Measuring Creativity with Divergent Thinking Tasks: Communication Design Students' Experience

Eric Francis Eshun[1] and **Kofi Amoako-Agyeman**

Kwame Nkrumah University of Science & Technology, Ghana

This study explored approaches to creativity development in design students with the needed employable creative skills needed by the creative industry. A quantitative method was adopted for the study which involved 112 (59 males and 43 females) in two mixed groups from two academic levels from the Department of Communication Design in Ghana. The study used the Torrance Test of Creative Thinking (Figural Form B) designed by E. P. Torrance (1966) to measure students' creativity levels. Mean, S.D. and T-test were calculated to analyse the data. The findings of the study are significant as they support the theoretical contention and empirical evidence suggests that special instructions (cognitive skill sets) have direct influence on individuals' creativity levels. The findings also revealed that boys do not differ significantly in all the variables of visual creativity, except the measures of originality from the girls.

Keywords: creativity, divergent thinking, communication design, higher education

---

[1] Contact email efeshun.art@knust.edu.gh

Introduction

Studies have shown that creative arts curriculum often presented the best opportunities for fostering creativity in young children; particularly, during the pre-school and secondary levels of the child's education (Lowenfield & Brittain, 1987; Craft, 2001). Among the major objectives of the recent reforms in pre-university education in Ghana was to develop employable senior high school graduates. Consequently, the creative and visual arts curriculum was designed with some pertinent goals:

- To produce senior high school graduates with some employable, creative and vocational skills (i.e., the ability to read, to think creatively, to synthesize, and to utilize technology and materials).

- To equip students with technical and production skills (i.e., the ability to design and to implement original ideas) (Quayson, 2006; Boateng, 2012).

On the contrary, observations from the field clearly shows most senior high school graduates in Ghana are inadequately prepared or lack the competences in problem-solving skills (Quayson, 2006; Boateng, 2012) required to be fully integrated into the formal and informal working sectors including the creative arts industry. Additionally, it could be observed that many undergraduate communication design students in higher education in Ghana hardly explore and exploit their creative potentials as manifested in their artifacts or graphic design works. It has been observed over the years that admitted undergraduates communication design students' artifacts or graphic design works lack originality and innovation expected at that educational level. It has also been observed that most visual arts students in tertiary institutions show little or diminishing interest in the offered fields of study in visual arts during their university education (Lowenfeld & Brittain, 1987), this is due to the unique anxieties and frustrations many students experience in the course of the study (Tawiah, 2006; Quayson, 2006; Vaughan et al., 2008; Mensah, 2009 and Lartey, 2009).

Statement of the Problem

The monitoring and evaluation of teaching pedagogy used in the creative arts has not been given the needed attention and support in Ghana. As a result, the visual arts students' creativity

development has been taken for granted and disregarded even though it has a positive effect on students' learning. We also believe that the visual arts instructors' over reliance on traditional didactic teaching approach is inimical to creative studio pedagogy, consequently contributing to the many factors underlying the low creativity in students' performance and the lack of interest in visual arts professional practice (Lowenfield & Brittain, 1987).

Currently, almost all tertiary institutions in Ghana are facing three debilitating challenges:

(1) large class sizes (averaging between 120-165 students in a class), Hattie (1998) and Sebatane (1998) have noted the negative effect of large class-size on learning and teaching.

(2) overuse of unproductive teaching pedagogy and

(3) task motivation.

In all these challenging situations, it is incumbent on instructors in visual arts in higher education to help students to understand and appreciate their personal role in facilitating improved learning (Eshun and Adu-Agyem, 2010; Hargrove, 2011). Amabile (1996) contends that creativity techniques and task motivation could enhance the capabilities and opportunities of the student to be creative; undoubtedly, the instructor's role remains the main source of inspiration (Beckhaus, 2008; Eshun and Adu-Agyem, 2010). To this end, this study addresses two questions:

1. Are there significant differences in the undergraduate communication design students' performance in creativity test due to teaching for creativity?

2. What is the effect of strategic teaching methods on creativity on gender?

The hypotheses are:

1. There are no significant difference ($\alpha = 0.05$) between the mean scores of the control group and treatment group in the creativity performance test.

2. There is no significant difference ($\alpha = 0.05$) between the mean scores of the male and female communication design undergraduate students in the creativity performance test.

The difference between the mean scores of the control group and the mean scores of the treatment group is not practically significant.

