

**PROBLEM OF THE USE OF TEACHING MATERIALS IN GEOMETRY TEACHING IN
FIRST SECONDARY YEAR IN DR Congo.**

(Case of schools in the municipality of Tshopo; city of Kisangani from 2012-2013)

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ABSTRACT

This study is a contribution to the awakening of the awareness of the mathematics teachers of the secondary school of the commune Tshopo and those of the other schools of the city who find themselves in the same situation of use of the basic instruments thus leading the students to acquire the subjects they are taught. The problem we are concerned about in this study is how teachers behave when they give their geometry lessons.

Our concern is not only to identify strategies, but also to assess whether these actions are likely to foster the emergence of personal initiative and creativity in the student.

Ultimately, in this publication, our concern is to get teachers to improve their working methodology if necessary.

KEYWORDS: problematic; teaching materials; teaching; geometry; secondary.

INTRODUCTION

Education is declining in the Democratic Republic of Congo: the training given to students in school seems not to adapt to the real needs of society. The school in fact a favourable environment where creative, independent men are prepared, able to provide for the needs of society. Unfortunately, we find that the school here is failing to train men who can adapt to the constant changes in modern technology. In this study, our wish is to know whether the difficulties faced by teachers also arise from the non-realization of teaching, that is, the principle of intuition is not observed. In other words, the teaching of geometry is given only in an abstract way. While everyone attributes the cause of this crisis to the many wars that our country, the pedagogues, have experienced, they see the crisis in terms of school loss, seen as a waste of knowledge of school buildings, materials and hard work related to teaching. The solution envisaged to this situation would be to put the necessary financial resources in the education sector in order to remedy this recurring crisis. We believe that the request would also be to analyze what is really happening in the classroom during the course of the teaching.

The lasting solution is to answer the question of whether the method used by mathematics teachers allows them to train the man that society needs, that is, a free, capable, independent, creative and initiating man.

Teachers in charge of the mathematics-geometry course in the secondary schools of the Tshopo commune would not use appropriate teaching materials and teaching materials for a good understanding of the subjects given to pupils, as:

- Teachers would not have the skills to create these materials themselves;
- Schools would not have the operating costs to obtain necessary teaching materials;
- School authorities, prefects and principals would not follow up to get teachers to use teaching materials.

This study aims to:

- To identify the various problems that arise with regard to the use of teaching materials in secondary schools (1st C.O) of the commune Tshopo;
- To propose appropriate solutions (solution track) to overcome this situation to improve geometry teaching.

The choice of this sub-branch of geometry is motivated by a double importance: firstly because the interest of the child is increasingly solicited by the concrete: (see, touch, feel and). It allows to develop and awaken the taste to the observation of all geometric shapes.

Secondly, the objectives set by the National Programme would like to see, in addition to a simple acquisition of knowledge, that the teaching of geometry gives the student a taste for representation of certain geometric figures (circle, rectangle, square, sphere...) that will allow him to integrate into professional life, develop in the student the necessary affect with regard to all the activities necessary for scientific development that involves social and economic development.

The Tshopo commune has been chosen for reasons of proximity and is full of schools of all the educational networks that can be found in the city of Kisangani: public schools (official and convention schools) and accredited private schools.

This study is divided into five key points:

- Understanding the fundamental concepts
- Methodological approach;

- Data counting and processing techniques;
- Presentation, analysis and interpretation of the results;
- Suggestions.

1. UNDERSTANDING THE FUNDAMENTALS

1.1 Problem

Is a question to be solved by logical methods, rational in the scientific field. A speculative difficulty, to which one seeks a satisfactory solution for the mind. (La Rousse, (2010, P822).

It is therefore a series of questions asked around a fact by specialists in order to find the solution or convincing explanations.

1.2 Teaching

Teaching refers to the action or art of teaching, passing on knowledge to a student or learner. However, in its current acceptance, teaching consists in instilling in the student the desire to know, to make able, to pass by himself, to understand, to judge and to reason by his intelligence.

