

# TOWARDS A COHERENT FRAMEWORK FOR INFUSING 21<sup>ST</sup> CENTURY SKILLS IN THE SCHOOL CURRICULUM

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## Abstract

The 21<sup>st</sup> century presented challenges and opportunities that demand certain skill set, termed 21<sup>st</sup> century skills. Technology and globalization have transformed how people perform tasks, relate to each other and their environment. Societies previously independent and industry-driven, have been significantly formatted to interdependent digitalized knowledge societies. As a result, education systems the world over have to alter their pedagogical practices in order to aptly produce employable and productive graduates. While a lot has been done to define the 21<sup>st</sup> century skills and expound their relevance, little has been done to guide classroom practitioners on how to infuse these skills in curriculum and instruction. This paper, using a desktop based critical review of six 21<sup>st</sup> century skills frameworks, sought to provide a coherent integrative 21<sup>st</sup> century skills framework for infusion of these skills in the school curriculum in an attempt to create a portrait of the learner depictive of their embodiment. The paper recommends a pedagogical practice wherein the learners complete project-based, cross-disciplinary tasks that encourage innovation and cross cultural collaboration.

**Keywords:** 21<sup>st</sup> Century skills, Curriculum, Civic literacy, Critical review, Financial literacy.

## **Introduction**

It is a widely-held belief shared by educational researchers, practitioners, policy makers, politicians and employers in public and private sectors that the current century demands a different set of skills for efficient and effective work productivity as well as good citizenship. Schools are compelled to reform in response to the socio-economic needs of students and society for them to remain relevant in this era where unemployment rates are at the highest the world over. The definition of this skill set, so termed the '21<sup>st</sup> century skills', is pretty illusive to the extent that some critics dismiss its advocacy as mere chronocentrism. In spite of more than one and a half decade into the 21<sup>st</sup> century the whole idea of 21<sup>st</sup> century skills remain blurred to majority of practitioners and scarcely understood by those supposed implementers.

## **Background of the Study**

Despite the apparent sound national policy objectives and relatively favourable operational conditions, schools in Botswana are charged with failure to prepare students for the 21<sup>st</sup> century. The gradually persistent rise in unemployment rate among school leavers and college graduates are a sure evidence of skills mismatch (NDP10, Republic of Botswana, 2010, 2013). Though there is a possibility that the unemployment could be owing to a stagnant economy with no job opportunities, it is equally an irrefutable fact to an indeterminate extent in the absence of further research, that it is attributable to skills mismatch. Skills mismatch implies lack of relevant skills and in this case, 21<sup>st</sup> century skills.

The Sunday Standard dated 20 October 2014 reported that millions of pula are going to waste as students who study commerce and accounting at both junior and senior secondary schools leave school completely unprepared for the business world. This problem is not uniquely peculiar to business subjects but typical of all school leavers. The 2015 Global Entrepreneurship Monitor Report asserted that experts felt that education and training were 'not good enough' to support entrepreneurship development in Botswana.

There is a dearth of 21<sup>st</sup> century skills that are pertinent for lifelong learning and global competitiveness in the labour market. Though the problem is fully manifest in the final output or graduates from training institutions, it certainly is resident in all levels of the education system. If those skills were rightly infused at school level they definitely would not be lacking in the graduates. There is no clear cut reason as to why such a mismatch exists. This incited this study to explore 21<sup>st</sup> century skills frameworks with a view to propose a relevant and

responsive framework for infusing 21<sup>st</sup> century skills in the school curriculum to address the skills mismatch.

Give the purpose of this study, being to explore 21<sup>st</sup> century skills frameworks with a view to propose a relevant and responsive framework for infusing 21<sup>st</sup> century skills in the school curriculum to address the skills mismatch, the following research question guided the study.

### **Research questions**

1. To what extent do existing 21<sup>st</sup> century skills frameworks reflect the literacies demanded by the world of work during the 21<sup>st</sup> century, and into the 4th Industrial revolution era?
2. How can these frameworks be adopted to infuse 21<sup>st</sup> century skills into the school curriculum at any level?