The concept of creativity

Creativity was once believed to be the preserve of some few gifted individuals, mostly artists and genius. However, since J. P. Guilford's historic presidential address on creativity in 1950 to the

American Psychological Association (APA), creativity has attracted more attention and research than ever (Aschenbrener et al., 2010). There are many valuable detailed accounts of creativity. For example, Jackson (2005); Hokanson (2007); Granville (2008); Isaksen and Murdock (2008) and Alonzo-Geta, (2011) have defined creativity and confirmed creativity as a human trait. Other studies have established the significance of creativity to human development and the world (Cohen and Ambrose, 1999; Tudor, 2008; Antonenko and Thompson, 2011). Salvia and Ysseldyke (1988) view creativity as a complex human behaviour composed of many skills. Tudor further notes that creativity is characterized by the ability to generate new ideas and valuable artifacts. It requires abundant fact and skill memory, abundant working memory, fine reasoning ability and language. Cramond (1994) contends that early detection and recognition of creative potential or abilities is essential in the provision of educational and guidance opportunities to nurture them.

Fostering of Creativity

Aschenbrener et al., (2010) and Eshun and de Graft-Johnson (2011) concede that it is difficult to foster and assess creativity in education without challenges. Rivas (1999) reckons that creativity could not be developed in isolation from other skills. In other words, a number of factors must be considered when fostering creativity, including the purpose of creativity, the overall learning environment, techniques and the role of previous knowledge. Fostering of creative ability depends mainly on the purpose of creativity. Creativity for a purpose provides motivation an important aspect of being creative as commended by Amabile (1996).

When fostering creativity, instructors assess a number of sub-skills as suggested by Berkhaus (2008); involving whether the student is able to acquire:

- Knowledge (of the field, theories and practical experience),
- Inspiration (from creative projects in the field and from other fields that are interdisciplinary),
- Project management skills,
- Knowledge of creativity methods,
- Self-confidence (in their creativity and relevance of their work),
- Motivation,
- The ability to focus (on goal and results).

To this end, the researchers deployed a new teaching strategy in their design studios, which sought to improve the students' creativity. However, there are few challenges to be cleared for the full implementation of the new studio working strategy across the entire academic levels in the undergraduate programme of Department of Communication Design, KNUST. The aim of this study is to investigate more closely the impact of the new studio working strategy in communication design. The significance of the study is derived from the fact that studies investigating the effect of the studio pedagogy on students' creativity performance in communication design in Ghana are rare and non-comprehensive. Therefore, this study will shed some light on the value of the pragmatic teaching in creative techniques and their effects on students' creative performance in communication design. This creativity intervention is currently implemented alongside the traditional didactic. The creativity intervention is meant to introduce new space for task motivation in addition to building students' self-esteem (Beckhaus, 2008, Hargrove, 2011).

Methodology

Participants for the study

Participants for the study were Ghanaian undergraduate students studying Communication Design at the Kwame Nkrumah University of Science and Technology (KNUST) Kumasi, a public university with a long standing tradition of providing Art and Design education in Ghana. The Department of Communication Design offers full-time undergraduate academic programme in visual communication design. A total of 112 students registered for the compulsory graphic design studio courses in years 1 and 2 and were purposively used in the study. Two separate cohorts each from first and two year groups volunteered to form the treatment groups. The groups were identified as follows; Group A - Control Group: Year 1 (CGp_1) and Year 2 (CGp_2), Group B - Treatment Group: Year 1 (TGp_1) and Year 2 (TGp_2). In all, the Group A had 65 members comprising of 37 (56.9%) male and 28 (43.1%) female and the Group B consisted of 37 volunteer 22 (59.5%) males and 15 (40.5%) females. The cohorts were aged between 19 and 26 years (mean age = 2.09, SD = 1.069).

	Group A Control (CGp)	Group B Treatment (TGp)	Total
Year 1	CGp$_1$(33)	TGp$_1$ (22)	55
Year 2	CGp$_2$ (32)	TGp$_2$ (15)	57
	65	37	112

The participants in the study had foundation studies in visual arts at the Senior High School and were examined on by the West African Examination Council (WAEC). In addition, they completed at least one semester study in visual communication at the tertiary level with practical studio experiences in drawing, basic design and colour. Therefore, the participants from the Department of Communication Design can be considered to have adequate background in graphic design.

