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Mathematical Model for Violent Phenomena In The Educational Institutions

Noufe H. Aljahdaly

King Abdulaziz University, Rabigh, Saudi Arabia

Abstract

The phenomena of violence is increasing problem in all educational institutes in the world. It significantly affects the students' academic future and their coexistence in the school. In this paper, we introduced a simple mathematical model that describes the effect of violence in the educational institutes as follows:

V'(t)=S-B U+C UV

U'(t)=A U(t)V(t) -D U(t)

where V denotes the number of students in the institute and U denotes the students who practice violence on other students. S is the rate of the number of new students in the school every month. B is the rate of number of V who moving out of the school for any reason other than the violence and C is the rate of number of V who moving out of the school for violence. D is the rate of number U who moving out of the school for any reason. A is rate of the number of violent behaviors in the institute by students.

Mathematical speaking, the presented mathematical model is a system of ordinary differential equations. In addition, the equilibrium points were obtained in order to study the stability of the system solutions, and the reproduction number (R_0) was realized. As a results, we found that the violence in the educational institutes increases if $R_0>1$ which means the violence increases by increasing the rate of the number of violent behavior or the rate number of new students in the institute, while the violence decreases by increasing the number of graduated students or decreeing the rate of students who practice the violence on others. The numerical solutions for the obtained system was represented with its discussion.

Keywords: Education, Numerical solution, ordinary differential equations, stability, violence