International Journal of Humanities and Social Science Invention
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 6 Issue 8||August. 2017 || PP.35-48

Knowledge text and reasoning in factorial and human genetics in Benin republic colleges

Thierry DOVONOU[1], GéroJ.FANOU[2], Paul ABOTO[3], Luc ADONONHOUE[4], Yvon WENDEOU[5] Christian Orange[6].
[1]*Institute of Mathematics and Physical Sciences (IMSP) University of Abomey-Calavi*
[2]*University of Lille (UL) France*

Abstract: *To reason, to make cognitive activities of problem solving is the leitmotiv of the Benin republicprogram through the Sciences of the Life and Earth (SVT). In Life Science (SV), formal genetics and human genetics are among the tools used in our colleges to solve problems by reinvesting the learning situation N°1:*

Genetic information: Nature, location and mechanism of transmission*. Does the production of a text of knowledge in genetics require an apprenticeship and how do learners produce knowledge texts at the level of which they do not differentiate between information and interpretation? Our research has attempted to understand the intellectual operations ofstudents in the elaboration of a text of knowledge. The analysis of some teaching sequences, copies of evaluations and interviews of the baccalaureatecandidates show that the instructions develop in students the formalization of stages of an explanatory reasoning where the already known is used to solve a problem Genetic problem. The two groups of students used for research leads us to identify twocategories of students: responding students and reflective students.*

Key words: *reinvestment, knowledge text, problem solving, responding students, reflective students.*

Date of Submission: 28-07-2017 Date of acceptance: 14-08-2017

I. Introduction

The development of a country depends fundamentally on the quality of its education system, the formation of its human resource. The educational system in Benin republic has always been one of the priorities of all our leaders. Thus, since Benin's proclamation of independence on 1st August 1960, Benin republic has always sought to improve the formation of young people. From 1960 to 2014, according to the evolution of the political history of Benin, three major periods characterized the country's education sector, 1960-1972, 1972-1990 and 1990 to the present. The latest reform introduced new curricula formulated under the Competency-based Approach (CPA), the objective of which is to "train the new man" that the country needs to develop by identifying and solving problems are facing the Nation ... The first problem is youth unemployment.

It is with this in mind that the new Life Sciences and Earth Sciences programs in Benin since 2004 for the Terminals Series A, B, C and D recommend to "make reinvestment for SA1 (Genetic Information: Nature, location and mechanism of transmission) so-called formal and human genetics by studying, explaining the modes of transmissions and segregations of alleles from the interpretation of the results of crossings of mono, di and tri hybridism and study Of pedigree»

It is to emphasize the importance of this reinvestment component that since 2005, in the tests of the SVT of the Baccalaureate in Benin republic, there is always an exercise of genetics. In 2009 in series C and D, we even observed a genetic exercise in part II of the two subjects to choose! The learner, so to speak, had no choice in the face of genetics. In the 2010 competition for admission to High Normal School (ENS) in NATITINGOU, there were two genetic exercises over three years.The APC option has its origins in an international context with the generalization of the APC in other countries (external educational reflections). As Stéphanie MATHÉ, Martine MÉHEUT and Cécile de HOSSON put it: "Appearing [pedagogical reflections] during the renovation of medical education in Canada," situations-problems "were aimed at making concrete and meaningful the teaching of Medicine by "contextualizing" learning in relation to concrete cases. In many definitions of the notion of situation-problem we find the idea of a concrete problem, hence a complex one, referring to "real" life, that is to say, a problem that is not exclusively academic. Here we come across the notion of "reference practice" developed by Martinand (1983): the problems dealt with at school must refer to "real" problems, that is to say, problems having an existence outside the context School, whether in everyday life or in different social or professional practices …". It is from the angle of these external educational reflections that Benin that appeared in the programs this reinvestment. To carry out our study, we chose a rural college located in the outskirts of Porto-Novo.

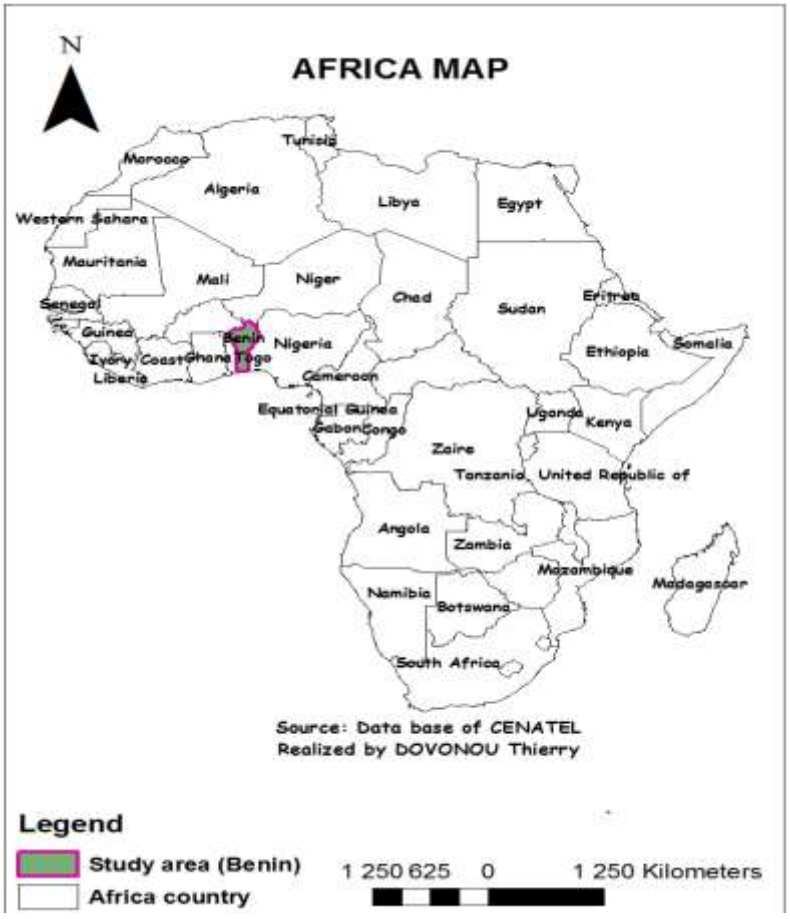
II. Problematical

The "problem situations" studied in SA1 (Genetic information: Nature, location and transmission mechanism) are different from the situations-problems proposed for classroom and baccalaureate assessment. The professor proposes in the "course" of reinvestment, a single type of situation-problem: "explain the transmission of characters or tare ...". Despite this seemingly simple situation, when learners had a choice between two subjects in the Baccalaureate (2005-2010), they always chose the subject without genetic exercises, even if the chosen subject is more difficult. This is the case of Benin republic Baccalaureate session of July 2010 where 26% of OUEME-PLATEAU students chose topic II which is very difficult. Only 2% of these 26% had the average while the genetic exercise in question is already out in the test of the white exam of the department of OUEME-PLATEAU and two other departments (MONO -COUFFO and ZOU-COLLINES). Genetic exercises therefore seem to pose problems for learners. Is this fear of candidates and this failure due to the fact that there was no methodological apprenticeship prior to the reinvestment? Why, the candidates were afraid to address the problems of genetics? Why are some students facing a genetic problem producing responsive, expositive texts? Faced with these questions, there is a problem that our study will try to solve: Is the production of a text of knowledge in genetics a learning process and how is it that learners produce texts of knowledge at the level of which they do not differentiate between information and interpretation?