Instrument for the study
The Torrance Test of Creative Thinking (TTCT) was employed in the study. The TTCT was first developed and used in 1966 it has since been re-normed four times: 1974, 1984, 1990, and 1998 (Kim, 2006). Kim further noted that TTCT is not a full proof testing tool, however, positive features of the TTCT include the short time needed for its administration, and the ease of its administration. Isaksen (2008) reported that TTCT is a well-known test on creativity and has been useful to many people in the understanding, predicting and developing of creative behaviour and creative persons. To evaluate the divergent thinking tasks, each participant student was administered with Torrance Test of Creative Thinking, Figural Form B (TTCT-F-B).

Torrance Test of Creative Thinking (TTCT)
The TTCT-F-B is divided into three 10-minute sections, Picture Construction Activity; Incomplete Figures Activity and Repeated Figures Activity. In the Picture Construction Activity, labeled Picture Construction on the Test, participants think of a picture or an object in which a given shape (e.g. a circle shape) is an integral part. Picture Construction Activity requires the participants to try and think of something that no one else will think of, and try to make it as complete and as interesting a story as they can. Divergent thinking task is assessed with divergent thinking tasks, in which participants generate ideas in response to verbal or figural prompts (Silvia

et al., 2008). The Picture Construction Activity was used to assess the tendency of creating meaning out of seemingly meaningless object. The battery measured creativity in a variety of areas fluency, originality, elaboration and flexibility. One way to test for this is to ask how many ideas one can think of the use of a circle? The more ideas the student was able to generate or put on paper the more fluent one was deemed to be (fluency factor); this relates to one part of creative thinking. To be sure such tests do not take into account patience, resistance or self-induced pressure of the willing participants. Tests of creativity measure not only the number of alternatives that people can generate but also the uniqueness of those alternatives. The ability to generate alternatives or to see things uniquely does not occur by chance; it is linked to other more fundamental qualities of thinking such as flexibility, tolerance for ambiguity or unpredictability.

The administration of the TTCT-F-B was conducted as specified in the TTCT-F-B Directions Manual and Scoring Guide (Torrance, 1998). Students were asked to complete all three activities in the test booklet (1) picture construction, (2) picture completion, and (3) circles. The testing was conducted during a regular studio period.

Procedure

Both Groups A and B (control and treatment) participated in the creativity test. Each Year's cohorts (two sub-groups) were jointly tested and each year had its turn within the 3-day test period. The cohorts were given general introductory instructions to the test. The study investigated the students' creative ability. The task involved combining common objects into creative forms. No special skills were required, and there were no right answers. Thirty minutes were assigned to the test. After the voluntary verbal consent, participants were given specific instructions to each sub-test, and the participants had short breaks between each sub-test to switch over. The TTCT Manual instructions were adhered to. The participants were required to create images that had the circles as integral parts. The time for each segment was adequate to allow for elaboration (details) or the original and uncommon responses (Cramond, 1994).

Treatment

The objective of the graphic design studio was twofold: 1) to introduce the students to the graphic design theory, history and design process as an approach of understanding the use of visual imagery in communication, 2) to support the students in the application of theory to creation of creative communication materials in graphic design. This was particularly important in acquisition of

divergent perspectives on the graphic design and its process. The basic structure of the course has remained consistent like other graphic design programmes. Both groups were exposed to foundation topics in graphic design using the traditional teacher-centered didactic approach. There were no recommended text reading; hypothetical graphic design exercises and studio activities promoted individuality. The studios were held in two sessions every week for 12 weeks, activities for the first session included lectures/presentations, sharing their experiences, challenges, and needs in relation to the adoption and use of visual imagery as a medium in visual culture. The second studio session aimed to provide hands-on experiences in graphic design assignment, the critique review process to studio pedagogy learning context. During these sessions, the lecturers demonstrated and introduced the design process containing all stages.

During the second semester, the cohorts for the treatment sub-groups (TGp_1 & TGp_2) were introduced to the interventions. Special extra graphic design studio sessions were organized for the cohorts. Some cardinal aspects of the special sessions included lectures, text readings, short critique essays on methods and theories of creativity and graphic design; critical thinking and brainstorming practice at rapidly generating multiple and numerous ideas; weekly student-directed personal design studio activities grounded in the learner's environment; a series of private collaborative activities and peer previews. The cohorts were given additional materials on visual puns and presentation skills. The cohorts were required to apply the acquired knowledge and experiences from the special studies to their regular graphic design studio assignments and projects. They were expected to show proof of thorough initial researches, the use of creative thinking, mind mappings and idea development sketches. The cohorts in the treatment group (TGp_1 & TGp_2) were also encouraged to use iterative creative process and document each stage of the process and participate in collaborative learning activities as well as student-directed learning.

