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Difficulties of Tunisian SVT teachers in the implementation of problem-situations.

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ABSTRACT : *This research is concerned with the way in which Tunisian primary school teachers design and implement a problem-situation and the nature of their support for the reproduction of Angiosperms. For this, we refer to didactic and pedagogical work on the problem-situation (Meirieu 1992, Arsac & al., 1988, Brousseau 1980, Douady 1984, Astolfi 2008, Vecchi & Carmonna-Magnaldi 2002, Fabre 1989).), official injunctions concerning the implementation of a situation-problem as defined in the official texts, and the theoretical framework of problematization, developed at the Center for Research in Education of Nantes (CREN) (Fabre & Orange, 1997, Orange, 2012). While there is a strong incentive for official texts to be taught by problem-situation, this article aims to understand how teachers cope with this when asked to make a situation-problem. We have focused our methodology on self-confrontation techniques (Clot & Faïta, 2000). This research work made it possible to identify certain difficulties concerning the setting up of a situation-problem.*

KEYWORDS: *conceptions of the teachers – SVT, difficulties of the teachers, Official texts, Problematization, reproduction of Angiosperms, self-confrontation, situation-problem.*

I. INTRODUCTION

Several observations have pointed to a considerable decrease in the number of young people in scientific fields and a lack of interest in science. Ourisson (2002) has shown that over the past decade or so there has been a significant reduction in the number of scientific students in France and other countries. Musset says that "For several years, surveys and reports of all countries point to the deficit soon crucial number of young people who are destined for a scientific career." (Musset, 2009, p 1). This problem, which continues to be topical, highlights the need to renew scientific education.

In Tunisia, the introduction of the competency-based approach in the Tunisian school context has led to a near total break with goal-oriented teaching. The institutional recommendations favor the introduction of a "situation-problem approach" for scientific disciplines, particularly in the first cycle of basic education (from 6 to 12 years old). Thus, the establishment of problem-based education and regular initial and continuing training schemes, whether for teachers or for trainers (inspectors and teaching assistants), constitute efforts in the direction of improving teaching practices.

However, during meetings or exchanges with Tunisian primary school teachers, it seems to us that they have difficulties in constructing situations that help students to change their conceptions and to access problematic knowledge. The majority of the learning situations they propose tend to dissolve and present themselves as ordinary dialogue lessons.

In the search for an explanation of this problem and its possible causes, it seems that the exploration of the teachers' conceptions of the problem situations, as well as the study of the help that could be proposed to the pupils in order to allow students to problematise the proposed situation, seem useful.

Our question is to know how Tunisian primary teachers design and implement a situation-problem and the nature of the help they deploy. The study will focus on the field of Angiosperm breeding.

II. THEORETICAL FRAMEWORK

2.1. Problem-situation in didactic and pedagogical research

By taking up different works on the problem-situation (Meirieu, 1992, Arsac & al., 1988, Brousseau, 1980, Douady, 1984, Astolfi, 2008, Vecchi & Carmonna-Magnaldi, 2002, Fabre, 1999), Fabre and Musquer (2009) have shown that this one has five significant traits:

• The problem situation is a staging of the knowledge in which what is to be learned appears at the end of a problematization. It aims at learning new knowledge. It differs from riddles, application exercises, trouble-free manipulations and the "open problem" of mathematics didactics,

• The situation-problem is a trap. That is, not just a question. But it is a question that must at one point "pinch" the student. The student is in a dead end or a critical situation. It allows students to break with their previous representations.

• It requires a real devolution of the problem. It is necessary that the problem posed really makes sense for the pupils and that its taking charge is effective.

• The student should (in principle) be able to evaluate his performances himself without the teacher needing to intervene to point out his mistakes. It is not enough to succeed in the problem situation to acquire knowledge endowed with some generality. But we must understand why we succeeded or failed.

• The steps of the situation-problem device can be summarized as follows: 1) individual or group action or research; 2) formulation or exposure to the class of results found; 3) validation or "proof" by the students of the validity of their results; 4) institutionalization or identification of knowledge built into their conceptual meaning; 5) then exercises and evaluation.

