Innovative Pedagogies in Higher Education to Become Effective Teachers of 21st Century Skills: Unpacking the Learning and Innovations Skills Domain of the New Learning Paradigm

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Abstract

As today's graduates engage with the demands of the current Knowledge Age, the skills that they need to succeed in their lives after college, or any other institution of higher learning, are 21st century skills rather than 20th century skills. Kivunja (2014) calls this "the new learning paradigm" (p.85). Unfortunately, those skills are not yet included in many of the learning outcomes prescribed by most educational jurisdictions or required to be assessed in high-stakes state and national examinations. It is essential that policy makers, across all nations, and in particular higher education providers, have a firm understanding of the skills most in demand in the 21st century Digital World, how those skills relate to the orthodoxy academic standards, and how those skills can be effectively taught. So, it is imperative to ask and answer the questions: what are those skills, and how can they be taught effectively to present and future students in higher education to improve their Digital Economy readiness?

This paper answers these questions in four ways. First, it gives a brief review of literature that highlights the meaning of effective teaching and its importance in pedagogy. Second, it reviews literature on the new learning paradigm that will equip learners with 21st century skills and explains what the 21st century skills are. Third, arguing that those skills constitute a new way of effective teaching and learning, the paper articulates the different domains of the new learning paradigm which comprise these skills. Fourth, it discusses the first of the domains – the Learning and Innovations Skills domain – so as to explain how the skills in this domain can be effectively taught to enable higher education students to graduate well equipped with the skills most in demand for success in today's knowledge-based, Digital World.

Keywords: Effective teaching, 21st century skills, The new learning paradigm, The Learning and innovations skills domain, Critical thinking and problem solving, Communication, Collaboration, Creativity and innovation.

1. Teaching Effectiveness and Its Importance in Pedagogy

1.1 What is Effective Teaching?

Teaching effectiveness is a slippery concept to grasp. It has been the focus of a substantial amount of research, which dates back to the first half of the 20th century when it was referred to as 'teacher effectiveness research' (Medley, 1979). That research tended to focus on what effective teachers look like rather than what they do. Emphasis shifted in the last quarter of the 20th century to what effective teaching looks like; and so the focus was on 'teaching effectiveness.' More recently, research has come to the conclusion that effective teaching is not based on some universal laws, but there are a multitude of ways of being a good teacher and teaching effectively. This is captured well by Marland (2007) who says:

> *what teaching effectiveness is, varies according to time, place and the learners in the classroom. What is effective for one teacher will not work for another teacher. What is effective in Grade 1 will certainly not be effective in Grade 6 or Grade 12. What is effective in this era will not be effective in the next. Teaching effectiveness varies from teacher to teacher, class to class and from one era to the next* (p.9).

Killen, one of the world renown educators and author of numerous books on teaching and learning including, (1998, 2003, 2005, 2007, 2009 and 2013), says that for a teacher to be effective he or she should be knowledgeable, enthusiastic, confident, optimistic, effective in communicating, committed, compassionate, curious, patient and persistent, willing to share and collaborate, resourceful and inventive, well organized, ethical and reflective. Similarly, research on the qualities of an effective teacher identifies a very wide range of key characteristics. This is why Tomlison and Germundson (2007) consider high-quality teaching to be like creating jazz. In creating jazz, the process involves combining musical sounds; including blue notes and syncopation and swing; and utilises unconventional combinations to produce unusual, unexpected outcomes that surprise even the composer. In this comparison, these authors say that effective teaching, like the creation of jazz music, uses different elements and brings together a wide variety of cultural styles utilising a range of instructional strategies and educational theories.

Research conducted for Education Queensland (Department of Education Queensland, 2001) in Australia, rated teachers as effective in the application of productive pedagogies if they demonstrated a sense of responsibility, expressed efficacy such that they viewed all students as capable of learning, were keen to talk and reflect about their successes, failings and changes that they made to their teaching. That research also found that effective teachers engage in professional conversations with colleagues about their teaching; understand curriculum and problematize assessment practice.

Marsh (2010) delineates the characteristics of effective teachers to include, "highly knowledgeable, communicate well; give clear instructions in their teaching and have good relations with children, staff, and parents" (p.4). Marsh (2008) adds that effective teachers are caring and kind, lend a hand to even the most unlovable child, they are enthusiastic, friendly but firm, have a sense of humour and demonstrate leadership qualities.