The two groups had identical studio schedules (48 hours over a period of three months). Students presented graphic design works at the end of each project for assessment and end of semester portfolio for final grade. All instructors on the study had similar postgraduate degrees majoring in Graphic Design although the instructor for treatment group had more teaching experience.

Data Analysis
Scoring

The Figural TTCT was rated according to the Streamlined Scoring Procedure (Torrance, 1988). Each cohort's visual stimuli were assessed under the four variables fluency, flexibility, elaboration and originality. Scoring of responses to this measure presents little difficulty and can be done by simple frequency counts of the positive responses on the total scale. For fluency, each positive visual response received a credit; for flexibility, each category or theme of ideas in the exercise also received a credit; all other responses receive a zero; for elaboration, the visuals are credited for their unique detailed response; for originality, any statistically uncommon responses given by a person receives a credit. Scoring responses to items is done by counting the number of positive responses, giving a credit of one for each positive response. All blank responses are scored zero. All these are specific creativity indicators, which were scored and then converted into scaled scores. The creativity index, or overall creativity level, was determined by summing the scores. Finally, it has a straightforward interpretation a creative response is a unique response (Silvia et al., 2008).

The completed TTCT worksheets data were colour coded by instructional approach and numbered in order to ensure the accuracy of data collation. The data for the measures were entered into the SPSS 16.0 (Statistical Package for the Social Sciences). Specific statistical analysis procedures included:

1. Descriptive analysis, to examine and then to report measures of frequency, means and standard deviation of the two groups.

2. Cronbach Alpha internal consistency reliability test which was run on all creativity variables

3. Independent t-tests and MANOVA were used to analyze differences on the TTCT variables that may be attributed to gender.

Reliability

Table 1 shows the correlations between the perceived attributes of creativity fluency, flexibility, elaboration and originality. All correlations were in the expected direction and were significant at the $p < 0.05$ level. The strongest relationship with factor of the creativity was with flexibility ($r = 0.939$), followed by elaboration ($r = 0.768$) and then originality ($r = 0.763$). Thus when students perceived greater flexibility, less complexity or more originality, they were also likely to be more fully adapt to creativity. Table 2 shows the reliability of the instrument as established by obtaining overall Cronbach alpha of .930. Inter rater reliability on the TTCT-F-B was high; it ranges from .89(fluency) to .935 (elaboration) (Torrance, 1974). Treffinger (1985) concluded that given the

complexity of creative thinking the TTCT can be seen as having reasonable reliability for group and research applications.

Table. 1: Inter-Item Correlation Matrix

	1	2	3	4	Mean	SD
1. Fluency	1.000				5.78	4.698
2. Flexibility	.939	1.000			4.61	4.208
3. Elaboration	.768	.780	1.000		2.32	2.574
4. Originality	.763	.843	.738	1.000	2.34	3.190

Table 2: Cronbach Alpha Rater-inter-rater reliability for TCTT-F-B Subscales for the Groups

TTCT Items	CGp	TGp	Overall
Fluency	.875	.889	.899
Flexibility	.875	.889	.899
Originality	.909	.910	.915
Elaboration	.894	.928	935

Note: Overall Cronbach alpha = .930

Results

Academic level and/or Gender Differences in Creativity

The mean and standard deviation for each scale of the TTCT were examined for the entire groups and respective groups (by academic level and by gender) to examine whether there are any

differences in the TTCT results. A 2 x 2 factorial (academic level x gender) ANOVA (analysis of variance) on the Creativity Intervention (CI) was conducted to examine whether there is a main academic level and a main gender effect as well as academic level interaction effect on the CI. A 2 x 2 factorial (academic level x gender) MANOVA (multivariate analysis of variance) on the four subscales of the TTCT was conducted to examine whether there is main academic level effect and main gender effect as well as academic level interaction effect on each of the four subscales of the TTCT. For the significant main academic level effect, main gender effect, and/or academic level interaction effect, which subscales of the TTCT contributed to the difference were determined by conducting ANOVA on each of the six subscales of the TTCT as follow-up tests to the MANOVA.

