

Exploring Students' and teachers' knowledge of mathematical modeling in linear equations

Luckson Muganyizi Kaino

Josiah Kibira University College
Tumaini University, Tanzania
Email: muganyizikaino@gmail.com

The ability of both students and teachers in identifying mathematical modelling aspects involving the system of linear equations with two variables was evaluated. Students were required to give the solution of a given ill-conditioned linear system, state the matrix of the system, and determine the determinant of the matrix and their views about the solution they obtained. The same problem was given to teachers to state the methods of solution, provide the solution and their views on solution of such problems in practical situations. The sample consisted of form four students from two schools in Tanzania and their mathematics teachers. The form four students were considered because it was assumed at this level, where they were expected to write their final examinations, students must have grasped enough knowledge of linear equations and their applications. Linear equations in two variables is one of the compulsory topics in the Tanzanian school syllabus.

The findings of the study showed that while teachers had knowledge of different methods to solve the system, they lacked an understanding of identifying ill-conditioned systems. Similarly, students had knowledge of the methods to solve the equation system but failed to explain the nature of the solutions they obtained. It was clear that the few students who had knowledge of singularity of the system did not get this knowledge from classroom teaching and most likely they acquired it through their own initiatives from other sources.

The lack of knowledge by the teachers to understand the nature of the given system indicated that teachers concentrated more on applying methods to solve the problem than investigating the nature of the problem itself. It also gave some clue on teaching approaches by teachers: teaching without an application approach. As many practical problems involve linear systems, it was clear that teachers lacked content knowledge to tackle such systems of linear equations. Lack of such knowledge could not be associated with the teachers' qualifications because the teachers involved in the study were holders of diplomas and degrees qualified to teach at this school level. There could be reasons this research did not find out that could lead to such a situation. One, these findings could reflect the nature of training at college level where concentration on the methods of solution than application could take precedence. Two, the pedagogical component in training could be weak because a competent teacher should have been able to identify the characteristics of the system and approaches to teach students how to solve such a problem.

