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Nurturing Curiosity Learning Through STEM in Physical Education in Zimbabwe

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ABSTRACT

Science, technology, engineering, and mathematics (STEM) develop deep mathematical and scientific underpinnings students need in the 21st-century workforce. The future of many countries lies in lifetime engagement with STEM education. STEM is an expressive curriculum pertinent to learners and develops reasoning, investigative, and creative skills. Modern lives that affect the economy are transformed through innovations. Economic ambitions can be driven through supporting technological creativity solutions for economic competitiveness. Children see STEM as a tool that helps them understand their world and critically think about intentionally incorporating different subjects across existing curriculum. This paper looks at the possibility of nurturing curiosity in physical education through STEM in Zimbabwe. The paper uses library methodology approach. The article proposes appropriate instruction for underprepared workforce through workshops and staff development. Proficiency thinking, problem-solving, and engineering skills exposure are also advocated for.

KEYWORDS

Curiosity, Economic Competitiveness, Nurturing, Physical Education, STEM, Technological

INTRODUCTION

Children are born with an incredible capacity to learn and should be exposed to activities that develop critical and problem-solving skills. Development of science and related skills begins in the early ears and the prowess among children could be nurtured through inquiry-based learning (Brandwein, 1995). Science, Technology, Engineering and Mathematics (STEM) has been at the heart of a technological revolution that is aimed at transforming the education system in Zimbabwe and elsewhere (International Technology and Engineering Education Association, 2011; Kelly, 2012; Miaoulis, 2011; White, 2014). STEM is viewed as a fundamental part of early childhood education that nurtures and develops skills and activities at an early stage ensuring that learners maximize their capacity (Brown, Brown, Reardon and Merrill, 2011; International Technology and Engineering Education Association, 2011). This paper focuses on possibilities of nurturing curiosity learning through STEM in Physical Education in Zimbabwe.

Background

Stem interest has significantly increased in recent years (Campbell, Speldewinde, Howitt & McDonald, 2018) and future prosperity is dependent on life -time engagement with STEM education and future occupations will require STEM related skills and experiences (Chubb, 2013). In Zimbabwe, STEM is rapidly becoming an educational initiative from Early Childhood Education to tertiary level

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because of its integrative approach. Zimbabwe's contribution in a new global economy is based on an Education system with STEM bias that aims to effectively empower citizens for the 21st century. Research has demonstrated that from infancy, children develop theories about the world around them just like scientists do (Gopnik, 2012; Gopnik & Wellman, 2012). Educating in learning institutions is a responsibility of the Education system and this is done through engaging learners with renewed focus on STEM so that they can thrive in a knowledge-based economy and society (Ministry of Primary and Secondary Education Curriculum Review Process Narrative Report, 2014 - 2015). A research carried out by Wagner (2012) discloses that STEM education empowers learners with the most significant essential skills as a way of coming up with productive citizen such skills include critical thinking and problem-solving, collaboration and leading with influence, agility and adaptability, taking initiative and being enterprising, effective written and communication skills as well as capability to access and analyse information (Miaoulis, 2011). Thus, this educational initiative basically provides all learners with skills that would ultimately make them more marketable in the field of work. A quality STEM program focuses on helping learners gain the skills required to succeed in today's challenging world (Whitehouse.gov, 2011; Sanders, 2009). The general understanding is that learners who participate in STEM Education from primary school level would be at an advantage especially if they fail to pursue post-secondary education or would have an even greater advantage if they happen to attend college, particularly in a STEM field.

At junior school level, emphasis is on the development of STEM disciplines which deal with enquiry based, project-based, hands-on learning of vital elements of learning experiences, from different subjects (in natural engaging ways) (Curriculum Framework for Primary and Secondary Education in Zimbabwe 2015 – 2022). Practical learning areas, such as Design and technology, Information and Communication Technology (ICT), Art and Theatre Arts are included and they further broaden the Zimbabwean Educational base at all levels (Ministry of Primary and Secondary Education Curriculum Review Process Narrative Report, 2014 - 2015). Through STEM learners investigate and attempt to answer an array of questions leading to own curiosity developing towards STEM enquiry.

It is important that seeds of STEM must be planted early through exposure of manipulatives and understanding of spatial abilities and use of technology. Thus, there is need to clarify the meaning of STEM education and how it can be transferred into curriculum across all stages of education making it useful to meaningfully embed STEM related content into teaching and learning (Hobbs, Cripps Clark & Plant, 2017; Marginson, Tytler, Freeman & Roberts, 2013). However, STEM may not be viewed as a separate subject for it is the application of the process and skills learned in these subjects.

Early years is the perfect time to engage in stem (Bagiati & Evangelou 2011). It is easier to understand STEM concepts in the younger years (Becker & Park, 2011). This is because learners make connections to real world contexts and raised interests guide investigations and learning in stem activities (Estapa & Tank, 2017; Hathcock et al., 2015). Early exposure helps young learners to outperform adults (Gopnik et al., 2017). STEM in early childhood education is said to be about rich material environments that children can freely explore within given guidelines (van Keulen, 2018). Importantly, STEM is essentially about questions that can be explored scientifically or about technological problems that can be solved through engineering and design (van Keulen, 2018).

STEM Disciplines

Baybee (2010) defines STEM as an intentional integration of STEM and their associated practices to create a student-centred learning environment in which students investigate and engineer solutions to problems. Interrelated disciplines of STEM are reliant on each other and not looked at in isolation and learning them will help learners gain their deeper understanding as well as help learners to use them more naturally (Martin-Paez et al., 2019; Honey, 2014; Baybee, 2010). STEM education does not always involve all four disciplines and this knowledge can shape integration that may vary according to learner interest (Vasquez, 2014). Engage in active meaningful learning challenges (Siekmann, 2016; Sanders, 2012). Integrated approach means linking two or more disciplines (Sanders, 2008).