The role of the teacher is crucial in achieving these different characteristics of the situation-problem. The staging of knowledge in the situation-problem requires the identification of knowledge to build with the students. This knowledge must be the condition of the problem that the teacher proposes to them. We also know that the design of this device requires the teacher not only to anticipate the conceptions and obstacles that may block students' thinking (because true learning requires work on error) but also to ensure adequate devolution of the proposed problem. In addition, the student usually does not solve the problem alone. In the situation-problem the teacher must be present to help him problematize. Its role is to provide relevant aids that can activate the process of problematization in the student without doing the work for him. This is a co-construction of the problem between the teacher and the students.

2.2. What the official texts in Tunisia say about problem-based education.

We will present here what the recommendations and the official injunctions concerning the conception and the implementation of a situation-problem (program and methodological document related to the teaching of the scientific awakening in the classes of 6th basic education (11, 12 years)).

From the first reading of official texts, we can see that there is a strong injunction to teach by situation-problem. "Solving problem-situations ..." is an expression that appears in all the statements of competences related to the field of science and technology. The general competence of this field is "solving significant problem situations". (Third degree official programs, P 109). In the program of scientific awakening, we find the approach to follow to implement the problem situation. It is a "pedagogical approach focused on solving a problem situation" (Official Third Degree Programs, P 113).

Although there is a strong injunction to set up problem situations, our analysis of the official texts shows that this notion is vague and imprecise. There is not enough clear and explicit guidance on the conditions for putting students in a problem situation. It seems that the latter is limited to asking a question to students without constraints or resources.

According to the official Tunisian texts (scientific awakening, master guide of the 6th year of basic education, p 6), a situation-problem must have the following characteristics.

1. stimulate the learner to solve the problem and allow him / her to visualize the types of answers required by the problem;

2. create a state of imbalance in the learner;

3. provide the learner with an opportunity to evaluate the solutions found to assess their compatibility with the requirements of the situation;

4. bring the learner to perceive the limits of his representations and his previous strategies

However, our analysis of the examples of the pedagogical sheets proposed in this guide shows that:

• what is referred to as "problem situation" is the question asked to students at the beginning of the session (starting question).

• There is no link between the problem posed and the conclusion reached. The conclusion seems disconnected from the problem of which it is the origin. This indicates that nothing allows us to say that the student will be placed in a situation-problem in the sense specified by Fabre and Musquer. For example, it is impossible to start from the following question "why can't person stay long without breathing? With students who do not already know the answer to reach the conclusion "the air is indispensable for living beings" if it is not the teacher who says the solution.

Note that the analysis of official documents shows that the error and its role in learning are not sufficiently explained. The only indication is in the methodological guide: "The situation-problem provides the learner with an opportunity to evaluate the solutions found. ". (Scientific Awakening, master guide of the 6th year of basic education, p 6).

The problematization (Fabre & Orange, 1997, Orange, 2012) is a particular point of view on the situation-problem. It's not just about changing students' conceptions, but about changing them from concept to reasoned knowledge. For problematization the problem situation is not a simple pedagogical means, it is something that has an epistemological and didactic significance.

Our work is in the field of science learning by problem solving (Fabre & Orange, 1997, Orange, 2012). To problematize in science according to Orange, consists in putting in tension an empirical register (or "worlds of facts and phenomena") and a register of models (or "world of explanations") with reference (explicit or implicit) to an explanatory register ("the world that gives meaning to the model and allows it to be manipulated"). (Orange, 2000, p27).

The importance given to scientific problematization and the involvement of students in this process raises, in return, a major problem, that of helping the problematization that the teacher anticipates from his preparation of course or that he will deploy in class. The problematization process is not self-evident and the teaching approach by situation-problem (Brousseau 1980, Douady 1984, Arsac & al., 1988, Astolfi 1993, Merieu 1992, De Vecchi & Carmonna-Magnaldi, 2002).) assumes the development of tools to help problematization. Hence the idea of problematization drivers developed by Musquer and Fabre (2009).

Given that our research lies in the context of problematization and that, on the other hand, there is a strong incentive for official texts to propose problem-situations, it is interesting to see how teachers put.

III. METHODOLOGY

Our research is a qualitative research. These are case studies. It concerns three young teachers (A, B and C) who teach science awakening in 6th year classes of the first cycle of basic education.

