using authentic problem-based tasks" (81 % for "quite often and very often" and 26 % for "very often"), "using open question tests" (78 % for "quite often and very often" and 21 % for "very often"), "using questions in context" (72 % for "quite often and very often" and 49 % for "very often"), and "children correcting each other's work and giving each other feedback" (78 % for "quite often and very often" and 32 % for "very often")

The methods of "using checklists to record observations of children" and "evaluating children's relevant gestures or physical activity" have similar weights (78 % for "quite often and very often") but have associated different percentages under the "very often" mark (15 % the first method and 25 % the last one).

"Asking each child to reflect on their own learning and progress" is employed by 56 % of the teachers "quite often and very often", while only 14 % of them use it "very often".

68 % of the respondents assess children by "using checklists to record observations of children" "quite often and very often", 15 % of them "very often".

Unexpectedly, only 52 % of participants relay "quite often and very often" their assessment on pupils' homework evaluation.

The answers to these questions prove that most of the teachers evaluate their students' advancement during the class, and fundaments their conclusions on children progress based on the educational process outcomes (portfolio, drawings, graphs, etc.) which demonstrate the development of scientific reasoning and understanding, and the way they applied what they learned.

C. Question 3: How Often Do You Reward/Praise the Following Characteristics in Your Pupils in Science?

Teachers' opinions on children personal abilities appreciated during science learning are summarized in Table III and Fig. 3. The questioned teachers had to evaluate children involvement in science classes as it concerns their personnel initiative, their imagination, and their curiosity towards new things, phenomena, concepts, and their motivation.

In about 70 % of the cases, teachers value "very often": the "ability to come up with something new" (74 %); children's "thinking skills" (72 %); "imagination" (71 %); "ability to work together" (71 %); "curiosity" (71 %). The great majority of these answers indicate teachers' interest towards the development of pupils' creativity.

The "sense of initiative" is seen ("very often") by 68 % of the respondents as being essential to the educational process.

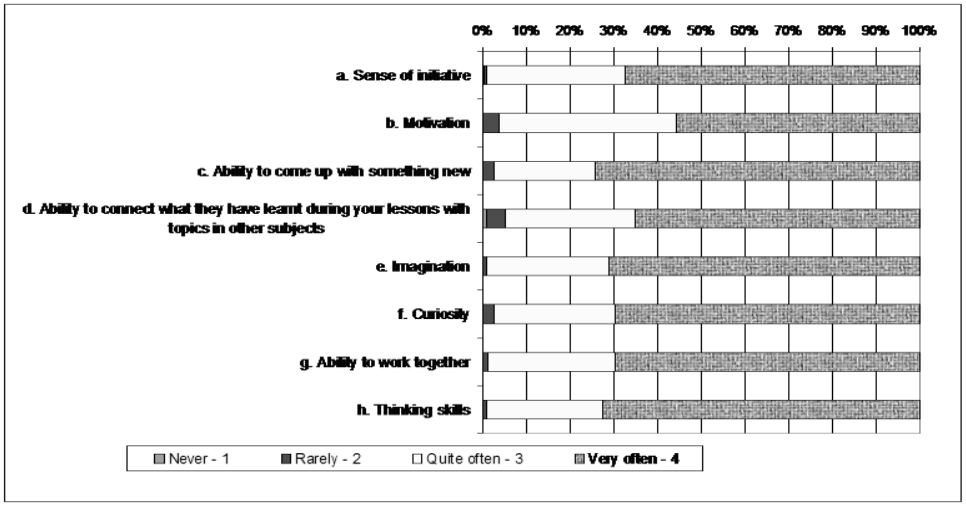

Fig. 3. Children personality development appreciated by teachers during science learning. Number of respondents: a – 232; b – 230; c – 230; d – 231; e – 231; f – 230; g – 231; h – 229.

TABLE IV: PURPOSES FOR CHILDREN ASSESSMENT

	1 (Not important)		2 (Rarely)		3 (Quite often)		4 (Very important)		Total respondents
	n	%	n	%	n	%	n	%	
a. To identify areas for improvement in your science teaching	8	3,5	37	16,1	139	60,4	46	20,0	230
b. To identify aspects of the science curriculum that could be improved	16	7,0	71	31,1	109	47,8	32	14,0	228
c. To identify ways to improve child science learning	2	0,9	25	11,0	142	62,3	59	25,9	228
d. To monitor regularly individual children's or cohorts of children's progress towards a set of desirable science learning outcomes	0	0	26	11,4	126	55,3	76	33,3	228
e. To inform parents of their child's progress in science	1	0,4	19	8,2	123	53,2	88	38,1	231
f. To help group children for science instruction purposes	5	2,2	30	13,2	138	60,8	54	23,8	227
g. To monitor year-to-year child progress in science	2	0,9	34	14,8	132	57,6	61	26,6	229
h. To provide feedback to children about their progress in science	3	1,3	32	14,0	133	58,3	60	26,3	228
i. To set targets with children for their own development in science	10	4,4	61	26,6	113	49,3	45	19,7	229