1.3 Geometry

Geometry is a mathematical science that studies the relationships between points, rights, curves surfaces and volumes of space. La (Rousse, 2010, P464)

It is also a sub-branch of mathematical sciences that deals with the different geometric figures (squares, rectangles, circles, pyramids,)

1.4 Teaching

It is usually defined as the art of teaching. It is certainly the discipline that deals with teaching practice.

1.4.1 Mathematics Didactic

She studies the educational activities aimed at: teaching mathematics, dealing with cognitive behaviour. On the situations implemented to teach students and especially the phenomena to which the complications of knowledge give rise to it clarifies the knowledge of the problem posed and found good questions and their solutions. (KAMBALE KASOMO, 2008, P29)

1.5 Didactic material

Is the set of objects that help, on the one hand, teaching to present notions, facts or experiences and on the other hand, to promote the learning of students (KAMBALE KASOMO, ditto, P8).

All teaching materials are objects of various natures, allowing the teacher to realize his lesson.

What matters is the physical facilities of the school, the classroom and the means of teaching available to teachers, and students or learners who contribute to the improvement of the quality of their work. (LITOMBO, 2012, P13)

1.5.1. Importance

For the teacher, the teaching material helps to make his lesson a reality, to speak little, by eliminating verbalism. We have to move from the concrete to the abstract, the connection between the thing and the notion or idea.

As for the students, the teaching material arouses interest and arouses their curiosity; it multiplies the sources of ideas and allows a better retention of ideas by eliminating verbalism. The teaching materials encourage students to examine the facts and make the connection with the situations in their living environment, it facilitates the exercise of observation, analysis and synthesis.

1.5.2. Characteristics

The teaching material must be: large, clear, interesting, solid, simple and excitatory. The first with proportional dimensions (large, element, large object). The second must not contain several details or elements.

The material used, the state of the colors, the sharpness of the shapes with its clarity, the impressions that these elements will leave to the touch, so many invoices that intervene to attract and fix the learners. The third must be durable and durable. And the fourth, on the other hand, must avoid too many details and fantasies that will distract the students from the essentials, finally the fifth material must satisfy the learners.

1.5.3. Types

In general, we can distinguish: natural, semi-natural, manufactured and audio-visual teaching materials. Natural teaching materials are those that can be observed in their natural biological and climatic environment, including the diet of bananas on its banana tree; backyard poultry;

Those of the semi-natural, differ from precedents in that they are displaced from their natural environment: a diet of bananas taken to class, a fresh fish taken in the classroom.

The manufactured teaching material is the type that is much more used in geometry. The teacher must have imagination and make by himself or have the students make teaching materials that they cannot find in nature or moving from their natural environment to the occurrence: latte, square, rapporteur.

Audio-visual techniques are educational materials. These are visual, sound or audio-visual auxiliaries due to the progress of new communication technology.

Fixed or animated projection, photography, VCR, computer, ...

The teaching material, also known as intensive material, is used to teach a lesson for a good transmission of knowledge and a better understanding of the subject.

1.6 Intuition

The term intuition comes from the Latin: "Intueri" look literally. It means the immediate grasp of the truth without the help of reasoning. It puts the student in direct contact with the actual object of his representation. (LITOMBO, ditto, P18).

What we have seen, heard, tasted, is firmly fixed in the memory and can no longer come out. The senses are the faithful chamberlains of memory (LYONGO, ditto, P18).

1.6.1 Direct Intuition

It is spoken of when a natural object directly strikes a meaning to teach it. The real direct intuition: is the gift that things are apprehended in their natural environment and in their dynamic aspect: to observe a fish in a river.

Concrete intuition: it is when the thing is detached from its natural framework and observed under its static effect: bringing a fish into class.

1.6.2 Indirect intuition

It comes in three forms: represented intuition, intellectual and moral.

- **Intuition** represented: it is the one that uses a model, a model, a photo, a map, a drawing
- **Intellectual** intuition: is the one that uses a path, a profile, a graph, a diagram. It is an intuition that is much more used or frequent in mathematics.
- **Moral** intuition: it is the one that is founded by exemplary and modern acts: politeness, solidarity, benevolence, etc.

It should be noted that intuition is to be considered as a means and not an end or a goal. This is an indispensable step in the natural approach of the human spirit.

