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Assessing CAD Instructors' Perception of Students' Creativity in School Based Design Work in University of Ilorin, Nigeria.

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ABSTRACT

With the increase in the adaption of digital innovations in design, there are learned discourses on the extent of effect of these technologies on the creativity of students especially for school based design work. This research sought to assess Computer-Aided Design (CAD) Instructor's perception of students' creativity in school based design work with emphasis on the department of Architecture, University of Ilorin, Nigeria. The researcher adopted the Creative Behaviours Model (CBM) to serve as the yardstick for assessing student's level of creativity by their Instructors. This model divided creativity into seven measurable parts; novelty, appropriateness, motivation, fluency, flexibility, sensitivity, and insightfulness. A simple random survey method of data collection was adopted for this research where student design project were selected and administered to CAD instructors in the department alongside an assessment sheet designed using the CBM model. The results reveal that CAD instructor's perception of students' creativity in school based design work was average but with good chances of improvement.

Keywords: *computer aided design (CAD), Creativity, CAD Instructors, School Based Design*

INTRODUCTION

The earliest design known in prehistoric periods are cave paintings and drawings on surfaces like bone, ivory etc. Some of the earliest designs known to the modern world from almost 6,000 years ago were that of engraved stone tablets and ceramics cylinder seals marking the beginning of the historic development of design (Oladumiye & Ogunlade, 2014).

The technological advancement and recent innovations in design are some reasons why stake holders are of the opinion that the creativity of design students could be affected. There is also a need to measure their creativity while using CAD for their school based design work

(Devries, 2002). Therefore, this study or research tends to assess CAD instructors' perception of students' creativity in school-based design work in University of llorin.

This study is significant because in the design studio especially in the University of llorin, students go through unique and different kinds of practices under the supervision of instructors. It is also significant that instructors should understand their role of not only to teach students to be designers but to know the students skills in terms of creativity. It is also noteworthy that the Ilorin design school had experienced tremendous growth as the University and the Ilorin city refuse to be called a city without aesthetics and creativity . The creation of the Department of Architecture in the University of Ilorin is one the identity that Ilorin is City that regards aesthetics and creativity. It is believed that the influence of CAD as technology has also affect the teaching of architecture in various schools in which the Department of Architecture in the University of Ilorin is not left-out. Thus, this study or research tends to assess CAD instructors' perception of students' creativity in school-based design work in University of llorin.

THE DESIGN PROCESS

The Design Process is an approach for breaking down a large project into manageable chunks as seen in figure 1. Designers, Architects, Engineers, Scientists, and other thinkers use the design process to solve a variety of problems without neglecting their scribble of ideas and sketches throughout the process (Braha & Maimon, 2007)

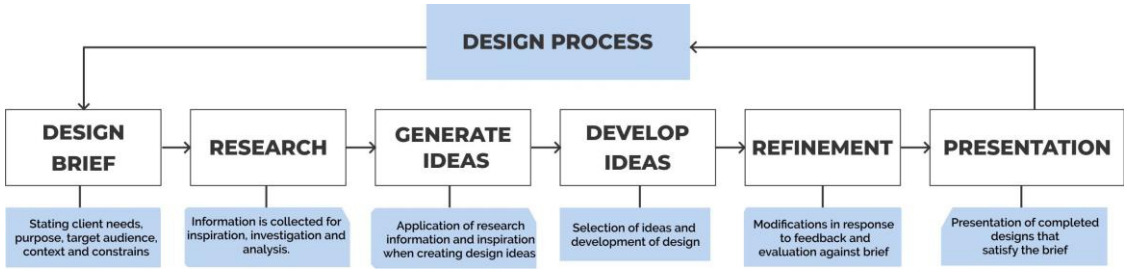


Figure 1: The Design Process.
Source: (Braha & Maimon, 2007)

According to another study by Chandrasekaran (1999), The design process begins with the identification of the problem and a proper research around related subjects. Other steps involve the analysis and synthesis of design components to form a system that meets design objectives while satisfying constraints that govern the selection.

However, keeping an open mind as a designer during the design process is important because creative ideas could surface at any stage in the design process. (Danah Henriksen, Carmen Richardson, Rohit Mehta, 2017).