### **Justification of Study**

There have been fundamental changes in the economy, jobs and businesses in the past decades globally. The manufacturing – based industrial economy has shifted to a service economy driven by information, knowledge and innovation (Karmarkar & Apte, 2007). The 2011 World Bank Report Number 59916-BW showed that in Botswana two thirds of the enterprises are in commercial services. Economic success is increasingly based on the effective utilization of intangible assets such as knowledge, skills and innovative potential as the key resource for competitive advantage (Economic and Social Research Council, 2005).

Amid such progressive trends, a complex challenge presents itself, graduates exiting university in Botswana lack the 21<sup>st</sup> century skills that make them employable. Studies done at secondary schools level indicated that teaching in Botswana is characterized by teacher-centeredness and that tend to explain the poor student performance of students (Sithole, 2010). Lack of 21<sup>st</sup> century skills in students however, may emanate from a host of factors; including a curriculum devoid of such skills, poor school facilities and infrastructure, teacher quality and incompatible teaching and learning practices.

This study was motivated by the fact that no study has been conducted to establish what teaching and learning methods teachers in Botswana use to infuse 21<sup>st</sup> century skills. It sought to develop a framework for infusing 21<sup>st</sup> century skills in the school curriculum at any level.

The study explored different 21<sup>st</sup> century skills framework to inform the development of a relevant framework for infusing these skills in the school curriculum. The study will benefit teachers at all levels by proposing a framework that they can adopt to prepare students for the 21<sup>st</sup> century and the 4<sup>th</sup> Industrial revolution.

### **Research Methodology**

This paper adopted a critical desktop review of the literature on 21<sup>st</sup> century skills and a synopsis of the differing frameworks that have been offered. Snyder (2019) submits that building research on and relating it to existing knowledge is the building block of all academic research activities. She further asserts that a literature review is an excellent way of synthesizing research findings to show evidence on a meta-level and to uncover areas in which more research is needed, which is a critical component of creating theoretical frameworks and building conceptual models (p. 333).

The literature review covered both technical reports and scholarly journal articles downloaded with the key search term; 21st century skills framework. The results of the search turned up 139000 scholarly articles and 739000 technical reports. Given the number of both scholarly articles and technical reports on 21st century skills frameworks, an inclusion / exclusion criteria was used to determine which source to use in the study and which ones to exclude. The following inclusion criteria was used: the articles or technical reports had to be about school curricula. The articles or technical reports had to be original or based on synthesis of literature. The exclusion criteria was based on that the abstracts or introduction had to be clear enough to provide the needed information because the authors were clear about the information they required for the synthesis of 21st century skills as presented through frameworks and /or models. Not all sources were read in full. Some sources required full reading but then did not provide any different models from those already found in other sources.

### **Literature Review**

The 21st century has witnessed a paradigm shift from the previous century's resource-driven economies to increasing emphasis on and development of knowledge based societies fuelled by globalization. Globalization dictates that the nations that succeed will be those that bring out the best in people and their potential. There has been an exponential growth in technical knowledge in specialized fields. The way we learn, perform our work and meaning of our social interactions have been greatly altered by information and communication

technology. Today's global economy hinges on information sharing, shared decision-making, collaboration and innovation, which befit it to be termed knowledge driven economy.

In 2008, the then British Prime Minister Gordon Brown announced that the challenge for this century is a 'global skills race' wherein education, knowledge and skills assume ever-greater importance (Brown, Lauder & Ashton, 2008). This shift demands a change from basic skill competencies and knowledge expectations of the past era to new standards for what students should be able to do. Pacific Policy Research Center (2010) therefore, posits that to meet this challenge school curriculum must be transformed in ways that will enable students to acquire the creative thinking, flexible problem-solving, collaboration and innovation skills they will need to be successful in work and life.

Pacific Policy Research Center (2010) noted that information and communication technology is transforming how we learn, the nature of how work is conducted and the meaning of social relationships. Its impact is in such a way that the digital era landscape dictates that educational success largely depends on the ability to communicate, share and use information to solve complex problems, on the ability to adapt and innovate in response to new demands and ever-changing circumstances and on ability to command and expand the power of technology to create new knowledge. Student success in work and life, therefore, demands a transformation in the school curriculum to accommodate ways that will enable students to acquire creative thinking, flexible problem solving, collaboration and innovative skills.

