

Reasons for the Selection of Information-Processing Framework and the Philosophy of Mind as a General Account for an Error Analysis and Explanation on Mathematics

Authors : Michael Lousis

Abstract : This research study is concerned with learner's errors on Arithmetic and Algebra. The data resulted from a broader international comparative research program called Kassel Project. However, its conceptualisation differed from and contrasted with that of the main program, which was mostly based on socio-demographic data. The way in which the research study was conducted, was not dependent on the researcher's discretion, but was absolutely dictated by the nature of the problem under investigation. This is because the phenomenon of learners' mathematical errors is due neither to the intentions of learners nor to institutional processes, rules and norms, nor to the educators' intentions and goals; but rather to the way certain information is presented to learners and how their cognitive apparatus processes this information. Several approaches for the study of learners' errors have been developed from the beginning of the 20th century, encompassing different belief systems. These approaches were based on the behaviourist theory, on the Piagetian-constructivist research framework, the perspective that followed the philosophy of science and the information-processing paradigm. The researcher of the present study was forced to disclose the learners' course of thinking that led them in specific observable actions with the result of showing particular errors in specific problems, rather than analysing scripts with the students' thoughts presented in a written form. This, in turn, entailed that the choice of methods would have to be appropriate and conducive to seeing and realising the learners' errors from the perspective of the participants in the investigation. This particular fact determined important decisions to be made concerning the selection of an appropriate framework for analysing the mathematical errors and giving explanations. Thus the rejection of the belief systems concerning behaviourism, the Piagetian-constructivist, and philosophy of science perspectives took place, and the information-processing paradigm in conjunction with the philosophy of mind were adopted as a general account for the elaboration of data. This paper explains why these decisions were appropriate and beneficial for conducting the present study and for the establishment of the ensued thesis. Additionally, the reasons for the adoption of the information-processing paradigm in conjunction with the philosophy of mind give sound and legitimate bases for the development of future studies concerning mathematical error analysis are explained.

Keywords : advantages-disadvantages of theoretical prospects, behavioral prospect, critical evaluation of theoretical prospects, error analysis, information-processing paradigm, opting for the appropriate approach, philosophy of science prospect, Piagetian-constructivist research frameworks, review of research in mathematical errors

Conference Title : ICMSE 2017 : International Conference on Mathematics and Science Education

Conference Location : Madrid, Spain

Conference Dates : March 26-27, 2017