The introduction of CAD may have brought a new era in how designers deal with their design tasks and generate creative ideas. CAD has gone through a progressive technology evolution for a wide range of users, from those undertaking less complex product design to more sophisticated and complicated design tasks. It facilitates various users' needs in designing activities including sketching in two-dimensions (2D) and three- dimensions (3D) (Musta'amal et al., 2014). Design presentations have been enhanced with the virtual reality features in CAD and designers now have efficient environment to communicate their design thinking and express their creativity.

CREATIVITY

The world is becoming more and more complex and technology seems to have touched everything from design to mass production, from communication to digital computing; making life today easier or in other cases more difficult, complicated or complex. Hence the need for creative solutions and round design and technology (Runco, 2004) . The flexibility characteristics exhibited by creative persons is what gives them the capacity to cope with these advances, opportunities, technologies, and changes that are a part of our current day-to-day lives.

Exhibiting creative behaviours in the use of Computer Aided Design (CAD) might be the innovative gap in designers that filling it will change their cause for excellence in the future. Fredricka (2014) differentiated both phenomena in very clear terms saying; Creativity and Innovation are not interchangeable. Creativity generates novel ideas and innovation implements these ideas. Creativity is the ability to come up with a new idea, process, or product. The people and companies that are innovative are able to harness those creative ideas and bring them to market in a profitable manner.

According to Ahn, Reymen, Ivashkov, & Overveld (2002), There is a need for every tertiary institution to include at least one course in creativity to help students in their different fields of study. The Federal University of Technology Akure (FUTA) might have taken a leap from Ahn et al. (2002) by introducing creativity in some departments like Industrial Design several years ago.

The quest to investigate the links between CAD and creativity is on the increase and submissions are that CAD should be regarded as a tool which when applied with the design process could give a better chance for creative outcomes. (Musta'amal et al., 2014).

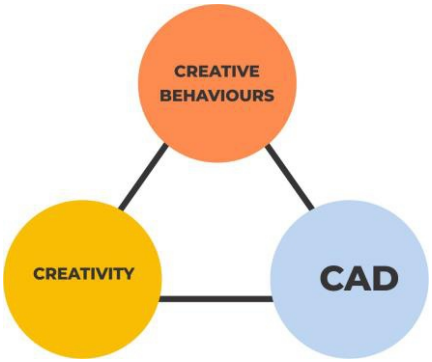


***Figure 2**: Linking CAD with Creativity in Design*
***Source:** (Musta'amal et al., 2014)*

A study by Robertson & Radcliffe (2009), pointed out that CAD impacts on creativity in design through an enhanced communication and visualization features allow designers to realize and communicate the products of their imagination, thus fostering the flexible development of design ideas. Lawson (2002) added that humans experience design more through visual senses and computers help designers in several ways especially because of their precision, accuracy and speed.

However, there is still a need to explore a measurable scale of impact, CAD might have on the creativity of design student.

FRAMEWORK TO CAPTURE CREATIVE BEHAVIOUR

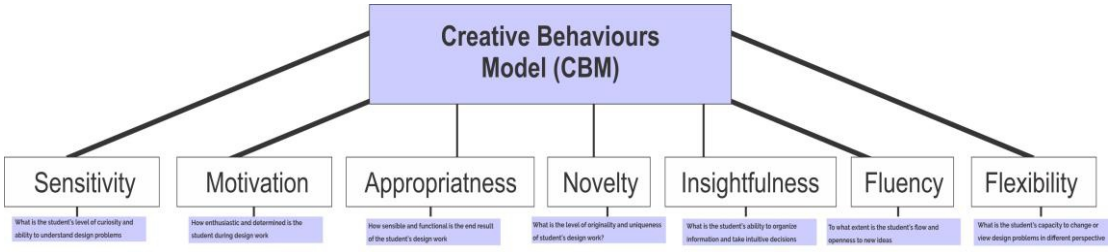


Figure 3: Creative Behaviours Model (CBM) and its Descriptors
Source: (Musta'amal, Norman, & Hodgson, 2009)

A framework to capture creative behaviour is necessary. Musta'amal et al., (2009) identified seven factors that form the Creative Behaviour Model (CBM) which serve as a framework to capture creative behaviour. These factors are sensitivity, motivation, appropriateness, novelty, insightfulness, fluency and flexibility. (See figure 3)

In order to clarify the nature and meaning of these seven factors, a brief discussion of each of them and their descriptor are stated below;

Sensitivity: is the ability to see problems. Creative individuals will not easily be satisfied with the status quo. They tend to see inappropriateness in things, and start to think creatively

from their dissatisfaction. This leads them to discover the core of hidden problems which are invisible to other people. It is an ability to put together the preliminary problem which requires solution. The outcome of this creative act will be instilled with aesthetic design element to attract public acceptance for their works (Musta'amal et al., 2009).