2. METHODOLOGICAL APPROACH

The analysis of the problem of the use of teaching materials in the teaching of mathematics geometry in the first year of secondary school helped us to go down to schools, to collect and process the data in order to obtain precise information on the use of teaching materials.

The documentary method allowed us to collect data on the numbers of networks, high schools, first-year secondary classes, teachers' teachers and teaching materials that schools have.

For public schools, data were collected at the Kisangani II primary, secondary and vocational education sub-division. In the Tshopo commune. We consulted the school statistics book for this municipality.

With regard to accredited private schools, we went down to their school branches where we consulted teacher implementations and end-of-year reports to supplement our data for the 2012-2013 school year. For the teaching materials we passed in the directions consult the repertoire of teaching materials used in the teaching of geometry.

We went to schools to converse with school leaders and teachers in mathematics courses if we had to consult the textbooks of the subjects forecasts, preparation sheets and inquire about some teaching materials by the teachers.

We used a survey questionnaire. Our questionnaire allowed us to gather information on the documents held by the teachers, the teaching materials used and also helped us to guide our solution path. We have taken care to ensure that we carry out this task with our subjects.

The work was done gradually after our explanations, the subjects surveyed remained with the questionnaire and time was not timed. After two weeks, we spent the protocols removed. Overall, the questionnaire was administered without constraint on our part or by the school authorities.

3. DEPASING AND DATA PROCESSING TECHNIQUES.

Is a research technique for objective, systematic and quantitative description of the overt content of communications for interpretation purposes? (GRAWITZ, 1974, P627)

To scan our data or the answers of school leaders and math teachers in the first year of secondary school, we opted for content analysis. This technique is very often used for answers to open questions. While for closed questions, we used the technique of pointing and then frequency in a contingency table.

3.1 The K-square test (x)

To determine whether the difference between the relative frequencies in our variables or not, we used the K-square test

After the calculation, the calculated Ki-two value is compared to that of the table at the threshold of 05 with a certain degree of freedom and two situations arise:

- The difference between the rates found is significant if the value of Ki-two calculated is greater than the value of Ki-two (X^2 tab) tabulated or observed in the table
- This difference is not significant, i.e. the difference is negligible if this calculated Ki-square value (X^2 cal) is less equal to the value of Ki-square (X^2 tab) observed in the table.

The coefficient of variation is obtained from absolute dispersion and the average. It is often expressed as a percentage and is calculated as follows:

$$(CV)ou v = \frac{\delta}{\bar{x}^2} \quad \text{BANDOMBELE (2012, P68)}$$

Legend:

CV. (V): variable coefficient

$$\delta: \text{sigma ou écart type} = \sqrt{\delta^2}$$

$$\delta^2: \text{variance} = \sum x^2$$

\bar{X} : Average

After the calculation, three situations may arise for the interpretation of the coefficient of variation (DHAINAUT 1986, P104):

- If the coefficient is less than 15%, there are no disparities;
- If the coefficient is between 15 and 30% it proves that there are significant contests.
- If it is above 30%, it shows that there are very significant disparities.

3.2 The offer of education

The provision of education is the school environment that includes premises, teachers, equipment, supplies and programs etc. this offer of education is thus organized in the educational system and in schools (LITOMBO op cit. P.28)

For our study, the results on the offer of education are presented in the various tables below.

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

Introducing schools targeted by management regime

Table No.1 distribution of schools by management regime

Regime	N.e	PERSONAL STAFF			f	%
		C.E	Prof	Total		
Etc	1	1	2	3	1	12,5
ECP	2	2	4	6	2	25
ECS	1	1	1	2	1	12,5
ENC	3	3	4	7	3	37,5
EPA	1	1	1	2	1	12,5
Total	8	8	12	20	8	100

Legend

ECC: Catholic Convention Schools;

ECP: Protestant convention schools;

ECS: Salvationist Convention Schools;

EPA: Chartered private schools;

N.E: Number of schools;

f: Frequency;

#: Percentage;

Prof: Teacher.