The methodology of data collection consists of placing each teacher in several successive situations. As a first step, the three teachers were invited to design individually and at home a detailed educational scenario on the Angiosperms breeding sequence from a problem situation. A question was proposed to the three teachers to serve as a basis for teaching by problem situation. "Fruits contain seeds that differ from fruit to fruit in color, size and shape. How is this fruit formed? And under what conditions? ". In a second time, we organized a meeting with the three teachers during which they discussed and argued their choices in their preparations. The third moment is to implement the situation-problem in class. Finally, we conducted a self-confrontation interview with each teacher (Clot & Faïta, 2000). These interviews, as well as the meeting and the three sessions were recorded (video), transcribed and translated from the Arabic language to the French language.

The analysis of each situation in which the teacher is placed is done according to four dimensions. The first dimension looks at how the teacher constructs the problem of teaching Angiosperms reproduction from situation-problem. The second is how it takes into account the conceptions and more generally the errors of the students. The third concerns how he engages students in the situation-problem and finally the fourth dimension is relative to the help he deploys for the benefit of his students and with which intention.

These questions constitute the thread of the presentation of our analysis. Our study will focus on the differences that may exist between the different conceptions of the three teachers from the preparation to the verbalization of the action through the implementation of the session in the classroom. Our goal is to identify the

gap between what teachers do and what they are asked to do; and: between what they do and what they say about what they do.

IV. TEACHERS' RESPONSES TO THE DEMAND FOR THE REALIZATION OF A "SITUATION-PROBLEM"

We will present, in the following, the results of this research work. We will try, each time, to identify, in each teacher, the discrepancy or the similarity that can exist between what the teacher conceives, what he does and what he says about what he does. And what he is asked to do, with regard to his conception of the situation-problem and the help he deploys for the benefit of his pupils.

4.1. "problem-situations" prepared and realized

For the teacher, to construct the problem of the teaching of the reproduction of Angiosperms from situation-problem, is to identify the knowledge put into play and its choices of what it seems interesting to him to teach to the pupils.

4.1.1. Teacher's case (A)

The teacher (A) planned to study the transformation of the flower into fruit. Indeed, after understanding the situation-problem by the students and collecting their ideas orally and writing it on the board, he planned to present two images of an apricot tree, the one where he is in bloom. another where it bears fruit (apricots). His goal is to lead his students to make the link between the flower and the fruit and thus prepare them to study the transformation of the flower into fruit. The questions he plans to ask his students, after they manage to connect the fruit to the flower, are the following: "What are the stages of the transformation of the flower into fruit? How does the flower turn into fruit? What are the stages of reproduction of apricot? ".

During the classroom implementation, instead of presenting the two images of the apricot tree, the teacher built with the pupils the life cycle of the bean plant. According to him, the students have already had the opportunity to plant and follow the development of this plant. The knowledge relating to the reproduction of Angiosperms that he chose to put in place with his students is the passage from the flower to the fruit. After having built with students the life cycle of the bean plant, he addresses his students saying: "[...] A question that arises now: how is this fruit formed and under what conditions? Personally, from seed to plant seems clear to me. From plant to flower is also clear. The question: it's from flower to fruit. How is this fruit formed and under which conditions? ".

During the self-confrontation interview, the teacher mentioned the connection made by this choice with previous learning: "Remember that this is a prior learning. My students know that the seed is transformed into a plant, the plant gives the flower and the flower turns into fruit. ". He adds: "[...] they are supposed to know that the fruit comes from the flower but they do not know how. ".

Regarding his choice of what it seems interesting to teach his students, the teacher has planned in his preparation these five concepts:

- the movement of pollen grain from the anther of a flower to its stigma. According to him, it is pollination;
- the formation of a tube crossing the style to reach the egg. According to him, it is germination;
- the union of the pollen tube with the ovum; which according to him corresponds to fertilization;
- The fate of the egg (the seed) and the fate of the ovary (the fruit)

The students discover these notions following their observation of a flash animation showing what the teacher calls the stages of the transformation of the flower into fruit.

