CREATIVITY METHODS IN TEACHING THE ARCH-DESIGN STUDIO

EIGBEONAN, Andrew B.

PhD Researcher in Architecture (Architectural Education), School of Architecture, Planning and Landscape,
Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom
Phone (Cell): +447440782434, +2348056703235
Emails: andrew.eigbeonan@gmail.com, andy_bodmas@yahoo.com

ABSTRACT

The aim of this paper is to search and find methods of fostering creativity or ideas relating to creativity in teaching the arch-design studio. Teaching creativity through its methods will be making the students grounded in designing with creativity ideas and therefore we can have professionals that design and build with satisfaction, safety and complementary. It means we can have real buildings and places that satisfy our clients, the society and in harmony with the environment. Although there are similarities in the curricula of training architects all over the world, but educators go about it in their own convenient and suitable ways and styles. The ideas of creativity have been part of architecture from the onset, but are not deligently applied and also not formally incorporated in the curricula of training. The topic is also very relevant and timely as arch-educators and other stakeholders are of the opinion that something has to be done to improve the ways and methods of training architects, especially the teaching of the arch-design studio with regards to creativity. Through exploration of literature and interviews (physical and telephone call) this paper finds methods of stimulating creativity ideas in the teaching of arch-design studio. Some of the methods of motivating creativity found in teaching the arch-design studio are: analogy, metaphors, biomimicry, brainstorming, attribute listing, mental map, TRIZ, restrictions, charrette, browsing, excursions, focus groups, other peoples viewpoints, using crazy ideas, using experts, visualizing a goal, working with dreams and images and giving students design tools such as drawings CAD and model making.

Keywords: Teaching and Learning, Creativity, Arch-Design Studio.

INTRODUCTION

History of Arch-Studio Teaching

The Ecole des Beaux Arts in France started the idea of the arch-design studio in the 18th century. It had a particular kind of teaching; theory in the classroom and design in the ateliers (studios). It provided academic architectural training and was open to students of any nationality. It attracted many architects from the US in the 19th and early 20th centuries (Conway and Roenisch, 2005) and became synonymous with architectural education in France, England and America (Moffett, et al., 2003). This system continued into the 20th century, initially within the offices of architects; the atelier of Le Corbusier, and at later stage within schools of art and design, and more recently within schools of architecture. The design studio is said to be the melting pot and therefore the core of the education of architects (Charalambous and Hadjisoteriou, 2009).

Arch-Studio Teaching with respect to Creativity

Horng, et al. (2005), argue that the concept of creativity must be a key factor in new teaching strategies and curriculum design. Also, Jeffries, (2007) reaffirms the need for new teaching methods in the design-studio to increase creative thought. There is a consensus on the necessary introduction of the concept of creativity in higher education (Altomonte, 2012) because creativity as a concept of bringing forward new ideas is seen by many as the driving force in the design process of architectural design education. But the objectives of creativity in building design should not be originality for its own sake. Essential is the search for new ways of solving problems (functional, technical, social, urban and aesthetic) in intelligent and environmentally responsible ways. Hence as this study has found out, creativity has become the driving force in teaching the arch-design studio.

STATEMENT OF THE PROBLEM

Many writers on architectural education have observed that the architectural design studio teaching is failing to meet the yearnings and needs of the users, societies, cultures, environments and technological developments as it was modelled after the curricula of the Beaux Arts and the Bauhaus. There is a need to bridge this gap to enable architectural schools to train students and young architects to relate appropriately to the society and develop appropriate architecture for

local and peculiar environment. Therefore the general consensus is that creativity should and continue to be the main force in teaching the arch-design studio. This is the purpose of this study and these various authors stress, argue and support the concept and ideas of creativity in teaching the design studio to bridge this gap and agree that it is an important venture (Olotuah, 2001, 2007, 2012; Adeyemi, 2000, 2012; Buchanan, 2012; Bala, 2010; Koutsoumpos, 2007; Kowaltowski, 2009; Crul and Diehi, 2010; Parashar, 2010; and the UIA/UNESCO 2002, 2003, 2005).

