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Standardized Educational Test for Diagnose the Development Level of Creative Mathematical Thinking Qualities

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Abstract

We propose a standardized educational test, developed according to the methodology created by L. Crocker and J. Algina (1986) which aims to diagnose the development level of creative mathematical thinking qualities. The standardized test requires a pre-test, which includes the analysis and ascertainment of the items quality, calculation of the difficulty coefficient and discrimination coefficient for each item. In addition, pre-testing involves the setting of the several qualities of the test[2] - objectivity, applicability, reliability and validity.

Keywords: standardized educational test, creative mathematical thinking qualities, fluency, flexibility, originality, elaboration, sensitivity to issues.

Introduction

Standardized educational test, developed according to the methodology created *by* L. Crocker and J. Algina[1], aims to diagnose the development level of the creative mathematical thinking qualities.

Proposed operational objectives for the educational test are circumscribed actions to establish creative mathematical thinking qualities of subjects, by testing several capacities. Firstly, it is the reorganization of the information and differentiation between explicit and implicit information in the text. Secondly, the recognition of many solutions based on rapid associations between: a default image and its counterpart in a given configuration (*figural fluency*), possible actions, as imaginary road construction on a default segment, according to a given criteria (*operational fluency),* combination of digits that respect some requirements (*associative fluency).* Thirdly, the production of many solutions based on their own classification and selection criteria in order to make associations between: a default image and its counterpart in a given configuration (*figural flexibility),* possible actions, as imaginary road construction on a default segment, depending on given criteria *(operational flexibility),* combination of digits with respect to requirements (*associative flexibility).* Fourthly, the generation of solutions by intuition to rethink the issue, passing from the two-dimensional plane in three-dimensional space, construction solution by resorting to constructive imagination and to structuring a configuration consisting in two overlapping coins, structured solution using creative imagination which facilitates the exit from stereotype (one which believes that a candle can be heated only at one end). Fifthly, the differentiation of information of the text, motivation of solutions, distinction of the inaccuracies elements, and validation of the information that correctly complete the solution designed.

Hypothesis: i. Solving items 1, 2, 3 is a good predictor of fluency of mathematical creative thinking. ii. Solving items 4, 5, 6 is a good predictor of flexibility of mathematical creative thinking. iii. Solving items 7, 8, 9 is a good predictor of originality of mathematical creative thinking. iv. Solving items 10, 11, 12 is a good predictor of elaboration of mathematical creative thinking. v. Solving items 13, 14, 15 is a good predictor of sensitivity to issues of mathematical creative thinking. vi. Solving all items is a good predictor of mathematical creative thinking qualities.

Material and Method

Our proposed standardized educational test contains 15 items. The chosen items are semi-objective *(short response)* or subjective *(problem solving)* type. They are formulated clearly, explicitly, without any interpretation, the choice for this type of item being motivated by the fact that they allow evaluation of a complex behavior from the higher taxonomic floors, including the creative size of the responses elaboration because it requests student's ability to formulate explanations, to argue, to describe ways of working in particular situations.

Test, correction scale and calculation of scores: Fluency: Item 1 Calculate the number of triangles and the number of squares in figure-1.Write the sum and difference of the two numbers obtained. Score is calculated according to table 1.

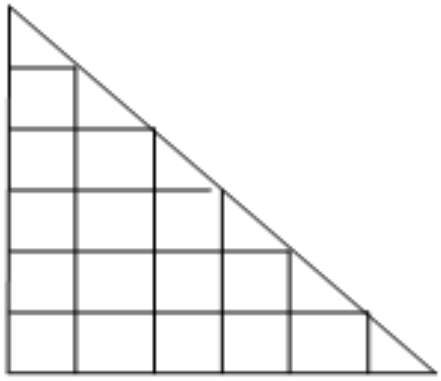

Figure-1

Item 2 One ant is at the middle of a simple lattice (figure 2) located over a channel. A bit of bread is in each peak of the grid. Find out what is the number of roads with minimum length that the ant can do for collect finally all pieces of bread, knowing that each time starting and ending from E, and if it starts on a road in order to touch a peak it is not permitted to return on the same road. Score is calculated according to table 2.