### **Research analysis and findings**

A desktop based critical review of 21st century skills was conducted, and their related frameworks are summarized and presented in table 1. Notwithstanding similarity of skills indicated in each framework, none was found to encompass all the pertinent skills relevant as the world moves into the 4th Industrial Revolution. The absence of a coherent integrative framework for infusing 21st century skills into the school curriculum was noted and it created a gap that needed to be addressed, hence the proposed Coherent Integrative 21st Century Skills Framework presented in figure 1.

Florida (2006) referred to the 21st century as the creative age, claiming that the economies in this era are primarily propelled by creativity. Robinson (2006) stated that creativity is as important in education as literacy and that we should treat it with the same status. Schools, and governments that empower, nurtures and enables imagination among their students and citizens will emerge the most competitive and productive globally. Advanced

economies compete by producing innovative products and services at the global technology frontier using sophisticated techniques (Porter, Ketels & Delgado, 2007). A highly skilled and creative manpower is required to fuel creativity, innovation and adaptability that are the hallmarks of competitive, high-growth and emerging industries (Ewing Marian Kaufman Foundation, 2007).

Partnership for the 21st century skills (2008) asserted that “Advanced economies, innovative industries and firms, high-growth jobs require more educated workers with the ability to respond flexibly to complex problems, communicate effectively, manage information, work in teams and produce new knowledge” (p. 6). This suggests that the best employers the world over are looking for the most competent, most creative, and most collaboratively innovative people on earth. They are hiring workers with a higher skill set, particularly expert thinking and complex communications skills. In a nutshell, the labour market demands that the school curriculum produce students possessing such 21st century skill set for it to serve this generation with relevance.

Cisco (2008) alluded to the fact that the ability of the education systems around the world to prepare all students for career opportunities and help them attain higher levels of achievement is the firmer foundation upon which the future growth and stability of our global economy can be built. As our global economy expands, the shift towards knowledge-based society becomes more pronounced and information and technology pervading all spheres of life; the need to align the school curriculum, more specially the pedagogical practices, to reflect these 21st century trends becomes even more imperative. The report however, noted that in spite of the several efforts made to improve educational standards, school systems around the world are struggling to meet the demands of the 21st century learners and employers.

Similarly, in the UK it was acknowledged that the learning environment was technology-rich and societies needed to remodel education into a lifelong learning undertaking. The European iCurriculum was adopted with focus on pedagogic approaches to teaching and learning in order to produce a digitally literate learner. Accordingly, digital literacy refers more widely to competencies required to effectively exploit the tools, practices and symbol systems made available by digital technologies. These competences, referred to a current context of rapid change, can be seen as the ability to update on your own to take advantage of future socioeconomic transformations (Organization for Economic Cooperation and Development (OECD), 2005). Many UK policy documents embraced constructivist approaches to the use of

technology for teaching and learning. However, there is strong suspicion that in reality practice may be different. Enochsson and Rizza (2009) cite Betrancourt (2007: p. 73-92), who, looking at an example from the UK project, “Harnessing technology”, “shows that the discourse of the politics concerning the implementation of ICT in schools is double: although the accent is put on national objectives concerning the use of ICT in order to support an active pedagogy, the majority of the tools support traditional transfer pedagogy and the use of ICT is limited to presentations (documents) and evaluations (quizzes).”

Cisco (2008) argues that many 21st century skills are already supported by curricula around the world; highlighting that the UK science curriculum is designed to enable students to develop skills such as teamwork, creative problem solving and ITC literacy. It is however, noted that having elements of the 21st century learning agenda in the curriculum does not necessarily mean they are widespread in the classroom. Thus, this paper gives attention to pedagogical strategies used in infusing the 21st century skills in and outside the classroom. It is pedagogy that translates theory into practice.

Cisco (2008) posits that “Education 3.0” (a reformatory system reflective of the 21st century learning) responds to socioeconomic realities and enhances learning opportunities through collaborative technologies. Presenting a global destination with a myriad of varied local paths, it could potentially provide new access to quality teaching and learning materials, expert practitioners, and global support networks, in a range of specialized domains.

The American Association of Colleges and Universities 21st century college learning framework identifies learning outcomes essential for success as knowledge of human cultures, physical and natural world, intellectual and practical skills, personal and social responsibility, integrative learning (Ananiadou & Claro, 2009). This is anchored on the assumption that our world today is greatly formatted by technology and globalization.