In classroom implementation, the teacher did not follow the prescribed steps. He chose to teach his students:

- At first, the determination of the organs of the flower that intervene in the formation of the fruit and their future. "[...] if I ask the question in another way: what are the organs of the flower involved in the formation of the fruit? ". After a moment of interaction with the pupils, he leads them to disengage the male organ of the flower (the stamen) and its constituents (anther, pollen, net) and the female organ (pistil) and its components (stigma, style, ovary). By trying to orient the students to make a link between the pistil and the fruit, he asks the students about the future of the pistil. Based on a sequence of a flash animation that illustrates the transformation of the ovary into fruit (pea) and eggs into seeds, he leads his students to the following

conclusion: "the pistil grows and becomes fruit. The ovary becomes an outer envelope for the fruit and the eggs become seeds ";

- In a second step, what the teacher calls the conditions that take place for the formation of the fruit. After a moment reserved to listen to the different ideas of the students on this issue, the teacher preferred to show them a second sequence of flash animation illustrating, in a chronological and successive way, three "[...] necessary operations for the training fruit to know [...] ":" 1) the transport of pollen grains from the anther to the stigma (pollination) 2) the penetration of pollen grains to the eggs 3) fertilization. ".

During the self-confrontation interview, he states that his choices are based on the official texts.

It can be seen that the teacher has not put in place a situation-problem as defined by the educationalists and pedagogues. He did not link the learning achieved with the problem. The flash animation sequences that the teacher presented to the students do not have the function of validating or invalidating a hypothesis of solution or settling a conflict between the students. Their function is to bring students to the solution. In doing so, the role of the problem in learning is eradicated. What the teacher does here is nothing more than a dialogue course based on a question he brings.

4.1.2. Teacher's case (B)

The teacher (B) chose in her preparation to work with her students the details of the pollination. Starting from three diagrams of two flowers (flower A and flower B), she plans to deal with the following questions with her pupils: "What important event in these diagrams? ... Can the pollination of flower A take place? Without the bee? ... What are the necessary conditions so that pollination can take place? ". The analysis of what the teacher did in class revealed that the knowledge involved is the passage from flower to fruit. Indeed, after a moment reserved for her students to understand, what she calls "situation-problem", she chose to teach the students the formation of the fruit. According to the teacher, to find out how the fruit is formed, is to determine its origin. That is to say first determine the part of the plant that is at the origin of the formation of the fruit (which is the flower), then identify the organs of the flower that turn into fruit (the egg becomes seed and the ovary becomes the fruit).

During the self-confrontation interview, the teacher said, "I have progressed with my students. I wanted to put them in the right direction. That is to say, the fruit originates from an organ of the flower so that they do not attack the leaves, or bud or anything else and then I wanted to show them that not necessarily each flower gives us a fruit [...] " So it is a transmissive model that eventually takes the form of a dialogue course that is presented here.

Regarding her choice of what it seems interesting to her to teach her students, the teacher has planned to teach her students pollination, its modes, and conditions and fertilization.

In the classroom implementation, the teacher made a number of choices for what she felt she needed to teach her students.

First, show that the origin of the fruit is the flower and is nothing else. This choice is designed in such a way that her pupils "... do not evoke leaves, buds or anything else [...]". For this, she chose to present them a fruit (a tomato with the rest of the calyx of her flower and her peduncle) and a flower of the garden to compare them. The comparison aims to identify the similarities between the two (flower and fruit). «Look carefully! Are there similarities? (The teacher draws the attention of her pupils to observe the rest of the chalice and the peduncle on the tomato fruit and the chalice and peduncle in the flower, which would push the students to note that the fruit was the flower). The conclusion she has drawn is that the fruit comes from the flower. So it is pedagogy of the report that is put forward.

The second choice is to teach students that it is the ovary that turns into fruit and it is the eggs that develop to become seeds. For this, she chose to work on a case of fruit: the apple. She put her students in groups. She presented them with three images of a longitudinal section of a developing apple. The first is taken just after fertilization, the second after about one month of development and the last is a mature apple. Each group was asked to observe and compare the three images. We chose to place the camera near one of the three groups. As soon as the students in this group have begun to negotiate and interpret the three images, the teacher quickly steps in to orient them to annotate the three images. Following this intervention, the group of students

tries to find and identify the organs of each image (ovum, ovary, pistil ...). Same thing for the other two groups. The presentation of the work of the three groups did not cause disagreement among the students. The three groups came to almost the same conclusion. Here's what she said when she spoke to her students: "Do you agree here that the egg is transformed into seed and the ovary into fruit? ". Given that pedagogy of observation is put forward and that the teacher intervenes so as not to cause a disagreement between her students, we can conclude that they were not put in a situation-problem.