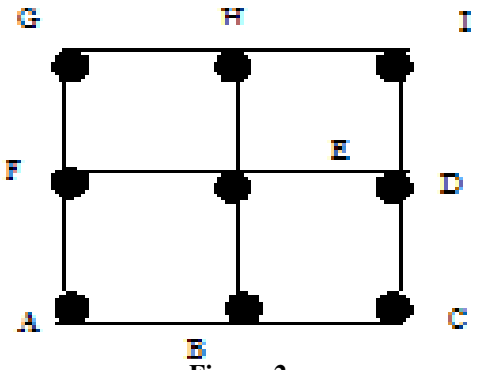

Figure-2

Item 3 Find all distinct three-digit numbers formed by the digits 1, 4, 7, 9. Score is calculated according to table 3.

Fluency score is the sum of the three scores obtained on **1, 2, 3**.

Flexibility: Item 4 Count all the triangles in the figure 3. Score is calculated according to table 4.

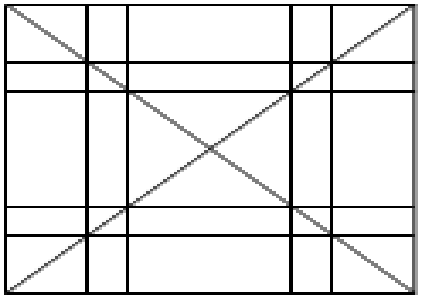

Figure-3

Item 5 Let A and O be two cities between which there exists a road network, like in figure 4. List minimum length paths between A and O. Score is calculated according to table 5.

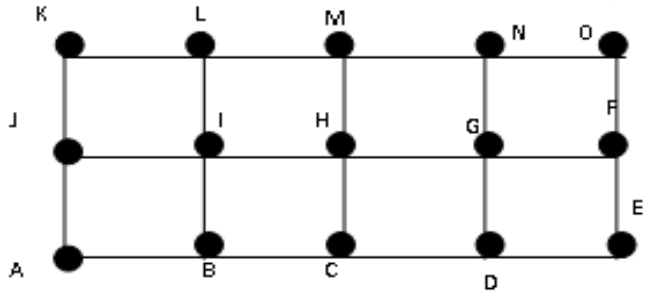

Figure-4

Item 6 Find all numbers formed by the digits 0, 1, 2. Score is calculated according to table 6.

Flexibility score is the sum of the three scores obtained on **4, 5, 6**.

Originality:Item 7 Draw a line on a sheet of paper (figure 5). Place three coins on the paper, so if you look on the left side of the line you will see exactly emblem of two currencies, and if you look on the right side of the line you will see exactly the money of two coins. (You may not use more than the elements of the problem.) Draw and explain. Score is calculated according to table 7.

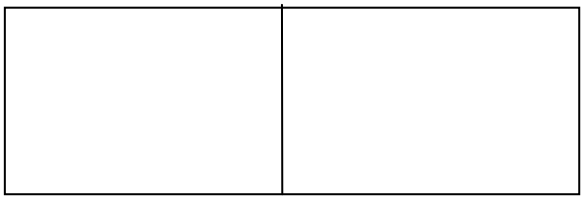

Figure-5

Item 8 Four coins placed on the vertices of a square, like in figure 6. Move a single currency to form two rows of three coins each. Score is calculated according to table 8.