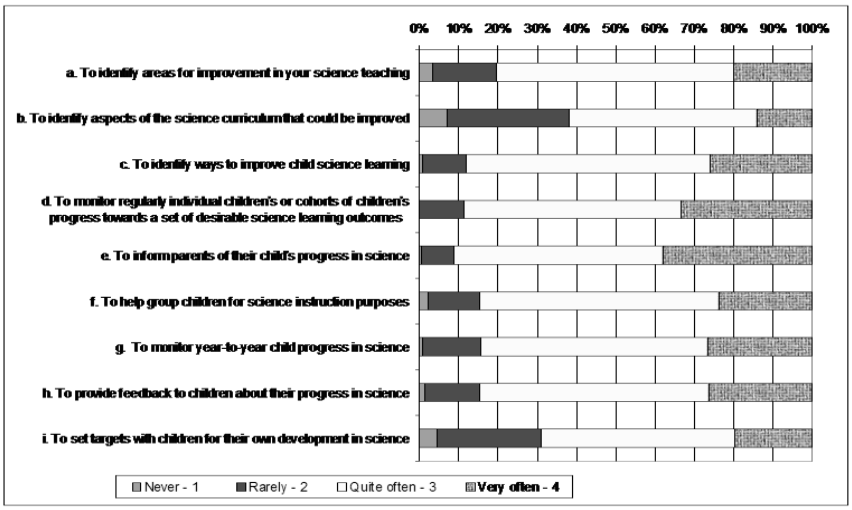

Fig. 4. The frequency of various purposes teachers assess children in science education. Number of respondents: a – 230; b – 228; c – 228; d – 228; e – 231; f – 227; g – 229; h – 228; i – 229.

Children's "ability to connect what they have learnt during the lessons with topics in other subjects" is estimated to be important in 65 % of the investigated situations, as teachers "very often" value it. 55 % of the participants thought "very

often" that "motivation" is of interest in assessing children personality development during science classes.

D. Question 4: How Often Do You Use Assessment of Children in Science for the Following Purposes?

The frequencies of various purposes for which teachers assess children in science education are given in Table IV and Fig. 4.

On this question the analyses will be done for "quite often and very often" answers.

Very close to the limit of 90 % positive answers are situated the following assessment purposes: "to inform parents of their child's progress in science" (92 %); "to monitor regularly individual children's or cohorts of children's progress towards a set of desirable science learning outcomes" (89 %); "to identify ways to improve child science learning" (89 %).

Another compact group (85 % of the answers) of responses covers: "to help group children for science instruction purposes"; "to monitor year-to-year child progress in science"; "to provide feedback to children about their progress in science". 81 % of the participants are interested "to identify areas for improvement in their science teaching".

E. Question 5: Please Reflect and Briefly Describe on Whether and How These Approaches Might Differ in the Case of Mathematics?

Teachers' opinions on the differences existing in children assessment in mathematics teaching compared to science teaching are cited below. The number of respondents to this question was 138. Here are some quotes:

- "In my opinion, the methods for assessment in the two disciplines should not be different."
- "Assessing the knowledge of 3-4 years old children should be made in accordance with the National Curriculum requirements."
- "In the case of mathematics, these approaches are slightly different because the mathematics assessment is objective and stricter; in mathematics we are dealing with a single response, while the responses in science could generate other responses and other questions".
- "The approaches used in science prove to be effective in the case of mathematics too."
- "I use to evaluate the investigations in the field of science by verifying the recording lists of observed/investigated data and portfolios and I formulate open questions. Regarding the math assessment, I use self-assessment strategies, independent work, stimulating metacognition through closed questions and individual work sheets."
- "Assessment in the case of mathematics teaching in kindergarten is done either based on worksheets that not all children are able to fill in and put on paper what they know, either verbally, through games, exercises, practical exercises which have higher success at the preschool level."
- "I use, depending on the situation, in mathematics assessment the same approaches and methods as those described above (questions 34-36), except portfolios."
- "Science and math are disciplines that I gladly teach and give them both the same attention. I am doing the assessment for both disciplines with equal interest; it represents the starting point for the next set of knowledge to be assimilated. I appreciate children interest in both fields and gifted children."

IV. Discussions and Conclusions

The study revealed the following patterns related to the learning assessment procedure implemented by Romanian teachers:

1) Romanian teachers assign a major role in the aassessment process to: the "knowledge and understanding of scientific processes", "positive attitudes and increase of interest in science", "positive attitudes and increase of interest in learning science" (more than 90 % answers fulfill the "important and very important" criterion.
2) The most common assessment methods are: "during classroom interaction", "evaluating children's pictures, graphs etc which show their scientific reasoning", "using questions in context"," using portfolios (collection of evidence of children's work and progress).
3) The most rewarded children abilities are: "ability to come up with something new", "imagination", "curiosity", "ability to work together", "thinking skills".
4) Teachers opinions indicate that, in children assessment, they are focused on: "identifying ways to improve child science learning", "monitoring regularly individual children's or cohorts of children's progress towards a set of desirable science learning outcomes", "informing parents of their child's progress in science", "helping group children for science instruction purposes", "monitoring year-to-year child progress in science", "providing feedback to children about their progress in science" (over 80 % of the answers reflect the "quite often and very often" situations.

This survey is the first step in diagnosing the assessment process in Romanian preschools and primary schools referring to science and mathematics teaching and learning. These results have to be corroborated with the outcome of the field research in order to highlight the tensions and the commonalities exiting between teachers' perceptions and opinions and their practice in the classroom. Nevertheless, for Romania, this is the first study on the subject and it is expected to be a good catalyst for future debates at national level, in the context of the present education reform.

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