Application of Visual Basic to Simulate Secondary School Mathematics

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ABSTRACT: This paper investigates the application of Visual Basic Computer Programming Language to simulate some secondary school Mathematics which is computational by nature. The significance of Visual Basic as a Programming Language and the headache faced when solving secondary schoolMathematics analytically, led to the design and implementation of this system.The structure of examination in Ghana more especially, the objective test organized by West African Examination Council (WAEC) is mostly computational. Therefore, students need programming skills to be able to compute for solutions faster.

KEY WORDS:Quadratic Equations, Application,Simulate, Visual Basic, Geometry, Secondary School Mathematics.

I.   INTRODUCTION

Problems that arise within the educational system are very complex, including the problems associated with mathematics. Mathematics is the basic knowledge needed by students to extend their learning to a higher level. Even mathematics is required in our daily lives, regardless of educational background and social life**.**Error in solving mathematical problems often occurs either in writing, or orally. Sometimes students know how to answer the question stated, but careless in computation [6].

Latest technologies developed from landmark inventions has made our life quite easy, especially computers remains the pioneer one in this regard. Advancement in computing architecture, applications and programming languages helped in solving ample numerical problems [1]. The frequent use of computers for teaching of mathematics demands development of newsoftware that may be embedded in the local context. Developing teaching software is a complex process, as it requires the basic philosophy, content selection, appropriate delivery, programming and the user-interface that is user friendly [5].Computer programming is not for everyone, but those who are attracted to it immensely enjoy it [8].Mathematical programming motivates students towards learning since it involved practical activities. According to [5], Mathematics software improves students learning achievements in mathematics at elementary level across different achievement levels.

Technology is becoming an increasingly important factor in everyday life and computers are available virtually everywhere particularly in developed countries [2].Application of rigorous analytical techniques is time consuming and limited in case of solving complex mathematical problems. Moreover, computation can be applied for much complex problems with the present efficiency of hardware's and software's[1].

Therefore, appending educational teaching and learning tools for the routine academic work will help the students to become more creative and learn the mathematical skills in a better way and gain better knowledge[2].

The enhanced computation speed enabled the students to explore more complex and difficult problems for their learning. This will accelerate their positive and creative thinking, explore more conditional or relational examples, sequence actions and allow them to experiment with more ideas
However, teacher's dependency and believes in traditional teaching methodologies and inability to concentrate on mathematics rather than exploring the computer functionalities has become a bar for the students to learn with the help of the computers in its complete potential[4].

II.   SECONDARY SCHOOL MATHEMATICS

Most topics in the secondary school mathematic curriculum are computational in nature. Example of few of such topics include: Quadratic equations, Pythagoras theorem, Trigonometry, Statistic, Mensuration, Simple Interest, Indices and logarithms.

Pythagoras theorem and trigonometry are very key areas in mathematics which are mostly applied together with geometry in Engineering to solve real problem.

Relationships, patterns for quantities, space and time has been meticulously explored applying mathematical approaches whereas statistics has been useful in testing the authenticity of the relationships and patterns generated. Although mathematics and statistics are related yet they have differences in approaches adopted for solving problems. Both the disciplines are vital in enabling students with proper procedures of investigations, exploration of various issues and interpreting the observed results to make some sense out of the generated data. Statistics, at large allows one to design a study appropriately, investigating a particular problem in a logical manner, find the relationships or patterns in a dataset and also solving a real time problem.

Quadratic equations are frequently used for modeling various problems and finding solutions for such real life issues. At school level mathematics, applying quadratic equations is considered as one of the most complex concept[3].

III.   CODING LANGUAGE

The system was developed using Visual basic 6.0 because of its graphical user (GUI) suitable for Mathematical programming.A large number of programming languages uses text mode features and do not consider any graphical user interface or embeds such features in it. VBA or visual basic is one such language which incorporates graphical features. Application of graphics dependent language aids in quick development of windows based programs[1].Visual basic 6.0 is like the other programming language it creates visualized interface between the user[9,10].
VB based programs displays Windows style screen or forms with the facility of embedded boxes for typing or editing information. This GUI based language is also having the facility of clickable control buttons for execution of particular action.