In a survey that asked educators what makes an effective teacher, Boag (1989), found that the 15 most rated qualities were:

1. Enthuse students
2. Treat them as individuals
3. Know the subject
4. Be loving and warm
5. Teach to learn
6. Empathise with students
7. Relate to others
8. Be fair, firm and flexible
9. Be organised
10. Prepare students for life
11. Manage classroom
12. Have high self-esteem
13. Have a sense of humour
14. Be a complete person
15. Take risks.

Melnick and Zeichner (1998) identified a wide range of skills and attitudes as the essentials for effective teaching. First on their list was what they called consciousness of oneself. Included in this are the teacher's personal beliefs, patterns of behaviour, coping with situations and the teacher's individual learning styles. Second was attentiveness to others. This refers to the teacher's skills and attitudes in listening to others, observing what happens and taking note and responding as needed; ability to encourage students, as well as analytic and diagnostic skills. Third, they identified ability to collaborate and communicate with others. This includes not only the teacher's students but also colleagues at school, administrators and parents of the children at the school. Fourth was resourcefulness. They included in this, the teacher's ability to apply to his or her teaching ideas from a wide range of sources. Fifth was openness to change. This calls for continual self-evaluation and use of feedback from others with an open mind to see how you can use it to improve your teaching. Sixth, they identified understanding of the cultural dimensions of people's lives and their impact on learning. Seventh was the teacher's ability to analyse educational systems and their impact on the learning environment. Finally, they called for a sense of self-confidence balanced with courage to question oneself and the

content of schooling. Chapuis (n.d.) says that effective teachers exhibit enthusiasm, know their content, are well organized, engage students in active learning, exhibit a strong positive attitude towards their students, exercise effective classroom management, maintain good people skills, set high expectations for their students, communicate well, give every child in their class some experience of success, use questioning to engage their students in productive, critical, higher-order thinking, are flexible with individual students, and create a pleasant, safe and secure learning environment for their children.

According to the National Board for Professional Teaching Standards (NBPTS, 2002) in the USA, five core propositions form the foundation of skills, knowledge, dispositions and beliefs of effective teachers. They articulated the five core propositions as:

1. Teachers are committed to students and learning.
2. Teachers know the subjects they teach and how to teach those subjects to students.
3. Teachers are responsible for managing and monitoring student learning.
4. Teachers think systematically about their practice and learn from experience, and
5. Teachers are members of learning communities.

In an analysis of frameworks for effective teaching MacGregor (2007), presents sixteen themes which provide an excellent description of what high effective teaching involves, including many of those outlined above.

1. There is a high degree of student engagement
2. The teacher designs and delivers effective instruction.
3. The teacher effectively uses assessment for student learning
4. The teacher uses a positive behaviour management approach.
5. The teacher demonstrates knowledge of students.
6. The teacher selects and communicates clear instructional goals.
7. There are clear classroom procedures.
8. The teacher demonstrates content knowledge.
9. The teacher uses high quality questioning/discussion techniques.
10. The teacher demonstrates flexibility and responsiveness
11. The lesson reflects the teacher's knowledge of resources
12. The teacher communicates clearly.
13. The teacher provides feedback to students.
14. The organization of classroom space is conducive to learning.
15. The teacher uses anticipatory set.
16. The teacher provides lesson closure.

In what is known as the Quality Teaching Framework in New South Wales, Australia, effective teachers are expected to create a quality teaching and learning environment, by promoting, "Intellectual Quality, Quality Learning Environment and Significance" (NSW-DET, 2003, p.1-3) of learning experiences. Briefly, in the framework intellectual quality refers to pedagogy that is focused on producing deep understanding of important, substantive concepts, skills and ideas. Quality learning environment refers to pedagogy that creates classrooms where students and teachers work productively in an environment clearly focused on learning. Significance refers to pedagogy that helps to make learning meaningful and important to students in their daily lives beyond school contexts.

Thus, the literature reviewed here characterizes an effective teacher as some kind of bricoleur whose work, according to Denzin and Lincoln (2000) is not only dynamic but multi-faceted and multi-tasked, in very diverse and complex ways. According to these two professors (Denzin & Lincoln, 2000), a bricoleur utilizes a wide range of methodologies, tools and skills to accomplish whatever task they are given. So does an effective teacher.

1.2 Why is Teaching Effectiveness Important in Pedagogy?

Research-based evidence on teaching effectiveness including Brophy, (1979), Black and Wiliam, (1998), Martinez and Martinez, (1999), and Hattie, (2003), strongly suggests that teaching effectiveness is a key determinant of

student achievement. For example, Hattie (2003) suggests that teacher effectiveness ranks only second to a student's family in its influence on student learning and explicitly asserts it "is the single most powerful influence on student achievement" (p.4). In agreement with Hattie (2003), Lovat (2003) says:

> *Teacher quality is the single greatest factor in explaining student achievement, more important than classroom related issues such as resources, curriculum guidelines and assessment practices, or the broader school environment such as school culture and organization* (p.2).