Gardner (2008) observed that the new millennium has dawned amid rapid advancements in science and technology, and globalization. He argued that the education system operational from the previous century was not designed to adequately respond to the needs of the fast-paced digital and global age. Premised on this necessity for change in education processes, he advanced a framework embodied in the five minds he believed learners should possess for the future.

The five minds are: the disciplined mind, the synthesizing mind, the creating mind, the respectful mind and the ethical mind. The disciplined mind is one that makes the learner a

master of at least one domain and through mastery achieves autonomy. The synthesizing mind takes information from disparate sources and domains, evaluates and reorganizes it in new ways. This is an especially necessary skill for success in this information age because of a plethora of easily accessible information that is availed which tends to overwhelm learners. The creating mind presents novel ideas, questions and seeks solutions to crucial intriguing questions, and thus, keeps ahead of computers and robots which depend on automated rule-governed logic. The respectful mind acknowledges and appreciates cultural diversity and individual differences; an indispensable skill for harmonious survival in a multicultural society. The ethical mind enables one to be compassionate, kind and considerate of the needs and interests of society above self.

The International Society for Technology in Education (International Society for Technology in Education (ISTE)) provided educational technology standards as a roadmap to effective teaching and professional growth in an increasingly technology driven world. ISTE impresses that education must adapt and provide students with skills necessary for digital age professionalism; skills built on solid technology literacy (Ananiadou & Claro, 2009). ISTE standards include; the ability to demonstrate creativity and innovation, communicate and collaborate, conduct research and use information, think critically, solve problems, make decisions, and use technology effectively and productively.

Metiri Group (2003) asserts that their enGauge 21st century framework is founded on the premises that students need new skills to survive and thrive in a rapidly changing digital world. The enGauge framework is comprised of digital age literacies, inventive thinking and high-level cognitive skills, effective communication and collaboration.

OECD (2005) posits that globalization and modernization have created a diverse and interconnected world. The OECD designed a framework to allow individuals to make sense and meet the demands of the newly challenging and complex society. The framework is a treble domain conception in which learners must acquire knowledge and skills through using tools such as language and technology interactively, interacting in heterogeneous groups and acting autonomously.

The European Parliament and Council of the European Union recommended “communication in mother tongue, learning to learn, social and civic competence, sense of initiative and entrepreneurship, and cultural awareness” as crucial skills and attitudes for success in personal fulfilment, social integration and productive employment in a digital and

globalized world (Punya & Kereluik, 2011. p. 6)

Partnership for 21st century skills developed a framework founded on the assumption that individuals now live in a technology rich environment, which brings with it an abundance of information, rapid advancements in technology, and unprecedented ability to communicate and collaborate with individuals around the world. Partnership 21 (2008) asserts that success in a highly digital and globalized world is essentially hinged on learning and innovative skills such as critical thinking, problem solving, communication and collaboration which permeates through the foundation of core content knowledge. It also claim that these skills are currently recognized as separating between students who are prepared for life and work in the 21st century and those who are not. The framework is extended to advocate for 21st century support systems for educators and students including learning environments, professional development, curriculum and instruction.

**Table 1: 21st Century Skills Frameworks**

| 21 <sup>st</sup> Century Skills | Frameworks          |             |  |              |                                |                         | Proposed |
|---------------------------------|---------------------|-------------|--|--------------|--------------------------------|-------------------------|----------|
|                                 | Metiri Group (2003) | OECD (2005) | Partnership for the 21st century skills (2008) | Cisco (2008) | (ISTE) Ananiadou & Claro, 2009 | Punya & Kereluik (2011) |          |
| Critical thinking               |                     |             |  |              | √                              |                         | √        |
| Problem solving                 |                     |             | √  | √            | √                              |                         | √        |
| Creativity                      | √                   |             | √  |              | √                              |                         | √        |
| Innovation                      | √                   |             | √  |              | √                              |                         | √        |
| Communication                   | √                   | √           | √  |              | √                              | √                       | √        |
| Collaboration                   | √                   | √           | √  | √            | √                              | √                       | √        |
| ICT literacy                    | √                   | √           |  | √            | √                              | √                       | √        |
| Civic literacy                  |                     |             |  |              |                                | √                       | √        |
| Financial literacy              |                     |             |  |              |                                |                         | √        |
| Global awareness                |                     |             |  |              |                                |                         | √        |