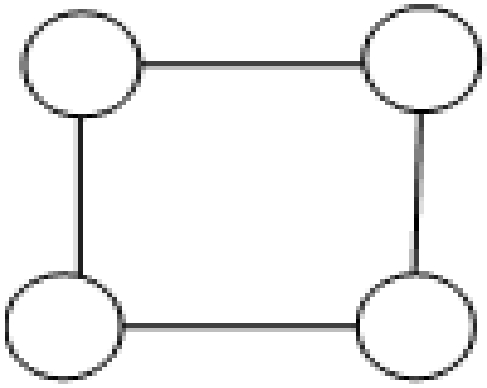

Figure-6

Table-1

1 point	If the student found maximum 6 triangles, 15 squares, and the sum and difference are properly made
2 points	If the student found minimum 7 triangles, 16 squares and maximum 14 triangles, 18 squares, and the sum and difference are properly made
3 points	If the student found minimum 15 triangles, 19 squares and maximum 21 triangles, 22 squares, and the sum and difference were properly made

Table-2

1 point	If the student found maximum 2 roads
2 points	If the student found 3 roads
3 points	If the student found 4 roads

Table-3

1 point	If the student found maximum 8 numbers
2 points	If the student found minimum 9 numbers and maximum 16 numbers
3 points	If the student found minimum17 and maximum 24 numbers

Table-4

1 point	If the student found maximum of 32 triangles
2 points	If the student found minimum 33 and maximum 64 triangles
3 points	If the student found minimum 65 and maximum 96 triangles

Table-5

1 point	If the student found maxim 5 road
2 points	If the student found minimum 6 and maximum 10 roads
3 points	If the student found minimum 11 and maximum 15 roads

Table-6

1 point	If the student found maximum 5 numbers
2 points	If the student found minimum 6 numbers and maximum 10 numbers
3 points	If the student found minimum 11 and maximum 15 numbers

Table-7

1 point	If the student draw two coins with the emblem (money) visible on the left of the line, and a coin with the money (emblem) visible on the right of the line, or vice versa
2 points	If the student draw to the left of the line a coin with the emblem visible, and a coin with the money visible on the right side of the line, and a coin on the line
	If the student draw two coins standing up on the line, both visible emblem on the left, and a coin visible on the right, or vice versa
3 points	If the student draw to the left of the line a coin with the emblem visible, on the right side of the line a coin with the money visible, and a coin placed on the line standing with the emblem to left, with the money on the right, or vice versa

Table-8

1 point	If the student draw a coin on the segment joining two other coins
2 points	If the student draw two coins adjacent
	If the student draw two pairs of stacked coins
3 points	If the student draw two overlapping coins

Item 9 We consider two identical perfect candles, which can be lighted up at both ends. When the candle is lighted up at one end, it burns completely in just one hour. Using completely the two candles, you have to measure exactly 45 minutes. The sectioning of candles it is not allowed. Score is calculated according to table 9.

Originality score is the sum of the three scores obtained on **7**, **8, 9.**

Elaboration: Item 10 Andrei, Barbu, Cristian and Doru, each has a pet: a rabbit with red eyes, a tarantula, a dog or a cat. Just Doru is not afraid of tarantulas. Andrew and Cristi do not like cats, and Andrew hates the red color. What animal has every boy? Score is calculated according to table 10.

Item 11 It is possible that among any three positive integers to find two of them that have even sum? Score is calculated according to table 11.

Item 12 Compose an issue whose resolution starts to solve the operation 12+43. Solve it. Score is calculated according to table 12.

Elaboration score is the sum of the three grades obtained on **10, 11, 12**.

Sensitivity to issues: Item 13 Discover what is the goal (A, B, C or D) that one can reach the central room in the labyrinth from figure 7. Score is calculated according to table 13.

Item 14 An adventurer found the damaged map of the Treasure Island, from the Figure 8. What is the order of caves in which the adventurer needs to visit, to be sure that he will find the treasure without being caught by the three pirates on the island, who are armed with guns. Justify. Score is calculated according to table 14

Item 15 Discover the mistake of following reasoning: "Because 2a-2a = a-a, we deduce that 2·(a-a) = a-a. Noting a-a with b, we obtain that 2b = b, where the dividing by b, we get that 2 = 1." Score is calculated according to table 15.

