SELF-ASSESSMENT IN WRITTEN REPORTS

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This article studies the development of students' self-assessment skill in the context of written reports in Mathematics. In particular, we present an interpretative case study, which involved two thirteen year old students from the 8th schooling year and six reports, written in two different stages and supported by assessment strategies at the teacher´s responsibility. The study suggests that, in each case, the student´ self-assessment skill evolves gradually but differentially. The study also suggests that the student´s appropriation of the assessment criteria is still under development and that self-assessment is, mostly, operated by students as a process that includes monitoring and excludes action.

INTRODUCTION

Classroom assessment practices should be part of the education process, should be used formatively to support and guide student´s learning and, at the same time, involve students in assessing critically their own work (Black & Wiliam, 1998a, 1998b; Cassidy, 2006; Santos, 2008; Wiliam, 2007). In fact, among student´s assessment forms, self-assessment is a privileged one, as it is performed by the subject himself/herself (Nunziati 1990; Santos, 2002). This strategy can, both, help students better understand the learning goals and take greater responsibility for their own learning process (Black & William, 1998b; Sadler, 1989) and lead to significant improvements in their personal performance (Cassidy, 2006; Irving *et* al., 2003).

This paper´s aim is to study the student´s development of self-assessment skill, during the elaboration of six written reports in mathematics, supported by some assessment strategies, at the teacher´s responsibility, namely the investment over the student's appropriation of the assessment criteria and feedback production. We suggest a grid of analyses of the students' self-assessment so to easily understand the development of this skill along the study. This research study was carried out during the academic year 2007/2008, within the AREA Project [1].

SELF-ASSESSMENT

In this study, self-assessment is seen as meta-cognition process, whereby the subject becomes aware of the different moments and aspects of his/her cognitive activity and exercises a conscious and critical self-control over his/her actions (Santos, 2002). It is

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an internal process to the subject which allows him/her to regulate his/her own thinking and learning (Nunziati, 1990). This process includes monitoring and action: the student confronts what he/she did with what he/she was expected to do, acknowledging the differences between these two situations, and acts to reduce or eliminate them (Santos, 2008). In other words, the student must: possess a concept of the standard level being aimed for; compare the current level of performance with that standard; and engage in appropriate action which leads to the closure of the gap (Sadler, 1989). Thus, self-assessment presupposes the confrontation between actions taken while performing a certain task and its implementation criteria (Jorro, 2000).

In this view, self-assessment is vital for an effective learning (Black & Wiliam, 1998a). In fact, self-assessment can lead to significant improvements in the student's academic achievement (Fontana & Fernandes, 1994) and contribute to developing important personal skills (Cassidy, 2006; Irving *et* al., 2003).

It should be noted, that despite the fact that this ability is found in every individual, it should be perfected by his/her learning (Nunziati, 1990) through a process that requires time, practice and intentionality (Black *et* al., 2003). The main problem seems to be related to the fact that students can only self-assess if they have a clear idea of the learning aims intended to be achieved and this is not usual (Black & William, 1998b). A continuous and sustained work is needed, so that students may internally appropriate the assessment criteria. Students should be presented with standards and multiple examples and engage in direct assessment experiences (Sadler, 1989). In the educational definition of objectives the teacher must promote the students active participation and "create a relational climate characterized by reflection, capacity for dialogue, negotiation and constructive vision" (Cambra-Fierro & Cambra-Berdún, 2007a, p. 37). However, it is important to note that "students focus on self assessment is not common practice, even amongst those teachers who take assessment seriously" (Black & Wiliam, 1998a, p. 25).

Cambra-Fierro and Cambra-Berdún (2007a) suggest a model that aims to evaluate self-assessment´s skill and its contribution in improving student's academic performance. The model includes both the student's personal characteristics and the guidance received from the teacher. The authors find that self-assessment helps improving student's academic performance and that the student's motivation, responsibility and self-concept, together with their teacher´s guidance, do influence significantly this self-assessment process. It is extremely important to provide work guidelines that stimulate the student´s self-assessment so that the more the students assess their own learning processes less intervention from external factors is needed (Cambra-Fierro & Cambra-Berdún, 2007b). Regardless of the suggested model, it's important to note that self-assessment processes are difficult to evaluate.

METHODOLOGY

We opted for an interpretive paradigm and a qualitative approach (Bogdan & Biklen, 1994). As to the study´s design we chose the case study (Yin, 2002). We have

considered two case studies, Duarte and Rute, two students from the 8th schooling year (13 year olds) from a secondary school in the North of Portugal. To select the participants the following criteria were taken into consideration: 1. Speaking ability, so as to turn students into good informants; 2. Having similar academic results in Mathematics; 3.Having different perspectives on Mathematics and Assessment.

Written reports were prepared in the classroom, in small groups, based on the performance of different kinds of tasks: two researches, two problems and two games. They were prepared in two phases: a first version was subject to written feedback and then students elaborated a new version. The reports should include each student's self-assessment, performed individually. At the beginning of the study, the report's script was discussed and the assessment criteria (suggested by a rating table) were negotiated.