### Proposed coherent integrative 21<sup>st</sup> century skills framework

Figure 1 is the authors' conception of a framework for infusing the 21<sup>st</sup> century skills in the school curriculum drawn from the understanding of the discussed frameworks presented in table 1. At the heart of this integrative conceptual framework is the Portrait of a learner emanating from the discussed 21<sup>st</sup> century skills, and reflecting the literacies demanded by the world of work during the 4<sup>th</sup> Industrial revolution. The Portrait is a set of statements that translates the philosophical principles the authors embrace from the aforementioned frameworks into a tangible vision of the 21<sup>st</sup> century learner in a diverse, digital and global

knowledge economy. While the Portrait focuses specifically on the learner, the vision it articulates serves as a common foundation for curriculum and instruction.



**Figure 1:** *Coherent Integrative 21<sup>st</sup> Century Skills Framework (Source: Developed by the authors)*

### **Critical thinking and problem-solving**

In the United States, a report entitled “Are They Really Ready to Work?” based on the research conducted in 2006 by The Conference Board, Corporate Voices for Working Families, the Partnership for 21<sup>st</sup> Century Skills, and the Society for Human Resource Management concluded that the new entrants into the workforce are ill-prepared. For example, over half (58 percent) of responding employers say critical thinking and problem solving skills are “very important” for incoming high school graduates’ successful job performance, yet nearly three-

quarters of respondents (70 percent) rated recently hired high school graduates as deficient in critical thinking.

Trilling and Fadel (2009) define critical thinking as the ability to analyze, interpret, evaluate, summarize and synthesize information. In the development of critical thinking skills students also develop other skills, such as a higher level of concentration, deeper analytical abilities, and improved thought processing. Critical thinking does not only contribute to career success, but also to success in higher education. In every day work employees must employ critical thinking to better serve customers, develop better products, and continuously improve themselves within an ever-changing global economy. Critical thinking entails effective inductive and deductive reasoning, use of systems thinking, making rational judgments and decisions, and solving problems. Hence the proposed framework sees Critical thinking and Problem solving to belong together as a set of skills sharing similar characteristics. It is important that in their pedagogical practice instructors do not lose sight of the fact that in their instruction the major focus is not only for learners to acquire knowledge but to develop critical thinking skills that will enable them to create and not just acquire knowledge. So Critical thinking leads to creativity and innovation.

### **Creativity and innovation**

In a digitalized world fast-moving towards knowledge-based society, creativity and innovation are key drivers in the global economy. Pink (2006) predicted that the future belongs to a very different kind of person with a very different kind of mind – creators and empathizers, pattern recognizers and meaning makers. According to Sternberg (2007) successful individuals are those who have creative skills, to produce a vision for how they intend to make the world a better place for everyone; analytical intellectual skills, to assess their vision and those of others; practical intellectual skills, to carry out their vision and persuade people of its value; and wisdom, to ensure that their vision is not a selfish one.

Creativity entails being open and responsive to new ideas and diverse perspectives; incorporating group input and feedback into the work; demonstrating originality and inventiveness in work, and understanding the real world limits to adopting new ideas. An interestingly unique aspect of creativity and innovation is viewing failure as an opportunity to learn; understanding that creativity and innovation are part of a long-term, cyclical process of small successes and frequent mistakes. Creativity and innovation skills can be developed, like other skills, with practice and over time (Wegerif & Dawes, 2004 in Partnership 21, 2008).

Trilling and Fadel (2009) argue that creativity is not only for the artistic-types and geniuses, but can be nurtured by teachers and learning environments that encourage questioning, openness to ideas and learning from mistakes and failures. The truth that if our students leave school without knowing how to continuously create and innovate, they will be underprepared for the challenges of society and the workforce, is unequivocal.