Sensitivity to issues score is the sum of the three scores obtained on **13, 14, 15**.

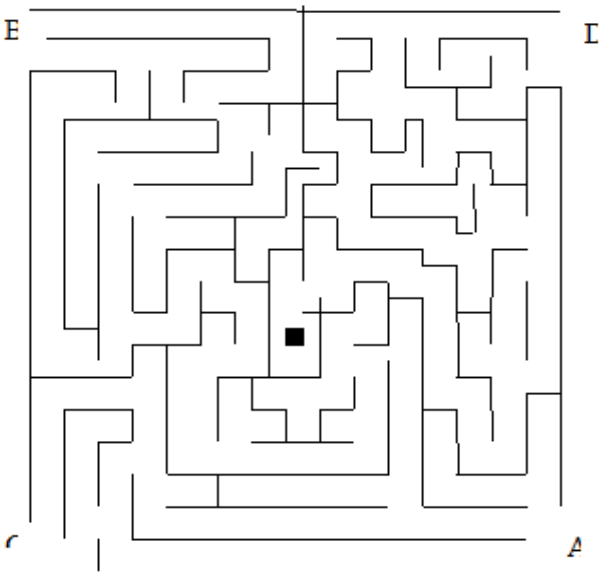

Figure 7

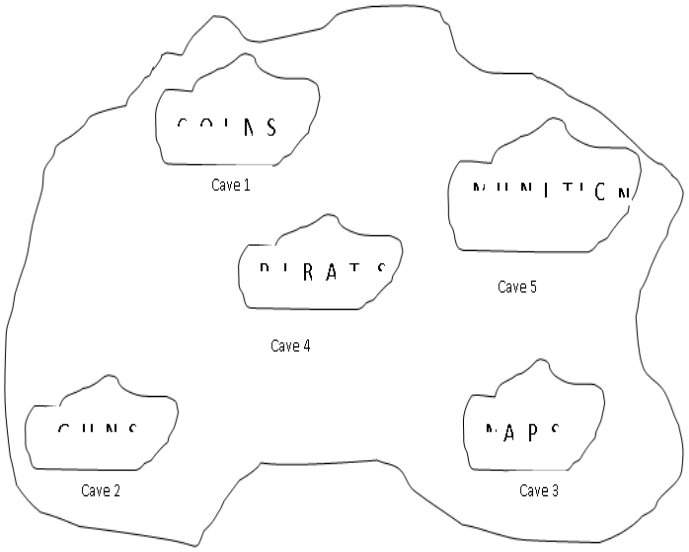

Figure-8

Table-9

1 point	If the student stated that even lights a candle at both ends
2 points	If the student stated that a candle lights at both ends and one lights at an end
3 points	If the student stated that the first candle lights at both ends and the second comes to an end, and when finished the first candle, the second lights at the other end to

Table-10

1 point	If the student associates properly the pet with the owner for maximum two children
2 points	If the student associates properly the pet with the owner for three children
3 points	If the student associates properly the pet with the owner for all four children

Table-11

1 point	If the student states that the sum of any two even numbers is even/the sum of any two odd numbers is odd
	If the student notice two of the cases: even, even, even / even, even, odd / even, odd, odd / odd, odd, odd
2 points	If the student notice t here of the cases: even, even, even / even, even, odd / even, odd, odd / odd, odd, odd
3 points	If the student stated that between any three natural numbers, there are always two with the same parity
	If the student notice all four cases: even, even, even / even, even, odd / even, odd, odd / odd, odd, odd

Table-12

1 point	If the problem has only one operation
2 points	If the problem has two or three operations
3 points	If the problem has four or more operations

Table-3

1 point	If it finds the correct path of the labyrinth
2 points	If it finds the correct path of the labyrinth and correctly stated the letters corresponding to minimum two gates
3 points	If it finds the correct path of the labyrinth and correctly specified all appropriate letters gates