Similarly, Martinez and Martinez (1999) also found research results which showed that teaching effectiveness was responsible for improved learning outcomes among students.

2. The New Learning Paradigm, Its Genesis and How to Implement It

2.1 What's the New Learning Paradigm and How did it Emerge?

In their seminal book entitled *21st Century Skills: Learning for Life in Our Times,* Trilling and Fadel (2009) argue that in order to be effective teachers and equip students with the skills that will enable them to be successful, productive citizens in the Digital Economy, it is essential to teach them not just the traditional core subjects but also the sets of skills most in demand in the 21st century. So, which are the 21st century skills and how were they identified?

The story begins in 2002 when, as part of the USA efforts to bring the power of technology to all aspects of teaching and learning, a joint public-private organization called the Partnership for 21st Century Skills (P21) was formed to serve as "a catalyst to infuse 21st century skills throughout primary and secondary schools by building collaborative partnerships among education, business, community and government leaders" (P21, 2008, p.4). As well articulated by Dennis Van Roekel, the President of the National Education Association, which was one of the foundation members of P21, the overall aim of P21 was "to forge a common vision for education that will prepare our young people for college, work and life" (NEA, 2014, p.2). The founding members included AOLTW Foundation, Apple Computer Inc., Cable in the Classroom, Cisco Systems, Inc., Dell Computer Corporation, Microsoft Corporation, National Education Association, SAP and the USA Department of Education as a key partner (P21, 2014). Since its foundation, P21 "has pioneered and championed the movement toward a 21st century approach to education" (Trilling & Fadel, 2009, p.168). Kivunja (2014) characterizes this movement as the paradigm shift from traditional core subjects and skills to 21st century skills in tandem with the traditional core skills.

P21 conceptualized the new paradigm as the vision for students' success in the new global economy and designed what they called the *Framework for 21st Century Learning* (P21, 2011), which identifies the skills, knowledge and expertise, which need to be effectively taught, and which students must master to be well prepared for success in the Digital Economy. These skills are popularly referred to as the 21st century skills and Kivunja (2014) synthesized them well in this formulation illustrated in Figure 1.

JR 21CS = f(TCS + LIS + CLS + DLS).
Where:
JR21CS= Job Readiness with 21st Century Skills
f = is a function of
TCS = Traditional Core Skills e.g. reading, -riting and -rithmetic or basic literacy and numeracy;
LIS = Learning and Innovation Skills; e.g. critical thinking, problem solving and creativity;
CLS = Career and Life Skills; e.g. flexibility, adaptability, initiative, teamwork and leadership;
DLS = Digital Literacy Skills; e.g. technological proficiency, digital fluency, computing, media and information literacy.

Figure 1. The New Learning Paradigm

According to the *Framework for 21st Century Learning,* and as illustrated in Kivunja's (2014) formulation, the 21st century skills consist of one domain of traditional core subjects supported by five 21st century interdisciplinary themes, and three domains of essential skills. The Traditional Core Subjects and skills domain (TCS) consists of a core of academic subjects including the traditional 3Rs of reading, -riting and –rithmetic. The Framework (P21-57,

2014), spells out the components of the Core Subjects domain as consisting of English, reading or language arts, World languages, Arts, Mathematic, Economics, Science, Geography, History, Government and Civics. These core subjects are interwoven with five interdisciplinary themes which P21 identify as Global awareness, Financial, economic, business and entrepreneurial literacy, Civic literacy, Health literacy, and Environmental literacy. P21 categorize the three domains of essential skills as the Learning and Innovations Skills domain (LIS), the Career and Life Skills domain (CLS), and the Information, Media and Technology or Digital Literacies Skills domain (DLS). The four domains and the five interdisciplinary themes are supported by four systems that P21 call Standards and Assessment, Curriculum and Instruction, Professional Development and Learning Environment (P21, 2011). As represented in the *Framework for 21st Century Learning,* the proposed approach to effective teaching and learning represents a paradigm shift from the traditional key learning areas to include 21st century skills relevant to some of the key issues and real-life problems that confront individuals, industries and occupations in the 21st century.