IV.   VISUAL BASIC GRAPHICAL USER INTERFACE

Students can have the feel of real-time application development and programming through the use of Visual Basic in windows operating system. In addition, Visual Basic is having extension modules for Web Development along with compatibility with different other programs and languages[8].The idea behind the Visual Basic system is that the programmer creates screens (Forms) that comprise the computer program. A simple program might contain only one form or multiple forms that appear and disappear as the program runs. A component of the tool box is control which is extensively used for application purposes for each form. The control is referred as an object which represents different items which may text toread, a graphic image to view, a pull-down menu to use, a radio button or a checkbox, or may be a command button to click.

Checkbox, or command button to click. For example, the Label displays text. The Textboxallows users to input information by typing. The Buttoncontrol might be programmed to make an object appear or disappear or a mathematical formula to be calculated when the button is clicked. Visual Basic programming is known as object-oriented programmingbecause each object can be set to perform a variety of functions.Figure1 below highlights the graphical user interface for Visual Basic 6.0
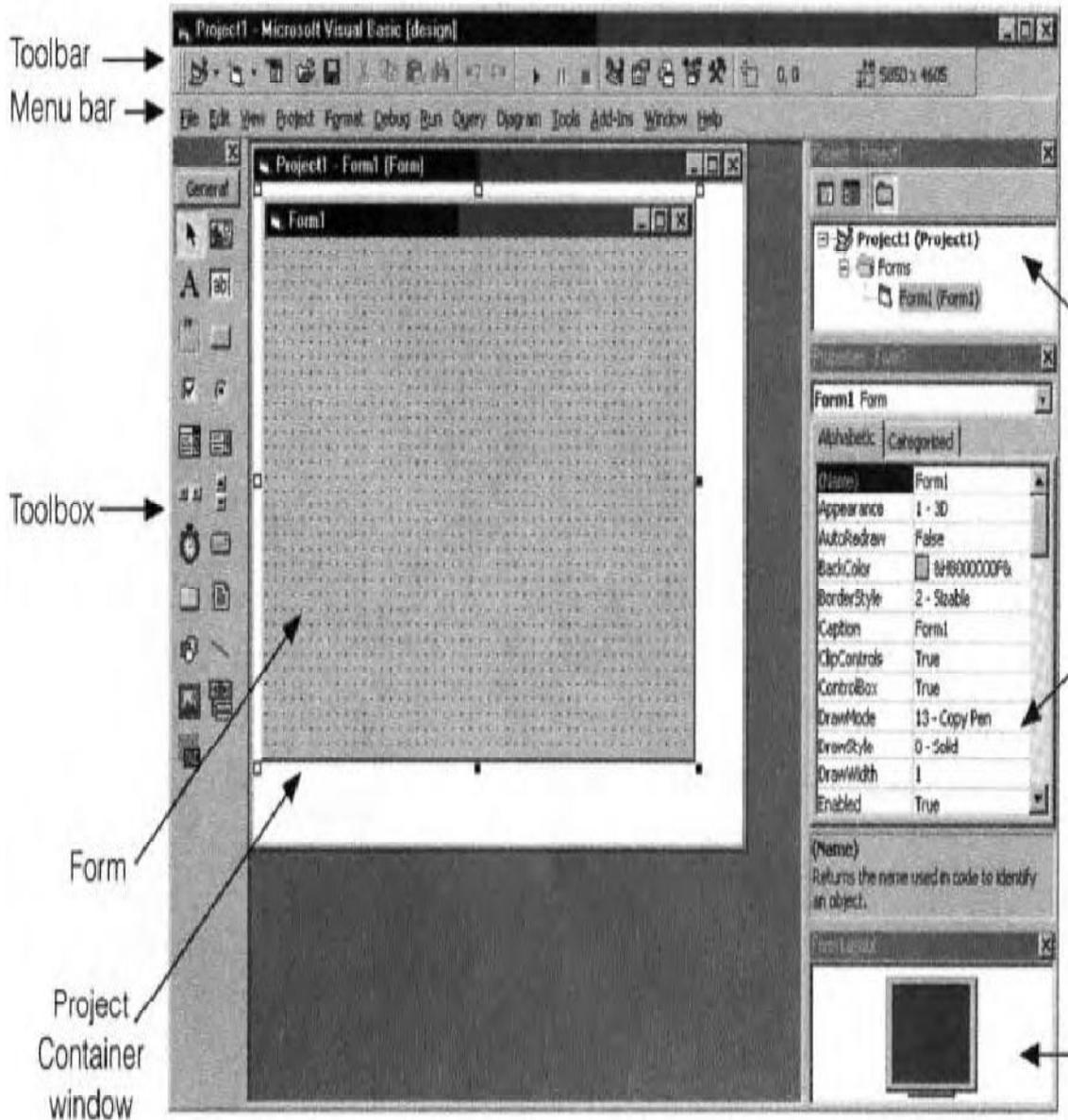
Figure1:Visual Basic 6 (GUI)