III. Research Methodology

3.1. Sturdy area and Data collection techniques

To answer this problem, our work was carried out at APPRO-MISSERETE College of General Education with students of terminal D. We used several tools that complement each other.



The data collection work was carried out in several stages:

3.1.1. A pre-test

The resolution of a problem of human genetics, a problem other than "explain the mechanism of gene transmission", problem related to the cause of the non-appearance of sick daughter in a family. Students have to solve the problem individually for up to one hour and in a classroom situation: an assessment session after

learning. The problem was identified by ourselves. We recall that the course was done four months before this transfer, this delay is due to the fact that the teachers have done three months of strike. But we had warned the students two weeks in advance so that they could review. In this stage of data collection, we chose to avoid contact with the students (the teacher administered the test) and any influence on their work by coming into the class after the composition.

3.1.2. Semi-directional interview

We interviewed some students individually, immediately after the problem solving session. Interviewees were selected based on their written outputs. During the interview, the learner explains his methods of solving the proposed problem. This interview, semi-directive, allowed us to know why they used a technique of resolution.

3.1.3. A comparative study of accompanying documents

This step involves two complementary steps. In first, we have studied the few accompanying documents such as CTIS Info, the Baccalaureate tests and the type-corrections that may have influenced the behavior of the learners. Then, we interviewed the professor to inform us about the theoretical framework, that is to say what he uses in solving genetic problems.

3.1.4. The conditions for data collection:

We assumed the influence of the conditions of the data collection on the content of the students' productions as well as their comments. To do this, we chose to carry out our data collection after learning (about four months after the teaching of the course), and to do this we have played on the following constraints: first we asked the teacher to solicit Students to review the course of genetics for a week explaining that they want to make an assessment that will have a query value. From this point of view, we can guarantee the revision of the course by the pupils by referring to their official pedagogical framework: they are pupils of terminal who should normally take up all their courses to prepare for the baccalaureate which will take place this year July 14, 2010, the year being extended for strike action. In addition, Life and Earth Sciences represent a basic material, its coefficient is 5, the highest coefficient inseries D. So students would benefit from revising them. Our second step was to contact the students and tell them before the data gathering session that we will be the author of the query on Wednesday,
April 14, 2010.

3.2. Analytical methods:

For the analysis of learner's productions, we have developed a grid that takes into account the three categories of learner's productions.Our analysis followed two steps: first, we carried out a comparative study of the different productions of each learner and of the official productions in order to determine the appropriation of the scientific method imposed for the solution of the problems of genetics by the learners. Secondly, we analyzed the different productions in order to identify the obstacles of the learners at each stage of resolution.In order to analyze how the learners proceeded to solve the problem, we used a grid based on Vergnaud's conceptual field theory. The elements to be used in the following table can be summarized:

Reference	Signify	Meaning
- Situations involving the transition from the macroscopic scale to the microscopic scale; -Situations evoking the transmission of a character or a tare; -Situations to determine the relationship between a character and one or more genes.	- Operational invariants such as definitions, characteristicproperties: gene, allele, transmission, chromosomallocalization, crossing-over, inter and intra chromosomal	- Mathematical language, symbols and formulas that refer to the concept of fertilization genotype and relate it to other concepts.

IV. Results Of The Analyze

In the pre-test, we took a school problem provided by the official instructions in disciplinary competence 2: "explain the result of a crossing". In the evaluation, we used the concept "problem" in the sense of the taxonomy of D'Hainaut (1986). : Problem solving differs from simple application in that the subject does not have a simple operator to solve the problem. It is confronted with a new situation in which it must combine in an original way the operators at its disposal and / or adapt them to the new situation. This is in the direction of reinvestment.

A- Pre-test of awareness.

Here is the exercise we gave.

Exercise

The transmission of characters is sought in the Drosophila: the color of the body and the shape of the bristles. For this purpose the following crossings are carried out:

DOCUMENT

1st crossing

The crossing of wild, gray-flowered and smooth-set drosophila with black-body mutants and hooked silks yields only wild-type Drosophila in FI.

2nd crossing

The crossing between female drosophila FIs with gray-body and smooth bristles and black-bodied males and hooked bristles gives:

- 484 Drosophila gray-faced with smooth bristles,
- 461 black-frogs with hooked bristles,
- 30 Drosophila gray-body with hooked silks,
- 25 Drosophila with black bodies with smooth bristles.

Instructions:

Using the information from the documents and using your knowledge, explain the result of the crosses presented in the document.

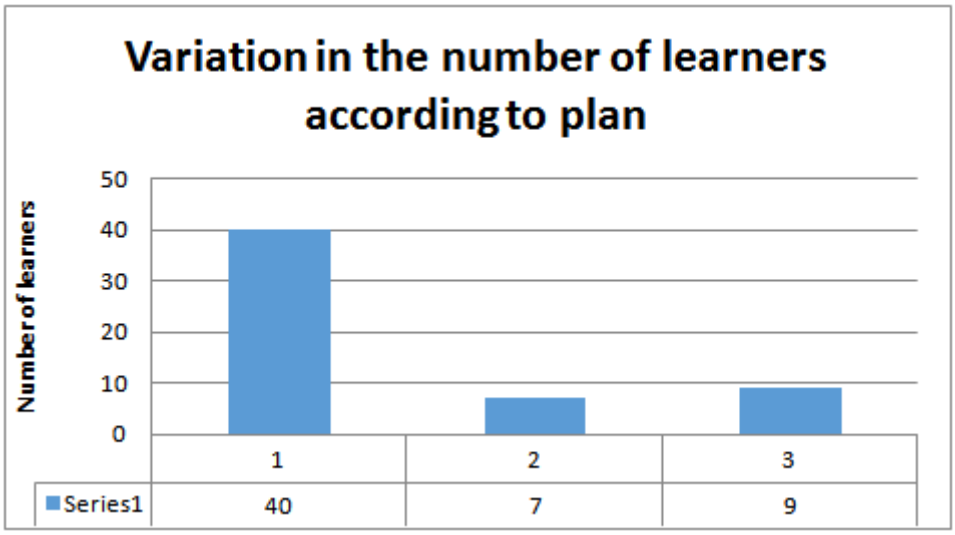
Your explanations will be illustrated by diagrams showing the behavior of the chromosomes.

The work for learners is to find a plan to deal with this exercise. At this stage of our work we have had three different plans.

1st plan:	2nd plan**:**	3rd plan**:**
Introduction General idea Problem Body of duty Information gathering: (Gene and allele, mode of transmission, location, mode of segregation). Hypothesis Verification or Treatment or explanation. Echequier + Mechanism of the crossing-over + factorial map. Conclusion.	Introduction General idea Problem Body of duty Gene and allele or number of allele gene Transmission mode Chromosomal location Mode of segregation). Hypothesis Verification or Treatment or explanation. Echequier + Mechanism of the crossing-over + factorial map. Conclusion.	Introduction General idea Problem Body of duty Character studied Transmission mode Chromosomal location Mode of segregation). Crossing-over mechanism Conclusion.