2.2 Being an Effective Teacher in the New Learning Paradigm

In a nutshell, according to Trilling and Fadel (2009), to be an effective teacher in this new paradigm requires a move from teacher-directed to student-centred learning, from direct teacher instruction to interactive exchange with and among students, from teaching content knowledge to equipping students with the relevant skills, and from teaching content to problem solving processes. Additionally, effective teaching in this new paradigm requires a shift from teaching basic to applied skills; from teaching facts and principles to investigative questions and problematizing, from mere theory to practice applying the relevant theory or theories, and from working with a fixed or set curriculum to working on authentic real-life projects. It calls for a move away from time-slotted schedules to completion of tasks on-demand, from teaching that applies a one-size-fits-all approach to all students to one that provides personalized scaffolding for learners, from competitive learning to collaborative learning, from classroom tied contexts to foot-loose global learning networks, from textbook-based data to web-based sources, from summative to formative assessment of students' performance, and from learning at school to learning throughout life. Trilling and Fadel (2009) say that:

> in our recently arrived Knowledge Age… the 21st century demands a fresh set of responses, … brain power replaces brawnpower, and mechanical horsepower gives way to electronic hertzpower. Achieving education's goals in our times is shaped by the increasingly powerful technologies we have for communicating, collaborating, and learning. And learning assumes a central role throughout life (pp.15–16).

As the traditional core subjects are well known in pedagogy, this paper does not discuss them. It would also be rather sketchy to attempt to discuss the other three domains in one paper. Instead, the rest of this paper unpacks the first of what Trilling and Fadel (2009) call the "three sets of skills most in demand in the 21st century" (p.48), namely the Learning and Innovations Skills domain, to shed light on what this domain entails and what and how to effectively teach students so they graduate from school, college, university or other institution of higher learning with the skills that will enable them to contribute effectively to the world of work and civic life in the new global Knowledge Economy of the 21st century.

3. The Learning and Innovations Skills Domain

3.1 Components of the Learning and Innovations Skills Domain

In the *Framework for 21st Century Learning,* the Learning and Innovations Skills domain comprises four elements which together constitute what the P21 Partnership (P21, 2009), describes as the "skills increasingly being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not" (p.3). Each of the elements starts with the letter C and so the *Framework for 21st Century Learning* (P21, 2011), refers to them as the 4Cs of the Learning and Innovations Skills domain. The 4Cs are i) critical thinking and problem solving, ii) communication, iii) collaboration, and iv) creativity and innovation. It is helpful to discuss each of these briefly.

3.2 Critical Thinking and Problem Solving Skills

3.2.1 The Concept of Critical Thinking

It is essential in this Knowledge Economy Age, that graduating students do so having been equipped with critical thinking skills that will enable them to be productive members in the Knowledge Economy, function effectively and responsibly and solve problems in ways that are sensitive and caring for others, society, the environment and the world as a whole. "Critical thinking and problem solving used to be the domain of gifted students, now it's a critical domain for every student" (P21, 2014, p.8). So, what exactly is critical thinking and what skills does it involve and how can we effectively teach those skills? Each of these questions is answered in this section.

Critical thinking has been defined in many different ways. For example, the National Council for Excellence in Critical Thinking based in California, defines it as the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (NCECT, 2014). Dobozy, Bryer and Smith (2012) define it as "being able to tell facts from opinions, to see holes in an argument, to spot illogic, to evaluate evidence and to tell whether cause and effect have been established" (p.4). The critical thinking process requires that what is said be challenged and evaluated for its integrity and authenticity based on what is already known or available evidence. If there is not enough evidence to support what is said, then critical thinking would dismiss it as generally untrue. As Halpern (2003) explains, it is not critical thinking if we base our understanding on common sense and personal opinions. These are subjective ways of knowing whereas what is required in critical thinking is to identify objective data that support an observation or phenomenon, weigh the data from triangulated points of view and derive an informed way of knowing. Larrivee (2008) says that critical thinking enables learners to dig deeper than the surface of ideas by putting the ideas to objective test and asking *why* so as to develop deeper insights. P21 (2014) define critical thinking and problem solving as reasoning effectively, (e.g., using inductive and deductive reasoning), using systems thinking, (e.g., analyzing how parts of a whole interact), making judgments and decisions (e.g., evaluating evidence, analyzing alternatives, reflecting critically) and solving problems (e.g., asking questions to clarify points of view and solving problems in innovative ways).

3.2.2 How to Teach Critical Thinking and Problem Solving Skills Effectively.

For students to develop their capacity to engage in critical thinking and problem solving in the 21st century work place, they need to be explicitly taught the relevant skills. This is well articulated by Pohl (1997) who asserts that to help our students develop a critical thinking culture; we must explicitly teach them thinking skills. Facione (2011) puts it even more emphatically when he asserts that critical thinking is essential for harmonious human society. He says "It is corner stone in the journey human kind is taking from beastly savagery to global sensitivity" (Facione, 2011, p.11). He adds:

> *Considered as a form of thoughtful judgement or reflective decision-making, in a very real sense critical thinking is* ***pervasive*** *(his emphasis). There is hardly a time or a place where it would not seem to be of potential value. As long as people have purposes in mind and wish to judge how to accomplish them, as long as people wonder what is true and what is not, what to believe and what to reject, strong critical thinking is going to be necessary*, (Facione, 2011, p.10).

