

"Reflect before you act"  
- Regulatory practice assessment for learning

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### Abstract

In this text, we tried to show the application a regulated assessment strategy for learning. It's a process appliqué a secondary school in Portugal, evolves students with sixteen and seventeen years. The described experience happened in the extent of the work developed. A group of investigators involved a project AREA<sup>2</sup> (Regulated Assessment for Teaching and Learning). In the teaching tasks and learning was tried a procedure for regulated assessment denominated "Reflect before you act". The teacher proposes the task to the students' discussion and they describe, in writing, the resolution process. After the feedback teacher resolution, the task is in agreement with the described strategy. After the analysis of the documents written by the students, it's requested the confrontation among there foreseen and there accomplished. Collect data is empiric, it evidences that differences exist between the description for strategies resolutions and the respective resolutions. Reflect before you act is a modality of regulated assessment. That can take to the alteration of some stages, a resolution and the passing of mistakes and difficulties. It is the regulated in the moment for a premature reflection.

### Introduction

The objectives a project AREA (Regulated Assessment for Teaching and Learning) it is the identification and experimentation for practices teaching to constitute as regulated assessment for learning.

This project is the responsibility as equips enlarged of teachers and that collect all a teaching levels, to which we belonged. The assessment of the learning is understood here as an intentional pedagogic process, integrated in the teaching process and learning, that it seeks to contribute for the improvement of the students' learning. In simultaneous, the regulated assessment for learning supplies information to the students and the teachers about the materialization or not for learning.

To take a practice this intention it is necessary that the students develop self-regulated attitudes for us to can, at a given moment, to do the solemnity-assessment of their knowledge and capacities, difficulties and mistakes, and they have independent attitudes for the progression and the passing obstacles that appear them in the day by day.

In practice teacher, it was if that some students show the domain of knowledge and capacities during the classes and that a moments you form of the testes assessment show difficulties in the same type of tasks. To understand this aspect, the group of investigators AREA it defined the strategy Reflect before you act as an alternative to be implemented.

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Being treated of an intervention for regulated assessment, it sought the answer to be known from the student to a task it can be helped by the understanding and anticipation of his resolution, and if that fact can contribute to a good act and consequently to eliminate mistakes and difficulties. Like this, it's tried to feel answer to the following subjects:

- What do differentiate if they can find between the oral discussion of the resolution strategy and his written description?
- What do differentiate if they can find between the written description of the resolution strategy and the respective resolutions?
- That way the description of a resolution strategy that advances his materialization can help the student's learning?

### **The regulated assessment**

For Santos (2002), the regulated for learning is understood as an intentional act that, acting on the learning mechanisms, it is as contribute to progression and the redirect of that learning. Black and Wiliam (2002), they reviewed about two hundred fifty investigation projects and they concluded that the students' learning is better when the teachers promote the formative assessment. In the materialization of this perspective, they can be simple act as the consistence among the assessment activities and of teaching, the feedback given to the student in the assessment tasks, the explicit of the classification criteria with observations and indications and the incentive to the regulated assessment for learning.

Like this, in a process regulated assessment, the student will be confronted systematically with their levels of development of the learning, for the need to assessment what gets to do (to dominate) at a given moment (Jorro, 2000; Perrenoud, 1998; 1999). His learning goes by the attitude change relatively to the school and the knowledge in general. In every moment of this process, the student, it will be requested to intervene, independent, in way can build it their own meanings.

This assessment concept is internally associated to the formative assessment, in the measure that this supplies information to the students for helping to reorient his work in the sense of pointing the flaws, learning no gotten and aspects to get better (Fernandes, 2005; Gipps, 1999). In him the solemnity-assessment is included as a primordial process when he intends to promote the regulated assessment for learning. Nunziati (1990) it detaches the importance of the solemnity-assessment when compared with other processes implemented in the practices of the teachers' formative assessment: the itinerary of the student's learning doesn't follow the logic of the discipline, nor the one of the teacher; the teacher's saying doesn't guarantee the appropriation on the part of the student; and the passing of mistakes can only be made by those that commit him and not for those that mark them, once the operation logics are different.

In a process regulated assessment, the student incorporates self-regulation techniques that help him to evaluate their products (Jorro, 2000; Perrenoud, 1998, 1999). This idea is common to several investigators (Allal, 1996; De Ketele, 2001) and share the premise that the cognitive processes and goal - cognitive of the students they play a prominence part in the regulated assessment for learning.