The 1st plan is the one given by the official instructions through CTIS info. It was on this model that learning was done. This plan is made by the majority of students (40 out of 55) The students who made the 3rd plan said during the discussions (interview) that the plan varies with the exercise. They are only 9 out of 55. The second plan was found by 7 out of 55 students. The first and second plan actually meet.

1st plan	2nd Plan	3rd plan
40(72%)	7(12,7%)	9(16,3%)



The learners seem not to know or can not identify the invariant operators (G. Vergnaud) or operators (L. D'Hainaut) that they must use. They do not seem to know when to hypothesize. Their tendency to be applicationists proves that the didactic contract was so strong that it does not allow the emancipation of the learners.The three categories of learners, with a few exceptions, have found the problem: how is the transmission of the characteristics studied explained or what is the mechanism of the transmission of the characters? They do not know the difference between test cross and Backcross. The learners did not master the operative invariants, so there is no more knowledge at play. When new types of individuals appear, they do not know whether the explanation of "the mechanism of transmission ..." stops at the mechanism of intra-chromosomal mixing or the chess board or the development of the factorial map, they unwind the band at the sight of the elaborate plans. The problem found "how to explain the transmission of the characters ..." is actually the transformation of the instruction in question. Some students think that by doing this, we have the problem. The first two categories do not know when the explanation is finished! The third category, a small percentage of pupils (compared to the others) coming from the city (are a priori influenced by the teachers) has been able to say that from the crossing-over, everything is explained.

Our reflection is whether we formulated the instructions otherwise, the majority of the learners will be able to find the problem? This is why we gave the same exercise to the same learners on the day of the simulated evaluation.

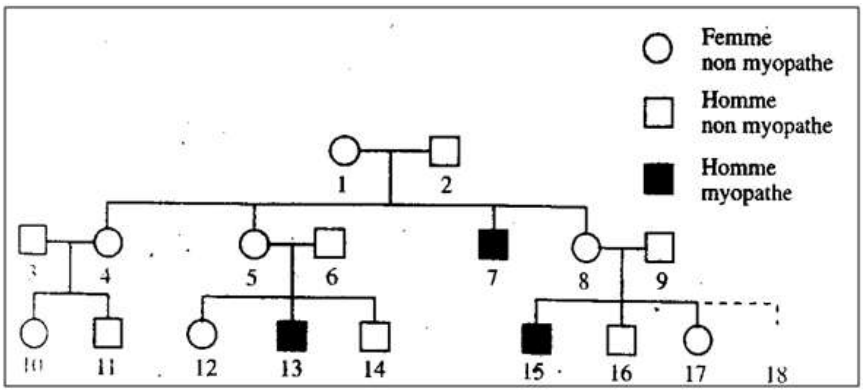
B- Evaluation

Exercise

We try to understand the reasons why certain genetic diseases such as the Duchenne rarely reach girls, for which purpose the following document on the YAGBO family is realized.

Document

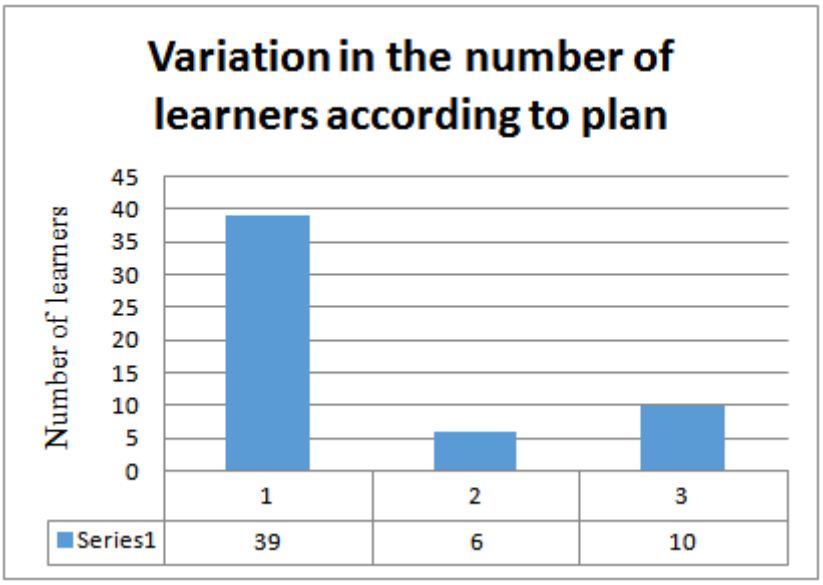
Duchenne myopathy is a degenerative disease. Myopaths do not synthesize a protein, dystrophin. The patients hardly reach the sexual majority. This protein is coded by the short arm of the X chromosome located on the part that has no counterpart on Y. The genealogical tree below is that of the YAGBO family.



Genealogical tree of the family studied

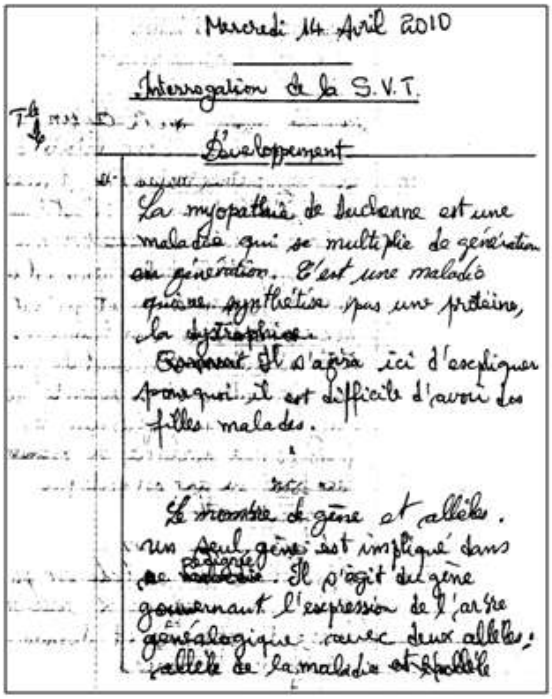
Instruction:
By limiting yourself to the information from the document, explain why it is difficult to have sick girls.

Results
We had three groups according to the adopted plan:
1st plan: 39 out of 55 learners (70.90%)
2nd plan: 06 learners out of 55 (10.90%)
3rd plan: 10 learners out of 55 (18.18%)



Of the 39 people, 9 were able to identify the problem and only 2 could find the answer; Of the 06 people, 2 were able to identify the problem and nobody could find the answer;
-Of the 10 people, 4 were able to identify the problem and only 2 could find the answer.
Our fear is confirmed, the learners function mechanically, because despite our preparatory work, we have not been able to undo the rigid "didactic contract" in the sense that the figure of the preliminary work have not varied.
We have grouped into three batches taking into account the methods used:
1st lot: learners who have adopted Plan N°1;
2nd lot: learners who have adopted Plan N°2;
3rd lot: learners who have adopted Plan 3;
We analyzed all six interviews, copies of resolution of human genetics.

Production ①



Mercredi 14 Avril 2010

Interrogation de la S.V.T.

Développement

La myopathie de Duchenne est une maladie qui se multiplie de génération en génération. C'est une maladie qui ne synthétise pas une protéine, la dystrophine.

