

May 15th, 9:00 AM

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Citation

Appiah, E., and Cronjé, J. (2013) ICT, ideation pedagogy and Innovation Education: setting a new paradigm in graphic design education, in Reitan, J.B., Lloyd, P., Bohemia, E., Nielsen, L.M., Digranes, I., & Lutnæs, E. (eds.), *DRS // Cumulus: Design Learning for Tomorrow*, 14-17 May, Oslo, Norway. <https://doi.org/10.21606/learnxdesign.2013.002>

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ICT, ideation pedagogy and Innovation Education: setting a new paradigm in graphic design education.

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Abstract: The introduction of ICT into graphic design education has also brought in some challenges as far as the pedagogy is concerned, as it requires relearning, training and upgrading. Whereas modern practices and education is flouted with ICT, the pedagogy of graphic design education, especially in the developing economies, which is an adaptation of the Bauhaus theory, is in variance with current practices in both the profession and in its education. As part of an ongoing stuHAGENdy, we discuss the literature of current graphic design practices as a contribution to the adaptation of Innovation Education (IE) in a specific Virtual Reality Learning Environment (VRLE) technology as way of looking at the paradigm shift due to the introduction of ICT in the developing countries. Some educational theories in the context of ICT and graphic design education are discussed. These discussions align with current ICT practices in the developing countries that call for a review of pedagogy that allows students to develop ideas digitally. It concludes with a call for an exploration of current ICT practices in graphic design education, that concern ideation and its pedagogy. We believe that if the much-touted potential of ICT to transform design education is to be realized, especially in the developing countries, then design educators will have to pay more attention to learning issues and the pedagogy.

Keywords: ideation, pedagogy, graphic design, innovation education

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Introduction

In the last two decades, learning has undergone tremendous shift in paradigm. These changes are mainly as a result of developments in information and communication technology (ICT), the commercialization and globalization of education, social changes and the pursuit of quality (Brown 2006: 109). Having realised the influence and the indispensability of information and communication technologies, graphic design educators are supporting the teaching and learning with ICT in one way or the other. This has resulted in new ideas and possibilities in the design education and its practices. Available literature shows that the online studio was advocated a decade ago in developed countries, as support for learning and teaching (Kvan 2001, Bennett 2000). Blended learning, which involves both traditional face-to-face instruction and asynchronous and/or synchronous communication via the Internet, is being introduced (Bender & Vredevoogd 2006:114). Latest courses are being designed in response to growing needs of ICT in design education (Bender 2005:4; Ranjan 2005:2) while collaborations in design projects are springing up due to the establishment of *virtual design studios* (VDS) especially in the developed economies.

Little attention is paid to graphic design pedagogy as it relates to ICT and ideation especially in the developing economies. Ideation, which is the process of brainstorming with images, letters, figures and sketches, plays a critical role in coming out with a design concept. Traditionally, ideation is viewed as paper-based activity and as ICT wages into the teaching and learning of graphic design, there seems to be disturbances in the practices as students veered into the use of ICT in their ideation process. While graphic design educators in the developing countries still hold on to the Bauhaus principles of design, which calls for identifying the processes of idea development in ideation on paper with its studio practices, students in their development seem to gain ideas on the use of ICT as they interact with technology. Should educators continue to strictly apply the same principles that characterised the Bauhaus pedagogy in this era of ICT? Moreover, with developing countries admitting more students in class, culminating in large classes, contrary to the Bauhaus principles that allow for few 'apprentices' to studio masters, can such pedagogy be applied in the current situation of ICT integration? With the introduction of ICT, what methods of ICT are there for the teaching and learning processes of ideation in graphic design and how effective are they for the educator and the learner in the developing economy?

Contradictions of current pedagogy

The Bauhaus principle, though out-dated, still informed the pedagogy of graphic design education, especially in the developing countries and continues to be the most famous ideas in design education in contemporary times (Franciscono 1971; Wallis, Williams & Ostwald, 2010). Anecdotal evidence suggest that this principle is still impacting on the teaching of graphic design, especially in developing economies. Its style of teaching has also influenced the pedagogy of design and is still widely accepted in the design education, if not art education in general. Its project-based pedagogy and ideology of studio method still include students hands-on practice skills, with the instructor observing and critiquing their work as they progress (Ellmers 2006).