DEFINITION OF TERMS

Creativity - Creativity is a concept for bringing forward new ideas and shunning repetition of unproductive ideas (Kowaltowski, et al. 2010). The Windsor Forum, (2004) members buttress this that making architecture has always been learning and adding on precedents. Creativity is different from originality, though both require imagination and resourcefulness and manifest themselves with maturity or experience. This study therefore is an exploration of creativity ideas or methods of teaching in the architectural design studio for a holistic learning experience. Though creativity cannot be learnt but can be encouraged, motivated or fostered in arch-design education by the following - setting well defined problem limits, imposition of restrictions (building codes, site conditions, costs, etc), brainstorming/visual brainstorming, browsing, charette, excursions, focus groups, other peoples viewpoints, using crazy ideas, using experts, visualizing a goal, working with dreams and images, etc and giving students design tools such as drawing, CAD and model making (Kowaltowski et al., 2010). This study and in agreement with several authors such as Coriddi (2008), Parashar, (2010) and Kowaltowski, (2009) argue that creativity should be and continued to be the driving force in teaching the arch-design studio.

Teaching and Learning – This is the act or profession of giving instruction (Ughamadu and Okoye, 1998). Teaching is synonymous with learning and both make up an education, of architects. The effectiveness of any system depends on the quality and devotion of the individuals involved in teaching (Ughamadu and Okoye 1998). Thus, that process or activity the teacher designs to make teaching is to target learning, as teaching is to bring about learning. As the learner is placed under the teacher's guidance and direction and both involved in activities, the learner not only interacts with the teacher but with the entire teaching environment, knowledge, information, facts, altitudes, skills and values which are the ingredients of the content to be learnt as passed on to the learner through teaching.

The types of learning in architectural design studio are: problem-solving, learning by doing, reflection-in-action (Schon's) – the student reflects on the action of the instructor and the instructor reflects on the action of the student – these mutual reflection activities form the critique process (Demirbas and Demirkan 2012). Surfice to say that motivation is an important ingredient to (in form of incentives, urges and drives) effective learning, that is, it makes students to perform any act satisfactorily or well. The general teaching method in architectural design is by the 'project method'. Although in the empirical study by Demirbas and Demirkan, however, it was concluded that there is a shift from learning by experiencing (CE) and learning by doing (AE) to learning by reflecting (RO) and learning by thinking (AC). All of these four learning styles occur in the design studio process.

Arch-Design Studio - This is the melting pot of training architects in higher institutions. "The Architecture Studio – Tutorial-Learn By Doing Experience: As a learning experience, the architecture studio can be related to music tutorials, dance and art studios, and similar educational experiences. It is a cross between one-on-one tutorial education and the learn-by-doing character of apprenticeship. The student does something with guidance and then gets critical feedback on what has been done. Then the student does it again and again, with subtle or great differences, and again receives critical feedback. Each effort is a learning experience, an increase in knowledge, in knowing how and what to do, in the ability to develop self-criticism and self-motivation" (Steven W. Hurtt in Widsor Forum 2004, p. 263). Gross and Yi-Luen (1997) emphasise that the arch-design studio is king: it is where the knowledge about buildings is applied, and it is where the act of designing – generating, evaluating, and developing alternatives – is learned and practiced. A recurring challenge of architectural education is thus to integrate domain material taught in lecture format courses into the design studio learning experience. In the highly social environment of the design studio students learn to critique and to respond to criticism, and teaching and learning are achieved by collaboration, integration, adaptability and motivation.

METHODOLOGY

This study is by exploration of literature and interviews (physical and telephone calls) from the stakeholders of architectural education. Their arguments are critically analysed and findings presented for any one/school to refer and adopt.

IMPORTANCE OF FOSTERING CREATIVITY IN TEACHING OF THE ARCH-DESIGN STUDIO

Why Creativity? / Reason for Creative Thinking

Koutsoumpos, (2007) re-calls that architectural design education is expected to teach creativity and as Asasoglu et al. (2010) have argued that the conflicts of modern times demand high levels of creativity from the architect. Creativity, with all its social and physical connotations, should therefore be the guiding concept in the revision of architectural education. Therefore creativity must be fostered in teaching the arch-design studio because it takes care of designs that work (serve functional requirements, satisfactory, buildable, etc.).