Kompf and Bond (2001) assert that it is important to train children in critical thinking because it helps them to engage in rational thinking, reasoning, developing knowledge, applying their intelligences and reflection.

Effective teaching of critical thinking and problem solving skills involves a deliberate attempt to help learners acquire information and knowledge, staying focused, recognizing different alternatives and being prepared to evaluate the alternatives, taking a position they can support with reasonable arguments, seeking precision in argumentation, proceeding analysis in a logical and orderly manner and listening well so as to be sensitive to other peoples' positions.

Effective teaching of critical thinking teaches students metacognition which helps them to consciously ask questions about observations or ideas about personal thinking. As a way of such training, students should be encouraged to look for gaps in whatever information they are given and to then seek ways in which these gaps can be filled in. Students should be taught how to distinguish between straightforward observation and inference and between fact and conjecture or fiction. Effective teaching of critical thinking and problem solving skills encourages students to probe for the assumptions that underlie what they are exposed to so that they can develop a fuller understanding of what it means and be able to draw inferences and conclusions from it by themselves. Effective teaching helps them to think deeply about relationships such as cause and effect and how they can be conscious of their own reasoning and test whether it is supportable with evidence or not, and whether it is generalisable or unique and specific.

Moore (2009) suggests a number of rather straightforward strategies that can be followed to teach students critical thinking skills. He suggests that this can be achieved through training them to change their thinking from guessing to estimating, from preferring to evaluating, from grouping to classifying, from believing to assuming, from inferring to inferring logically, from associating concepts to grasping principles, from noting relationships to noting relationships among relationships, from supposing to hypothesizing, from offering opinions without reason to offering opinions with reasons, and from making judgments without criteria to making judgments with criteria. He emphasizes that critical thinking requires cognitive levels that fall within the higher-order levels of Bloom's (1956) revised taxonomy, namely analyzing, evaluating, and creating. Moore (2009) also proposes that teaching students metacognitive

strategies is a good way to teach them critical thinking. He suggests that these strategies include:

> consciously identifying what they already know, determining how performance will be evaluated, estimating the time required to complete a task, planning study time into their schedule and setting priorities, making a check list of what needs to happen, organizing materials, taking necessary steps to learn by using strategies such as outlining, mnemonics, and diagrams, reflecting on the learning process, monitoring learning by questioning and self-testing, providing their own feedback, and keeping concentration and motivation high (Moore, 2009, p.229).

Brookfield (1987) also contributes to an understanding of how critical thinking can be effectively taught by suggesting that this can be achieved through training learners to challenge the assumptions that underlie values and the belief systems of their culture, so that they learn how to examine old ideas in new ways; exploring and imagining alternatives to old ways of thinking., and to develop open-mindedness and willingness to explore alternative possibilities. As students learn these strategies, direct teacher instruction, such as explaining, teacher-led discussion and questioning, can be used as effective teaching strategies to help students engage with these strategies.

In discussing how to teach learners critical thinking and problem solving in the 21st century, Trilling and Fadel (2009) suggest several approaches. The first of these is training them in the ability to reason effectively. This involves examining data or a situation and engaging in inductive or deductive reasoning to gain a deep understanding of the issue. The second strategy is teaching them to engage in the use of system thinking. This is an approach well developed by Professor Peter Senge (1999) in what he calls developing Mental Models in Systems Thinking. It requires an analysis of how parts of a whole work together or interact among themselves so as to function as a cohesive whole. The third strategy is to teach learners how to make rational judgments and decisions. This teaches them not only how to analyze but also how to evaluate available evidence, arguments given and claims made. This way, students learn how to look at the data from different lenses and then making connections between and among the bits observed. From the analysis emerges interpretation of the data enabling students to make well informed, data based conclusions. The fourth strategy for teaching critical thinking and problem solving Trilling and Fadel (2009) propose is to train learners in thinking deeply and considering all possible alternatives so they can solve non-familiar problems in different ways.