Hence, the descriptor for this factor is to know the student's level of curiosity and ability to understand design problems.

Motivation: This is also known as self-actualisation, a condition which indicates the need of individuals to sustain and enhance life in anticipation of their full potential. Creative people are motivated by challenging tasks, and excited by the opportunity to use their ability to solve problems in a novel way (Hatib et al., 2008)

Hence, the descriptor is; how enthusiastic and determined are the students during design work?

Appropriateness: A good idea or outcome can only be termed creative if it is appropriate in terms of use and purpose. In the context of creativity, it refers to a behaviour which shifts the status of uncommon ideas from not being only unique but functional and right. (Musta'amal et al., 2009)

However, the descriptor for this factor is; how sensible and functional is the end result of student's design work?

Novelty: According to Hatib, Norman, Khata, & Buntat (2012), novelty refers to creating something new and different from that which existed. As novelty is related to creative outcomes in the form of ideas or products, they will be expected to be original or uncommon. Novelty is one of the important elements in defining creativity and must have something to do with producing exceptional outcomes, which are unexpected or surprising, and completely unique. It is not enough for an outstanding product to be accepted as creative unless accompanied by appropriateness to the task.

Hence, the descriptors for this factor is understanding what is the level of originality and uniqueness of student's design work.

Insightfulness: this is the number of different knowledge domains the product contacts. The outcomes of an insight by a creative person may have sensible inferences of use that lie outside of the framework in which it was initially visualised. Insightfulness also refers to a sudden vision of strategy for a long unsolved solution that comes from previous hard work. It occurs as a result of intense thought or action on the task, and the solution may not come into sight instantly, but through the process of time (Musta'amal, A. Norman, 2009)

Meanwhile, the descriptor for this factor is: What is the student's ability to organize information and take intuitive decisions?

Fluency: this is the ability to perform an action smoothly, accurately, and with ease. In the context of creative processes, fluency has to do with the ability to facilitate the generation of a number of ideas. A creative individual should have the ability to generate more than one idea that is suited to the tasks. To encourage the smooth and diverse flow of ideas, their spontaneous capturing and externalising should be facilitated (e.g. brainstorming). Being open-minded is also an attitude that needs to be displayed by creative people and willingness to explore other possibilities from various perspectives (Musta'amal et al., 2009).

Therefore, the descriptor for this factor is evaluating to what extent the students are able to flow and their openness to new ideas.

Flexibility: this is a capacity for change and the ability to view a problem as a whole and not in a limited perspective. Flexibility of thought will allow individuals to explore possible solutions to defined problems in numerous ways. This will then lead to the emergence of ideas that may affect not only the intended problems but also other uses or functions (Walther, Robertson, & Radcliffe, 2007).

However, the descriptor for this factor is understanding the student's capacity to change or view design problems in different perspective

From the Creative Behaviours Model (CBM), the researcher projects that the creativity of students offering design related courses in the Federal University of Technology Akure could be measured to some extent using the CBM model conceptualised by Musta'amal et al. (2009).

RESULT AND DISCUSSION

Table1: Educational qualification of the CAD Instructor

Table 1 describes the educational qualification of CAD instructors in Architecture department, University of Ilorin. 60% of the CAD instructors have Master's degree while 30% have PhD as their highest qualification. Figure 4 also summaries the data further by emphasising that there are CAD instructors that have the required qualification.

	FREQUENCY	PERCENT	MEAN
First Degree	1	10%	
Master	6	60%	5
PhD	3	30%	
TOTAL	**10**	**100**	