### **Communication**

In the same report entitled “Are They Really Ready to Work?”, nearly three-quarters (72 percent) of incoming high school graduates are viewed as deficient in basic English writing skills, including grammar and spelling. While education has always emphasized fluent reading, correct speech, and clear writing, there is evidence that students are not mastering these most basic skills. Linguistically and culturally effective listening, empathy, and effective communication skills are essential skills for every person in the knowledge economy. Because complex communication involves explanation, negotiation, and other forms of intense human interaction, jobs that require these skills are not likely to be automated (Levy & Murnane, 2004) and therefore are beyond machines. Such jobs will be available in and beyond the 4th IR. Communication as a 21st century skill refers to the ability to articulate thoughts and ideas effectively using oral, written, and nonverbal symbols; listen effectively to decipher meaning in a variety of forms and contexts, and ability to use multiple media and technologies in diverse environments.

### **Collaboration**

The Partnership for 21st century skills (2011) defined collaboration as the ability to work effectively and respectfully with diverse teams. Diversity in teams brings multiple individual and cultural perspectives into the collaboration. Collaborative effort does not only create more holistic results than individual efforts, but it also creates knowledge for a larger number of people (Surowiecki, 2005). Collaboration skill is evidenced in an individual by exercising flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal. It assumes shared responsibility for collaborative work, and values the individual contributions made by each member of the team. Knowledge creation for diversity is not possible working in silos but requires collective and collaborative efforts.

## **ICT literacy**

It is evident from the cited frameworks that each acknowledges ICT literacy as core driver skill of the 21st century and therefore central to meaningful global usefulness of learners. One dimension in which ICT has presented an amazing discovery of the century for learners is when it availed Web 2.0.

Web 2.0 is both a platform on which innovative technologies have been built and a space where users are as important as the content they upload and share with others. Web 2.0 includes social networks, such as MySpace, Facebook, and Ning; media sharing, such as YouTube and Flickr; social bookmarking, such as Delicious and CiteULike; collaborative knowledge development through wikis (e.g., Wikipedia); creative works, such as podcasts, videocasts, blogs, and microblogs (e.g., Twitter, Blogger); content aggregation and organization, such as RSS (Really Simple Syndication) feeds and tagging tools; and remixing or mash-ups of content from different content providers into new forms, such as combining geographical data with transportation data (Greenhow, Bobelia, & Hughes, 2009). The learner's familiarity with web 2.0 technologies opens up a new space for and style of learning (Downes, 2005; Anderson, 2007; Walton et. al., 2007). This new style of learning focuses on collaborative knowledge building, shared assets, problem solving, and the breakdown of distinctions between knowledge and communication (e.g., interactive tutorials).

DeGennaro (2008) describes an example of education-oriented Web 2.0 use by a group of students who persuaded their advisors to use instant-messaging technologies, leading to home-school activities in which students and advisors negotiated goals, co-constructed solutions, and "argued to learn" (p. 12). Conceptually, Web 2.0 seems to embody "knowledge" as "collective agreement" that "may combine facts with other dimensions of human experience, such as opinions, values, and spiritual beliefs" (Dede, 2008, p. 80). Emphasizing learners' abilities to communicate with an international audience through the Web, Windschitl (1998) also argued for deeper investigations of how virtual global communication experiences, such as e-pen-pal programs, shape participants' values, attitudes, and beliefs about other cultures.

Another dimension in which ICT has presented a learning adventure in the 21st century is mobile technology integration in education. If mobile phones which are the most popular and commonly used interactive ICT worldwide can be employed to deliver and improve education, then, they carry a tremendous potential to assist the learning of people everywhere (UNESCO, 2012b). Birch (2012) posits that using cell phone technology as a tool to research,

organize, evaluate and communicate has become a 21st century skill. He further argues that mobile learning, integrating cell phone technology into the classroom, would increase student achievement and engagement as well as revolutionize instruction. Mokgoare and Nleya (2014), however, noted that despite the promising capabilities of mobile technologies in the school system, integrating mobile phone technology in some schools' systems seems far-fetched as students were forbidden to bring these devices to school.

Whilst the authors are fully cognizant of the fact that information literacy specifically refers to "the ability to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (LearnHigher, 2006 in Pacific Policy Research Center, 2010), for purposes of narrowing down the focus of this paper it is technically housed in ICT literacy.

