

Researching students' mathematical reasoning in bilingual context of Pakistan

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Abstract

In Pakistan, according to National Policy, 2009, public schools are expected to teach, and many private schools are already teaching, Mathematics in English to the students of Class 4 and above. However, students' home language is usually either Urdu, which is the national language, or other regional languages.

In Pakistan, teaching of different mathematics curricula ends up achieving different learning outcomes. Some curricula focus on developing students' skills in carrying out routines computation whereas the focus of other curricula is developing students' mathematical reasoning. In order to compare mathematical reasoning of different groups of Year-11 students, while they were solving novel problems, I used thinking aloud protocol in a clinical interview setting. Students were grouped on the basis of the curricula which they had studied in their earlier grades. The focus of this research was to study the impact of the curricula on students' reasoning. During the interviews, students in the beginning preferred to use English in front of an outsider-researcher as it was the official language of instruction in their schools. However, as I developed a rapport with the students many of them began code switching between English and Urdu, which was the common language between us.

Comparison of data sets reveals that the students' reasoning was, to a great extent, linked with their understanding of when and how code switching between English and Urdu would be appropriate. The students, when did code switching, generated qualitatively different reasoning from the reasoning generated when they only used English. It is also evident from the data that bilingual context provides students with opportunities to mediate with epistemological and cognitive barriers which students usually encounter in learning mathematics. The students who did code switching in a way that it became one hybridize language got benefited the most.

Using sociocultural perspectives on interconnection between reasoning and speech and thinking as self-communication, this paper presents anecdotes of conceptual change with the change of language and supports the argument that thought and language cannot be separated. The languages carry with them culture-specific representations, metaphors and tools which people usually find hard to transfer in other languages and are usually lost when students completely swap from one language to another language. However, those who mingle different languages as it becomes one hybridize language are usually able to get benefits of the reservoirs of different languages. However, it creates a dilemma for researchers to have to convert expressions of local languages in an academic language.

The arguments put in this paper can make one sceptic of many of the researches, which have been carried out with non-English speaking people and communities and reported in English, as they apparently tell the half-truth about mathematical reasoning and understanding within a specific linguistic background. This paper set forth a need for a methodology which can capture language -specific representations and practices of mathematics and bring them in the domain of international research literature.