The Menu barof the Visual Basic screen displays the commands you use to work with Visual Basic. Some of the menus, like File, Edit, View, and Window, are common to most Windows applications. Others, such as Project, Format, and Debug, provide commands specificto programming in Visual Basic. The Toolbaris a collection of icons that carry out standard operations when clicked. To reveal the function of a Toolbar icon, position the mouse pointer over the icon for a few seconds. Most information displayed by the program appears on the form. The information usually is displayed in controls that have been placed on the form. The Form Layout window provide us the option to pop up the form in a particular position of the screen during run time comparative to the use of entire screen [7].

V.   **SOFTWARE SCREENS**

The graphical user interfaces for the system are shown below.

Figure2:Login

Students are to enter the correct username and password and click the ok button to have access to the main form. Message box will popup for wrong username of password and the set focus method will be initialized.

Figure 3: Trigonometry

The trigonometry ratios are computed after entering the values for angle and the sides of a right-angle triangle.

Figure 4:Mean and Standard Deviation

The start sequence button is to clicked first and values are to be entered in textbox named "enter a value" and the accept button clicked once. The sequence continues until the final valued is entered before clicking the compute button. The mean and standard deviation will be shown in the textboxes provided.

Figure 5: Simultaneous Equations

Students are to enter the coefficients of simultaneous equations and click the compute button.

Figure 6: Logarithms

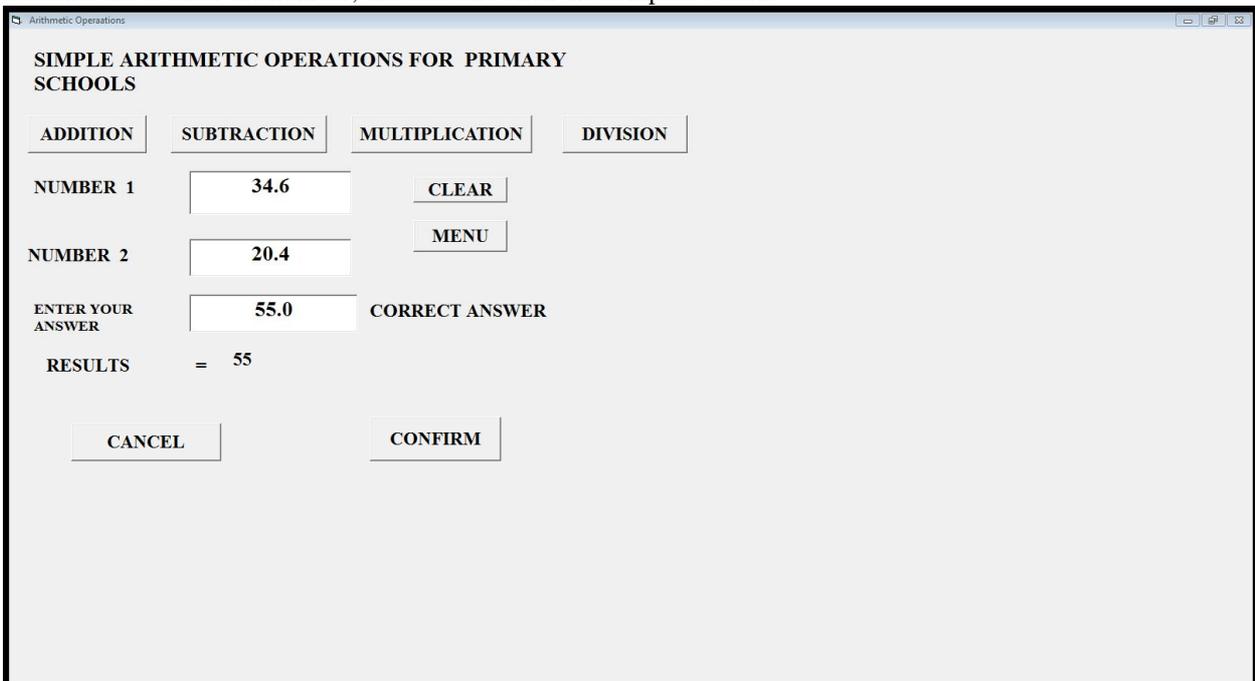Students are to enter the number, the base and click the compute button.