Contexte. Il s'agira ici d'expliquer pourquoi il est difficile d'avoir des filles malades.

Le nombre de gène et allèles. Un seul gène est impliqué dans la maladie. Il s'agit du gène gouvernant l'expression de l'arbre généalogique avec deux allèles, l'allèle de la maladie et l'allèle

Réalisation

Marriage : [N] ∪ [N] H (normal) (N)

phénotype : [N] ∪ [N] (normal malade)

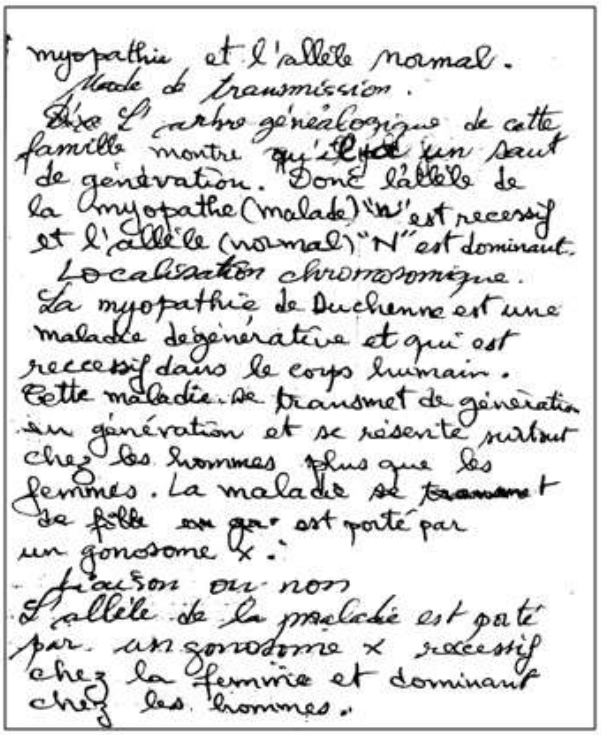
génotype : $X^N X^m$ ∪ $X^N Y$

gamètes : $1/2\ X^N$ $1/2\ X^m$ $1/2\ X^N$ $1/2\ Y$

Echiquier

gamètes	$1/2\ X^N$	$1/2\ Y$
$1/2\ X^N$	$1/4$ [N] $1/4$ [N]	$1/4$ [N]
$1/2\ X^m$	$1/4$ $\frac{N}{m}$ [N]	$1/4$ [m] .

Le résultat théorique est conforme au résultat expérimentale.



myopathie et l'allèle normal.

Mode de transmission.

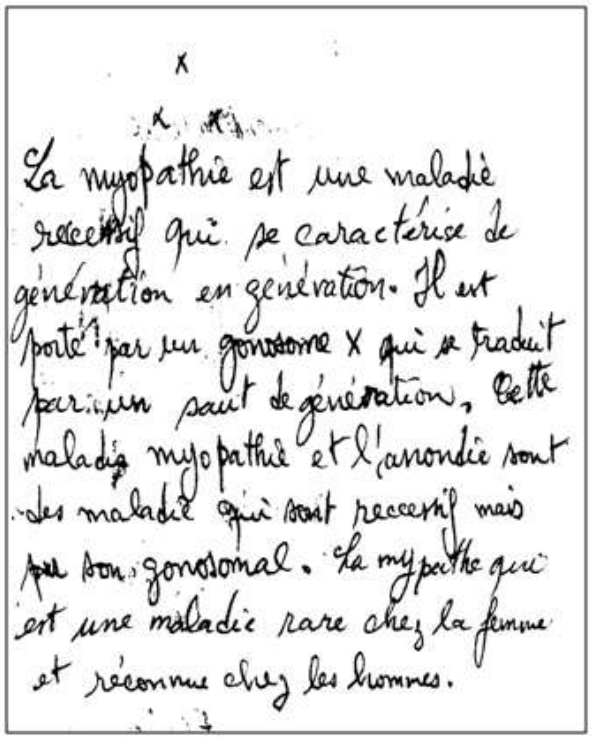
D'après l'arbre généalogique de cette famille montre qu'il y a un saut de génération. Donc l'allèle de la myopathe (malade) "m" est recessif et l'allèle (normal) "N" est dominant.

Localisation chromosomique.

La myopathie de Duchenne est une maladie dégénérative et qui est recessif dans le corps humain. Cette maladie se transmet de génération en génération et se résente surtout chez les hommes plus que les femmes. La maladie se transmet de père en fils est porté par un gonosome X.

Façon ou non

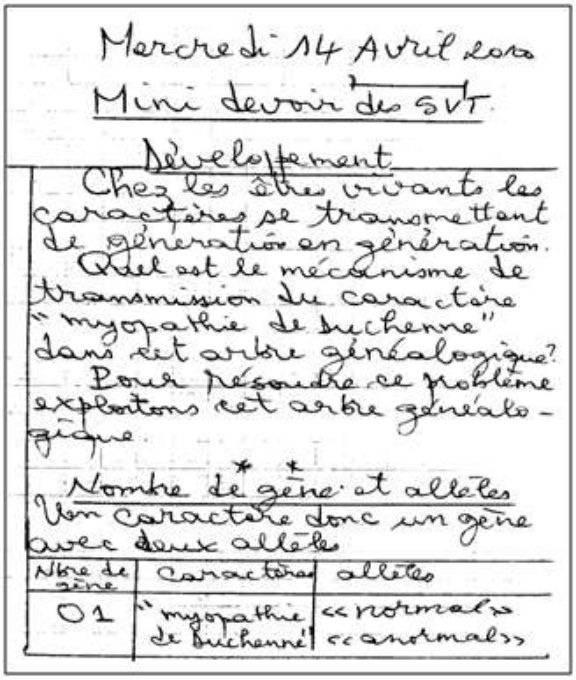
L'allèle de la maladie est porté par un gonosome X recessif chez la femme et dominant chez les hommes.



X

La myopathie est une maladie recessif qui se caractérise de génération en génération. Il est porté par un gonosome X qui se traduit par un saut de génération. Cette maladie myopathie et l'anomalie sont des maladie qui sont recessif mais pas gonosomal. La myopathie qui est une maladie rare chez la femme et réconnue chez les hommes.

Production ②



Mercredi 14 Avril 2021

Mini devoir des SVT

Développement

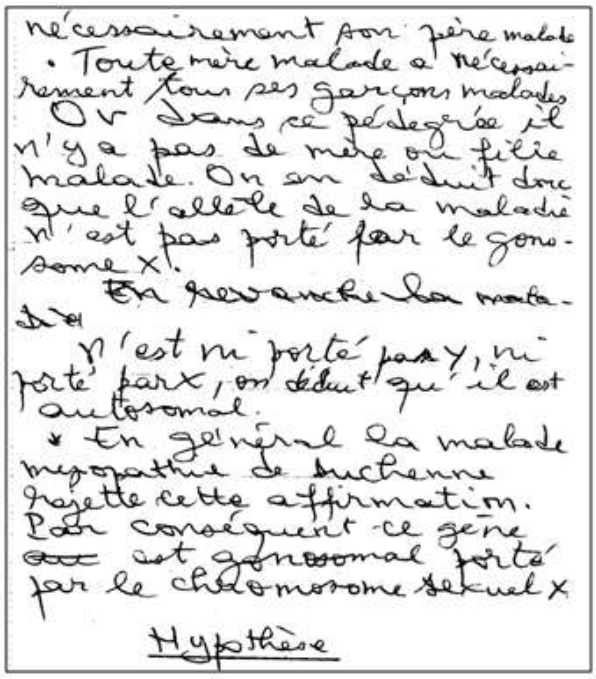
Chez les êtres vivants les caractères se transmettant de génération en génération. Quel est le mécanisme de transmission du caractère "myopathie de Duchenne" dans cet arbre généalogique?