Source: *Researcher's fieldwork 2023*

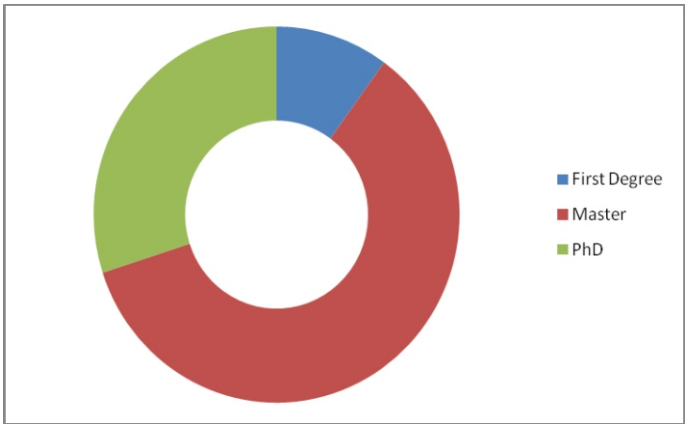


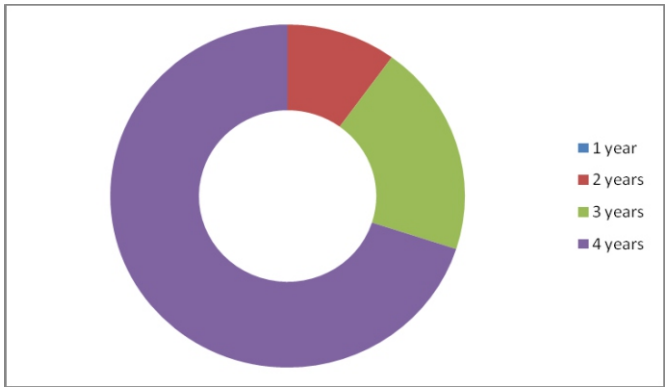
Figure 4: *Highest Educational Qualification of the CAD Instructors*
Source: *Researcher's fieldwork*

Table 2: How long have you being a CAD instructor?

Table 2 describes how long the respondent have been a CAD Instructor. There was 10% of the CAD instructors corresponding to 1 respondent who have been a CAD Instructor for 2years; 20% of the CAD Instructors corresponding to 2 respondent who have been a CAD Instructor for 3 years while 7 respondents corresponding to 70% have been a CAD Instructor for 4 years and above. Figure 5 shows how long respondents have you being CAD Instructors

	FREQUENCY	PERCENT	MEAN
1 year	0	0%	5
2 year	1	10%	
3 years	2	20%	
4 years and above	7	70%	
TOTAL	**10**	**100**	

Source: *Researcher's fieldwork*



Source: *Researcher's fieldwork*

Table 5: CAD Instructor's Perception of Student's Creativity for School Based Design Work

From the Table 5, CAD instructors' perception of the students' creativity for school based design work was based on CBM (Creativity Behaviour Model). In terms of sensitivity, CAD instructors perceived that the students are curious to understand design problems with a mean score of 4 and Standard Difference (SD) of 1.0. In terms of motivation, CAD instructors perceived that the students are enthusiastic and determined during design works with a mean score of 4 and SD of 1.0. In terms of appropriateness, CAD instructors perceived that the students are sensible and functional in their design works with a mean score of 3 and SD of 1.63. In terms of novelty, CAD instructors perceived that the students are original and unique in their design works with a mean score of 3.5 and SD of 1.3. In terms of insightfulness, CAD instructors perceived that the students are sensible and functional in their design works with a mean score of 3 and SD of 1.0. In terms of fluency, CAD instructors perceived that the students are able to flow with new ideas in their design works with a mean score of 4 and SD of 1.0. In terms of flexibility, CAD instructors perceived that the students are capable to change or view design problems in different perspectives in their design works with a mean score of 3 and SD of 1.0.

	N	MINIMUM	MAXIMUM	NO IDEA	MEAN	SD
Sensitivity	10	3	5	0	4	1.0
Motivation	10	3	5	0	4	1.0
Appropriateness	10	3	5	1	3	1.63
Novelty	10	2	5	0	3.5	1.3
Insightfulness	10	2	4	0	3	1.0
Fluency	10	3	5	0	4	1.0
Flexibility	10	2	4	0	3	1.0

Likert scale: 5=very good, 4=good, 3=average, 2= fair, 1=poor

Source: *Researcher's fieldwork*

With these records, CAD Instructors foresee an improvement in the creativity of students in their school based design work.

SUMMARY AND CONCLUSION

Based on the research, the following finding was made: That CAD instructor's perception of students' creativity in school based design work was average and the students showed an average level of sensitivity, motivation, appropriateness, novelty, insightfulness, fluency and flexibility in their school based design works and CAD instructors are optimistic that their performance could improve with time.

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