Other studies (Santos, 2004) they point that in the learning is necessary that the student reflect, identify the reasoning deviations, their mistakes and cross them (Pinto, 2003). It is known that the reflect on what learned and as he learned him, the interacts, the feedback, the reflection on him learned and the solemnity-assessment is factors that contribute so that the learning becomes significant (Bishop & Goffree, 1986; Hadji, 1994), and that the originating from solemnity-assessment the verification of a mistake

or difficulty motivates the search of new interacts (Santos, 2002), what contributes to the self-regulated for learning.

In the classroom, the search interactive of obtaining answer for the subjects with that it is confronted takes the student to adhere it a regulated mechanism that allows the adjustment of the teaching process and learning. But, for this to happen, it is necessary that the student reflect on his learning, identify the reasoning deviations, their mistakes and cross those (Pinto, 2003). Filling out the identified gaps, be through the reorientation for learning process, be already through a larger insistence in the process in course (Santos & Pinto, 2006).

Interacts among equal, in this in case he enters students, it is essential so that there is cooperation, argument capacity, critical spirit (César et al., 2002), confrontation of opinions, need to argue and to justify, acceptance of critics, etc. In a private situation, the student in communication with the other students or with the teacher (Gipps, 1999; Shepard, 2000), he is in a confrontation situation that takes him to explain, to justify, to argue, to expose ideas, to give or to receive information to make decisions, plane or to share the work and to obtain resources. This interacts happens in the teaching process and learning and it works as a favors to the regulated assessment for learning (César, 1997; Dias, 2005).

The teachers, in interacts with the students, they can fall back upon the feedback to show to the students that the knowledge is built by progresses and back, attempts and mistakes, you conjecture and refutation or it proves, and like this to disassemble the notion that everything pronounces in the perfection, in way the one that the students can develop and to learn. The orientation in this process occurs of the established interacts with the teacher, the work group or other support, of the several experimentations on the process in the search of examples and against-examples, of the mobilization of knowledge, of the identification of mistakes and difficulties, of the solemnity-assessment accomplished through the verification of the conclusions registered, of the used processes and of the assessment time for the materialization (Dias, 2005).

It is through the reflection in each one of the stages of this process, of the solemnity-assessment, of the interacts and of the socket of conscience of the existence of mistakes and difficulties that the work takes direction and the worth student or not the knowledge with that it is confronted and it establishes continuation courses, constituting, like this the regulated assessment for learning.

### **The assessment in the Secondary's school in Portugal**

In Portugal, the programs of the different disciplines have been suffering alterations, reforms of the educational system exist in that, they move the name of the disciplines, as it belongs the case of the introduction to the Portuguese "A" and Portuguese "B" in 1997, and altered in 2004 for Portuguese Language or what happened with Mathematics versus Mathematics "A", Mathematics "B" or Applied Mathematics to the Social sciences. However, in the contents there are few alterations to point out, but an evolution is verified in the importance that feels to the traverse capacities: resolution of problems, investigation activities, mathematical communication and technologies.

In what he concerns the assessment, since 1991 that this is understood as integral part of the process for teaching and learning, let us see the programs of Mathematics:

[Assessment]: to Assessment the students' mathematical knowledge means to gather and to analyze data on which these know regarding concepts and mathematical methods. These data should be used so many by the teachers as

for the students; the teachers should use them to help the students to acquire deep knowledge and ideas egg whites on the mathematical contents. (Portugal Ministry of Education, 2001, p.13)

The formative character of the assessment is reinforced and, in matter, solemnity-formative. It is intended that the assessment in Mathematics doesn't limit to evaluate the final product but also the learning process and allow the student to be an element active, reflexive and responsible for their learning.

At the level of the instruments of it collects of data, also, the ones that are recommended allow the development of the persistence in the search of solutions for new situations and the ones that promote a reflection attitude for learning. They are some examples of these indications the use of the test in two phases, the mathematical compositions and the portfolios.

In the general methodological suggestions about assessment, also the interaction concepts, reflection, competences and investigation tasks passed to be included. The beginning of the integration of the curriculum and of the assessment, recognizing the differentiation to the level of the courses, the competences and the components practical and experimental of the curriculum, and it seats in an assessment as a process regulator for learning, advisor of the school course and certifier of the several acquisitions accomplished by the students.

### **The accomplished experience: reflect before you act**

Reflect Before you Act was the implemented strategy and it was rendered in the following way:

- i) The students were confronted with a problem or a problematic situation; the interpretation of the task was made through a discussion in the group, without the teacher had intervention;
- ii) After the discussion, the students described, in writing, the process of resolution of the task without to solve;
- iii) The teacher took the description made home and he gave feedback, in the written form, through comments for the improvement, interrogations, or suggestions for resolution;
- iv) The student solved in agreement with the written strategy and made the confrontation among the two produced documents.