Table-14

1 point	If the student finds the correct names caves
2 points	If the student specified path adventurer, comprising at least three caves, without recourse by the need to find the original maps of each caves
3 points	If the student specified path adventurer, comprising at least four caves, the first being that with the maps of each caves

Table-15

1 point	If the student notice that b = 0
2 points	If the student observed mismatch between the result obtained by replacing b with value in relation 2b = b (2 · 0 = 0, true) and the result obtained by dividing the relationship 2b = b to b (2 = 1, false)
3 points	If the student notice that mismatch is caused by dividing by 0, which is meaningless operation

The standardized test required a **pre-test**, which involves an analysis of items (calculation of the difficulty and discrimination coefficient) and the verifying of the overall qualities of the test[2], like objectivity, applicability, fidelity (stability coefficient; equivalence coefficient; assessment method of fidelity by halving; internal consistency coefficient) and validity (content validity; conceptual construct validity). In this purpose, we applied this test in 2 sessions (in November 2010 and in June 2011) on a group of 356 subjects.

Difficulty coefficient of an item[2] is calculated as the percentage of subjects who correctly solved an item. Because items too easy or too difficult to solve not provide relevant information about the subjects, they were removed during revision of the test. From the statistical point of view, the "ideal" item would be solved correctly by 50% of the subjects.

Discrimination coefficient[2] indicates the extent to which an item differentiates between subjects with high and those with low performance. It was calculated as the difference between the percentage of subjects who correctly solved the analyzed item upper one-fifth of the league, based on the total test scores (top 20% of subjects) and the percentage of subjects who correctly solved the analyzed item of one-fifth lower ranking (last 20% of subjects).

The **fidelity**[3] (consistency or stability of the test) can be estimated through four different ways. Firstly, the fidelity test-retest (the stability coefficient) is demonstrated by comparable results obtained by applying the same assessment tool to the same subjects, at different times. To prevent that the assessment of this type of fidelity leads to errors arising from familiarity subjects with questions, (it is possible that the stability results are given by memorizing questions and answers, not by the qualities of the instrument), the time interval between the two applications was sufficient long to avoid this type of error (November 2010 - June 2011). Secondly, the fidelity through alternative forms (equivalence coefficient) is proved by the fact that the results obtained by the subjects on this test (in November 2010) are comparable to those obtained by the same subjects, after applying a test with similar items (in retesting June 2011), obtained by interchange order items from the tool applied in November 2010. Thirdly, the assessment method of fidelity by halving was achieved by dividing the first test results (November 2010) of all students participating in the study into two comparable halves and getting their correlation coefficient. Fifthly, the fidelity estimated by internal consistency or homogeneity of a test refers, on the one hand, to the extent to which all items relate to each other and, on the other hand, to the extent to which each item relates to the total result obtained by subjects.

Also, an interesting aplication of the statistical methods what we have used in this paper, we find applied to the compute the support and confidence of all possible association rules, or the impact of the motivation factors[4,5].

Validity of a test refers to the extent that it captures what is supposed to measure. For the creative thinking mathematic test, we estimated the following types of validity: content validity, criteria validity and construct validity[6,7,8].

Content validity, although often considered a subjective value[9], reflects the extent to which test items covering problem studied. The chosen methods for proving the content validity are the **Evans'** procedure[7] and the calculation of content validity

coefficient and correlation coefficient. Although it is considered that the content validity can not be estimated on the basis of statistical methods, to increase the objectivity of judgments, recent work[9] bring forward formulas for calculating content validity coefficient and correlation coefficient. The content validity coefficient formula is:

$$CVR = \frac{N_e - N/2}{N/2}$$

Where N is the total number of experts, and N_e is the number of experts who believe the test or the item as representative. This validity factor can have values between -1 and +1, and the more value is higher, the higher is the content validity. The correlation coefficient formula is

$$CC = 1 - \frac{s^2_{int}}{s^2_{max}}$$

(Where s^2_{int} is the variance between expert assessments and s^2_{max} is the maximum possible variance between expert assessments).