Pour résoudre ce problème exploitons cet arbre généalogique.

Nombre de gène et allèles

Un caractère donc un gène avec deux allèles

Nbre de gène	Caractères	allèles
01	"myopathie de Duchenne"	«normal» «anormal»



nécessairement son père malade

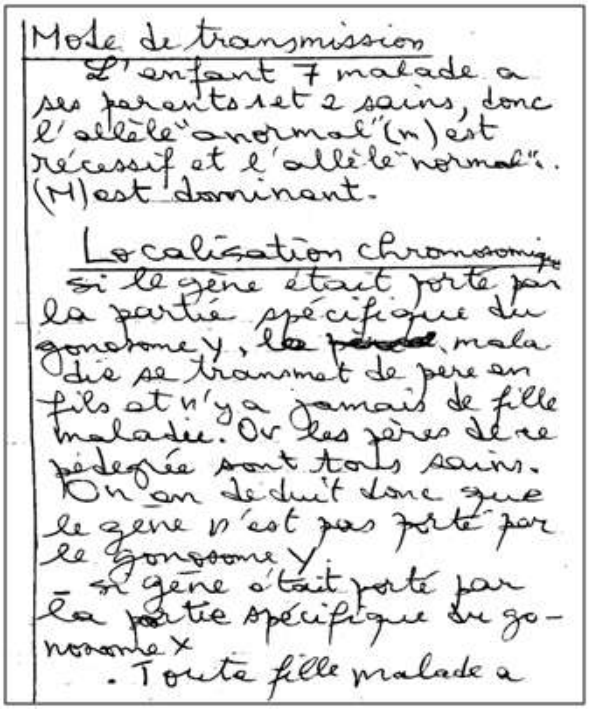
• Toute mère malade a nécessairement tous ses garçons malades

Or dans ce pédigrée il n'y a pas de mère ou fille malade. On en déduit donc que l'allèle de la maladie n'est pas porté par le gonosome X.

En revanche la maladie n'est ni porté par Y, ni porté par X, on déduit qu'il est autosomal.

* En général la maladie myopathie de Duchenne rejette cette affirmation. Par conséquent ce gène est gonosomal porté par le chromosome sexuel X

Hypothèse



Mode de transmission

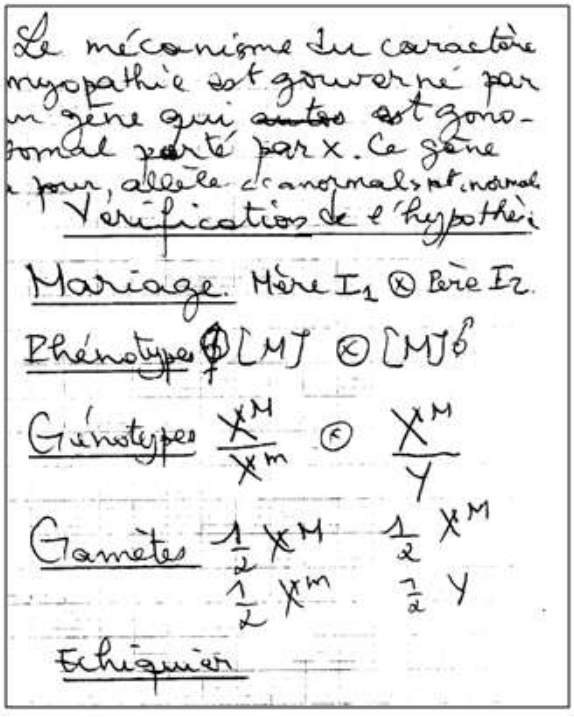
L'enfant 7 malade a ses parents 1 et 2 sains, donc l'allèle "anormal" (m) est récessif et l'allèle "normal" (M) est dominant.

Localisation chromosomique

si le gène était porté par la partie spécifique du gonosome Y, la maladie se transmet de père en fils et n'y a jamais de fille malade. Or les pères de ce pédigrée sont tous sains. On en déduit donc que le gène n'est pas porté par le gonosome Y.

si gène était porté par la partie spécifique du gonosome X

• Toute fille malade a



Le mécanisme du caractère myopathie est gouverné par un gène qui est gonosomal porté par X. Ce gène a pour allèle « anormal » et « normal »

Vérification de l'hypothèse

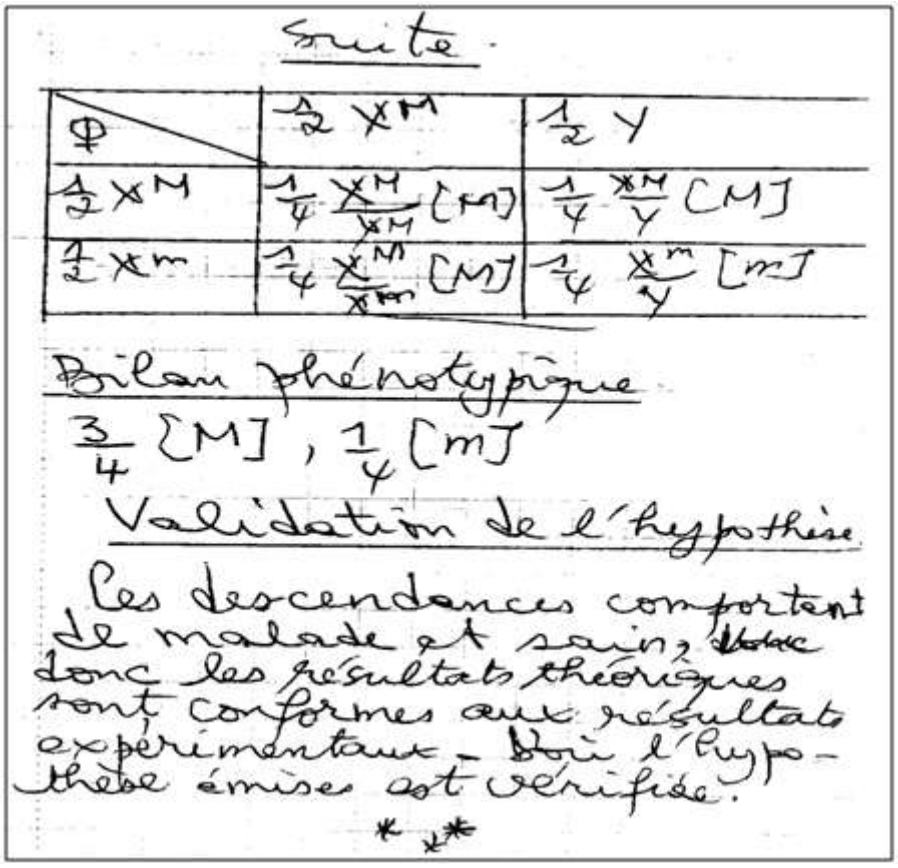
Mariage Mère I_1 ⊗ Père I_2

Phénotypes ♀ [M] ⊗ [M] ♂

Génotypes $\frac{X^M}{X^m}$ ⊗ $\frac{X^M}{Y}$

Gamètes $\frac{1}{2} X^M$ $\frac{1}{2} X^M$ $\frac{1}{2} X^m$ $\frac{1}{2} Y$

Echiquier



Suite.