Kowaltowski, et al. (2009), and most other authors as shown in this study argue that the architectural design process is based on a creative phase where creative thinking is highly valued, and that with increased complexity in the design world, the stimulus for creative thought should no longer rely on talent alone. Creativity or creative thinking, as a concept of bringing forward new ideas, is seen by many as the driving force in the architectural design process and in variety of other fields (Horng, et al. 2005; Sternberg, 1991; Iashin-Shaw 1994 and several others). Boden (1999) however warns that novelty is not sufficient to classify a solution as something creative or original. The idea has to have a specific purpose and solve a determined problem. Alecar (1996) shows that relevance to a context is of extreme importance for a product to have scientific, technological, social and aesthetic value.

Benefits of Fostering Creativity in Teaching of the Arch-Design Studio

From analysis of the International Association of Architectural Schools, AIAS' Studio Culture Task Force Report in the United States on 'The Redesign of Studio Culture', December 2002, this study states the benefits of fostering creativity in teaching the arch-design studio as follows:

1. Creation of better designs – The arch-design studio teaches critical thinking and creates an environment where students are taught to question all things in order to create better designs; therefore fostering creativity in teaching the arch-design studio will offer tremendous potential for creative discovery, exploration of ideas, critical discussions, and risk-taking.

2. Opportunities for collaboration and working with 'real life' situations; as Bill Clinton, the former president of the US would say; "what really works successfully outside there is collaboration" (Clinton, B. 2012). Collaboration is the art of design, as students are served better by learning about the value of collaboration.

3. Promotion of interdisciplinarity – Arch-design is inherently an interdiscinary act as architectural education must depend less on skill-based learning and more on the dissemination of knowledge. Twenty-first century architectural problems are complex, demanding multidisciplinary responses and attention. At a fundamental level, successful instruction must incorporate knowledge about the complex processes of real-world design application.

4. Building of Culture – of optimism (providing time and opportunities for student extracurricular efforts), respect (where students are respected for their ideas and engaged as partners in design studio decision making), sharing (to encourage students to work collaboratively, education must place a priority on communication, teaching of writing skills must be paid attention to; - Boyer and Mitgang, 1996, p. 70), and engagement (by embracing a culture of engagement, architecture schools can prepare students to serve as leaders, successful architects, and, above all, good citizens. Leadership is a process that can be learned and developed through education and experiences. The value of architectural education and the profession will increase by engaging students within the community. Architecture schools can make a commitment to enhancing citizenship. "Graduates should be knowledgeable teachers and listeners, prepared to talk with clarity and understanding to clients and communities about how architecture might contribute to creating not just better buildings, but a more wholesome and happy human condition for present and future generations" - Boyer and Mitgang, 1996, p. 129). To accomplish this goal, students must gain experience working with communities and learning first-hand about the issues that are important to society. The architecture community would be well served to learn the necessity of acting as creative listeners who focus more on embracing the public as opposed to educating the public. There should be a number of design/build courses and community design courses in the curriculum. These opportunities should be amongst the most popular with students, as they offer incredible potential to strengthen architect-

tural education. Through these community outreach efforts, students typically are exposed to collaboration, real clients, hands-on learning, community interaction, economic issues, and the realities of designing within constraints.

Criticisms of Creativity

Creativity is, being innovative, entrepreneurship, ability to bring into being by force of imagination. Although members of the Windsor forum (2004) agree that creativity cannot be taught but manifests with time on practice and can be fostered. Kowaltowski, et al. 2010 show evidences that higher education seldom adopts practices that favour creativity. Thus most graduating professionals are capable only of applying what is common knowledge in conventional ways (Alencar and Fleith, 2004). Students imitate the style of fashionable architects without understanding the implications for users or the appropriateness for local context. And less experienced students view architectural design as an opportunity to express their inner creative urge, rather than as a challenge to resolve a complex set of technical and social issues (Gross and Yi-Luen Do, 1997).

The architectural design process is based on a creative phase where creativity is highly valued and literatures on creativity are rich in ways to stimulate the decision-making process, but the tools are rarely formally present in the building design process. The results indicate that instructors apply methods that may stimulate creativity mostly informally, with some positive results (Kowaltowski, et al. 2010).