### **Financial literacy**

Financial, economic, business and entrepreneurial literacy speaks to the set of skills individuals need to make informed economic decisions (Pacific Policy Research Center, 2010). Jump Start Coalition (2002) indicated that there is considerable deficiency in financial literacy among high school students and adults in the United States. Du Toit and Gaotlhobogwe (2018) observed that the absence of entrepreneurship education in South Africa and Botswana Lower school curricula was a neglected opportunity to address the challenge of youth unemployment in the two countries. We note that none of the frameworks reviewed and presented in table 1 considered financial literacy as an important 21st century skill, however, time has come when financial literacy or entrepreneurship education cannot be neglected as observed by Du Toit and Gaotlhobogwe (2018). Effective economic and social operation in the 21st century demands adaptability, cultural awareness and advanced critical thinking and information literacy skills. This necessitates a balance between demand for STEM (Science, Technology, Engineering and Mathematics) skills globally seen as source of innovation and growth, and call for lifelong learning opportunities in vital areas of the arts and humanities capable of producing independent self-starters who are responsible, persevering, self-regulating, self-evaluating and self-correcting (Hopley, 2003 cited in Partnership 21, 2008).

Financial and entrepreneurial literacy exhibits productivity and accountability skills. Such skills are seen in the students' ability to manage projects, set and meet goals, produce results, multitask, work positively and ethically; being accountable for results, and collaborate effectively within teams. Such skills will be indispensable during the 4IR. Braunstein and

Welch (2002) cited in Pacific Policy Research Center, 2010 argue, however, that an increase in financial knowledge does not necessarily translate into improved financial behaviour, hence we propose financial literacy which encompasses not only knowledge but behaviour and is linked to other 21st skills set.

### **Global awareness**

Like Financial literacy, Global awareness did not emerge as an important 21st century skill in the frameworks presented in table 1. Global awareness theme argues for the need for students to be able to learn from and work collaboratively with individuals from diverse cultures, religions, ideologies and lifestyles in an environment of openness and mutual respect; addressing issues in diverse learning communities. The Pacific Policy Research Center (2010) observed that students who participate in international collaborative problem solving e-learning projects showed heightening motivation in class, improved reading and writing skills, and enhanced engagement.

Social and cross-cultural skills are an essential 21st century life skill visible in global awareness. It entails an understanding and respecting of social and cultural differences and using those differences to develop new ideas and new solutions to problems beyond machines which cannot tell any difference in cultures, religion, ideologies and worldviews.

### **Civic literacy**

Civic literacy voices the need for students to be able to understand and influence civic decision-making (Pacific Policy Research Center, 2010). It centers on the importance of staying informed and understanding governmental processes, being able to participate in civic life and recognizing the local and global implications of civic decisions. Lazare (2005) propounded on the need for students to develop critical reading, writing and thinking skills for participation in civic society. Leadership and responsibility skills are manifest in civic literacy as individuals would demonstrate ability to work within the interest of the larger community, to inspire others by example, and to utilize strengths of others to achieve a common goal.

### **The School Curriculum**

The development of the school curriculum and instructional materials should reflect the world of work by promoting integration across subjects and across the skills domains, thus, fostering the “synthesizing mind”. The provision of more practical and work-related tasks in

the curriculum and cross-curriculum approach to work-readiness should be supported by the strengthened management structure at school level, with identified supervisory responsibility for this area of activity and for career guidance. Formal links should be developed between schools and commerce and industry. All teachers should possess the 21st century skills themselves to be able to facilitate their infusion into the school curriculum. Adequate budgets for learning resources, especially library facilities, multi-media resource centres, supplies and maintenance, should be allocated to support this infusion. Co-curricular activities that promote contact with the world of work, should be encouraged.

Given that such decisive attention had been accorded the 21st century skills by the reviewed frameworks it definitely warrant inquiry to explain the tragic development of skills gap or lack of 21st century skills claimed by employers. Perhaps, the school curricula has not made sufficient provision to ensure development of a holistic 21st century learner capable of thriving in the competitive global economy. It is from this standpoint that the authors found a need to develop a framework to infuse 21st century skills in the school curriculum.

### **Pedagogical practices**

Barron and Darling-Harmond (2008) postulate that enthusiasm for approaches to instruction that connect knowledge to the contexts in which it will be applied is on the increase with recommendations emphasizing the need to support 21st century skills through learning that supports inquiry, application, production and problem-solving. Instructional reforms to help students gain vital media literacies, critical thinking skills, systems thinking, interpersonal and self-directional skills that allow them to manage projects and competently find resources and use tools have been suggested on the basis that for today's students to be prepared for tomorrow's workplace they need learning environments that allow them to explore real-life situations and consequential problems.