When applying this strategy it was sought that the process of description of the resolution promoted a deep reflection that it came to be identifiable in the resolution. Leaving of the beginning that the student, when solving, has in bill the reflection that had need to do in the description phase would be inevitable the alteration of the resolution in agreement with the reflection made. In the presupposition that the reflect need to describe that that she try to transmit in the resolution of the problematic situation eliminates possible mistakes during the resolution and clamor roads, it tried to drive the student for the resolution correct. He still broke of the conviction that the reflection and the description has the advantage of making possible the student them to think and rethinking his resolution strategy.

### **Methodology**

The accomplishment of this study followed a qualitative and interpretative approach, for being the methodology that better he adapted to the defined problem. Relatively to it collects it of data, a group of Mathematics "B" was studied the 12nd years old, terminal year of a cycle of studies frequented by students of sixteen and

seventeen years. The students of Mathematics “B” don't have national exam of obligatory for the conclusion of the discipline and of the course, however, some students accomplish it because of they intend to use the discipline as specific discipline of access to the higher education. The involved students belonged it a group of pedagogic continuity, or be with the same teacher in the two terminal years, constituted by eight students, six male and two female. In the end of 2005/2006, the students were submitted a reflect experience before acting, that it evidenced the need to deepen the strategy as a form of regulated assessment. In 2006/2007, in the 1st and 2nd period, the students were submitted to the resolution of three problematic situations, where it was made the observation of the students' work in class in a log book, accompanied of the recordings audio, and photocopied and analyzed the written productions written by the students. The analysis of data was made among the comparison of the students' written works, to recordings audio and the observation of classes. After the systemization of the collected data they were established categories, in agreement with the theoretical picture of reference.

The strategy was applied, usually, in the final part of the class, so that it was possible to the teacher the reading of the students' descriptions and the consequent feedback. In the ownership of the descriptions written about the resolution of the task and with the teacher's feedback, the students solved the task and they made the confrontation among the two documents.

### **Presentation and discussion of the results**

They come, following, a solitary example of the group of tasks in that the students were involved. It is an exploration task in that the students need to understand the situation, to interpret the meaning of the variables in the presented context and to mobilize different knowledge and capacities, he/she wants choose for a resolution predominantly analytical or fall back upon the technology that allows graphic representations. They comes a task and the work developed by two students, Carlos and Liane. Both had a school course without disapproval situations, but Liane had a negative classification in the 11st year and in the 12ºano, year in that she elapsed her collects of data, she needed to obtain positive to finish the discipline. Carlos was a very determined student, it always accomplished the house works and it reached a good level of classifications in the several disciplines, being recognized by his/her merit by the teachers and for their friends. The task World Day of the Water was applied in two classes of ninety minutes, in the first the students accomplished the description of the resolution and in the following the resolution:

In the 22 of Mars of 1995, World Day of the Water, in a public garden, a great lake was inaugurated, in which 200 fish were introduced. It admits that, annually, from the inauguration of the lake, in the World Day of the Water, to the year of 2005, they were made counting regarding the number of original fish and to the total number of existent fish in the lake. Past  $t$  years after the inauguration of the lake, the number of original fish and the total number of existent fish in the lake are given, respectively, for the models

$$O(t) = 200 \times 0,6^t \quad \text{and} \quad T(t) = 200 \times e^{0,2t}$$

In what year after the counting it was verified, for the first time, what at least 80% of the fish put at the lake in the day of the inauguration had died? (I space B - 12nd year, p.202)

In the interpretation phase and discussion of the task, the students try to understand and to organize the data that the work proposal contains, for us to organize the answer plan. One of the aspects to highlight is the understanding of the meaning attributed to each one of the variables in the expressions of  $O(t)$  and of  $T(t)$ , and the relationship that the variables establish, namely they make the analysis of the numeric values included in the algebraic expressions:

1. (...) Liane: Then, passed the number of original fish and the total number of existent fish in the lake, they are given... This is the original fish.
2. Carlos: That is now the ones that is.
3. Liane: But the originals are 200, here they are 200,06.
4. Carlos: The total number of existent fish in the lake, the total number of existent fish is this. (...)
5. Carlos: The 40 are not the 80%, the 80% are the 160 that died. At the most, because the 160 of fish that it is the 80% that died have that removing to the 200, and he/she will feel the 40.
6. Carlos: Ok! well, but ready. But that is the number..., but only that it is like this it what interests the number of original fish is, are we here the original fish, don't you see? At least 80% of the fish put at the lake in the day of the inauguration.
7. Liane: Ya.
8. Carlos: Therefore we are to do well. 0 (I reduce to zero) of  $t$  it is the number of fish of the lake put in the day of the inauguration. (...)
9. Liane: If  $t$  is 0 is 200 times 1 is well my.
10. Carlos: Ah ya, was what we were to speak of the again that you atrophied with the zero.
11. Liane: To the end of one year they did already die 80, in one year they die 80 soon, in two years... there 160, not?
12. Carlos: No, this cannot be...
13. Liane: Ya, cannot be the same thing.
14. Carlos: It is already 200 less 72 already...
15. Liane: Then, in one year they die 80 and the year to proceed...
16. Carlos: Then, cannot this be type, now you do want to see in the 3rd year? I find strange my. In the 3rd year..., 0.6 high  $t$ , in the 3rd year there are already only 43 fish.
17. Liane: Is shovel, are you to do that well?

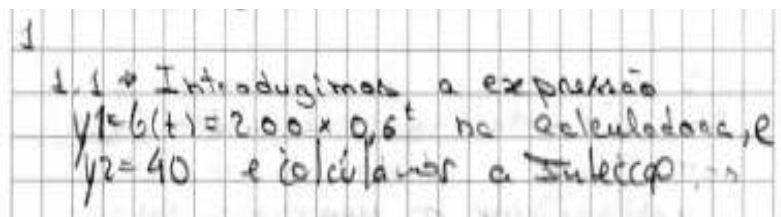
The students translate the text of the task for an own language (speech 1), in way to establish the understanding (speech 2) and the compression of the proposal (speech 3). They discuss which says respect to the amount of original fish of the expressions and the one that concerns the total amount of fish (speech 6). In the same way that, they try to identify the meaning of the numeric values in the algebraic expression (speech 5), for instance the values 200 and 0, 6 in  $O(t)$ .

The united work, in pair, allows a change of interpretations that promotes the evolution in the understanding (speech 7). Carlos interprets the question that it involves the 80%, and it explains to Liane the meaning of this value in the context of the situation (speech 8). He settles down a constant dialogue among the two students, with successive interruptions, where the comments done by each one of the students allow the other to develop in the understanding (speeches 7 and 13) and build their own meanings (speech 15). It is identifiable the repetition of several sentences that they are

part of the text of the task (speeches 1, 4 and 6) and that repetition is less frequent as the students develop in the construction of the answer.

It is verified, still, the domain of some mathematical concepts as it is the case of percentage (speech 5) in spite of show difficulties in the mathematical language (speech 3). It is of highlighting that, they develop in the depth of the analysis and understanding and they promote the solemnity-assessment of the work that they accomplish (speeches 16 and 17).

The recording allowed to acceding to the work accomplished by the students during the interpretation and understanding for a language accessible, to the student's context. However, the writing of the description of the resolution process is tiny when compared with the work accomplished in the discussion phase:



This written, about the description of the resolution, doesn't show the difficulties, the mistakes, the discussion and the whole work that the students accomplished. In this description, the students limited to inform the teacher of the possibility of obtaining of an answer. They didn't include the meaning of the different variables in the context of the task and the explanation that it could be used a graphic representation in his resolution. Also, they don't refer to the numeric value 40, as being the number of fish that, they remained at the lake. They refer the value 40 as being a value to introduce in the graphic calculator, without connection to the context of the problem. After it collects it of the students' descriptions, the teacher analyzed the documents written by the students and the proceeded some written comments:

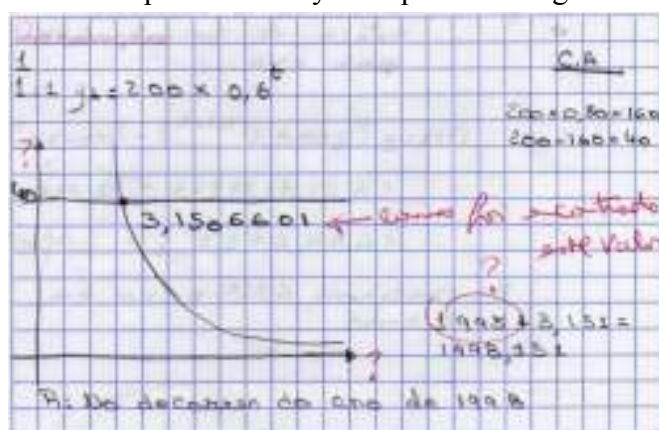
If you had to say somebody as it is that if he/she did...

From where came the 40, they get to explain how it is that she there could arrive...