Among the aims and ambitions of the establishment of the original Bauhaus was to tailor its teaching to the demands of the industry and therefore sought 'to establish contact with the leaders of the craft and industries (Whitford 1984:12). Such desire made the founders called teachers, 'masters' and students, 'apprentice' and

'journeymen' to signify that the school was to be part of real, working world (Whitford 1984:30). Moreover, workshop was to provide the basis of teaching, instead of studios with workshop – teaching as the tandem system. It has been suggested that the master/apprenticeship model shares a number of similarities with the 'studio' concept in today's design pedagogy in terms of the working environment, the use of projects and one-on-one interaction (Wallis et al. 2010:1). These similarities and achievements notwithstanding, there still exist a dearth of issues on technological and pedagogical gaps that require some re-directions and these call for pedagogical review in the current educational paradigm (Kowaltowski et al. 2010; Ehmann 2005; Yeoh 2002).

Lovett (2010) discusses the challenges and opportunities facing studio delivery in integrating art and design programmes under a new studio structure, typical of studio practices in the developing countries. Lovett's study is framed against the understanding that what is at stake in the attempt of the interdisciplinary studio delivery model is the preservation of a differencing of material, critical and cultural positions within design studio practices. Such interdisciplinary idea was the concept and principles of the Bauhaus studio model. The principle recognizes the facts of industrial production and distribution that artists and designers do mingle to produce commodities, albeit specialized ones (Lovett 2010:3). The reason for Lovett using the Bauhaus studio model which this present paper partially agree, is to recognize the potential for development through knowledge transfer. It is also to emphasise the need for rational and objective analysis in the design process, later referred to as a self-conscious process that starts with a problem in the actual world (Anon 2011:3). However, since current definition of graphic design now work across a variety of disciplines and media, what similarities of the Bauhaus do feature with current graphic design with ICT and its studio practices?

In the "workshop" or studio model, the Bauhaus introduced the design process based on model-making and encouraged experimentation and exploration (Gu 2003, in Sintusingha & Wu 2010:6). It also allowed for exploration of the real-world situation in the studios by developing experimental prototypes, to solve real world situations (Gu 2003:6). While Lovett's study strongly aligns with this argument especially with learners finding solutions to design problems using real-world scenario, it does not see the pedagogical inappropriateness with today's educational practices. The Bauhaus typifies the teacher-centred pedagogy, which allows for learners looking and following their 'masters' in the production of ideas to solutions. Current educational paradigm requires self-directed learning that plays such an important role in effective learner-centred education systems (Wang 2011; Wang 2009; Stensaker et al. 2007).

The other positive aspect that aligns with Lovett's study is the Bauhaus principle that embraced the interplay between technical and artistic idea of bipolar workshop structure. In the workshop structure each student had a *Master of Form* and a *Master of Craft* acting as mentors (Bennett n.d.); a tandem system of workshop teaching that equip learners with as much technical expertise as theoretical and creative. 'Apprentices' were instructed by masters of each particular craft (Workshop Masters) as well as by practicing fine artists (Masters of Form) (Broadfoot & Bennett, 1991:3). These however are informed by small class sizes against large class of students that typifies developing countries currently. This situation makes the 'master/apprentice' system of model highly ineffective as far as ideation by students are concerned in the studios within developing countries.

This paper agree with the assertion that before any progress can really be made concerning the process of ideation in graphic design, there should be a harmonious

relationship between technical and artistic ideas as both clearly contribute essential elements in the design process (Bennett n.d:8). But to the best of the author's knowledge, there is no research done to show that graphic design educators are really practicing professional designers and whose professional expertise and technical ideas clearly impart on their 'apprentices/students', at least not within scope. For architectural design education, there may be such.