E 1: here, the bee takes the pollen grains
E 2: (cut the floor) no! no ! here the bee takes the pollen grains. It wanted to put them on the stigma of this flower. It finds the ... the wrapped ... so it went to the flower (B) ... she is not wrapped ... it puts them on her stigma
E 1: Why put them?
E 2: (smile) ... Ah! the ! I do not know. [silence]…

This excerpt from the discussion shows that students are moving towards debating a fundamental problem, that of the goal of pollen grain deposition on the stigma. However, the teacher's intervention has led them to determine the stigma on which the bee can put the pollen grains.

The presentation of the work of the three groups did not cause disagreement among the students. The three groups came to almost the same conclusion. "The bee can not put the pollen grains on the stigma of the flower (A) because it is wrapped."

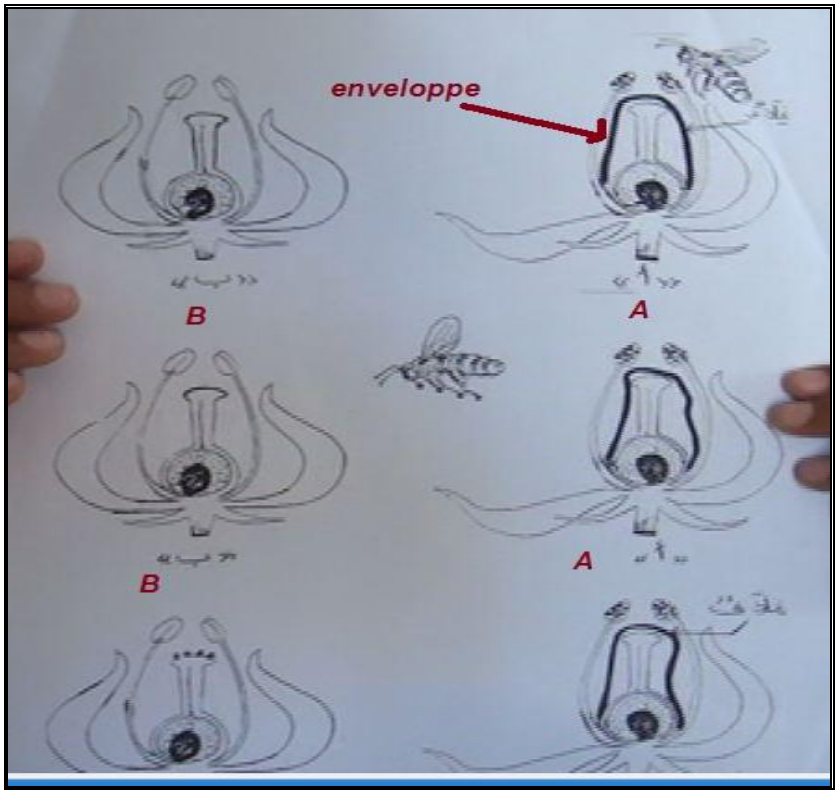

Figure 1: diagram of two flowers (A and B) presented by the teacher.

Finally, the teacher chose to teach her students the germination of the pollen grain.

The choice of knowledge and the expected learning are rooted in the discussion session between the three teachers. The teacher said during the self-confrontation interview: "Sincerely, the discussion with my colleagues during our meeting led me to change my conception of the lesson."

We can conclude that the teacher did not give a moment for her students to discuss and argue their points of view in relation to the question asked. The work of each question was split in two moments. A moment for students during which they express their ideas about the question asked. And a moment for the teacher during which she transmits knowledge and learning in the context of a dialogue course. We can see that what the teacher has done is not a problem-situation in the sense of the research.