Despite the above crticisms, several authors like Steve, (2002), Morrow, et al. (2004), Holloway, (2013) and Thompson, (2013) have all find the importance of creativity in the training of architects, that it will lead to producing creative architects and consequently functional, adaptable and beautiful architecture. This study in agreement with these authors contends for ideas or methods of creativity to be fostered in teaching the arch-design studio.

HOW TO FOSTER CREATIVE THINKING IN ARCH-DESIGN STUDIO TEACHING

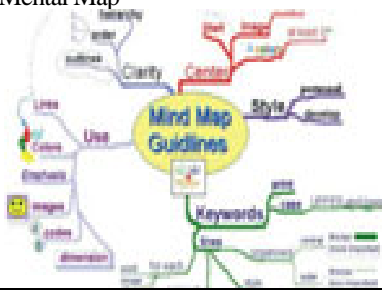**Methods that may foster creativity in teaching the arch-design studio**

From this study exploration of literatures, the followings are found to be methods that may foster or stimulate creative thinking in teaching the arch-design studio:

(1) Restrictions – building codes, site conditions, costs, etc. (2) Brainstorming (3) Analogy/ies (4) Removing mental blocks (5) Tools - like CAD (6) Techniques - like drawing/drafting technique (7) Protocols of good practice (8) Structure - good structure of design problems (9) Cognitive - cognitive thinking (10) Philosophy - philosophy of design methods (11) Research (12) Theories of Architecture (13) Synecticts (14) Morphological Charts (15) Criticism (16) Historical Drawing (17) Model making (18) Attribute Listing (19) Axiomatic design method (20) Bio-Mimeticry (21) Browsing (22) Precedents (23) Architectural Values (24) Charrettes (25) Component Detailing (26) Doodling (27) Testing activities (28) Exaggeration (29) Excursions (30) First Principle (31) Focus/Focus Groups (32) Mind Mapping (33) Other Peoples Viewpoints (34) TRIZ (35) Think Tank (36) Using Crazy Ideas (37) Using Experts (38) Visual Brainstorming (39) Visualizing a Goal, (40) Doing Sketches (41) Working with Dreams and Images (42) Repertoire learning (43) Computer screens (44) The Creative Pause (45) Outputs (46) Chanllenge (47) Alternatives (48) The Concept Fan (49) Concepts (50) Provocations/Setting Up Provocations (51) Movement (52) Phototyping (53) The Random Input (54) Sensitizing Techniques (55) Visualizing a Goal (56) And having a critical knowledge and application of structures, materials, colours, light, shadow, lines, planes, masses, space, etc., can result to creativity too (Asasoglu, A. 2010 et al).

Many of these methods are traditionally part of the design process, such as Charrettes, and those that emphasize visualization of ideas (Goldschmidt and Smolkov 2006 and van der Lugt 2005). Olotuah (2012) and Buchanan, (2012) recommend a learning design project involving architectural, structure, planning and approval, costing and construction in one of the years or semester of study. The teaching staff should have physical building experience, and learning should be towards the cities, not only where they eventually work but for inspiration and exploration for themselves (Boyer and Mitgang, 1996). It should be remembered that low student number stimulates learning as students will have the opportunity for learning from each other. The teacher must be talented at crit and the participation of the practitioners should be a selection of the interested and experienced, who have actually designed and built projects (Adeyemi 2012). Students can be asked to demonstrate their analyses as sketches, models, scenario discussions, posters, 2D and 3D images, initial site plan drawings and physical models to be completed on a small scale (Bala, 2010).

Glossary of various methods that may stimulate creativity in teaching the arch-design studio.