♀ / ♂	$\frac{1}{2}X^M$	$\frac{1}{2}Y$
$\frac{1}{2}X^M$	$\frac{1}{4}\frac{X^M}{X^M}[M]$	$\frac{1}{4}\frac{X^M}{Y}[M]$
$\frac{1}{2}X^m$	$\frac{1}{4}\frac{X^M}{X^m}[M]$	$\frac{1}{4}\frac{X^m}{Y}[m]$

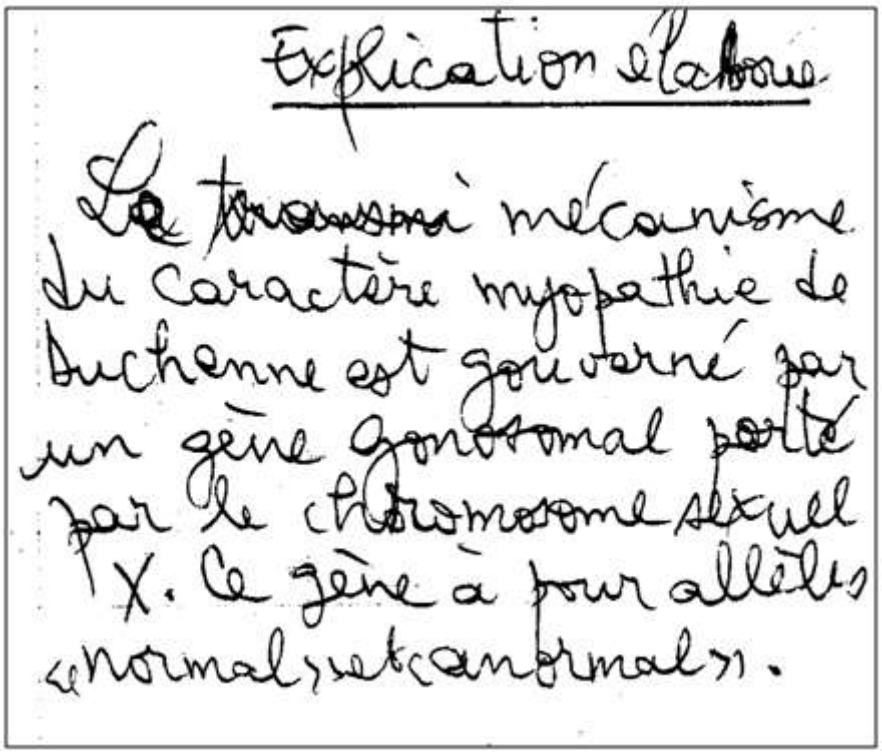
Bilan phénotypique

$\frac{3}{4}[M]$, $\frac{1}{4}[m]$

Validation de l'hypothèse

Les descendances comportent de malade et sain; donc les résultats théoriques sont conformes aux résultats expérimentaux - Donc l'hypothèse émise est vérifiée.

* **



Explication élaborée

Le mécanisme du caractère myopathie de Duchenne est gouverné par un gène gonosomal porté par le chromosome sexuel X. Ce gène a pour allèles «normal» et «anormal».

These different productions were analyzed in relation to the contents, which allowed us to establish the orders of the different stages that appeared in the different productions. We have made a comparative study of the order of the stages in the different productions of each learner with the order proposed by the teacher, which is in fact the order proposed by CTIS info, focusing essentially on the step "Problem formulation "and" information gathering"placed opposite the instruction to determine the reasoning of the different pupils. We

remove the barriers that fall within this reasoning. In this perspective, we note that in the semi-directive interviews we tried to put the learner in a favorable situation in which he could find what he actually did, so the different stages he followed in resolution of problem.

During the interviews we have an interview grid that includes questions about the different stages of the resolution. We added another question, which relates to the difficulties encountered by the learner in the resolution of the proposed exercise.

This approach has helped us to identify barriers that learners may encounter in genetic problem solving. The interview of the learners on their steps in solving the problem has shown that they follow resolving steps that are very similar to those proposed by their teacher, which we call the "instructions". Allowed to identify the priorities that each learner assigns to the different stages of solving the problem. In this section we have focused our analysis on the status of the hypothesis in the learner approaches in order to classify their reasoning. We have in the following tables the questions we asked the learners and their answers.

1st lot: learners who have adopted plan N ° 1;

A: I read the whole exercise and then I make the introduction. I pass to the body of duty consisting of information gathering, treatment, assumptions and verifications.	1
I: What problem is posed by this exercise (giving a copy of the exercise).	2
A: What is the mechanism of transmission of the tare under study?	3
I: How did you formulate the problem?	4
A: We were told that to find the problem in genetics it is enough to transform the instruction in question.	5
I: Who gave you this idea? Read the instructions aloud and tell me if your problem is right.	6
A: Eheu !!! They are comrades ... the problem posed is not fair.	7
I: Did you read the instructions before starting the resolution?	8
A: Actually no, I had looked at the pedigree.	9
I: What do you do after the introduction?	10
A: I do the information gathering, then processing or checking and I make my conclusion.	11
I: What is the collection?	12
A: Consists of saying the gene and the alleles, the mode of transmission, the chromosomal localization in the case studied.	13
I: What does it mean to say "the gene and the alleles"	14
A: Here there is a disease we simply say: there is a gene studied with two alleles and then we quote the alleles which are diseased allele and healthy allele.	15
I: In your opinion, have you just given a piece of information?	16
A: Yes Sir.	17
I: Can you define me the word information?	18
A: Eheu !!! Information: that's what we see.	19
I: Are you sure you saw the gene and alleles on the pedigree?	20
A: Ah! …., no. The teacher told us that in the case of genetics, this is information.	21
I: continues the "collection"	22
A: I make the mode of transmission by saying what is dominant and what is recessive.	23
I: Then?	24
A: I do the localization by saying the type of chromosome that carries the alleles	25
I: Then?	26
A: I make hypothesis.	27
I: What do you call hypotheses?	28
A: I give provisional explanations	29
I: In relation to what do you give provisional explanations?	30
A: with respect to transmission mode and location.	31
I: Reread your production (tending its production) It seems to me that you are already the mode of transmission and the localization.	32
A: Yes, it was in information gathering.	33
I: An assumption is made with respect to what?	34
A: Compared to a problem!	35
I: Where is the problem here?	36
A : ….	37
I: Why did you make a hypothesis at this level?	38
A: it's the teacher who said to do it like this	39
I: Then?	40
A: Then I do the processing or verification	41
I: What do you call "verification" or treatment?	42