Design institutions in the developing countries might have based their pedagogy on the Bauhaus in the wake that such studios had started with small classes allowing for the 'interplay between technical and artistic idea of bipolar workshop structure in which each student had a *Master of Form* and a *Master of Craft* acting as mentors' (Bennett n.d.). This paper makes an assumption that students will show some attitude of sidestepping and will distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed. This assumption is in reaction to large class sizes that characterize current graphic design studios in the developing economies. Indeed such a situation has called for this current discussion within this paper, in an effort to sensitise discussion and apply the suitable pedagogy for such studio classes with the advent of ICT.

Even though traditional methods of teaching allow teachers to play several active roles in the design courses, such as lecturing, setting out exercises, critiques to guide students through given design problems, conducting evaluation and assessment, and guiding discussions, they do not offer clear and active participation of students. The traditional methods make students' involvement so passive as listening, note-taking, following instructions and practicing the design skills discussed in critiques (Sagun et al. 2001:334).

Bender and Vredevoogd (2006) advocate for pedagogy that supports blended learning that will seek to support large studio courses. Bender and Vredevoogd (2006) argument supports the idea that since studios are unique learning environments embedded in a historical context, educators cannot do away with the traditional aspects. Bender and Vredevoogd (2006) therefore advocate the infusion of the traditional studio with online technologies that will serve as best practices. This paper agrees with their argument that today's studios have become more technological as the profession and it therefore require digital integration (Bender & Vredevoogd 2006).

Anecdotal evidence indicates that educators see these tensions as disturbing issues and a deviation of the learning outcomes of the pedagogy. The creative process and problem-solving strategies based on technological education are important because they enhance quality of solutions based on real-life problems. Ideation in graphic design is geared towards finding a solution, not only to studio works, but also to real-life challenges as far as design is concerned. Indeed, it is an essential part of the design process, both in education and in practice (Broadbent, in Jonson 2005: 613). The Bauhaus principles which call for the learner opening up to issues solely from the master might not be the most appropriate educational paradigm when it comes to ICT integration. Such a paradigm might be that of behaviourism and constructivism.

Behaviourism versus Constructivism

In educational settings, behaviourism implies the dominance of the teacher, as in behaviour modification programmes. It can, however, be applied to an understanding of unintended learning. Perhaps because behaviourists describe experiments in which

they structure learning for their subjects, attention tends to fall on ideas such as **behaviour modification** and the technology of behaviourism.

Behaviourism itself is more about a description of how learning occurs in the mind, as it were, than about how to make it happen, and when it is approached from this perspective that it gets most interesting (Atherton, 2011). What this means is that, in the learning process of behaviourism, the mind is excluded from the learning processes. The behavioural laws, according to Jonassen (1991), was a primary theoretical cause of the paradigm shift in learning psychology (Jonassen, 1991:6). In his discussion on instructional system technology in the field of learning psychology, Jonassen (1991) debunked this assertion and explained the role of the mind as 'a material entity that controls the actions of the knower' (Jonassen, 1991:7).

Jonassen (1991) went further to attack the theory of objective reality by posing that, 'if our learning theory assumes that we construct meaning for objects and events by interpreting our perceptions of them in terms of our past experiences, beliefs, and biases, then each of us mentally represents our own personal reality'. Such idea inference means, there will always be differences in the way we give meaning to a situation. In ideation in graphic design, it can be accepted as the basis for which educators cannot prescribe a lay-down approach for learners to gain ideas to achieve their design outcomes. This is because in graphic design, every design problem may have a different approach to its solution.