Descriptive Statistics for the CI of the TTCT are shown in Table 2. The mean score of the CI for the entire group was 14.93 (SD = 13.421); for Control Group the mean score was 7.8(SD = 7.659); and for Treatment Group it was 21.96 (SD = 14.284). The mean score of the CI for males was 16.57 (SD = 15.492); and for females it was 12.5(SD = 13.421).

To examine main academic level and main gender effects as well as academic level*gender interaction effect on CI, a 2 x 2 (academic level *gender) factorial ANOVA was conducted on CI. A significant main academic level effect (F [1, 110] = 37.178, p =. 000: Treatment Groups mean CI score was higher than Control Groups). The main gender effect (F [1, 110] = 2. 898, p =.091) whilst the academic level*gender interaction effect (F [1, 110] = 5. 107, p =. 026) on CI was significant. The p-value for the interaction is 0.026; the interaction is significant and we can conclude that the effect of academic level on creativity levels for male students and female students are not the same. The interaction plot below (Fig. 1) suggests that as students experienced improved teaching pedagogy at higher academic level, both creativity levels of male and female students soar, the score of female students remained lower.

Table 3: Descriptive Statistic for the Creativity Index of the TTCT

[N = 112 (Group A = 55, Group B= 57)]

Dimension of Creativity	Groups	N	Mean	SD	t-value	p
Fluency	Year 1	55	3.14	3.01	-7.239	.000
	Year 2	57	8.42	4.61		
Flexibility	Year 1	55	2.39	2.46	-6.609	.000
	Year 2	57	6.82	4.43		
Originality	Year 1	55	.95	1.30	-5.174	.000
	Year 2	57	3.74	3.86		
Elaboration	Year 1	55	1.39	1.29	-4.121	.000
	Year 2	57	3.25	3.15		
Creativity Index	Year 1	112	7.89	7.659	-6.554	.000
	Year 2		21.96	14.284		
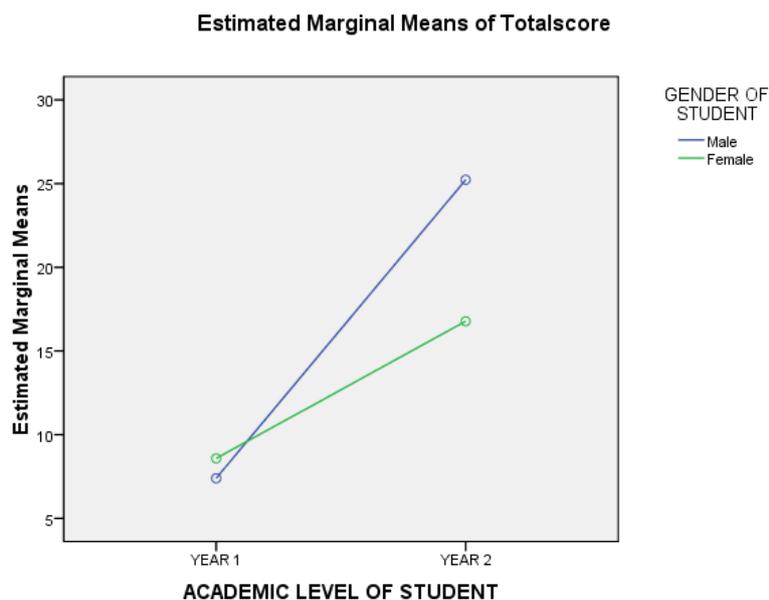
Fig. 1: Estimated Marginal Means of Creativity Total score

Academic Level and/or Gender Differences in the TTCT Subscales

Descriptive Statistics for the subscales of the TTCT are shown in Table 3. To examine main academic level and main gender effects as well as academic level*gender interaction effect on the TTCT subscales, a 2 x 2 (academic level x gender) factorial MANOVA was conducted on the TTCT subscales. A significant main academic level effect (Wilkss λ = .69, F[4, 107] = 12.079, p=.000) was found on the combined four subscales. Neither main gender effect (Wilkss λ = .95, F [4, 107] = 1.342, p =.259), nor academic level* gender interaction effect (Wilkss λ = 94, F [4, 107] = 1.488, p =.211) was significant. For the significant main academic level effect, which subscales contributed to the difference were determined by conducting ANOVA on each of the four subscales of the TTCT as follow-up tests to the MANOVA. The ANOVA on Originality (F [1, 113] = 4.192, p < .043) was significant and was still significant after the Bonferroni correction.