Validity criterion requires a high concordance between subjects' results from the applications of test and a criterion[3, 9].

Competitive validity involves comparing the results between assessment tool, and criterion or another tool (whose validity has been established previously and is high). In this case, the validity coefficient expresses the correlation between the instrument and criterion.

Conceptual construct validity refers to how well a concept is translated into an instrument (a competence, a characteristic and so on). Evaluation of construct validity requires both a theoretical approach and an empirically approach: attending the specialized bibliography that includes previous experimental data on the same construct / concept and clarity of hypothetic-deductive reasoning, all of them are equally important as procedures based on empirical data.

The most used procedure for assessing the construct validity, based on empirical data analysis[9], is, first, the correlation between the results obtained by applying this test and from the use of other tests or questionnaires that measure the same construct. Secondly, the method is the correlation between the results obtained by applying an instrument, and those obtained from the application of measuring instruments, which are related to studied characteristics. Thirdly, the procedure is to study the effect of experimental variables on the scores obtained by subjects; and, finally, the Multitrait-multimethod Matrix.

Similar methods for verifying the factor of validity are also used successfully in a study which investigates the effects of job experience, satisfaction, and motivation on organizational commitment[10].

Results and Discussion

Pre-testing included an analysis of items (calculation of the difficulty and discrimination coefficient), after which the test structure changed, eliminating items considered too easy and those who experiencing major difficulties in solving, on the grounds that are irrelevant to this study. It is to note that students participating in the pre-test did not participate in subsequent tests, the students of classes IV-VI from "Ion Creanga" School, Iasi, Romania.

The pre-testing of this **standardized educational test for diagnose the development level of creative mathematical thinking qualities** reveals that all the items have difficulty coefficient between 25% and 75% and the discrimination coefficient values meet the minimum requirement of 25%.

Objectivity of this test is provided by the explicitly and clarity of items, which allows obtaining comparable scores for competent assessors.

The applicability of this test is guaranteed by the adequacy of the contents covered items, the amount of time and material resources necessary to its application (90 minutes for 15 issues of difficulty ranging between 25% and 75% is considered a reasonable time), the clear way for calculating scores.

Statistical indicator of the stability coefficient and the equivalence coefficient is the **Pearson**'s correlation coefficient. Most papers consider that a correlation coefficient equal to or greater than 0.70 is sufficient to provide that types of fidelity. **A. Anastasi**[6] and **G. Evans**[7] mention that the values of correlation coefficient at least 0.80 assure a high fidelity. When calculating the stability and equivalence coefficient, we obtained a value of **0.937** for **Pearson**'s correlation coefficient, which shows that the creative tool has high fidelity (table 16).

The correlation coefficient of the two halves of the test is used to calculate internal consistency coefficient whose value was deduced to be **0.724**, and it was corrected by Spearman-Brown formula, yielding the value **0.819** for Guttman Split-Half coefficient[3,6] (table 17).

The method used to establish the internal consistency coefficient is the calculation of Cronbach's alpha coefficient. His value calculated for the first test results (November 2010) has a value of $\alpha = 0.892$, demonstrating internal consistency of creative thinking test of mathematics (table 18 and table 19)

Table-16
Correlations

		Test mathematical creativity 1	Test mathematical creativity 2
Test mathematical creativity 1	Pearson Correlation	1	0.937 **
	Sig. (2-tailed)	0	0.000
	N	356	356
Test mathematical creativity 2	Pearson Correlation	0.937 **	1
	Sig. (2-tailed)	0.000	0
	N	356	356

Correlation is Significant at the 0.01 level (2-tailed).