Method	Description
Analogy	Association of uncommon ideas and concepts coming from other domains to produce new, innovative solutions. Analogy is considered the most appropriate technique to enhance creativity in students. The technique is appropriate for all course levels. Design methodology courses and sustainable design can profit most from the application of Analogy. The advantages of this method are the possibility of increasing students' repertoire. Analogies help the design discussion by integrating meaning and communication to design.
Metaphors	This is also association of uncommon ideas and concepts coming from other domains to produce new, innovative solutions. Metaphors increase the exploration of various design solutions and develop lateral thought processes, but thought that analogy is a difficult method to apply in the design-studio system. The main problem is related to finding adequate examples and avoiding shallow associations, which may compromise design choices. Students lack analytical tools to reflect with some depth on their design problem and this causes difficulties in using analogies as a design tool. With time and increased experience, students will learn to see a design problem from various angles, both conceptually and as abstractions. Once they are able to proceed this way, analogies are applied with more ease and productivity.
Biomimicry	Finding models in nature which are similar in problem definition and which may be imitated or may inspire solutions. Biomimicry is considered the transfer of technology between life forms and man-made constructs. The analysis of nature's systems may lead to the seeds of inspiration in a creative design process and Biomimicry is a method increasingly employed in design processes of famous architects like Ken Yeang and Calatrava. For instance, an often cited example is the Eastgate Centre in Harare, Zimbabwe; a shopping centre designed by Mick Pearce and built in 1996. The thermal comfort of the building is supported by principles discovered in termite mounds. Ken Yeang uses other examples. The understanding of the chemical structure of DNA may stimulate the conception of building elements and as an analogy; a pile of dishes of a restaurant kitchen demonstrates that building slabs may gain in stability when rotated.
Brainstorming	Spontaneous generation of large number of ideas and/or possible solution to a problem, with choice of best solution only at the end of the process. Brainstorming is probably the best-known method to stimulate creativity, where experts from various fields put their ideas forward without prior judgment. There are basic rules to Brainstorming: Focus on quantity; No criticism; Unusual ideas are welcome since they combine and improve ideas. Brainstorming is a conference technique by which a group of people attempts to find a solution for a specific problem by amassing ideas spontaneously.
Attribute Listing	Decomposition of a problem into attributes or key-factors which may be improved changed or substituted. This breaks the problem into parts and investigates them individually. The technique consists in identifying essential characteristics of a product or process and reflects on ways to modify and improve them. An inventory of all aspects of a problem should be made: types of material used, dimensions, building technique, fabrication process, user requirements, etc. Once the list is ready, priorities are marked and alternatives suggested. The combination of ideas increases exponentially with the number of attributes.

Method	Description
Mental Map	Diagrams of items organized around a central concept with connections and branching on a theme or proposition. Mental Map or Tree diagram is based on the potential of idea generation when structured according to initial concepts. This method is usually associated with the visual representation of ideas, to help the ''free association'' process of Brainstorming. Ideas are classified, structured and visually presented. By mapping information, rapid expansion and exploration of an idea occurs. Analogy of images may be part of this method. In design processes, this method is often identified in the drawings of architects, especially in first sketches.
TRIZ	Structure a problem into its generic domain and search for the solution through a matrix of 40 principles found in patents. In TRIZ, problems are structured according to 40 basic inventive principles, identified as: weight of moving object; length of moving object; speed; force; stress; shape; temperature; illumination intensity; power; loss of energy, time, substance, information; reliability; ease of maintenance, operation repair; etc. If these principles are identified and codified, they could be taught to people to make the process of creativity more predictable. The transfer of TRIZ principles to the architectural design process was attempted and the case study presents some promising results in relation to facilitating decision-making. 16 specific architectural design goals including environmental comfort (visual, thermal, acoustics and smell), ergonomics, efficiency, equilibrium, flexibility, visual impact, independence, movement, functionality or practicality, productivity, rationalization and security and safety were used.
Design Repertoire	This is a design reference with concept of creativity. Design repertoire is of prime importance to enhance the creative process. Conceptual abstractions, coming from references, create bridges between mental and physical activities and are the basis for deeper exploration of theoretical concepts of design repertoire. Formal repertoire is also known to be the most often applied information in the design-studio. Given a specific design reference, a student may learn to identify relevant concepts and build a theoretical basis for his/her design knowledge, which can then generate new design solutions.
CATWOE	Technique consisting in seven steps: Appreciating the unstructured problematical situation. Understanding the worldviews of the key stakeholders. Creating root definitions of relevant systems. Making and testing conceptual models based upon worldviews. Comparing conceptual models with reality Identifying feasible and desirable changes Acting to improve the problem situation.
Assumption busting	A list of assumptions about the problem is made. Correctness in relation to the problem at hand is tested. New assumptions appear and the most applicable of these are used to find solutions.
Morphological analysis	A problem-solving technique based on problem structuring and elimination of the illogical solution combinations.
NAF (Novelty, attractiveness and functionality)	Solutions are analysed as to their novelty, attractiveness and functional usefulness. Grades are given on a 1–10 scale for each attribute.
Other people's viewpoints	Technique to encourage people to adopt unfamiliar viewpoints during a problem discussion.
PDCA (Plan, Do, Check, Act)	PDCA is a four-step problem-solving process also known as the Deming Cycle. Starting with: PLAN: Establish goals and processes necessary to deliver results in accordance with the specifications. DO: Implement the processes. CHECK: evaluate the processes against the goals. ACT: introduce action to improve the process and start the PDCA process over.
QFD	Method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.