4.1.3. Teacher's case (C)

The teacher (C) planned to study the transformation of the flower into fruit. She chose to work with her students the following question: "Students are given a flower and its fruit for example a bean pod and the bean flower. Students are asked to explain how this bean flower is transformed into fruit. ". She chose to teach her students pollination and fertilization of the bean plant.

The analysis of what the teacher did in class showed that what she did is almost similar to what she planned. Indeed, in her class, the teacher began her lesson by recalling the female and male organs of the flower. Then she chose to introduce her students to a pod and a bean flower and ask them to explain how this flower is transformed into fruit. So, the knowledge she wants to put into play is that of the passage of the flower into fruit.

She divided her students into four groups. She provided each group with a flower, a bean pod and a leaf to write the answer to the question asked (how is the bean flower transformed into fruit (pod)? "The four group representatives presented the work of the group:

- First group: "the bean flower is transformed into fruit by the male and female organs. By depositing pollen seeds on the stigma. "

- Second group: "The male and female organs mix. The pollen grains fall on the stigma to form the fruit. "

- Third group: "The flower turns into fruit when the pollen grains fall on the stigma. "

- The fourth group made a diagram. It is a diagram of a legendary flower (female organs, male organs).

Through a series of questions and answers between the teacher and some students, she guided them to define pollination and fertilization. If we refer to the definition of the problem-situation as defined by the educationalists and pedagogues we can see that what she has done does not correspond to a situation-problem.

4.2. What do teachers say about student engagement in the "situation-problem"?

According to the characteristics advanced by the didactic and pedagogical researches that we gave above, in the conception of a situation-problem it is essential that the problem be taken care by the pupil, that is to say that he becomes his own problem. Let's see how teachers engage their students in the situation-problem.

Regarding the teacher (A), we noticed that there is a difference between what he designed and what he did. What he has planned to engage his students in the situation-problem is to have his students work on one question (how does the fruit form?) Instead of two (how does this fruit form and under which conditions?). He wants to reduce the degree of openness of the problem. During the discussion session with his colleagues he said: "[...] but if one apprehends the situation with these conditions, one can see multiple differences between the interventions of the learners; at this point we are going into a big problem [...] ".

During classroom implementation, the teacher presented the following two questions (how does the fruit form and under which conditions?), Contrary to what he planned in his preparation. This change seems to be related to what was said during the discussion. He said following the explanation advanced by the teacher (C): "maybe! The teacher seems to be influenced by what the teacher (C) said. The following excerpt[1] from the script of the discussion between the three teachers shows that:

[1] C = teacher (C), A = teacher (A), F = myself

34- [...]
35- **C**. Exactly! These are the conditions. Besides, that's what I put in my preparation.
36- **F**. OK! You see that the question of how the fruit is formed leads us to speak about the organs of the flower which gives us the two components of the fruit: the seed and the fruit. And concerning the conditions, there are the conditions of its formation which are pollination and fertilization. That's it?
37- **C**. yes! Yes! That's it.
38- **A**. maybe! [silence]
39- [...]

But if he starts from a question that could lead him to make a situation-problem, we notice that during the session he simplified it. He chose to work on a case of fruit (bean) known by the students. In addition, after the presentation of the initial question written on the board, he chose to explain to his students how the seeds differ in color and size. His goal is to prevent his students from discussing the differences between seeds.

As for the teacher (B), to engage her students in the "situation-problem", she planned to cut the situation into accessible small steps that will lead to the final knowledge that is the formation of the fruit. During classroom practice, she invites her students to explain orally what they understood and to rephrase the original question until the students agree on what is asked of them. Its purpose is to ensure the understanding of the issue so that its students do not address things it has not considered. According to her, engaging the students in the "situation-problem" is to ensure their understanding so that the student does not address things that they did not consider and therefore put them on the path of the solution.

Regarding the teacher (C), she has confidence in the "magic" of the "situation-problem". She thinks that the situation itself allows students to engage in its resolution because it is "[...] close to the middle of students. Close to their life ... they will be active ... it makes sense for them ... ".