Figure 7:Basic Arithmetic

For this arithmetic operation, students are to enter the values of number 1 and 2, for any given operation, then enter his or her answer in the textbox provided before clicking on the confirm button.
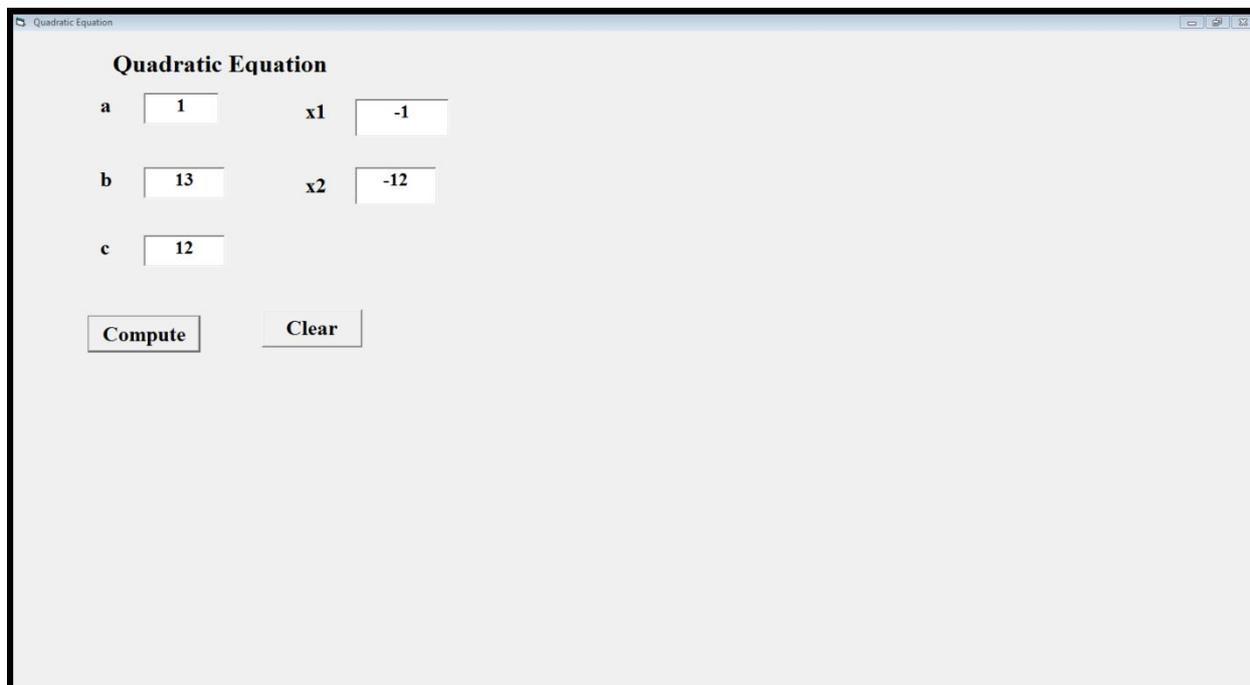
Figure 8:Quadratic Equation

In solving quadratic equation, students have to enter the constants for a, b and c terms and click the compute button.

VI.   CONCLUSION

Visual Basic as a programming language is mostly applied to mathematics to solve real life problems. Mathematical programming plays a prominent role in applicationsand is an area in which two separate disciplines have arisen. First, there is the algorithm and mathematical properties discipline. People working in this area are interested in the theoretical and computational properties of mathematical programming solution techniques. Computer program associated forms are frequently used by several simulation models to execute the logical operations in a sequential manner which is scheduled by the program. Hence, secondary school students can nowapply their analytical and algebraic techniques alongside with computation to solve mathematical problems.

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