Method	Description
Random stimuli	Random stimulus is based on randomization with exploration of associations to novel non intentional ideas. The Random Word technique starts with a random word used to generate new associations. This helps to look at problems from unusual sides directing thought toward creative solutions.
Group discussions/Design Criticism by Students.	Group discussions and design criticism by students of the work of colleagues. Group discussions permit students to think beyond their own work. The exchange of ideas can help design development mutually. Learning from others is valued as a stimulus to the divergent thought process.
Charrettes	Concentrated short period design exercises are positive methods that may productively stimulate creativity.
Six sigma (DMAIC and DMADV)	The methodology consists of: Define process improvement goals consistent with customer demands and enterprise strategy. Measure key aspects of the current process and collect relevant data. Analyse data to verify cause-and-effect relationships. Determine the elationships and ensure that all factors have been considered. Improve the process based upon data analysis using techniques like design of experiments. Control to correct deviations from target. Set up pilot runs to establish process capability. Finally move onto production, set up control mechanisms and continuously monitor the process. This method is mostly used in Construction Management.
Six thinking hats	The hats represent six thinking strategies identified by Edward de Bono, consciously applied in techniques to enhance creativity. Red hat—Emotional thinking. Yellow Hat—Positive thinking. Black Hat—Critical thinking. White Hat—Facts. Green Hat—Creative thinking. Blue Hat—Big Picture.
SWOT (Strengths, Weaknesses, Opportunities, Threats)	A strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project by identifying the internal and external factors that are favourable and unfavourable to achieving that objective.
Synetics	Synetics is a technique to generate and evaluate ideas. In the first session the problem is analysed. In the second session the problems is described and the scope of action determined. Ideas are generated (using other techniques). Idea springboards are identified to focus on the solution realm. Possible solutions are brought forward. These are analysed and a new cycle of synetics may have to begin if the solutions are rejected until a consensus is reached.

The methods that are promising and especially useful in the idea generation phase of design processes are Analogy, Attribute list, TRIZ, Brainstorming, Mental Mapping and Biomimicry (Jones 1970; Altshuller 1984; Gero 2000.)

Evidence of body of knowledge in an architectural piece can also foster creativity. The great practitioner Andres Duany in Windsor forum (2004) argues that in a school of architecture, it is important to deal with architecture in a rigorous way. And that if you look at the work of architects like Aalto and Corbusier in terms of style, it is all over the place. But the quality is very high because there is a certain rigour; there is a body of knowledge.

Table of Classification of various methods that may stimulate creativity in relation to phases of the creative process (Clegg and Birch 2007; Mycoted 2007)

Creative process phase	Methods
Problem definition	Assumption Busting; Assumption Surfacing; Backwards Forwards Planning Boundary Examination; CATWOE; Chunking; Six W's and Hs; Multiple Redefinition; Other Peoples View Points/Definitions; Paraphrasing Key Words; Why Why Why?
Idea generation	Analogy; Attribute Listing; Biomimicry; Mind Mapping; Morphological Analysis; Nominal Group Technique; Pictures as Idea Triggers; Pin Cards; Random Stimuli; Talking Pictures; TRIZ, Metaphor, Brainstorming.
Idea selection	Advantages, Limitations/Restrictions and Unique Qualities; Anonymous Voting; Consensus Mapping; Idea Advocate; NAF; Plusses Potentials and Concerns; Sticking Dots; Unique Qualities.
Idea verification	PDCA; QFD; Six sigma.