The analysis of the implementation in class showed that the teacher chose, before starting the situation-problem, to highlight the reproductive role of the male and female organs of the flower. Its purpose is to make the situation easy for students to guarantee their membership. She reserved a moment for understanding the original question. She invited her students to answer the first question orally ("how does the fruit form?"). In the face of what she saw as removing students from what she expects of them, she decided to adjust the issue to student levels. Here is her comment during the self-confrontation interview: "I saw that students have moved away from what I expect. I noticed at that moment that they found it difficult to understand the question [silence]. [...] instead of talking about how the fruit is formed, I approached with them the question of how the flower turns into fruit. "

Note that the three teachers refer to the "starting point" as "problem-situation". This reminds us of what the official texts we have analyzed above say.

4.3. Taking into account students' conceptions

Regarding the consideration of students' conceptions in the problem situation, we found that there is a gap between what the three teachers expect and what they do.

The analysis of the preparation as well as the script of the discussion between the three teachers showed that the way in which the teacher (A) takes into account the students' conceptions is to select the ones that are relevant. That is, those that correspond to scientific knowledge. "... normally I take them individually. And I only transcribe the relevant. That is, "those who are close to the solution" and predict a return after the conclusion phase to compare what has been said by the students with what is obtained.

The analysis of the session showed that the teacher avoids the statements of the students who seem to him to be unsuitable with what he wants to obtain or he corrects them immediately. He did not reserve a moment for a return on the students' conceptions. In trying to explain this, the teacher evokes the constraint of time. "We can not do everything in a more or less short time span". On the other hand, it minimizes the role that "conceptions that are far from the solution" can play in learning.

Concerning the teacher (B), her way of taking into account the students' conceptions is to collect them at the beginning of the lesson while insisting on integrating "a correct conception" among them. The latter, either is said by one of the students, or proposed by her. All conceptions will be left at the end of the session for the student to compare his initial idea to what he found as a result. Its purpose is to invalidate or confirm the different proposals. This facilitates the arrival of the solution and saves time.

The analysis of what she did in class is almost similar to what she planned. She chose to study with her students, in the first place, the question of the formation of the fruit. She began by collecting the pictures of her students and putting them on the board. They evoked different organs of the flower which are at the base of the formation of the fruit.

After a while, the teacher introduced three images of a longitudinal section of developing apple. His goal is to get his students to determine the organ of the flower that turns into fruit (the apple).

The teacher invited her students to compare the three images (group work). She is interested, through this activity of comparison to invalidate or confirm the representations of the students to reach the solution of the problem.

As for the teacher (C), she planned to collect orally and in a collective way the conceptions of her pupils on the problem of the formation of the fruit and to write them on the board. After collecting the designs, she thought to have her students work in groups to find the solution and then set aside a moment to check the conformity of the designs collected with this solution.

In the classroom, the teacher started by putting her students in groups to write down their representations about the formation of the fruit. This, according to her, is that the collection of group conceptions allows students to express their ideas spontaneously.

Subsequently, the representatives of the three groups successively presented their productions. The production of the first group is: "the bean flower is transformed into fruit thanks to the male and female organs. By the fall of pollen grains on the stigma ", that of the second group is:" The fruit is formed from the female organs and male organs, they mix. Then the pollen grains fall on the stigma. And that of the last group is: "the bean flower turns into fruit. Then the pollen grains fall on the stigma ".

After the presentation of the three productions, the teacher made a return only on the production of the first group to validate it after a discussion with the students through a series of closed questions. The rest of the session was devoted to guiding students to define pollination and fertilization and to identify the fate of ova and ovary. The teacher has been subjected here to two constraints. The first is to follow the logic of the students by continuing to invalidate or confirm their representations. It is not safe then, according to her, to manage to teach the expected concepts. The second is that of teaching pollination, fertilization and fate of ova and ovary.

4.4. The aids deployed and their intentions

About the helpers that teachers deploy for the benefit of their students and their intentions, our analyses have shown that help is thought of as a step-by-step guide that puts students on the trail of the solution or simplification of what the teachers consider as "situation-problem". Table 1 shows the various help provided by the three teachers and their intentions.

Table 1 - Aids deployed and their intentions.