Bransford and Darling-Hammond (2005) averred that students do not routinely develop the ability to analyze, think critically, write and speak effectively, or solve complex problems from working on constrained tasks that emphasize memorization and elicit responses that merely demonstrate recall or application of algorithms. They tend to perform better when availed opportunities to engage in projects and activities that require them to employ subject knowledge to solve real world problems. In his studies Newmman termed those practices "authentic learning" (Newmman, 1996). In a study of more than 2100 students in 23 schools, overwhelming evidence highlighted the benefits of authentic learning together with a growing

interest in providing students with more engaging, thought-provoking learning opportunities (Newman, Marks & Gamoran, 1995). Many teachers were prompted at all levels to experiment with incorporating inquiry-based learning into their curriculum. These proposed 'learning by doing' approaches are promising but checkered history of their implementation testify to the need for detailed knowledge about how to successfully manage such approaches in the classroom (Barron, Schwartz, Vye, Moore, Petrosino, Zech, & Bransford, 1998).

Baron and Darling-Hammond (2008) affirm that the discord between the theory and practice of inquiry-based approaches is in part due to the fact that teachers often lack information, support, and tools necessary to fully integrate and support this alternative to teaching and learning.

Project-based learning is a learner-driven, teacher facilitated approach to learning, where learners solve real-world problems by designing their own inquiries, planning their learning, organizing their research, and implementing a variety of learning strategies critical for thriving in the 21st century (Bell, 2010). Project-based learning involves completing complex tasks that result in a realistic product or presentation to an audience. The goals of project learning aim to enabling students to transfer their learning to new kinds of situations. Some comparative studies demonstrated benefits from project learning, such as increases in the ability to define problems, reason with clear arguments, and plan projects (Shepherd, 1998). Another research has documented improvements in motivation, attitude toward learning, and work habits (Boaler, 1999). Students who struggle in traditional instructional settings have often excelled when working on a project, which better matches their learning style or preference for collaboration (Darling-Hammond, 2008).

Chisholm, Dhunpath and Paterson (2004) revealed that the discourse on education reform is replete with arguments which demonstrate that the infusion of new technologies produces little results if underlying relations do not change. Warschauer (2000) argues that the root of the problem is the mismatch between industrial models of schooling, and the post-industrial organisation of society.

Chisholm, et.al. (2004) further argues that though the variety of technologies embedded in the concept of ICT provide for greater flexibility and autonomy for the learner to engage in self-directed and independent learning, teacher attitudes cannot be assumed consonant with greater learner independence. Tafa (2002) claims that in Botswana, 'prescriptive teacher-dominated classroom practices which limit pupil's learning opportunities' are evident (p. 17).

To leverage on the merits of ICT as a learning tool relations of authority that have traditionally characterized the profession should give way to learner autonomy. The training of educators must take on board the fundamental curriculum assumptions that underlie the implementation of ICT as a means of empowering the learner to engage in self-directed learning (Paterson & Lundall, 2001).

Evidently, one of the challenges schools have to deal with for the success of incorporating learning technologies is the pedagogical repertoire of teachers. A paradigm shift in pedagogy advocated by 21st century learning will benefit somewhat didactic systems where rote learning has traditionally dominated. In spite of high test scores that these systems sometimes produce, there is no certainty that the students graduate with the 21st century skill sets that employers need, especially for interaction-intensive industries.

### **Conclusion**

School curriculum need to do better in developing 21st century skills that are the indispensable currency for participation, achievement and competitiveness in the global economy. Although the landscape is global, the path to 21st century education requires a local journey; one that recognizes and responds to specific challenges and opportunities. To that effect, this paper proffers a pedagogical practice wherein the students complete project-based, cross-disciplinary tasks that encourage innovation and cross-cultural collaboration, and apply critical thinking and creativity to solving real-world problems. Students need 21st century skills that will increase their marketability, employability and readiness for citizenship. These skills will withstand the test of time, fluctuations in the economy and marketplace, and dynamic employment demands.

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