SIXTH-GRADERS INTERPRETATION OF INFORMATION USING BAR GRAPHS AND ISOLATED CASES

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ABOUT THE REPRESENTATION OF INFORMATION

This study aims to understand the effect of different representation of information (clustered and stacked bar graphs and isolated cases) on Portuguese children's mathematical reasoning, when discrete variables are involved. Statistic is one of the most relevant domains of the citizen daily life. It may promote the development of students' critical sense, which is fundamental for students in particular, but also for citizens in general (Batanero, Godino & Roa, 2004).

Students should be aware of the power of the different types of representation of information and its adequacy according to the situations and nature of data. Bar graphs provide representation of information that students should be able to build, interpret and use in solving problems and investigations. This study focuses on Clustered and Stacked bar graphs that can be used to describe two or more categories of a variable. Visually, Clustered bar graph provides first the comparison of different categories and after the comparison of those of the axis of categories. In Stacked bar graphs each bar is divided into the number of categories, using different colours or patterns. One of the problems of this representation is that the frequency of the first category can compromise the reading of remaining categories.

Watson and Moritz (2001) argue that students present different levels of response to the representation and interpretation of information, and pictographs can be seen as a starting point for the development of the analyses of relations between variables. Also Selva, Falcão and Nunes (2005), who analysed the combination of isolated cases and bar graphs on 39 children (6- to 8-years-old) about the understanding of additive concepts, argued that isolated cases can have an important role on children's understanding of bar graphs. Concerning the representation of discrete variables, Nunes (2004) argues that the use of isolated cases emphasizes the direct connections between the signs and the units they refer to, making them similar representations of the information; tables and graphs belong to the class of symbolic representations as they refer to relations between variables. Carvalho (2008) investigated the influence of staked bar graphs, tables and isolated cases on 12- to 13-years-old children's (n=226) understanding of multiplicative concepts. Results suggest that tables and graphs enhance children's performance in tasks oriented to assess whether there is an association between two variables.

This study aims to understand the effect of different representation of information using clustered and stacked bar graph, and isolated cases on Portuguese children's mathematical reasoning, when discrete variables are involved. It addresses three questions: 1) Are there differences on children's performance when the information is represented by clustered bar graphs, stacked bar graphs and isolated cases? 2) Are there differences on children's reasoning in each of these conditions? And 3) What difficulties do children present when solving problems with information presented using these representations?

METHODS

A survey by questionnaire is being conducted with 6th graders (n=120) from public Elementary Schools, from Braga and Porto. The tasks are adapted from the study of Carvalho (2008). The children were randomly assigned to work in one of the three groups: *Clustered Bar Graph* - solved the problems using only clustered bar graph; *Stacked Bar Graph* - solved the problems presented only using stacked bar graph; and *Isolated Cases* - solved the problems with the information presented by isolated cases. Each group solved 5 problems to interpret information; the problems were controlled for across the groups. Data collection is still being taken.

RESULTS

Results have been suggesting differences on students' performance and understanding of information according to the type of representation. Educational implications of these findings will be discussed.

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