To try to explain how it is that it is done. For instance, to say "or we are going to the graphic menu of the calculator or we will use the table, or we will decompose in factors for later to have the same base"...

(Log book, 8/3/2007)

With these indications, the teacher sought that the students explained the done options, that they developed their capacities of mathematical communication and that they justified some of the interpretation subjects and understanding. The document of the students' work, now commented on, it was returned them and in him they were the suggestions. To leave of that moment, the students made the resolution of the task with base in the resolution description and they incorporated the given suggestions:



The students accomplished a resolution for graphic representation falling back upon the graphic calculator. In spite of being coherent with the description of the resolution of the task proposed turn to not to be present the part of the mathematical communication. The resolution is dominated by the mathematical language, without including aspects of the maternal language and without explaining how they were obtained the numeric value 40. It is understood, starting from the song right superior, that the number of fish was calculated starting from the percentage of 80% and that it was made the difference with the initial value.

Also, it is possible to observe that the concern of this group of students existed to give answer to the subject. The students calculated the encounter of the curve with the horizontal line and starting from the value found  $t=3.1506601$ , they added the year 1995. This aspect evidences that a true understanding of the situation existed, because the value of the variable  $t$  represents the number of years after 1995.

But, he doesn't make part of the written resolution the done mathematical reasoning nor the aspects that try to answer to the feedback given by the teacher. As well as, also, they are not identifiable similarities between the resolution of the task and the description of the resolution process, what can indicate that the students understand the resolution of the task as a document, where they should consist aspects strictly related with the mathematical procedures.

### **Conclusion**

Collect her empiric data, it evidences that differences exist between the description of the strategy resolution of the proposed task and the respective resolution. Relatively to the visual aspect, in the description the text prevails written in the form of written document and in the resolution the predominance of calculations is verified and of graphic representations. The average language, used by the students, in the interpretation audio - not recorded transported for the description, but this last one appears organized with the formalisms of the maternal language, standing out the existence of the terms as: If..., he wants to say that..., soon..., as..., or be..., But..., for...,... we have that..., after..., knowing that..., Then..., I Marry....

In the resolution, the students show the foreseen strategy, but they don't explain to her, nor they justify her, they are limited to follow it giving relevance to the mathematical aspects however they give an answer to the put problem. In the two written documents the proposed strategy leads to the right resolution problem, having in the description a valorization for the process that should be preceded and in the resolution the application of that process.

Although they are not identified the mistakes and the difficulties in the written documents, for the interpretation audio - recorded is possible knowledge that they existed, they were identified and outdated. The deep reflection suffers the task can help the student to cross mistakes and difficulties, once he has to develop the necessary mechanisms to evaluate the application or not of a given resolution strategy. The form of the students' work, in groups of two, facilitated to interact among students. The one that for César (1997) and Dias (2005) it makes possible the discussion concerning the done experimentations, the search of examples and against-examples, the mobilization of knowledge, the identification of mistakes and difficulties and the solemnity-assessment.

In the search of a road that can lead it to the true solution, the student makes experimentations, he establishes conjecture and he evaluates his truthfulness. When



involving in this procedure, the own student verifies the mistakes that he committed during the process and he crosses them falling back upon several strategies (Pinto, 2003; Santos, 2004).

I verified that the students involved in this investigation interpret and they understand the problematic situation that was put them, that they try to understand the mathematical and linguistic concepts that they are involved, but they just write in the resolution descriptions that that they understand be the mathematical content. Starting from this evidence I could infer that in this modality of regulated assessment for learning broadly that that the student shows in the written form passes, because other aspects that are not told in the written documents exists but that contribute equally for that that they are the representations and the knowledge that the students have of the mathematical knowledge. In the practices of the school, the materialization of this perspective can go by simple tasks as the consistence among the assessment tasks and of teaching in the incentive to the regulated assessment for learning (Blach & Wiliam, 2002; Perrenoud, 1998). Also, in this existence, the student can develop his capacity of understanding of written text, she wants at the level of the interpretation, she wants at the level of the writing.

The modality regulated assessment *reflect before you act*, is a priori an assessment modality the that it can: to develop the capacity of the written understanding; to allow the passing of mistakes and difficulties; to contribute for the resolution of the task with success, filling out the identified gaps wants through the reorientation for learning process wants already through a larger insistence in the process in course (Santos & Pinto, 2006). When the student wraps up in a process of this type, he tries to interpret and to understand what is requested him/her, but in simultaneous she has to do a process of reverse-visit of their structures of form knowledge the power to give the appropriate answer to the situation (goal-cognition), contributing this way to his self-regulated (Nunziati, 1990; Santos, 2002).

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