Table 4: Descriptive Statistic for the Creativity Index of the TTCT
[N = 112 (Male =59, Female = 43)]

Dimension of Creativity	Gender	N	Mean	SD	t-value	p
Fluency	Female	43	5.17	3.732	1.136	.258
	Male	59	6.19	5.238		
Flexibility	Female	43	3.83	3.129	1.638	.104
	Male	59	5.13	4.753		
Originality	Female	43	1.61	1.680	2.048	.043
	Male	59	2.84	3.827		
Elaboration	Female	43	1.87	1.424	1.531	.128
	Male	59	2.62	3.096		
Creativity Index	Female	112	12.50	9.211	1.601	.112
	Male		16.57	15.492		

Discussion

This study investigated the creativity levels among students. Two groups of students from the Department of Communication Design were involved. Two questions were addressed in this study. In this section, the findings in regard to the two questions are discussed.

1. *Research Question 1:* Are there significant differences in the Ghanaian undergraduate communication design students' performance in creativity test due to either teaching methods (teaching for creativity and traditional method) or gender?

To answer the first research question, the Figural TTCT was administered and the medians of the fluency, flexibility, and originality in the two different groups were compared. The comparison showed that the students in the two groups differed significantly across all the Figural TTCT sub-scales. Group B representing second year students did much better than Group A (first year) students on the fluency, flexibility, elaboration and originality on the Figural TTCT. In the Figural TTCT, students were asked to express their ideas by drawing pictures. Taking the difference in Fluency scale as an example, most first year students tried to finish the third activity within the limited time. It was observed that most of the first year students showed weak standards of creativity regarding fluency. Fluency factor addresses the understanding that creative people generate more ideas for any given question. Fluency also looks at the ability to generate large numbers of solutions to a given problem. The first year (Group A) participants failed to use the circles provided and most sheets had fewer than expected drawings. This may be as a result of failure of first year students to read instructions which clearly spelt out what is required. In their haste, they misused the test. Undoubtedly, there could be other concerns which may have contributed to their poor results. The findings of this study corroborates with the findings of Hokanson's (2007) study where all members of the treatment group (those enrolled in the creative problem solving class) experienced increases in measured fluency.

Concerning flexibility, most participants remained stuck to some few common visuals, representative of everyday items (visual cliché). The fact that second year students (Group B) were able to generate lot of ideas is because those students were in their senior year of higher education and had learned the topic of critical thinking and brainstorming by the time they took the creativity test. The ability to produce a wide variety of ideas, visuals or use a variety of approaches to solve

a problem is very important in establishing the participants versatility and ability to think outside the box. Creativity seeks answers that go beyond mere slight differences to generation of novel answers to solve problems due to students inability to stretch their imagination beyond that typically found in their classroom. Admittedly, for almost all the participants the test was their first creative test. The students could not bring themselves to terms as to how to explore for ideas on the spur of the moment. It was also clear from observing students creative products that most students failed to do the appropriate search and scrutiny on ideas. This handicap could be as a result of students over reliance and the use of foreign images from the internet sources.

With regards to elaboration, the treatment groups performance was much better. It was observed that many students did not hasten to finish the exercise. On the other hand, students from the control group chose to complain about time instead of focusing on the test. Defeating the essence of the test, which sought to determine how proficient and creative students are in developing ideas, most participants rushed to fill the spaces given without exploring for creative and meaningful ideas. Additionally, they lacked the capacity to show refinement and details to make an idea clearer within the test period. The differences in the elaboration situation among the two groups indicate that students' content knowledge does have a great influence on their ability to add details and good sketching.

The Originality was, undeniably, the most difficult aspect of the creativity test. Creative thinking hinges on this factor. From the means, it was clear that as the participants progressed through the exercises they were challenged the more with regards to showing originality. Time and again, the instructors had observed that students plagiarized ideas and photos from internet sources in students practical studio projects which are worrying in assessing creativity. This finding agrees with a report by Jackson (2005b). They have also exhibited a careless attitude of not using the creative process during studio projects to improve their ideation and problem-solving skills. It does appear that these issues may have contributed immensely to the poor results. These results are generally consistent with previous study on the effect of creativity training on nurturing creativity by Hokanson's (2007) study which found that teaching creativity in a separate course is effective in developing measured creativity in design students.