Data was collected through classroom participant observation (Lessard-Hébert *et* al., 2005), the examination of the two versions of each report and seven semi-structured interviews (Fontana & Frey, 2005) done to each participant, one at the beginning of the school year and the other after completing the second version of each report.

To examine the data we created a framework of analysis for the student's self-assessment with five dimensions: (A) Appropriation of the assessment criteria, (B) identification and explanation of mathematical learning, (C) identification of difficulties and explanation of how they were overcome, (D) identification of areas for improvement and outlining strategies, (E) self-assessment gain. For each dimension we considered different categories, according to Table 1.

A	A1 – uses the evaluation criteria for the report´s elaboration A2 – values important aspects, in accordance with the assessment criteria
B	B1 – considers that learning has not occurred B2 – identifies acquired learning B3 – identifies acquired learning and spells out how it was achieved
C	C1 – does not consider any difficulties C2 – identifies a few experienced difficulties C3 – identifies the experienced difficulties and explains how they were overcome
D	D1 – identifies areas for improvement D2 – identifies areas for improvement and outlines intervention strategies D3 – identifies areas for improvement and makes a critical analysis of the intervention strategies applied
E	E1 – shows the investment done on written self-assessment E2 – recognizes that self-assessment is important for their learning in mathematics

Table 1: Dimensions and categories of the analyses of self-assessment´s skill.

DISCUSSION OF RESULTS

Rute

R is a student with a good performance in Mathematics, who tends to associate mathematics to numbers and calculation and its application to shopping and money change on a daily basis. As to mathematic learning, she considers that students can play an active role and sees the error as a disappointment. She considers assessment as a way the teacher has to become aware of the student's difficulties and refers tests, reports, compositions and work observation in the classroom as important assessment tools. The reports are particularly interesting for this student who values strategies description. R is concerned about obtaining good results. Examining the data on R´s self assessment skill, in each of the six reports, we obtained Table 2.

Reports	1	2	3	4	5	6
A	A1/A2	A1/A2	A1/A2	A1/A2	A1/A2	A1/A2
B	B2	B3	B3	B3	B3	B3
C	C1	C3	C2	C3	C3	C3
D				D2		
E	E1/E2	E1/E2	E1/E2	E1/E2	E1/E2	E1/E2

Table 2: Grid of analyses on R´s self-assessment skill.

Concerning the *dimension A*, R used, as a rule, the assessment criteria in order to develop a quality report:

> I used the criteria in the conclusions. In the script I saw what I was supposed to say ... later on in the criteria I saw how I should explain it to the teacher in order to get good grades. (R´s interview 07/02/08)

In addition, R showed, right from the beginning, that she valued key issues in the reports, in accordance with the criteria, such as explanation and justification of the adopted solving process:

> [The teacher] will enhance the way we explained the strategies and if the answers are right or wrong. It´s no use saying the first player has the lead, we must explain how we reached this conclusion (...) The way we explained it in writing and made the schemes is important". (R´s interview 07/02/08)

For the *dimension B*, R tends to identify, in her self-assessment, the mathematics learning that she was able to accomplish and to explain how she did it. For example, in the second report, R states that she learned to determine the radius of the cone´s base from the radius of the original circle and explains how that happened:

> To find the radius [of the cone´s base], I found the circle´s perimeter and divided it into three equal parts, we got the cone´s base perimeter. We know that to find the perimeter is $2 \pi r$ so, to find the radius it is the other way around: the circle´s perimeter / $2 \pi = r$.

Regarding the *dimension C*, R tends to identify the difficulties she experienced and explains how she overcame them. Particularly, she did it in the last report:

> As to the expression´s resolution I didn´t feel it was very difficult (...) Whenever I couldn´t make up my mind whether to choose a positive or negative number or a zero, I talked it over [with my colleague] and in case he didn´t understand it I asked the teacher.

On the other hand, concerning the *dimension D*, R generally doesn´t identify improvement areas in her work or suitable strategies to achieve it. In fact, she only recognizes that she needs to improve a few aspects and sets forward appropriate strategies in her fourth report: "I find it difficult to match angles in order to prove the triangles´ similarity but I want to improve by solving some exercises".

As to the *dimension E*, in general, R valued self-assessment by investing in her writing and taking into consideration the teacher´s written feedback. Most of the time, R seeks clarification from the teacher on the written feedback in order to answer it. The student herself stresses the importance of self-assessment to determine what aspects of her work have to be improved and thus obtain better results:

> It´s important. Self-assessment shows me what´s wrong and helps me to improve (...) I can study more at home and be more attentive in class ... and manage to get better grades". (R´s interview 12/06/08)

Duarte

D is a student with a good performance in Mathematics who recognizes that mathematics is much more than numbers and calculations and links it with geometry, graphics and problem solving. D believes that mathematics is useful for everyday life and also "for computer programming, and (...) science." He considers that, while important, mathematics sucks. D has a traditional view of a mathematics classroom (the teacher explains and the students solve the exercises) and he see error as cause for disappointment and shame. As to assessment, he believes it is meant to serialize the students and that results are important. Examining the data on Duarte´s self-assessment skill in each of the six reports, we obtained Table 3.