Several leaders in the field of critical thinking and problem solving, including Dewey, (1910) Le Cornu, (2009), Facione, (2011) and Reynolds, (2012) identify several areas in which students need training so as to develop critical thinking and problem solving skills. They include open-mindedness, observation, being aware of gaps in information and consciously raising questions, distinguishing between observation and inference, and between fact and conjecture. They also recommend providing training in how to draw inferences from data, how to robe for underlying assumptions, developing hypotheses and testing them, engaging in inductive or deductive reasoning to derive what data really mean.

The work by an international group of experts (Esterle & Cluman, 1993) on critical thinking and problem solving highlights some of the strategies that need to be included in teaching these skills. These include teaching students how to engage in a high level of clarity in stating points for discussion or concerns, exercising orderliness in working on complex issues, exercising a high level of diligence in seeking relevant information, being reasonable in selecting and applying data, persisting with the pursuit of goals even when difficulties are encountered and trying to be as precise as possible.

3.3 Communication Skills

3.3.1 What Do 21st Century Communication Skills Involve?

"Communication skills have always been valued in the workplace and in public life. But in the 21st century, these skills have been transformed and are even more important today" (P21, 2014, p.13). The Partnership for 21st Century Skills (P21, 2009) delineates five sets of communication skills. They include the ability to articulate thoughts and ideas effectively, both orally and nonverbally, the ability to listen and make sense of what is being said, the ability to utilize communication effectively, the ability to utilize a wide range of media and related technologies and ability to communicate in different environments. These skills are also elaborated by Trilling and Fadel (2009) who argue that the permeation of digital technologies in business and everyday lives in the global Digital Economy has created a new demand for communication skills. In particular, there is a much greater need to be able to communicate in a way that enhances learning and working together. This new way of working together does not necessarily require face-to-face interaction but relies on internet based messaging, using different software and Web tools that enable participants to create and share their ideas, views, work and products in virtual environments online.

3.3.2 How can 21st Century Communication Skills be Taught Effectively?

Trilling and Fadel (2009) suggest that to effectively teach 21st century communication skills, the following strategies should be followed. Firstly, students should be taught how to articulate thoughts and ideas using oral, written and nonverbal communication skills. This should be taught in a range of forms and contexts, which help learners to be flexible and increase their ability to communicate in different contexts. Secondly, students should be taught how to engage in active listening. This training should help them to interpret and understand the meaning within the communication, taking into consideration participants' cultural backgrounds, values, attitudes and intentions. Thirdly, students should be taught how communication can be used for different purposes. For example, it could be used simply to inform clients, to instruct participants, to motivate learners or to persuade potential customers. Fourthly, students should be exposed to a wide range of media technologies and be taught how to use them. They should be helped to understand and to evaluate the effectiveness of different media and media technologies and be able to assess the potential impacts of the different media and technologies. Fifthly, they should be trained in communicating in diverse environments, including the use of a variety of languages other than their own.

3.4 Collaboration Skills

3.4.1 What Do 21st Century Collaboration Skills Involve?

Collaboration is essentially the ability to work with others as a team that seeks to achieve a common goal. Bruner (1996) emphasizes that it is "participatory, proactive, and communal" (p.86). P21 (2014) say, "Fifty years ago, much work was accomplished by individuals working alone, but not today. Much of all significant work is accomplished in teams, and in many cases, global teams" (p.19). In teaching its undergraduates collaboration, the University of Strathclyde in Glasgow (Strathclyde, 2014) gives a very good description of what collaborative skills involve. The description includes, giving and receiving feedback from peers or other team members in order to perform a common task, sharing credit for good ideas with others, acknowledging others' skill, experience, creativity, and contributions, listening to and acknowledging the feelings, concerns, opinions, and ideas of others, expanding on the ideas of a peer or team member, stating personal opinions and areas of disagreement tactfully, listening patiently to others in conflict situations, defining problems in a non-threatening manner, supporting group decisions even if not in total agreement. The Innovation and Business Industry Skills Council of Australia (IBSA, 2009) emphasizes that the purpose of collaboration is to give the people involved the opportunity to work together so as to generate ideas and at the same time get feedback on those ideas. IBSA (2009) add that it involves freely discussing ideas, respecting the ideas of others, giving and receiving critical and constructive feedback, maintaining up-to-date knowledge, selecting and maintaining a contact network and identifying one's own limitations and seeking assistance when needed. In the 21st century learning and work contexts, collaboration has taken on new dimensions which require people to work effectively with others that they have never met, don't know or will never meet face to face, but with whom they need to be able to cooperate on a common task or tasks. In the new workplace, collaboration requires that participants be able to take actions, which, together with those of others they collaborate with in the Knowledge Age, lead to achievement of objectives that benefit all the collaborators.