Academic Level and/or Gender Differences in Creativity

The results of previous research on gender differences in creativity were inconclusive. However, the present study found no gender differences, which is consistent with Özdemir and Çakmak's (2008) result among 4th grade students. The present study found that Ghanaian samples have equal creative potential in males and females in general.

In the comparison of the means of students scores in the test in terms of gender variable, there was not a significant difference in "fluency", "flexibility" and "elaboration" dimensions while there was meaningful difference only in originality dimension in favour of the male students. According to this, the case in the four dimensions, which did not differ in test scores in accordance with the gender variable, can be considered as a result of the equal opportunities of education provided for girls and boys, and the difference in the abstractness of the titles dimension in favor of the boys can be interpreted as the case of boys preferring to use abstract concepts or expressions more than the girls do.

Limitations

There were several limitations in the present study. One limitation was that the sample size of the present study was small and the characteristics of the participants were homogeneous in terms of their academic programme distribution (all participants were from the same academic department), all were enrolled in educational programs and the class-size, etc. In addition, the students were not selected randomly within the two student populations. Thus, the generalization of the results of the present study is limited. For future studies, it would be appropriate to conduct research with a larger sample size and heterogeneous samples that can represent the entire population.

Conclusion

In conclusion, the research finding presented here contributes to the existing knowledge of creativity development. The result seems to suggest so, since the second year students spent additional year learning more graphic design skills, working on creative problem solving in graphic design which involves more than designing but also recalling the design problems learned in the past to their advantage; than the younger students, like first year students, who have not been exposed to many problems in communication design and creativity, therefore, are more likely to create their own problems and solutions based on their prior knowledge. Another implication is that student's creativity abilities might be affected by their graphic design knowledge; socio-cultural

predispositions and prejudice and neglect of visual arts students at pre-tertiary level as likely to contribute to their poor performance. Due to these challenges faced by the individual visual arts students in their development; especially, lack of competent art teachers at pre-tertiary level, lack of art resources and poor state of art facilities; improper handling of visual arts curriculum and the use of ineffective art pedagogies at the pre-tertiary level. The results are the lack of confidence and self-esteem in expressing themselves creatively; reduced intrinsic and extrinsic motivations in visual arts students with lost focus on career development. The creative potential of the tertiary level visual arts students, however, can be stimulated if the students are taken through pragmatic cognitive instructions, learning processes and constructivist learning environment.

The purpose of the study was to find out whether visual arts students admitted to the communication design programme were in the best of shape for artistically gifted education in a tertiary institution and also if the students are taken through treatment they would be capable of expressing their own creative thoughts naturally and freely, taking into consideration their individual character traits, working environment among other factors. Since it is the Department of Communication Designs responsibility to train and develop students' creative potential through art and design, the challenge would be for the department to carefully factor the apparent inadequacies of the first year students into the communication design curriculum development and implementation. It was also evident that the results suggest that students showed markedly improved creativity performance after they were taken through more rigorous creativity training and comprehensive graphic design instructions.

Recommendations

Based on the findings of this study, the following under listed are recommended:

- Activities and tasks that involve real-life, real-time problem-solving should be introduced and encouraged. The use of various creative thinking tools in teaching communication design, should be seriously considered.

- The department should implement innovative teaching strategies and improved learning environment that stimulate individual traits creative development in a large class-size situation.

- Studies on creativity should be integrated into the curricula; regular creativity exercises should be conducted to enable students improve their creativity thinking levels.

Suggestions for Future Research

Though population of interest comprised 114 students from first and second year groups, for a firmer authentication of this research, more extensive research would be needed to validate or invalidate the findings in the other year groups (year three and year four). Future studies should look at the number of participants and a more critical study on the correlation of creativity, intelligence and student achievement in communication design. It is hoped that the findings of this study will assist administrators and instructors to implement programmes to monitor the creative development of the students in effort to improve the training being provided, thereby improving and increasing employee retention in industry.

References

Adu-Agyem, J. & Osei-Poku, P. (2012). Quality education in Ghana: the way forward. *International Journal of Innovative Research & Development,* 1(90), 166-177.

Alonzo-Geta, P. M. (2011). Researching, measuring and teaching creativity and innovation: a strategy for the future. 307-311.