Jonassen (1991) advocates the need for objectivism and constructivism as the new philosophical paradigm for learning and education. He justifies the role of objectivism – that there is an objective reality – as what learners assimilate. And since the role of design educators is to help students learn about the real world it is the role of the teacher or the instructor to interpret events for them (p. 10). Juxtaposing this to constructivism, he conceded that perhaps 'what is transferred to the student is learned by the student without interpretation or reconstruction'. 'Rather than attempting to map the structure of an external reality onto learners, constructivists recommend that we help them to construct their own meaningful and conceptually functional representations of the external world'. This he supported and quotes 'objectivism and constructivism represent alternative conceptions of learning and thinking, much like the artist-scientist, two-world dialectic (Snow, 1960 in Jonassen 1991: p. 12). Constructivist pedagogy holds the promise of transforming the relationship between teachers and students in the direction of empowering learners to be much more active and interactive in the classroom (Means & Olson 1997 in Wang 2009:208)

Wang (2009) thinks constructivism is not new. Quoting von Glasersfeld (1989) and Hawkins (1994), he justifies this existence;

The fact is that this epistemological and educational paradigm resides at the heart of Western civilization in the teaching method of Socrates who elicited knowledge from students by asking them carefully- chosen questions. Human reason, leading to the discovery of eternal ideas beyond individual experience, after the manner of the ancient Greek philosophers Plato and Aristotle, was glorified during the European Renaissance, culminating in the philosophical writings of Descartes and the founding of modern science by Newton. Nevertheless, beginning in the seventeenth century European philosophers started to question what humans can actually know through the senses and rationality. Locke, Hume, and later Kant all argued that objective reality, independent of the person experiencing it, is unknowable. Once this sceptical attitude became fairly well established among intellectuals, the development of constructivism as an epistemological and educational theory was inevitable (Wang 2009:206).

According to Wang (2009), the strongest progenitor of constructivism should be the early twentieth century American philosopher John Dewey whose teachings, he believes is pragmatism. Wang (2009) refer to Dewey's philosophy as pragmatism because of its intellectual inquiry, which is not to understand reality apart from experience, but to learn how to function in the best possible way within any given situation. This, according to Wang (2009), Dewey called 'a theory of epistemology instrumentalism, a term that has virtually the same meaning as constructivism' (Field, 2007 in Wang 2009). Such teachings undoubtedly are known as pragmatism.

ICT and Constructivism

The introduction of ICT in design – its interactive and explorative nature – typifies the epistemology of constructivism in the educational theory. Wang (2009) in his discussions on the transformational promise of ICT for professional educators in architectural education comes out with the idea that ICTs have the potential for radically transforming educational practice. He also agrees that ICTs promote the constructivist paradigm of epistemology (Wang, 2009:206). 'If constructivism had not already existed, it seems likely that ICTs would have invented it to explain how they operate' (Wang, 2009). Quoting Murphy, Wang (2009) emphasised technology as being touted as an optimal medium for the application of constructivist principles of learning (Murphy, 1999 in Wang 2009).

Significantly, educators are rooting for learner-centred theory of learning which allows the student to gain knowledge in his discovery process, often quoted, as "students should construct their own knowledge". In graphic design, students need to make informed decisions as to the visuals and ideas that will communicate well with their thoughts. Using ICT allows students to search and apply their own creative thoughts, together with principles acquired in earlier projects. This help in transforming them from being passive and uncritical receptacles of past knowledge into being active and creative learners (Wang 2009:208). Such is Wang support for ICT in design education as being emphasised in this statement.

Wang (2009) bemoans the issue of pedagogy when it comes to ICT in design and questions why educators struggle to embrace technology while the necessary groundwork is not done in terms of getting enough pedagogical preparation to work with it. Accordingly,

"certain questions about implementing ICT for pedagogical purposes will not go away. Why is there such a gap between promise and practice? Who is to blame for the gap? Is ICT being forced upon the education system by enthusiasts and policy makers eager to be up to date and to compete in the global marketplace? Is constructivism, the educational paradigm that is always associated with ICT, appropriate for any level lower than postgraduate studies" (Wang (2009:210)?

He therefore advocates the need for scholars to continue examining these issues carefully together with other issues like the cultural context of ICT. Wang conclude his submissions with the statement that the "principal problems associated with using ICT for educational purposes appear to be a persistent failure to find a link between theory and practice and the difficulty of training teachers to use ICT creatively"(p. 211).

In her contribution to Foucault's 'Limit-experience', Thompson (2010) advocates a strong connection of learning to the concept of transformation.