Teacher		Helps	intentions
Teacher (A)	The designed	• two images of an apricot tree (the first where it is flowered, the second where it bears fruit)	• Make what he considers "situation-problem" concrete and more accessible to students
	Do it	• a flash animation showing the steps of the transformation of the flower into fruit • Work on the bean plant instead of the apricot tree • Work on the two original questions separately. • guidance step by step	• simplify what he considers to be "situation-problem" to put students on the trail of the solution
Teacher (B)	The designed	• three patterns of two flowers (flower A and flower B) • a flower with stamens longer than a pistil and a flower with stamens shorter than pistil. • a diagram of a flower where its anther is not ripe. • diagram of a pistil and on its stigma a grain of pollen. • diagram showing the entry of pollen grain content into the ovary through the pollen tube.	• Discover the pollination, its modes, its conditions • To distinguish between self-pollination and cross-pollination • To highlight the condition of anther maturity and stigma for pollination • To discover fertilization
	Do it	• real objects (a tomato and garden flowers) • three images of a longitudinal section of developing apple • Closed-ended questions that sometimes contain the expected answer (Topaz effect) • Strong guidance towards the discovery of the expected notions, which are pollination and fertilization, therefore the solution of the problem.	• determine the flower organs that are the basis of fruit formation (egg and ovary). • Discover Pollination and Fertilization
Teacher (C)	The designed	• real objects • progress little by little	• discover how the flower turns into fruit
	Do it	• real objects • mostly closed issues • diagram illustrating the reproductive organs of the flower	• the students' discovery of the two notions: pollination and fertilization • simplify to arrive at the result

V. DISCUSSION AND CONCLUSION

The purpose of this work was to study the conceptions and practices of three primary school teachers regarding the implementation of a problem-situation related to the reproduction of angiosperms and the aids they deploy for the benefit of their students. In our approach, we drew on the research work in didactics and pedagogy that was carried out on the notion of situation-problem and the work done at CREN in this field, and we focused our methodology on the placement of each teacher in several successive situations: conception of a course preparation, discussion between the three teachers on their choices, implementation in class of the situation-problem and finally verbalization of the action (self-confrontation interview).

The results obtained show that the teachers' actual conceptions of the situation-problem do not allow them to construct a situation-problem as it is foreseen in pedagogical and didactic texts. If they start from a question that could be dealt with in a problem situation, they do an ordinary dialogue course where they strongly guide students towards the knowledge they are aiming for. The idea of confronting the student with an obstacle is absent. This can be interpreted as difficulties teachers encounter when confronted with problem-based education and their conceptions of knowledge and learning.

An analysis of what teachers say about their students' engagement in the problem-situation highlighted a difficulty. The teacher is in a situation of discomfort when he is confronted with an open problem. He/she seeks to reduce the degree of openness of the proposed problem.

Regarding the way in which the teacher takes into account the students' conceptions, our analyses have highlighted two difficulties. The first is related to time management (inabily to make a return at the end of the session on the designs). The second is the embarrassment situation to which the teacher is subjected. Either he follows the logic of the students in their discussions and their proposals or he introduces them to the new learning (to learn pollination, fertilization and fate of ova and ovary).

The results on teachers' support for their pupils and their intentions show that they are focused on the solution of the problem to the detriment of a real construction of the problem by the students.

The difficulties raised here could be explained first, by making the link with teachers' assertorical conceptions of knowledge and scientific learning. We believe that the teacher's knowledge of the nature of scientific knowledge and learning is a determinant of his action. Our analyses showed that what the teachers of our study aim at as learning varies between passage of the flower in fruit, detail of the pollination and formations of the fruit. However, we can not consider a teaching that allows students to access a reasoned knowledge as the image of what is to be learned does not go back to the conditions of possibility of the solution of the problem. As long as we did not build necessities with the students on the problem studied.

In addition, the analysis of official texts shows that they are vague and imprecise and do not give much guidance by limiting the situation-problem to a question that is not quite fixed (neither constraints nor resources). It is not surprising that teachers feel that they respond to what they are asked to do. They do what they can according to the conditions they are given. Problem-based education is inherently complicated and difficult, but if they are led to believe that what they are doing is what they are asked to do, there is no reason to question their ways of doing things.

The identification of such difficulties could help to review the nature and content of teacher training on the problem-situation for constructivist education. But also to review the content of the official texts.

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