



**RESEARCH ARTICLE**

# **Automation of Mathematics Teaching — Demonstration by Methods of Completing the Square in Solving a Quadratic Equation**

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*Abstract—There were generally some steps used in traditional mathematics teaching, including writing down the origin of each topic or idea on the blackboard (maybe some topics lack of introducing the origins for simplicity), explanation of the theorems or properties, and proof, demonstration or practicing of some examples in solving steps, and corresponding homework assigned to students. Owing to the more progress in computer and network techniques than before, students learn by using these skills in many ways now, and get more help or assistance from the aided learning ways, for example, mathematics software wxMaxima helps to draw the graphs of functions and validate the computed results, and sometimes these modern technologies or facilities help students make up the absent classes by teaching files (audio-and-video or image files).*

*This study plans to get a thorough and automatic way in learning mathematics by using the free and powerful software wxMaxima as a basis. The authors try to program the series of demonstration steps into codes in wxMaxima, and then integrate these steps into a final mathematical class for specific topic teaching use. First by use of a multimedia interface to introduce the source or origin of the topic to the beginner (maybe more interesting and attracting than the dull and pure texts statements), and then the full explanation of the theorems and inference of their properties (stress on the generality or universality on the theorems), examples and practicing and special instances occurring in this topic. Finally, assigning the homework for students to really interact with the software to solve their problems encountered in this learning stage, students can key in the same kind of problems to get the solving processes in a series of demonstration in wxMaxima and to contrast with the results of their self-practice.*

*Keywords—Symbolic algebraic system; Method of completing the square; Quadratic equation; Automatic demonstration*

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