'In learning, the learner gains a new perspective on the world as well as on herself. Learning means change and transformation.... Learning brings the individual in contact

with a different view of the world, and it is impossible for the learner to the viewpoint as it was maintained before (Thompson 2010).

At any point in time, one must see a change in the learning process. And this is even more significant with the introduction and use of information and communication technologies. What used to be working yesterday, might lead to a new knowledge today, which can also change the mode of learning and teaching tomorrow. With such knowledge, learners are able to construct new ideas and meanings in their studies. Such change might cause a paradigm shift in the pedagogy.

Discussing the use, updating and integration of ICT in higher education, Stensaker et al. (2007) assert that 'current teaching and learning schemes have, so far, not been adjusted to the technological development' as far as ICT in design education is concerned (Stensaker et al. 2007:427). The pedagogy of most of the design courses in the developing countries in Africa are still rooted in the Bauhaus principles of the 19th century, even though design educators are struggling to embrace today's technology of ICT. In the studio method of graphic design education, students practice hands-on skills with the instructor observing and critiquing their work as they progress (Ellmers 2006). Wang (2009) believes that this 'hands-on, exploratory, interactive nature of ICTs, particularly the Internet, causes them (students) to gravitate toward the postmodern epistemology and educational theory of constructivism' (Wang 2009).

One of the arguments against the use of ICT in the ideation process of graphic design is that it eliminates the learner/educator studio interactions. Technology affords the same academic interaction, however the introduction of ICT requires 'a different approach for social interaction such as online chats, virtual office hours, group projects and interactive software with live video and audio' (Dale 2006:4). If ICT can make any meaningful impact in the teaching and learning of graphic design, then the pedagogy should be re-defined. Quoting Bates (2000), Stensaker et al. (2007) argue that 'the main intention behind the use and integration of ICT in teaching and learning is often to change how teaching and learning are conducted in the sense of putting more emphasis on interaction, flexibility and innovation' (Bates 2000 in Stensaker et al. 2007:431). Stensaker et al. (2007) are therefore convinced that if such intentions are to be realised, it should 'be in the link between purpose, people and pedagogy that much can be gained' (Stensaker et al. 2007:431).

Making a case for a careful consideration of ICTs implementation in university programmes for the education of design professionals, Wang (2011) argues for constructivism;

Traditional instructivist models emphasise learning as assimilating, while constructivist models regard learning as a combination of diverging, converging and accommodating. All things considered, constructivism, with its emphasis on student-centred, collaborative problem solving and its vision of the teacher/professor as a coach or a facilitator, instead of a disseminator of knowledge, seems to be very well suited to the education of professionals.

ICT and Experiential Learning

Linked to constructivism is the experiential learning theory, which draws on the work of prominent 20th century scholars like John Dewey, Kurt Lewis, Jean Piaget and others. One of the pillars of the experiential learning theory (ELT), according to Kolb and Kolb is that ELT proposes constructivist learning (Kolb & Kolb 2005), where knowledge is created and recreated in the personal knowledge of the learner. Kolb and

Kolb (2005) define ELT as a situation ‘whereby knowledge is created through the transformation of experience and ... results from the combination of grasping and transforming the experience. ‘Not only does ELT combine cognitive and behavioural learning theories, but it also allows for affective changes to be recognised as learning’ (Wang, 2011:191). Through experience, learners also create their own knowledge of ideas that hitherto had not been conceived either by neither the learner nor the teacher.

ICT is allowing design students gain more knowledge in their ideation process than before and thus their ‘traditional idea capturing’ seems to be discarded. Not only are they seeking for better ways to capture their ideas, but also the fastest way to make them real. Conceptualization from the digital point of view also means focusing on the entire spectrum of design challenges. If learning is an active process of constructing rather than acquiring knowledge, and instruction is a process of supporting that construction rather than communicating knowledge (Duffy & Cunningham, 1996), then ICT is helping students to create knowledge when they engaged with the various ICT tools in the ideation process. What seem not to be clear are what, how and where the instruction should be aligned, with the introduction of ICT. Perhaps it is about time design educators and researchers look at emerging theory of ‘navigationism’.

