

Laying The Foundation for Software Development Industry in Zimbabwe

^ICaroline Ruvinga, ^{II}Lawrence Ruvinga, ^{III}Munyaradzi Zhou,

^{IV}Samuel Musungwini, ^VTinashe Gwendolyn Zhou

^{I,II,III,IV}Dept. of Computer Science and Information Systems, Midlands State University Private Bag 9055
Gweru, Zimbabwe

E-mail : ^Vtagwic@msu.ac.zw

Abstract

This paper analyses the impact of the Zimbabwe education curriculum on the development of home grown software solutions. Interviews and questionnaires were employed as information gathering techniques, to obtain both qualitative and quantitative data. This study reveals that, to a greater extent early exposure to computing studies produces high quality software development programmers. The study further reveals that most computing professionals only learn programming basics at advanced stages of career development. This adversely affects the software development industry in Zimbabwe as it runs short of experts in the field. The paper recommends early introduction to programming concepts in primary and secondary education, which will go a long way in career development and ultimately create opportunities in the software development industry and benefit the Zimbabwe economy at large.

Keywords

Software development, education curriculum, computer programming, experts, technology

I. Introduction

Software is arguably the world's most important industry since it has made possible many new businesses and is responsible for increased efficiencies in most traditional businesses [1]. Computer programmers are directly involved in the development of software packages. Computer programming is considered an important competence for the development of higher-order thinking in addition to algorithmic problem solving skills [2]. However, reports from teachers of programming and results from some empirical studies now suggest that the teaching of programming has created significant difficulties for high school and university students. This has failed to catalyze the development of higher order thinking skills [3]. Development of cognitive ability is a valid predictor of performance in the knowledge domain of computer programming [4]. A sound background in problem solving skills is an important factor if one is to take programming as a career. Papastergiou, [5] found that the gaming approach was both more effective in promoting students' knowledge of computer memory concepts and more motivational than the non-gaming approach. In addition to playing computer games, surfing the net, making a multimedia show and doing other activities using off-the-shelf application packages may be a more educational task that parents may do together with their children [6].

A learning intervention (cMinds) that deploys game-based visual programming towards building analytical, computational and critical thinking skills in primary education [7] has been adopted for classroom use in some countries to enable early development of computer programming concepts. The proposed learning method uses graphical programming, hands on graphical experimentation, solution synthesis and visualization of programming results, to assist children to gain a better understanding of programming concepts and logical operations such as conditionals, loops or switches. Morelli et al. [8] allude that engaging students in building free open source software (FOSS) that serves society is a positive step towards strengthening undergraduate computing education. The software industry in Zimbabwe has remained dormant over the years despite the increasing number of graduates in the field of computer science and information systems. There is an

acute shortage of skilled personnel in the software development industry [1]. A limited number of graduates venture into the field of bringing out software solutions. One of the more perplexing conundrums and an area where the answers should be clearer is the challenge of finding enough highly skilled technologists [9]. This is despite the overwhelming number of students graduating each year. A dynamic technology landscape requires programmers and technologists to constantly update their technical and domain skills [10]. Development of career management skills needs to be included in education programs from primary school through to adult career transition programs [11]. In programming courses, teaching students who have varied levels of knowledge, skills and the requisite competencies to perform in real-world software development teams is indeed difficult [12]. Bearing in mind that youths are our future programming experts, youth need to acquire a good foundational set of social and academic skills [13]. Effective mathematics education for young children (approximately ages 3 to 5 years) seems to hold great promise for improving later achievement [14]. There is need therefore to prepare future software developers through problem solving and mathematical skills at early stages in the education cycle.

This paper highlights the important stages and components in introducing computer programming and related skills at early stages in the education system of Zimbabwe for development of future software experts. To the best of our knowledge, research on the impact of the Zimbabwean education curriculum on the development of home-grown software solutions has not been reported.

II. Method

A random sample of two programmers from four software development companies (A, B, C and D) were interviewed, to get an in-depth understanding on the computer programmers view concerning early introduction of programming concepts. Five programmers from each of the software development companies were given a questionnaire. A total of twenty questionnaires were successfully completed for data analysis.