Table-17
Reliability Statistics

Cronbach's Alpha	Part 1	Value	0.876
		N of Items	3 [a]
	Part 2	Value	0.778
		N of Items	2 [b]
		N of Items	5
		Correlation Between Forms	0.724
Spearman-Brown Coefficient		Equal Length	0.840
		Unequal Length	0.845
		Guttman Split-Half Coefficient	0.819

a. The items are:Fluency, Flexibility, Originality. b The items are: Originality, Sensibility to issues, Elaboration.

Table-18
Case Processing Summary

		N	%
Cases	Valid	356	100.0
	Excluded [a]	0	0.0
	Total	356	100.0

Table-19
Reliability Statistics

Cronbach's Alpha	N of Items
0.892	5

The procedure Evans[7] requires that experts be asked to judge the extent to which the instrument capture the phenomenon or trait investigated. In this sense, they built a test protocol presentation and investigation, id est assessing the extent to which chosen items in the proposed test evaluate an mathematical creative thinking quality. The six experts who have analyzed the proposed test configuration agreed with structuring items. Thus, it was shown that solving items 1, 2 and 3 is a good indicator of the fluency of creative mathematical thinking as involving reorganization of information and recognition as many rapid association[11] between different components of the statement of the problem. In this items, becomes operational the preset image and its counterpart in given configuration -figural fluency; possible actions (road construction segment default) depending on given criteria -operational fluency; combination of digits with respect to requirements-associative fluency. Additionally, the solving of this items reflects the ability to find as many associations between objects, events, expressions, ideas, within a certain period of time, and the facility, speed and clarity with which they are issued. All the results obtained by means of qualitative analysis and quantitative research items 1, 2, 3 prove that the first hypothesis is valid.

Solving items 4, 5 and 6 is a good predictor of the flexibility of creative mathematical thinking as involving differentiation explicit and implicit information in the text and producing as many solutions based on their own criteria for classification and selection. In this items, becomes operational the preset image and its counterpart in a given configuration *(figural flexibility);* possible actions (road construction segment default) depending on given criteria *(operational flexibility);* combination of digits with respect to requirements *(flexibility associative).* Additionally, solving these items reflects the natural ability of flexibly to change the trajectory of thought, quickly change the view, easily moving from one reference frame to another, to redesign slim, fast and appropriate the information, methods, action, system of knowledge, and to flexible and operational adapt on new situations, activities, requirements, depending on the requirements of the problem. All the results obtained by means of qualitative analysis and quantitative research items 4, 5, 6 prove that the second hypothesis is valid.

Solving items 7, 8 and 9 is a true indicator of the originality of creative mathematical thinking as involving generation solution by intuition because of the need to rethink the problem by building constructive solution, by appealing to the imagination and, respectively, by structuring solution using creative imagination[12]. Additionally, solving these items reflects the facile exit from stereotype and proves the ability of giving new answers starkly different from what is common, usually, currently statistical, new responses involving very distant establishing connections made spontaneously, according to a surprising intuition, supported by confidence, governed by constructive imagination and creative fantasy. All the results obtained by means of qualitative analysis and quantitative research items 7, 8, 9 prove that the third hypothesis is valid.

Solving items 10, 11 and 12 represents a fair evaluator of elaboration of creative mathematical thinking as involving distinguishing information in the text and reasoning solutions, which shows the quality that allows individual to add to the product a large number of particulars, details, and to achieve it in a balanced and economic way[13]. In addition, it conditions browsing of all stages or steps to reach creative solutions or products and requires tenacity, passion and great work capacity[14]. All the results obtained by means of qualitative analysis and quantitative research items 10, 11, 12 prove that the forth hypothesis is valid.

Solvings items 13, 14 and 15 constitutes a relevant tool for assessing the sensitivity to issues of creative mathematical thinking as involving distinguishing elements inaccuracies and validation information which correctly complete the designed solution. Additionally, solving these items reflect the ability to "see" the problem, to observe difficulties which must be repaired or inconsistencies between facts or ideas, imperfections that can be removed. However, the specialists was objected that these items seem not to keep strictly to mathematical thinking, but we motivated using the idea that items are designed according to the principles of cryptography (the cryptograms constituting itself into a real training logical game) and cryptography is one of the most new areas introduced in mathematics. All the results obtained by means of qualitative analysis and quantitative research items 13, 14, 15 prove that the fifth hypothesis is valid.