Considering table 1 above, it emerges that there are five types of schemes that run and organize secondary schools in the Tshopo commune. The non-contracted scheme with 3 schools, or 37.5% and a Protestant contracted scheme with 2 schools, or 25% organize more schools with percentages that place themselves above the theoretical average of 20%. The Catholic contracted scheme with 1 school or 12.5%, private and approved with 1 school, or 12.5% organizing fewer schools the percentages less than 20%.

Table 2 on the distribution of headteachers by diet and gender.

Sex/Regime		Etc	ECP	ECS	ENC	EPA	TOTAL
M	F	1	2	1	3	1	08
	%	12,5	25	12,5	37,5	12,5	100
F	F	0	0	0	0	0	00
	%	0	0	0	0	0	00
TOTAL	F	1	2	1	3	1	08
	%	12,5	25	12,5	37,5	12,5	100

Legend

M: masculine

F: Feminine

It is clear from the reading of the statistical data contained in Table 2 that, out of 8 schools surveyed, all 8 or 100% are digested by the heads of schools who are male subjects.

Table 3 breakdown of headteachers by level of education

Qualification/Parameter	N	%
S.Q	0	0
N.Q	0	0

G3	0	0
The	4	50
L2	4	50
TOTAL	8	100

Legend:

S.Q: Underqualified;

N.Q: Unqualified;

G3: Graduated in teaching;

LA: Graduated in teaching;

L2: Graduated from university or others.

Table 3 shows that: 4 out of 8 headteachers, or 50% are associate graduates of teaching and 4 out of 8 headteachers, or 50% are university graduates or others.

4.2. Level of professional experience of school leaders in target schools.

The professional experience of school leaders is a factor in the school environment that can condition teachers or teachers with advice and remarks on the use of teaching materials.

We believe that a qualified or unqualified teacher, through proper pedagogical supervision, may become capable of exploiting the principle of initiation.

To start our subjects acquired according to the variable seniority, we opted for a six-year experience by the fact that the legal texts related to school regulations reward any teacher who totals three years of career. This is called a "rung" in primary, secondary and vocational education. We believe that with more than six years or more of a level of experience, the teacher is capable of creativity and initiative in the realization of his teaching.

Table 4 on the distribution of headteachers by seniority

Seniority /Parameter	F	%
Under 6 years	3	37,5

Over 6 years	5	62,5
Total	8	100

Considering the statistics in Table 4 of our study, relating to the seniority of school heads in targeted schools, the following considerations emerge:

- 5 subjects or 62.5% have a seniority of more than six years with the percentage that is above average (50),
- 3 subjects or 37.5 have work experience of less than six years with the percentage less than (50).

Table No.5 breakdown of math branch teachers by qualification

Qualification /Parameter	N	%
S.Q.P	7	58,5
Q.P	5	41,7
Total	8	100

Legend:

S.Q.P: Under pedagogical qualification

Q.P: Pedagogical Qualification

Table 5 tells us that 7 subjects or 58.5% are pedagogically underqualified, i.e. have no knowledge of mathematics teaching compared to 5 subjects or 41.7% with skills to properly ensure mathematics teachings.

It should be noted that the qualified teachers who teach mathematics do not match the required number. We believe that this under-qualification can make it difficult to implement mathematics lessons.

In view of the pedagogical dimension, we believe that the extended day of our subjects in teaching, that is, their professional experience could enrich their pedagogical know-how. This is how we analyze the results according to the seniority variable.

Table 6 distribution of math teachers by seniority variable

Seniority /Parameter	N	%
Less than 3 years	4	33,3
More than 3 years	8	66,7
Total	12	100

Table 6 above indicates that: 8 subjects or 66.7% have work experience of more than three years and 4 subjects or 33.3% have a seniority of less than three years with percentages far removed from the average (50%)

The pre-qualification rates of education officers and their seniority confirm that there are more underqualified than qualified; while for professional experience, we see seniority, both at the level of headteachers and at the level of teachers of mathematics courses, likely to train the didactic technicality of our subjects surveyed. This is how we analyze in the following paragraph the offer of education related to documentation and teaching materials.

Table 7 possession of the official mathematics course program by teachers.

Program /Parameter	N	%
Yes	5	62,5
Not	3	37,5
Total	8	100

Table 7 shows that: 5 institutions or 62.5% own the program with the above-average percentage (50%) 3 institutions, or 37.5%, which provide education without a programme.

