METACOGNITIVE INCIDENTS MANIFESTED BY STUDENTS OF YOUTH AND ADULT EDUCATION IN AN INVESTIGATIVE ACTIVITY

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Abstract

Practices that take into account youth and adult education (YAE) are still rare in the literature. The present work applied an investigative activity with YAE students from the last year of middle education, in the discipline of sciences, about the methods of construction of science and tests of variables. From the categorization of metacognitive incidents used, it was verified that the stimulus to the argumentation that the investigative activity potentiated was fundamental for the students to conclude the activity successfully.
Keywords: *adult education, investigative activities, youth education, metacognitive incidents.*

Introduction

In general, science education accompanies the political moment experienced in a country. With each new government happens a new reform that mainly reaches the levels of primary and secondary education. In Brazil, for example, during the 1950s and 1960s, science education was too technical, aiming to train scientists. This fact was a reflection of the Second World War that occurred, demanding the formation of professionals to act in the war research, for example (Krasilchik, 2000).

After redemocratization in Brazil in 1984 and the elaboration of the Brazilian Federal Constitution in 1988, science education again aimed at the critical formation of the citizen. In addition, it was also during this period that, in view of the progressive educational movements of the time, it instituted, for the first time in legal terms, the right to Basic Education, including those who did not have access to it in their own age, including, therefore, youth and adults education (YAE). In this sense, it is still relatively recent in the Brazilian context the assurance of the right of youngsters and adults to study (Santos, Bispo, & Omena, 2005).

However, there are still reports of the difficulty of pedagogical practices that meet the specificities of this public. Porcaro (2011) has pointed out that a recurrent problem in working with this public is the absence of places for discussion of a pedagogical proposal appropriate for this audience, which has specifics, requiring different treatment, and that works that point out strategies for this audience are still scarce. Thus, works that show adequate strategies for the public of the YAE are very important, in order to subsidize the teaching work in the science classes.

In this way, some works that discuss science teaching suggest that the discussions and the interactions within the classes are fundamental strategies to improve certain abilities, like the argumentation and the proposition of hypotheses (Altarugio, Diniz, & Locatelli, 2010; Gonçalves & Goi, 2018; Sasseron & Carvalho, 2013). Aslan (2019) also ponders out that the investigative activities, besides favoring the work of these abilities, can favor the learning of the conceptual contents of sciences.

On the other hand, assessing the development of these skills during a class using investigative strategy can be very subjective. Thus, the categorization of metacognitive incidents (Locatelli & Arroio, 2014) is shown as a possible tool to measure the manifestation of these abilities along an activity. The authors define as an incident the manifestation of a questioning or rethinking about something, the categories being defined as confirmation, monitoring, positive change and negative change. The confirmation incident is one that ratifies an idea, while the monitoring incident is related to the oversight of some concept. Positive change is a self-regulation directed towards an appropriateness to the idea taken for granted, whereas negative change would be a departure from the expected response. Even though, in this context, was chosen to use effective change instead of positive change, since it is believed that the word expresses the student's expected response more closely, as well as change in construction instead of negative change, because it translates from more objectively, the student's expected departure from the expected response. Thus, four metacognitive incidents were considered: confirmation, monitoring, effective change and change in construction.

From the above, the aim of this work was to identify the metacognitive incidents manifested by YAE students during the performance of an investigative activity on the hypothesis test during the scientific work.

Research Methodology

Data collection was carried out during a science class on methods of building science, lasting one hour and thirty minutes. The number of participants was 10 YAE students, between 18 and 57 years old, who attended the last grade of middle school, at night in a public school located in the city of São Paulo, Brazil. Three types of paper (sulfite, offset and carton), two types of yarn (string and nylon), two types of bladder (small and large) and two types of straw (normal and milkshake) were provided to the students. From these materials, the students were asked to answer the following question: "How to make the rail travel faster?"

The construction that should be done is to pass the wire (rail) inside the straw and then to glue the filled bladder, but not tied with tape, in the straw. The objective was for students to test the variables to arrive at the conclusion of which combination of materials would make the course faster, as seen in figure 1.
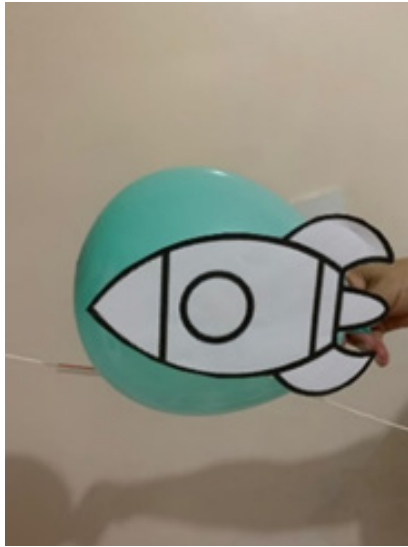
Figure 1. Scheme of the experiment developed.
(Source: Prepared by the authors).

In the present research only one of the participating groups was considered, with five students (A1, A2, A3, A4 and A5) in order to have the analysis done in depth. The choice of this particular group was due to the fact that they had the older participants and that they spent longer periods away from the classrooms. Student interactions during this process were recorded and then fully transcribed. The speech shifts were analyzed according to the categorization of metacognitive incidents proposed by Locatelli and Arroio (2014).

Research Results

The transcription of the group discussion during the activity resulted in 32 speech shifts. The argumentation among the students was fundamental for the group to be able to elaborate a hypothesis and to test the different variables that made up this experiment. Furthermore, all metacognitive incidents were manifested.

The speech shifts also showed that the metacognitive incident monitoring was very related to hypothesis proposition. This way, students monitored their ideas, with the help of the group, before proposing a new hypothesis. The results obtained also indicate that metacognitive incident effective change was overlapped with the monitoring by the group so that through the collective contributions that this incident was manifested.

In this sense, through the categorization of metacognitive incidents, it was possible to identify that the investigative activities potentiate the dialogue and the group argumentation, especially in the moments in which the students tested the variables, that is, the different materials, during the tests that performed. Therefore, skills that are expected to be improved during science classes, such as the hypothesis testing and assay were contemplated during the development of this activity.

The results showed that the research proposals in the science classes can help to promote these abilities, as other works of the literature point out.

Conclusions and Implications

From the analysis of the obtained data, the investigative activity made possible the manifestation of the four categories proposed by the theoretical reference. Through the interactions evidenced by the speech shifts, it is observed that the dialogue among the participants was nerve-wracking so that the group analyzed the approached expected response.

In addition, the variable test process shared by the group of students was privileged by the argumentative process built throughout the activity, evidencing the importance of the investigative process for this construction.

As future works, it is suggested to carry out investigative activities with other publics, in order to evaluate if the strategy favors the manifestation of metacognitive incidents as well as the YAE students.

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