A: it is the realization of the chessboards; We find the gametes in their proportion, then we make the chess-boards and we compare the proportions to the theoretical results.	45
I: What are the theoretical results here?	46
A: Eheu .... I do not see them !	47
I: Why do you compare something you do not see with what you have produced?	48
A: It's the teacher who said to do this.	49
I: What definition do you give to "verification" and "treatment"?	50
A: it's the same thing: it's the explanation.	51
I: when in gathering information about the location you said that the gene is carried by an autosomal is information or an explanation? You said that the information is "what we see": do you see the autosomal which you speak?	52
A: No. I did not see the autosome.	54
I: In your opinion, is it always information?	55
A: No, but it was the teacher who said it was information;	56
I: Let's go back to your treatment or Explanation: you made a chessboard. In your opinion, how important is this part to problem solving?	57
A: ... I. Do not know, it's the teacher who said it's important	58

When we interviewed the learners in the first batch (learners who adopted Plan N°1, the learners whose productions resemble each other like two drops of water in the CTIS info approach), on the different steps they followed for the resolution Of the genetic problem we found that they simply quote the instructions given by the teacher (CTIS info). It is on this pattern that the teacher has made his course. There is a contract that the learners do not want to violate at any price.

2nd lot: learners who have adopted Plan N ° 2;

A: After the introduction, I pass to the body of the duty consisting of allele gene, mode of transmission, localization, verification or treatment.	1
I: What problem is posed by this exercise (giving a copy of the exercise).	2
A: What is the mechanism of gene transmission?	3
I: how did you formulate the problem?	4
A: It is always this type of problem that we are used to solving.	5
I: How did you make that statement?	6
A: It is by looking at all the exercises that we had solved since last year.	7
I: Explain to us the different stages of your work beginning with: "allele gene"	8
A: "gene allele" I speak of the gene and the alleles involved in the appearance of the character.	9
I: Read the exercise again. Are you sure that it is a gene that is studied? We talk about myopathy. You agree?	10
A : Yes indeed. This is not a gene. It is a tare that is studied, but the tare is governed by a gene.	11
I: What is the next step?	12
A: consists in finding the mode of transmission of the alleles, that is to say, dominance or recessivity. After I go to the localization	13
I: What does "Location" mean?	14
A: Here there is a disease we simply say: the chromosome that carries the gene and then I pass to the verification.	15
I: What do you put in verification?	16
A: I write the genotypes of the parents then I make the chessboard and the phenotypic balance to check the phenotypics.	17
I: What do you put in the "phenotypic assessment to check the phenotype"?	18
A: I do the statistics from the chessboard and I compare with ...	19
I: You're comparing with what? In the data for the exercise, do you have any figures?	20
A: No!	21
I: Why did you say in your answer that the balance sheet is consistent with phenotypic proportions?	22
A: I.....	23
I: Apart from the pedigree, the statement gave you figures?	24
A: No.	25
I: Then why did you make the chessboard and why did you make the comparisons?	26
A: It was the professor who said that this comparison should be done.	27

When we asked the learners of the 2nd batch (learners who adopted Plan 2) about the different steps they took to solve the genetic problem we find that they have mixed us the steps from the instructions CTIS info and the different steps of problem solving of the official type-corrector of the Baccalaureate 2007 (which is taken as instruction by certain professors). The learners interviewedhere are repeaters from other colleges, rural colleges.

3rd lot: learners who have adopted Plan 3;

A: I read the exercise and then I introduce the problem. . I then pass to the body of the task constituted of tare studied, mode of transmission, location and mechanism of the crossing-over.	1
I: What problem is posed by this exercise (giving a copy of the exercise).	2
A: Why are girls not sick in this family?	3
I: how did you formulate the problem?	4
A: I left the set and the pedigree.	5
I: Who gave you this idea?	6
A: It was our teacher from last year who told us to use this method.	7
I: Explain to us the different stages of your work starting with: «studied tare»	8
A: "tare studied" I speak of the gene and the alleles involved in the appearance of this disease?	9
I: Why are you talking about studied tare	10
A: In human genetics, the professor told us that it is usually the dysfunction of the genes are studied.	11
I: What is the next step?	12
A: I turn to the next paragraph, which is to find the mode of transmission of the tare, that is, dominance or recessivity. After I go to the localization	13
I: You talked about paragraphs all the time. What does paragraph mean?	14
A: We are doing a drafting. One of the rules is: an idea a paragraph	15
I: The continuation	16
A: I go to the localization paragraph.	17
I: What do you put in "localization"?	18
A: I explain the type of chromosome that carries the gene ... then I finally go to the possible and probable genotype of the parents and the offspring to explain why there is no sick girl.	19
I: Why talk about finally, why the genotype stage possible and probable?	20
A: That's what can help us to have the reason why there is no sick girl.	21
I: In your plan you talked about mechanism. Why did not you talk about mechanism?	22
A: Because here there are not two genes. It therefore can not have crossing-over.	23
I: The continuation	24
A: I realize in the same paragraph the chessboard of fertilization to explain the absence of sick girl.	25

When we asked the learners of the 3rd batch (learners who adopted Plan 3) about the different steps they took to solve the genetic problem, we find that they simply quote the different stages of problem solving of the 2007 Baccalaureate. The learners interviewed here are 80% of the repeaters from another college, from urban colleges. From the analysis of the tables we retain two essential things: the permanent reference to what the teacher said when there is no answer to a question and the ignorance of the usefulness of the operative invariants in problem solving.

- In the three categories we find: "it is the teacher who said to do it like that", "it is our teacher of last year who told us to use this method": the didactic contract is At issue here, it does not allow the emancipation of learners, the learner must respond by producing prototypes. Our second hypothesis: "Problem solving would involve a characteristic didactic contract where students would seek to work on typical exercises or prototypes of resolution. That which would present a second source of their difficulties to the resolution "is verified;
- In the majority of learners, there is ignorance of the utility of the operative invariants, so for them, in a problem solving, there is no knowledge at stake. This is a tragic mistake.

When we asked the professor (who confessed to us that he follows instructions from inspectors and pedagogical advisors to the letter) if he knows why the learners could not solve the problem, he said do not know. So we decided to go further. We then wondered whether this contract of the generalized prototypes does not influence the teachers also to reason otherwise? To answer this question, we analyzed a text of formal genetic exercise knowledge written by professors.

C - A production that also imprisons teachers

In this part we take an exercise solved by certified teachers who are also pedagogical advisers, who work under the supervision of the pedagogical inspectors. This exercise was proposed in the framework of the white exams (2009) of the OUEME PLATEAU department. The answer provided by a panel of highly experienced teachers was sent to the forty college with terminals in the department.

Part II of topic I

Drosophila is a material of choice used in genetics. To understand the phenotypic diversity of a population of Drosophila, the following crossing is carried out:

There is a female Drosophila with red eyes and without wings with a male Drosophila with red eyes and long

wings. The progeny are distributed as follows:
- 600 females with red eyes and short wings;
- 600 male Drosophila with red eyes and without wings;
- 200 female Drosophila with black eyes and short wings;
- 200 male Drosophila with black eyes and without wings.