Although the numbers of schools that own the program are high, the rate is high and therefore cannot be overlooked. That is how we went to look for the reasons for this state of the matter.

Table 8 reasons for lack of official math course program

Reason/Parameter	f	%
Scarcity of course program on the market	2	66,7
Neglect of head of school	1	33,3
Total	5	100

Data contained in Table 8 tell us that: the scarcity of said document on the market (laboratory) with two institutions, 66.7% and more advanced with the above-average percentage, the negligence on the part of headteachers to obtain the mathematics program with a subject or 33.3% and less advanced with the percentage that is below 50%.

The high rates of schools that have the official mathematics course program lead us to analyze the result on the existence of teaching materials in targeted institutions.

Table 9 existence of teaching materials in targeted schools

Existence of M.D/Parameter	f	%
Yes	6	75
Not	2	25
Total	8	100

Legend:

M.D: Educational materials

It is clear from table 9 that: 6 institutions or 75% have teaching materials with the percentage that is well above average (50%), in 2 schools or 25%, there are no teaching materials for mathematics-geometry courses.

The very high rate of schools owning the materials leads us to identify the type of these materials.

Table 10 type of teaching materials in our schools

No	Types of M.D/Parameter	N	%
1	Square	6	19,3
2	Compass	5	16,2
3	Rapporteur	5	16,2
4	Slats	5	16,2
5	Putting cane	1	3,2
6	Cardboard cube	1	3,2
7	Cardboard square	1	3,2
8	Cardboard rectangle	1	3,2
9	Wooden parallelepiped	1	3,2
10	Wooden pyramid (cardboard)	1	3,2
11	Wooden diamond (cardboard)	1	3,2
12	Triangle	1	3,2
13	Circle	1	3,2
14	Plan configuration	1	3,2
Total		31	100

Table 10 shows that:

- Squares with 6 subjects, or 19.3%, compass with 5 subjects or 16.2%, rapporteurs with 5 subjects, or 16.2% and slats with 5 subjects or 16.2% are more cited with percentages that are above average (68%)
- The cane meter, the cardboard cube, the square, the rectangle, the parallelepiped, the pyramid, the diamond, the triangle and circle with one each 1 subject or 3.2% are on average '32.2%).

4.3. Offer of education related to monitoring the use of teaching materials**Table No.11 Headteachers' Position on Teacher Tracking in the Use of Teaching Materials**

Position of the C.E/Parameter	f	%
Yes	5	62,5
Not	2	25
Undecided	1	12,5
Total	8	100

The reading of Table 11 on teacher monitoring in the use of teaching materials shows that:

- 5 headteachers, or 62.5% accompany their teachers with the above-average percentage (50%)
- 2 subjects either 25% do not accompany their teachers and another, or 12.5% by the legislator
- By adding up the rates of the undecided and the subjects who do not accompany their teachers, we find that the results (37.5%) tends to average; that is, we can say that the difference between the two groups is not significant.

Table No.12 how to follow up teachers in the use of teaching materials

No	Way/Parameter	N	%
1	Availability of M.D	5	20
2	Regular check of preparation sheets	6	24
3	Regular visit of lessons	4	16
4	Educational animations	4	16
5	Make comments on the cards	4	16
6	Sanctioning irregulars	2	8
Total		25	100

The reading of Table 12 shows that:

- Subjects related to regular monitoring of preparation sheets with 6 subjects or 24% and availability of teaching materials with 5 subjects or 20% are more recommended with percentages that are below average (16.6%)
- Make regular visits to lessons, do pedagogical animations and make remarks on the sheets with 4 subjects, each, or 16% are moderately recommended with percentages close to average (16.6%)
- Penalties to irregulars with 2 subjects, each 8% are less recommended with percentages that are below average.

Based on the results of these two tables of teacher follow-up in the realization of teachings does not solve by a single tool, a single approach.

However, regular follow-up and class visits by school leaders can be a dynamic state that encourages the teacher to choose a teaching material, approach or method to engage in it and to persevere in his accompaniment in order to achieve a goal.