Navigationism in the era of ICT

Brown (2006) in discussing the paradigm shift in education finds it difficult to accept that teachers and educationists still continuing to work within our “content-driven” paradigms of constructivism. In his article ‘Beyond constructivism: navigationism in the knowledge era’, he discusses how ICT is impacting on education and the shifts in the educational system for the past decade. Quoting Restak (2003:57) he indicated that, “within the modern age, we must be able to rapidly process information, function amidst chaotic surroundings, always remain prepared to shift rapidly from one activity to another and redirect attention between competing tasks without losing time” (Brown 2006:109). Accordingly, “providing our learners with preselected and carefully designed and developed content” in the current situation of changes in educational environment, especially with ICT means “we are heading for a disaster, if we are not willing to take the leap out of this fatal paradigm” (Brown 2006:116).

Brown therefore strongly argued for ‘navigationism’ as “the new learning paradigm that lies beyond constructivism”. He define navigationism as a learning paradigm where “learners should be able to find, identify, manipulate and evaluate information and knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others”(Brown, 2006:116). ICT is allowing graphic design students to locate the appropriate ideas within the virtual environment and studios, manipulate them for the development and execution of their desired objective as far as the design process of ideation is concern. Students might have gone through the stages in ideation using the traditional pedagogy but working within the virtual environment will make it difficult for them to trace and document these stages as required by the traditional methods of ideation.

Brown exhorts design educators to coach learners to identify, manipulate and evaluate information and knowledge, and to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others. “Teachers and educators should become the source of how to navigate in the ocean of available information and knowledge. We should become coaches and mentors within the knowledge era”. (Brown 2006:116)

What is needed and which will be much appreciated is ‘a paradigm that is underpinned by different principles, ‘based not on the acquisition of isolated facts and knowledge, but on the development of multidisciplinary connections with global networks and participation in communities of practice, together with reformed teacher roles, and greater autonomy and agency for students’. Educators should therefore adopt ‘pedagogies that move beyond instruction to creativity, innovation and generative thinking’ (Mcloughlin & Lee 2008:647).

New media and social software

Mcloughlin & Lee (2008) also takes the argument beyond constructivism. They propose a paradigm that blends social software, constructivism, connectivism and navigationism.

In an increasingly digital world, where ubiquitous computing and demand-driven learning are the trends, there is a need to expand our vision of pedagogy so that learners become active participants and co-producers rather than passive consumers of content and learning processes are participatory and social, supportive of personal life goals and needs.

The concept of studio activity is to allow for interactive participation of students and their peers to discuss and critiquing their works. In other words, studio teaching is seen as a “model of interaction” and for “assimilation of real-life situations”.

Mcloughlin & Lee envision that;

the affordances of these technologies, coupled with a paradigm of learning focused on knowledge creation and networking, offer the potential for transformational shifts in teaching and learning practices, whereby learners can access peers, experts, the wider community and digital media in ways that enable reflective, self-directed learning (Mcloughlin & Lee 2008:649).

Implications for graphic design pedagogy

With the introduction of ICT, there seems to be pedagogical disturbances calling for a shift in paradigms informed by the introduction of ICT as far as ideation and ICT in graphic design education is concern.

The field of graphic design is much broader now than in the past and now includes disciplines such as motion graphics, environmental commodities, and new media. It has evolved from the pre-historic abstract geometric shapes to include a spectrum of ideas for film and TV and all manner of visual communication and design. It also involves understanding human engagement in an effort to useful and pleasing artefacts.

It is now almost impossible to talk about graphic design without the use of technological resources from idea development to final execution of the design solution. Computer technology has become one of the tools of ideation, in other words, a ‘thinking tool’ (Dorst and Cross 2001). It is a fact that professional designers and student designers will rely very heavily upon technological tools like ICT and its techniques to make sense of their ideation within their respective design tasks.