3.4.2 How can 21st Century Collaboration Skills be Taught Effectively?

To collaborate effectively in 21st century workplaces, graduates should be taught to work respectfully with different teams, not only in their physical workspaces, but also in their online interactions (Trilling & Fadel, 2009). They should be taught flexibility and willingness to compromise so as to reach the goal that benefits all collaborating parties. They should be taught and encouraged to take on responsibilities for joint work with others. They should learn to value the ideas and contributions of every member of the team of which they find themselves part. Students developing collaboration skills should be taught the five principles of cooperative learning which Kagan (1994) articulates as Positive Interdependence, Individual Accountability, Equal Participation, Group Processing and Simultaneous Interaction. In Positive Interdependence students learn that the gains of a team member benefit all team members and that the team as a whole succeeds only if every member contributes to the joint effort. The team sinks or swims together. In Individual Accountability, students are taught to be fully responsible for the contribution expected of them in the team effort. The principle of Equal Participation teaches team members to contribute their personal best to the joint effort. In Group Processing, collaborating members have the opportunity to reflect on their task and to share feedback on their progress. Simultaneous Interaction gives participants the opportunity to all be involved in the task, all-at-once, without standing by just watching other team members get on with the task at hand. In the guide to instructors involved with the training of people in collaboration skills, IBSA (2009) recommends encouraging trainees to work together as a team on a project and to practise giving and receiving feedback, strategies which are fully consistent with these Kagan's (1994) principles. IBSA (2009) also recommends, "developing

professional and social networks and participating in virtual worlds" (p.15) as part of teaching students collaboration skills. P21 (2014) suggests that students should be taught how to work effectively and respectfully with diverse teams, how to exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal, how to assume shared responsibility for collaborative work, and how to value the contributions made by each member of the collaborating team.

3.5 Creativity and Innovation Skills

3.5.1 What Do 21st Century Creativity and Innovation Skills Involve?

The Innovation and Business Industry Skills Council of Australia (IBSA, 2009) defines innovation as "consciously exploiting new ideas, or new uses of ideas, to add social or economic value" (p.1). In the past, creativity and innovation were perceived as secondary to the forces that mobilize economic activity and industrial progress. However, the 21st century Global Economy has an avid appetite for better processes, better products and new services, and "creativity and innovation are key drivers in the Global Economy" (P21, 2014, p.24). To cater for this demand requires that industries have a workforce that has the skills for creativity and innovation. As Trilling and Fadel, (2009) say, "Many believe that our current Knowledge Age is quickly giving way to an Innovation Age" (p.56). The skills most prized for creativity and innovation include the ability to solve problems in new ways, to invent new technologies or to create new applications of technologies already in existence. These are the skills that will shape the future alluded to by Daniel Pink (2006) when he said, "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. These people will reap society's richest rewards and share its greatest joys" (p.36). These skills should be taught to enable graduating students to reap such rewards and to share in the envisaged joy.

3.5.2 How Can 21st Century Creativity and Innovation Skills Be Taught Effectively?

The key to teaching creativity and innovation skills lies in creating quality learning environments that give learners the opportunity to solve authentic, real-world problems and to be inquisitive with an open mind. In such environments, learners are encouraged to utilize higher-order thinking skills that involve thinking outside the square, analyzing, evaluating, elaborating and creating (Anderson et al., 2001). They are challenged to stretch their imagination so as to come up with new ideas using well-tested creative thinking strategies such as brainstorming, mind mapping, visual creativity, word association, SWOT analysis, and lateral thinking (IBSA, 2009). Such strategies serve to generate new ideas, to open up the minds of learners to ideas they didn't know, to encourage them to build networks and to share their own ideas and to seek feedback on their ideas in order to improve on them. As creative and innovative thinkers students learn that the process of coming up with something new involves many trials, errors and mistakes and even failure. However, students learn that occasional failure and mistakes are part of the creative and innovative processes rather than a discouragement to an adventurous spirit. They learn to reflect on and to evaluate their experiences and to work with others to improve on those experiences, so as to come up with better or new ways of doing things.

4. Conclusion: Pedagogical Implications of Adopting the Learning and Innovations Skills Domain

Several educators (Holmes, Hughes & Julian, 2003), have attempted to predict different skills and knowledge levels and types that are needed to maintain the momentum of economic activity and social progress that are taking place in society. Developed by P21, the 4Cs that comprise the Learning and Innovations Skills domain, (critical thinking and problem solving, communication, collaboration, and creativity and innovation skills) are elements that are much in demand in the Knowledge Economy of the 21st century. As John Stocks (NEA, 2014) put it, "Using the Four Cs to engage students is imperative. As educators prepare students for this new global society, teaching the core content subjects – math, social studies, the arts – must be enhanced by incorporating critical thinking, communication, collaboration, and creativity" (p.3). It is thus a pedagogical imperative that education providers at all levels of instruction and learning provide effective training in these skills so that their graduates will be ready to apply them in the workplaces and occupations that they will enter on graduation.