Following assessments by Evans' method, the value obtained for content validity coefficient is 1 and for correlation coefficient is 1, which indicates a high content validity.
For prove the competitive validity, we chosen to calculate the correlation coefficient between the test results of students for overall creative thinking (tested with Battery of tests for creative thinking, created by A. Stoica-Constantin and M. Caluschi[15] and creative thinking mathematics, we obtained for the Pearson's coefficient 0.682 for the first session test, and 0.713 for second session test. This results suggest that the standardized educational test for diagnose the development level of creative mathematical thinking qualities is validity competitive. (table 20 and table 21)

The method proposed by D.T. Campbell and D. W. Fiske[16], named Multitrait-multimethod, can assess convergent validity (the extent to which two tests measure the same construct) and discriminatory (referring to non-correlation relationship with tests that measure other constructs than studied). The output specific summary matrix, named Multitrait-multimethod Matrix, includes correlations between tests that measure the same trait, correlations between tests that measure different features, and correlations between them when using different methods of measurement[6, 9]) (table 22)

In this study, we opted for exploratory factorial and confirmatory analysis on construct validity, because it facilitates getting, based on the correlation matrix, of matrix factorial saturation representing the correlation coefficients between items. The analysis of 356 test scores, obtained in the first test of creative mathematical thinking, using Extraction method for principal component of the analysis and Rotation method Varimax, with Kaiser normalization model prove that items, who listing fluency, flexibility and originality, are closely correlated, contributing 45.74% to the variation of scores. In addition, items, who listing elaboration and sensitivity to issues, form a second group of correlation, contributing 37.8% to the variation in results (table 23). All the results obtained by means of qualitative analysis and quantitative research items from 1 to 15 prove that the sixth hypothesis is valid.

Tabel 20
Correlations

		Test mathematical creativity 1	**Test mathematical creativity 2**
Overall creativity test 1	Pearson Correlation	1	0.937 **
	Sig. (2-tailed)	0	0.000
	N	356	356
Mathematical creativity test 1	Pearson Correlation	0.937 **	1
	Sig. (2-tailed)	0.000	0
	N	356	356
**. Correlation is significant at the 0.01 level (2-tailed).			

Tabel-21
Descriptive Statistics

		Overall creativity test 2	**Mathematical creativity test 2**
Overall creativity test 2	Pearson Correlation	1	0.713**
	Sig. (2-tailed)	0	0.000
	N	356	356
Mathematical creativity test 2	Pearson Correlation	0.713**	1
	Sig. (2-tailed)	0.000	0
	N	356	356
**. Correlation is Significant at the 0.01 level (2-tailed).			

Table-22
Descriptive Statistics

	Mean	Std.Deviation	Analysis N
Fluency	4.87	1,574	356
Flexibility	3.67	1,489	356
Elaboration	3.91	2,001	356
Sensitivity to issues	4.35	1,814	356
Original	3.07	2,074	356

Table-23
Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Fluency	4.87	1.574	356
Flexibility	3.67	1.489	356
Elaboration	3.91	2.001	356
Sensitivity to issues	4.35	1.814	356
Original	3.07	2.074	356

Conclusion

After the pre-testing stage, the analysis of items revels that the standardized educational test for diagnose the development level of creative mathematical thinking qualities is a properly created tool, because the mathematical creative thinking test items have difficulty coefficient of between 25% and 75% and the difficulty coefficient between 25% and 75%. In addition, the checks from pre-testing of the overall quality of the test reveals that it has objectivity, applicability, fidelity and validity, features that recommend it as a reliable and useful tool in the diagnose of the level of creative mathematical thinking qualities (fluency, flexibility, originality, elaboration, sensitivity to issues).

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