Current educational pedagogy cannot fully rely on the Bauhaus principles that defined the process of design as an object-centred process, which has to produce an artefact or environment that solves a problem. Moreover, the pedagogy that includes the issue of ideation - fundamental to the design process - but still viewed in the traditional model of professional graphic design does not accommodate ICT. We need an educational paradigm that encourages cognitive learning that comes with ICT and

therefore encourages the issue of pedagogy that use technology to facilitate such learning paradigms.

Methods of ICT for the ideation process

With the introduction of ICT in ideation in graphic design, educators need to ask themselves; what methods of ICT are there for the teaching and learning processes of ideation in graphic design? Graphic design educators are encourage to adopt pedagogies that move beyond instruction but that which encourage creativity, innovation and generative thinking (Mcloughlin & Lee 2008:647). Contemporary goals in education, particularly graphic design education will mean giving students the required tools to stimulate the search for creative solutions to problems, as well as a solid scientific basis for decision-making processes, especially in ideation. These are possible currently with ICT and researches have proved them to be successful. Through “digitisation” – ICT as a digital design tool – a student may render a word in sketches that will lead to further idea development of ideas and thus create a required solution (Wang 2011; Wang 2009; Stones and Cassidy 2007).

Thorsteinsson et al. (2010) in their studies on *Adoption of ICT in Supporting Ideation Skills in Conventional Classroom Settings* makes a contribution of ICT in idea development. In their studies, Thorsteinsson et al. (2010) show that ICT with ideation is possible digitally, through Virtual Reality Learning Environment (VRLE) technology. With Innovation Education (IE) there is the possibility that one could use the VRLE tool for ideation in many course, including open and distance educational (Thorsteinsson et al. 2010:314). Page et al (2009) advocate that ‘individual must be able to adapt to novelty through Innovation Education (IE) environment which is increasingly relevant for ideation and collaboration, based on the notion that ‘everyone has creative ability that can develop further some degree through educational stimuli and self-developmental activities’ (Page et al. 2009:11). This article supports Page et al’s (2009) IE for the reasons that it see possibilities in using new knowledge to produce new products that stimulate and develop the creative abilities of students. IE also encourages the teaching, studying and learning in certain problem and innovation-based learning process; from identifying a context, where students develop their own and realization with appropriate models. Finally, IE encourages and develops the students’ initiative and strengthens their self-belief.

Effectiveness of ICT in graphic design education

ICT is encouraging graphic design students to be more innovative in their approach to design development. Spendlove and Hopper (2004) believe that ICT should be seen as a set of tools for developing ideas, and should be adopted as and when they are appropriate within the broad creative or design process (Spendlove & Hopper 2004:2). The argument of ICT as a tool or subject in graphic design will be settled when educators adopt the IE approach in design education. According to Page *et al* (2009), creativity and problem solving are not only intrinsic to design education but also to technology education. Quoting Loveless (2002) in their paper, Spendlove & Hopper, (2004) argue that, by providing new tools, media and learning environments, creative teachers and learners can use ICT to support ‘imaginative expression, autonomy, and collaboration, fashioning and making, pursuing purpose, being original and judging value’ (Loveless 2002:2 in Spendlove & Hopper 2004:2). The problems that need to be tackled then is when and how these tools should be adapted for effective development of ideas as far as current pedagogies are concern. As Spendlove and Hopper (2004)

remark, “it is now apparent that with the rapid introduction of new technologies, the time taken for them to be embedded into the curriculum and the time for them to impact upon pedagogy (favourably and unfavourably) is increasingly becoming shortened” (Spendlove & Hopper 2004:5). The time has come for educators to have the greatest opportunities for reflection prior to the introduction of new technologies (ibid).

Going further, this article encourages an on-going research of exploring issues that will greatly help in answer the question: what methods of ICT are there for the teaching and learning processes of ideation in graphic design and how effective are they for the educator and the learner in the developing economy. This can be achieved within the right and appropriate framework; an activity-oriented framework that relates to graphic design and show the tensions and imbalances in current pedagogy.

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