It is not sound pedagogy to assume that any of the 4Cs will be a concomitant result of other forms of training that students will experience. They need to be explicitly, and effectively taught in their own right, following many of the strategies suggested by many leaders in the field, including Dewey (1910), Brookfield, (1987), Esterle & Cluman, (1993), Pohl (1997), Senge (1999), Kompf & Bond, (2001), Moore (2009), Trilling & Fadel, (2009), Le Cornu (2009), and Facione (2011), reviewed in this paper.

These 4Cs skills need to be prescribed among the highly valued learning outcomes that graduating students are expected to achieve as part of their training. They should also be included in the states and national high-stakes

examinations. As such, they represent a new approach to teaching, learning and assessment – a new pedagogical paradigm, suited to the Digital Age of today rather than the Industrial Age of yesterday.

The orthodoxy academic skills such as the 3Rs of reading, -riting and –rithmetic, continue to be essential for a basic education but they are no longer sufficient for productive engagement in the Knowledge Economy. The 4Cs are not just supplementary to the 3Rs and traditional academic skills. They are foundational skills for success in the 21st century. Failure to equip graduating students with the 4Cs will turn out graduates ill-equipped for the skill-demands that lead to positive change and success in the Digital World.

Success of this new pedagogical paradigm which includes the 4Cs, require changes at four levels, at least. First, there is need to accept that the world outside schooling and other spheres of academia has changed and so schooling and academia can no longer continue to do 'business as usual' in this new world order. Continuing to teach without change because **T**hat's **T**he **W**ay **W**e've **A**lways **D**one **I**t **A**round **H**ere (**TTWWADIAH** syndrome), is no longer a pedagogical option. It condemns educators and educational institutions to stagnancy and intellectual stalemate that leads to irrelevance in the 21st century economy. Second, educators and institutions need to educate themselves for change. It is one thing realizing that change is needed. It is another knowing how to implement that change effectively. This step might require in-service training and professional development to ensure that those charged with the privilege of educating learners for the 21st century are themselves well skilled in the 4Cs and can in turn teach them effectively to their learners. Thirdly, system-wide reforms are needed to reflect this new approach. It is at this level that educational policies, curriculum documents and educational programs need to be revised to incorporate the changes that will enable the 4Cs to be taught and assessed effectively. This will mean, for example, that learning outcomes be updated and assessment structures, including the high-stakes examinations, be re-designed to include the 4Cs. Fourthly, there is need to educate the public at large about the need for learners to be smart in the 4Cs. Parents and guardians of students should be partners in the joint venture of educating their children for the Digital Age. Not only should they know that the learning outcomes and expectations of their children have changed but they should also be encouraged to demand that their children be entitled to an education that will help them become productive citizens in the new Knowledge Economy. They have a right to expect, and to demand, that their tax dollar, be utilized to provide an effective education tailored to the success of their children in the Digital World. As the authors of *enGauge 21st Century Skills* (Burkhardt et al., 2003) warn, "not providing students with opportunities to develop 21st century skills and proficiencies will create a disconnect between jobs being created and the skills in the workforce" (p.9). As indicated earlier, the 4Cs – critical thinking, communication, collaboration and creativity – that compromise the Learning and Innovation Skills domain discussed in this paper are only one of the three domains that together constitute the 21st century skills. A focus on these skills is essential in the effective teaching of students to prepare them well for the future. These skills, as well as those in the other domains (the Career and Life Skills domain and the Digital Literacies Skills domain) that will be discussed in a later article need to be effectively taught to prevent the type of disconnect that Burkhardt et al. (2003) warn against. The possibility of this disconnect and the urgent need to take measures at all levels to prevent it has attracted the attention of the most influential decision-makers in the world, including the President of the USA, Barak Obama who has said, "I'm calling on our nation's governors and state education chiefs to develop standards and assessments that don't simply measure whether students can fill in a bubble on a test, but whether they possess 21st century skills like problem-solving and critical thinking and entrepreneurship and creativity" (Obama, 2009, p.5). Education providers at all levels, but particularly in higher education, should follow the lead of P21 and join the 21st century education movement so as to help all students become a well prepared citizenry and workforce that will succeed in the Knowledge Economy driven by critical thinking, communication, collaboration and creativity, and fueled by digital technology.

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