Unfortunately, given the magnitude of the task, headteachers are getting carried away by educational discouragement and disillusionment. The continuous statistics in the tables below speak very well.

4.4. Student results in math class

We present the results of students in Grade1 22 2011-2012 from all targeted schools

The interpretation of success rates will be made in relation to the mastery of knowledge in mathematics and according to the estimate of the pedagogues.

For a subject to be considered mastered by students, they must achieve a performance of at least 60% for an acquisition judged to be average and 80% for better control. (ETIAITHO,2000, P17).

Table No.13 Results of First-Year Secondary Students in 2011-12 School Year Mathematics

No	management regime /Parameter	Number				%
		schools	classrooms	Students	success	

1	Etc	1	4	225	120	47
2	ECP	2	12	391	292	74,9
3	ECS	1	2	120	90	75
4	ENC	3	8	307	196	63,8
5	EPA	1	2	98	80	81,5
Total		8	28	1171	778	66,5

Source: division of primary, secondary and vocational education and Archives of the schools under consideration.

Table 13 shows us that:

- Students in private school with a 81.5% success rate have a better command of mathematical materials with the percentage above the 80% threshold;
- ECP students with 74.9% of ECS with 75% have moderate control of the contracted with 63.8% mastering the masters with a performance that varies between 60% and 80%;
- ECC students with 47% of achievements have a low mastery with a performance of less than 50%;
- The performance of 8 schools (66.5%) shows that in the 2011-2012 school year, students did not achieve the rate of better mastery of subjects.

The different success rates calculated in the table above reveal that mathematics teaching is done in an abstract way and knowledge acquisition is a problem.

This is one that we asked our respondents to offer us some solutions to make this mathematics teaching a reality, especially the geometry part.

4.5. Basic factors of non-concrete teaching of mathematical geometry and some solutions

4.5.1. The non-concreteness of the teaching of mathematical geometry and its factors

The teaching by objective makes available to the teacher possible pedagogical principles.

The knowledge to be transmitted is abstract, the teacher, through intuition, exploits the learner's senses in order to make his teaching concrete. This use of teaching materials has never been easy and our study identifies some explanatory factors such as: teachers' pedagogical under-qualification and lack of supervision, lack of work experience and initiative; neglect of some headteachers and lack of adequate

and adopted or appropriate teaching materials; the regular failure to keep teaching materials and the lack of control of the objectives assigned to the teaching of mathematics geometry, the inadequacy of the costs for the purchase of materials.

4.5.2. Solution track for the realization of mathematics geometry teaching

Table No.14 solutions for the use of teaching materials

No	Solution Track/Setting	f	%
1	Arranged educational materials	8	22,9
2	Teacher supervision	2	5,7
3	Be proactive	1	2,9
4	Have an official math program	3	8,6
5	Has documentation that is compliant and adapted to the program	5	14,3
6	Regularly holding educational documents and defining	6	17,1
7	Teaching monitoring by school authorities	4	11,4
8	Boosting operating costs	2	5,4
9	Hire teachers	4	11,4
Total		35	100

The following findings can be found from the reading of Table 14 on the research to materialize the mathematics teaching:

- Possession and use of the various teaching materials with 8 subjects, or 22.9% have a document compliant and adapted to the program with 5 subjects or 14.3% the regular holding of pedagogical documents with 6 subjects or 17.1% and followed by teachers by the school authorities are more desired with the percentages that are above average (11.1%).
- Other tracks such as monitoring teacher supervision and increasing operating costs with each 2 subjects or 5.7% having a mathematics program with 3 subjects or 8.6% having the spirit of initiative with 1 subject or 2.9% are less desired with the percentages below the average (11.1%).

5. SUGGESTIONS

- That the recruitment of mathematics teachers in secondary schools take into account their qualification pathway;
- That school leaders try to multiply the number of classroom visits and strengthen the teaching units of mathematics by organising model lessons and educational animation services for the benefit of teachers;
- That the provincial chief inspector increase the number of math inspectors to regularly visit schools to see the implementation of the national program.
- That the Congolese Government equip secondary schools with appropriate teaching materials in mathematics-geometry.

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