CONCLUSION

As have been strongly argued by the relevant stakeholders that architectural design education is expected to teach or foster creativity because in the design studio the students are supposed not merely to learn how to form space, how to shape places or how to fashion buildings according to a pre-existing pattern. In support of this study we, as teachers, have the responsibility to break this conformity, make them think innovatively, have a fresh view on the built environment, be able to design a world even better than before, a world that possibly we cannot even imagine. Re-collecting Asasoglu et al. (2010) have argued that the conflicts of modern times demand high levels of creativity from the architect, as creativity, with all its social and physical connotetions, should be the guiding concept in the revision of architectural education. Also this study finds too that students (irrespective of their inborn talent levels) learn creative modes of thinking that are highly important in practicing architecture. Nevertheless some educational philosophers might have argued that creativity is congenital, and that it cannot, therefore, be taught. It may be true that talent, inclination, intention and determination help to realise creativity at an early age, but as Bruner, (1963) and Illich, (1970) as cited by Kowaltowski, (2010) have argued; through conducive and eliciting teaching methods anyone can be sensitised towards a rich variety of ideas, outside influences, knowledge and creativity at a proper age.

In agreement with Medawar (1969) as cited by Kowaltowski, (2010) that posits that creativity is a rapid intuitive deduction, which owes its power to the infirmity of our powers of reasoning, an illumination, or a kind of awareness, or yet a generative act in architectural discovery, which obviates an image of a fragment of a possible world, hence creativity ideas in teaching the arch-design studio must be taken seriously. It cannot be learned perhaps, but it can certainly be encouraged and abetted, and these we must do by through the teaching methods enumerated in this study.

REFERENCES

Adeyemi, E. A. (2000). Lest we forget, *Text of a keynote address at the annual general meeting of the Association of Architectural Educators in Nigeria*, at FUT, Akure, 24-27 Feb.

Adeyemi, E. A. (2012). *Phone Call Discussions*, January and April.

Alencar, E.M.L.S. (1996). A gerencia da criatividade: abrindo as janelas para a criatividade pessoal e nas organizacoes. Sao Paulo, Brazil, Makron Brooks.

Altomonte, S. Ed. (2012). Sustainable Architectural Education: *EDUCATE – Environmental Design in University Curricula and Architectural Training in Europe*. EDUCATE Press, UK.

Asasoglu, A. et al. (2010). Basic design dilemmas in architectural education. *Scientific Research and Essays*, vol. 5, (22), pp. 3538-3549.

Altshuller, G. S. (1984). *Creativity as an exact science: The theory of the solution of inventive problems.* New York, USA, Gordon and Breach.

Bala, H.A. (2010). Sustainability in the Architectural Design Studio: A Case Study of Designing On-Campus Academic Staff Housing in Konya and Izmir, *JADE* Turkey, 29.3, Blackwell Publishing Ltd.

Boden, M.A. (1999). *Dimensoes da Criatividade*. Porto Alegre, Brazil: Artmed Editors.

Boyer, E. L., and Mitgang, L. D. (1996). [popularly referred to as the Boyer's Report] *Building Community: A New Future for Architecture Education and Practice*. A Special Report, California, Princeton Fulfilment Services; 1445 Lower Ferry Road, Ewing, NJ 08618.

Buchanan, P. (2012). What is wrong with architectural education? Almost everything. *The Architectural Review*. Accessed 04/02/2013.

Charalambous, N. and Hadjisoteriou, M. (2009). Introductory Architectural Design Studio: (re) Searching a New Approach. EAAE no 35. *Teaching and Experimenting with Architectural Design: Advances in Technology and Changes in Pedagogy.*

Clegg, B. and Birch, P. (2007). *Instant creativity: Simple techniques to ignite innovation & problem solving*, London, UK: Kogan Page.

Clinton, B. (2012). *US Presidential Democratic Party Convention*, September.

Conway, H. and Roenisch, R. (2005). *Understanding Architecture*. 2nd Edition, Routledge.

Coriddi, J. Ed. (2008). Policy and Practice; *A Development Education Review*. *Centre for Global Education,* Lisburn, Impression Print and Design NI Ltd.

Crul, M.R.M. and Diehi, J.C. (2010). Design For Sustainability, *A Practical Approach For Developing Economies*. Accessed 04/02/2013.