Reports	1	2	3	4	5	6
A			A1	A1/A2	A1/A2	A1/A2
B	B2	B2	B1	B2	B2	B3
C				C1	C1	
D						
E				E1	E1	E1

Table 2: Grid of analyses on D´s self-assessment skill.

Concerning the *dimension A*, initially, D didn´t care for the assessment criteria, given that he considered they´re mainly used by the teacher to evaluate the reports, and he subjected his work to a few preconceived ideas of what he considers important:

> Well no, we didn´t use [the criteria]. I don´t know ... I think we already had the script and that the comments were enough. And I already knew what to put there. The criteria are more appropriate for assessment. It´s more like, for the teacher (D´s interview 14/11/07)

Throughout the study, D comes to understand the importance of the criteria for the students to learn about the elements valued by the teacher and to elaborate consistent reports: “The criteria are useful. They help improve the report, if we understand what we are asked to do and do the report as we were told it will be okay, we can get a good grade.” (D´s interview, 20/05/08); and comes to recognize greater value to explaining and supporting answers: “It is important to explain our reasoning. We just couldn´t go and say where was [the circle´s] center without any explanation (...) we have to explain it.” (D´s interview, 20/05/08).

As to *dimension B* and *dimension C*, the student merely identifies acquired learning and difficulties, without explaining how he accomplished/overcome them: "With this activity, I learned that the Pythagorean Theorem can be done with other figures (Report 1). In some cases, D says he didn´t learn anything: "Although I enjoyed dealing with these issues I think I didn´t learn anything" (Report 3) and that he didn´t run into difficulties, which does not match the researcher´s observation of reality.

Nevertheless, one notices an evolution in D´s self-assessment. For example, in the fourth report, the student deepens his conclusion, explaining the reasons that led him to appreciate the work done and demonstrating the efficiency of this work in his learning:

> I actually liked to develop it [this work], mainly because I didn´t have to do geometric drawing by hand and I think the group worked more. I managed to consolidate something, the triangles´ similarity criteria, but I didn´t have any concerning doubts.

Concerning the *dimension D*, the student, in his self-assessment, never identifies areas for improvement. Furthermore, regarding the *dimension E*, D does not recognize the importance of self-assessment in his results nor to his mathematical learning, so he does not invest in his performance and only presents what he considers absolutely necessary to obtain the grade he wishes:

> I knew I had to post it... but I had already answered other questions and that was enough to get a medium level grade (...) The conclusion is not very important, I don´t think it counts much. (D´s interview 28/11/07)

D gets to the point of ignoring deliberately, in the first three reports, some of the teacher’s written feedback for the elaboration of his self-assessment in the second phase. Gradually, the student comes to understand that self-assessment has a significant weight in the report´s evaluation, and might be important to help identify and overcome everyone´s difficulties:

> I know it's important for the teacher, for the report´s grade (...) At first I didn´t think so. It´s important we know what kind of difficulties we have, so to work them out or study to improve them.” (D´s interview 07/02/08)

However, by the end of the study, D maintains that self-assessment does not contribute to his learning in mathematics, allowing his self-imposed standards to lead "But I don´t think [self-assessment is] very important, I don´t think one can learn much in Mathematics " (D´s interview 07/02/08).

CONCLUSIONS

R, right from the beginning, values the assessment criteria in the report elaboration process and reveals a serious investment in her self-evaluation, presenting her work, in general accordance with the criteria and taking advantage of the given feedback to improve the first versions. In particular, R identifies and explains her accomplished mathematical learning and identifies the difficulties she experienced. She believes self-assessment influences the results obtained and her learning process in mathematics (Cambra-Fierro & Cambra-Berdún, 2007b).

As for D, he showed, right from the start, that he had self-imposed standards deeply rooted. Gradually, the student comes to value the assessment criteria in the report´s elaboration and to invest more in his self-assessment. Ultimately, he identified and explained the mathematical learning accomplished and recognized the importance of self-assessment to identify and overcome difficulties, in accordance with Sadler (1989) and Santos (2008). Therefore, we witnessed an adjustment of the student´s initial representations and self-control of his initial standards. The student persists, however, in considering that self-assessment does not contribute to his learning in mathematics, allowing his self-imposed standards to lead (Santos & Gomes, 2006).

R and D showed different self-assessment skills. It should also be noted the fact that both students tend not to identify areas for improvement in their work neither to outline / review intervention strategies in order to eliminate the differences between the current and the desired state of events or to closure the gap (Sadler, 1989). Self-assessment seems, then, to be limited to a meta-cognitive process which includes monitoring only and not action (Santos, 2008). This suggests a still poor appropriation of the assessment criteria (Hadji, 1994) and the need to continue the work developed, readjusting, if necessary, the teacher´s regulation strategies so to guide students in achieving a successful self-assessment (Cambra-Fierro & Cambra-Berdún, 2007a, 2007b; Sadler, 1989). This is, of course, a long and complex process.

NOTES

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