Exploits the results of this crossing to explain the phenotypic diversity of this progeny.
As can be seen, the instructions of this exercise have changed in relation to the instructions that we are used to: explain the mechanism of....
The answer suggested by certified pedagogical advisors and professors chosen for their qualification is the following:
«- General idea
- Explain the diversity of the offspring obtained.
*
**
The crossing involves two characters and therefore probably two genes:
- Eye color gene with two alleles: red and black
- Gene wing size with also two alleles: long and without wings.
For the mode of transmission, the crossing between the two red-eyed parents reveals in the offspring of black-eyed individuals, then the black allele (r) is recessive and the Red (R) allele is dominant.
Similarly, the cross between a female without wings and a male with long wings gives female offspring with short wings and males without wings. The appearance of females with short wings indicates that the alleles without wings (S) and long wings (L) co-dominant and [C] is the intermediate phenotype.
Concerning the chromosomal localization, it can be seen that:
- For the first gene the descendants do not show a sexual distribution because the red and black colors are found both in the male descendants and in the female descendants. However, the color gene of the eyes is autosomal;
- For the second gene, male offspring inherited the phenotype of their female parent and females have an intermediate phenotype.
Now, we deduce that the wing size gene is gonosomal and carried by X.

From the collection of the information we can hypothesize that: the transmission of the characters would be ensured by 2 independent genes the 1st autosomal transmitted with dominance, the 2nd gonosomal carried by X transmitted with co-dominance.
Verification
Female [RS] ç male [RL]
Exchequer
Conclusion

The phenotypic diversity of the progeny is due to the intervention of two characters governed by two independent genes, one autosomal transmitted with dominance and the other gonosomal carried by X and transmitted with codominance.

We resumed the answer without full correction.

It can be seen that the plan applied by these Pedagogical Counselors (CP) is Plan N ° 1 used by the majority of the learners. Like learners, CP also could not differentiate between information and information processing. In the text one gets the impression that they see the genes: "The crossing involves two characters therefore probably two genes" They should say that the studied characters are probably governed by two ... in doing so they will explain what one sees by what we do not see. In the last paragraph, when they said in the body of duty that one allele dominates another, it is always information. They also do not know when formulating a hypothesis. They do not know, therefore, that in the proposed evaluation, according to Louis D'HAÏNAUT, one can not have an hypothesis since the learner must mobilize the rules and principles learned to solve the problem posed. We also note in this answer that the problem is badly posed. And like the majority of learners, the solution found seems to ignore the invariable operative. The teacher, the CP also working on the principle of prototypes ("explain the mechanism of transmission") does not know how to solve a problem of reinvestment.

V. Discussion

Benin republic program defines reinvestment as a transfer of knowledge that is at the heart of the teaching-learning process. Indeed, the ultimate goal of teaching is to get students to transfer the learning from one task to another, from one school year to another, from school to home and from school environment to that of work. It is then essential to understand the type of learning experiences that lead to transfer, which could simply be defined as the ability to use what has been learned from a simple context to a more complex context (vertical transfer) , Or to generalize what has been learned in an initial context to new contexts (horizontal transfer). According to this definition, we should be able to recognize the transfer process when it occurs. Thus, if knowledge is transferred from task A to task B, the pupil who has completed the learning outlined in A should be able to learn B more quickly than the student who did not initially complete task A. Thus, for the SA, entitled **"Genetic Information: Nature, Location and Transmission Mechanism"**, students should be able to produce knowledge texts on reinvestment in formal and human genetics. Our studies have highlighted their difficulty in writing a text of knowledge in genetics. It seems to us that reinvestment instructions such as "explaining the mechanism of transmission ..." would be due in part to the difficulty of learners in developing a text of knowledge. Indeed, during learning, they learned to explain the location of genetic information, its nature, its transmission from one to another and from one generation to another. They also explained the expression of information. They do not know the probabilistic laws of formal genetics or the principles of the study of pedigrees which can be used as apprenticeships foreseen in a through task A. It seems to us that the difficulties of the learners are amplified by the official instructions of CTIS-INFO which gives a plan that imprisons teachers and students in a rigid didactic contract. In order for students to succeed in reinvesting in the learning situation, that is to be able to learn human genetics from the learning of the probabilistic laws of formal genetics through task A , These probabilistic laws and explanations (mechanism: intra and inter chromosomal mixing) must be associated.

VI. Conclusion

To seek to acquire competence in a subject is to organize a learning situation for him, then through the evaluation, to verify whether the competences have been acquired. One of the principles of teaching - learning - assessment is that, throughout the learning process, the objective in terms of competence that can be reinvested by the subject, on its own initiative, in Situations of the same type. The case studied here in reinvestment is human and formal genetics. This reinvestment, as elaborated by the institution through the instructions seems to lead to student respondents, they answer the questions mechanically to "explain the mechanism of the transmission of ...".These pupils are enclosed in a didactic contract created by the institution itself. Learners become reflective, that is, produce good-quality texts of knowledge when, contrary to official instructions, there is an apprenticeship to move from a task A to a task B. In other words when official instructions are violated. Indeed, the good texts of knowledge are produced for reinvestment when one makes with the students a methodological work and modifying the instructions "habitual" or taking human and formal genetics as object of learning.

It is in this perspective that we propose that formal or human genetics be the object of learning and the other one can be reinvested. We are leaning much more towards human genetics such as areinvestment.

References Bibliographiques

[1]. Programme et guide des SVT de la classe de terminale, DES et INFRE 2003 ;
[2]. Bulletin de l'INFRE : CTIS info N°2, 2006;
[3]. Guy BROUSSEAU, Théorie des situations didactiques, Grenoble, La Pensée Sauvage, 1998 ;
[4]. Orange C, (1997), Problème et modélisation en biologie ….. ;
[5]. Annales de didactique des sciences -1985- A. GIODAN, J.L. MARTINAND, J. MATHIEU, R. VIOVY,
[6]. Transposition didactique à l'épreuve, ouvrage coordonné par Gilbert Arsc et Al, La pensée sauvage, Editions
[7]. Des catégories pour décrire et comprendre l'action didactique, Gérard Sensevy,
[8]. La Resolucion de Problemas de FisicacomoInverstigaciion : un Instrumento de cambioMetedologico. Thesis Doctoral, MARTINEZ TORREGROSA Université de Valencia. Citée par DUMAS-CARRE et al, (1992).
[9]. A. Giordan, G. de Vecchi, Les origine du savoir, Neuchâtel, Delachaux&Niestlé, 1987, p.5
[10]. Problèmes et modélisation en biologie quel apprentissage pour le lycée. Christian ORANGE, PUF, l'éducateur.
[11]. Edumétrie et docimologie pour praticiens chercheurs. D. Leclercq (2005) Editions de l'Université de Liège
[12]. Encyclopédie philosophique universelle. Les Notions Philosophiques, dictionnaire 2. Presse Universitaire de France (pp 2049-2051,1998). 1ère édition, 1990.
[13]. Dictionnaire Encyclopédique de l'Education, Jean Pierre ASTOLFI,
[14]. Les objets de la didactique des mathématiques. BROUSSEAU. (G.). Séminaire de la 2ème école d'été de didactique des mathématiques. Cité par DROUIN (p 30, 1985).

* Thierry DOVONOU " Knowledge text and reasoning in factorial and human genetics in Benin republic colleges " International Journal of Humanities and Social Science Invention (IJHSSI) 6.8 (2017): 35-48.