Demirbas, O.O. and Demirkan, H. (2012). *Focus on architectural design process through learning styles.*

Gero, J. S. (2000). Computational models of innovative and creative design processes. *In Technological Forecasting and Social Change,* **64**, (2-3), 183-196

Goldschmidt, G. and Smolkov, M. (2006). Variances in the impact of visual stimuli on design problem solving performance. *Design Studies,* **27**(5), 549-569.

Gross, M.D. and Yi-Leun Do, E. (1997). *The Design Studio Approach: Learning Design in Architectural Education*, Kolodner, J. & Guzdial M. (Eds.), College of Computing, Georgia Institute of Technology, September 8-9, Atlanta.

Gross, M. D. and Yi-Luen DO, E. (1999). *Integrating Digital Media in Design Studio: Six Paradigms.* http://depts.washington.edu/dmachine/PAPER/ ACSA99/ Retrieved 26 Jul 2011.

Holloway, L. (2013). *Eco Design – It's Not Just About Being Green*. Newcastle Institute for Research on Sustainability.

Horng, J. S. et al. (2005). Creative teachers and creative teaching strategies, *International Journal of Consumer Studies*, **29**, 352-358.

Iashin-Shaw, I. (1994). Cognitive structures of creativity: Implications for instructional design. *European Journal for High Ability*, **5**, 24-28.

Jeffries, K.K. (2007). Diagnosing the creativity of designers: Individual feedback within mass higher education. *Design Studies,* **10**(5), 485-497.

Jones, C. (1970). *Design methods*, London, UK: Wiley Bros.

Koutsoumpos, L. (2007). Confirming Conformity? Revisiting Creativity in the Design Studio, *Creativity/Conformity Conference.*

Kowaltowski, D. et al. (2010). Methods that may stimulate creativity and their use in architectural design edducation. *International Journaal of Technologiccal Design Education*, **20**, 453-476.

Moffett, M., Fazio, M. & Wodehouse, L. (2003). *A World History of Architecture*. Laurence King Publishing, London.

Morrow, R., Parnell, R. and Torrington, J. (2004) Reality versus Creativity? *CEBE Transactions,* **1**(2), 91-99(9).

Mycoted, (2007). *Creativity and innovation, science and technology: Tools, techniques books*, discussions. Accessed 11/02.2013. http://www. mycoted.com/

Olotuah, A. O. (2001). The Cross-Roads of Architectural Education in Nigeria. *Journal of Environmental Technology*, **1** & **2**.

Olotuah, A. O. and Adesiji, (2007). *Appraisal of Architectural Education in Nigeria.*

Olotuah, A. O. (2012). *Face to face discussion* with Prof. Olotuah in FUTA, Akure, Nigeria.

Parashar, S. (2010). Basic Ddesign Studio; *An Ongoing Research*, BKPS College of Architecture, Pune, India. Retrieved 04/02/2013.

Sternberg, R. J. (1991*). A theory of creativity. In Proceedings of XIV ISPA Colloquium.* Braga, Portugal.

Stevens, G. (2002). *The Favored Circle. The Social Foundations of Architectural Distinction*. MIT Press. USA.

Thompson, I. H. (2013). Landscape and Utopias, *SAPL Research Seminar, Newcastle University, UK.* 8th February.

Ughamadu, K.A. and Okoye, N.S. (1998). Principles, *Methods and Strategies for Effective Teaching.* KMENSUO Educational Publishers, Onitsha/ Agbor, Nigeria.

UNESCO/UIA (2002). Validation System For Architectural Education. *Text adopted by the XX11 UIA General Assembly* (Berlin, July 2002).

UIA/UNESCO (2003/2005). Work Programme Education. UIA/UNESCO Charter for Architectural Education.

van der Lugt, R. (2005). How sketching can affect the idea generation process in design group meetings. *Design Studies*, **26**(2), 101-122.

Windsor Forum/Viseu (2004); Forum on Design Education: *Toward an Ideal Curriculum to Reform Architectural Education*. Vero Beach, Florida, April 12-14, 2002. New Urban Press, Miami, FL.

Viseu - Conference of Council for European Urbanism in the Age of Globalisation. Hosted by the School of Architecture, Universidade Catolica Portuguesa in Viseu, Portugal. May, 2004.