Amabile, T. (1996). Cretavity and innovation in organizations. Harvard Business School Publishing, Boston, MA.

Ametordzi, S., Osei-Poku, P. & Eshun, E. F. (2012). Pedagogical situations and learning outcomes in graphic design in selected senior high schools in the Kumasi Metropolis of Ghana. *International Journal of Innovative Research & Development,* 1(90), 178-191.

Antonenko, P. D. & Thompson, A. D. (2011) Preservice teachers' perspectives on the definition and assessment of creativity and the role of web design in developing creative potential. *Education and Information Technologies,* 16(2), 203-224.

Aschenbrener, M. S., Terry, R. & Torres, R. M. (2010). Creative and Effective Teaching Behaviors of University Instructors as Perceived by Students. *Journal of Agricultural Education*, 51(3), 64-75.

Beckhaus, S. (2008). Seven Factors to Foster Creativity in University HCI Projects. Retrieved July 12, 2012 from http://www.imve.informatik.uni-hamburg.de/.../22-SevenFactors-HCIed06_Beck.

Boateng, C. (2012). Restructuring Vocational and Technical Education in Ghana: The Role of Leadership Development. *International Journal of Humanities and Social Science*, 2(4), 108-114.

Buakanok, F. S., Suwannoi, P., Jefferies, A., Davey, N., Kanarkard, W. & Taweepworadej, W. (2011). A Comparative study British and Thai undergraduates in Torrance Test of Creative Thinking. Paper presented at The Asian Conference on Language Learning 2011 Official Proceedings Osaka, Japan.

Cohen, L. M. & Ambrose, D, (1999). Adaption and Creativity. In Runco, R and Pritzker, S. R. *Encyclopedia of creativity* (Vol. 1). London: Academic Press.

Cramond, B. (1994). The Torrance Test of Creative thinking: From design through establishment of predictive validity. In R. F. Subotnik & K. D Anorld (Eds.), Beyond Terman: Contemporary longitudinal studies of giftedness and talent. (pp. 229-254). New Jersey: Ablex Publishing Corporation.

Eshun, E. F. & de Graft-Johnson, K. G. (2011). Learner perceptions of assessment of creative products in communication design. *Art, Design & Communication in Higher Education*. 10(1), 89-102.

Eshun, E. F. and Adu-Agyem, J. (2010). Learner perceptions in design critiques: impact on creative development. *Journal of Science and Technology*. 30(3), 42-50.

Granville, G. (2008). 'Comprehensible by June'? Problems of interpretation of art *in* and *as* research in higher education in Ireland. Proceedings of the 4th International Barcelona Conference on Higher Education. Higher Education: New challenges and emerging roles for Human and Social Development. March 31st–2nd April 2008. Retrieved May 26, 2011 from http://upcommons.upc.edu/revistes/bitstream/2099/5758/1/l4_pap_Granville.pdf.

Hargrove, R. (2011). Fostering creativity in the design studio: A framework towards effective pedagogical practices. Art, Design & Communication in Higher Education. 10(1), 7-31.

Hattie, J. (1998). Assessment and classroom learning: A deductive approach. *Assessment in Education: Principles, Policy & Practice, 5* (1), 111-122.

Hokanson, B. (2007). By measure: Creativity in design. In Creativity or Conformity? Building Cultures of Creativity in Higher Education. Proceedings of Conference organised by the University of Wales Institute, Cardiff in collaboration with the Higher Education Academy Cardiff January 8-10 2007. Retrieved December 10, 2010 from www.creativityconference07.org/presented.../Hokanson.

Isaksen, S. G. & Murdock, M. C. (2008). The Outlook for the Study of Creativity: An Emerging Discipline? Retrieved December 12, 2010 from http://www.cpsb.com/research/articles/creative-problem-solving/Theoretical-Perspectives-Creative-Learning-Facilitation.html.

Isaksen, S. G. (2008). Educational Implications of Creativity Research: An Updated Rationale for Creative Learning. Retrieved November 10, 2010 from http://www.cpsb.com/research/articles/creativity-research/Educational-Implications-Creativity-Research.html.

Jackson, N. J. (2005). Making higher education a more creative place. *Journal for the Enhancement of Learning and Teaching,* 2 (1), 14-25.

Jackson, N. (2005b). Assessing students' creativity: synthesis of higher education teacher views. The Higher Education Academy. Retrieved May 12, 2010 from http://www.heacademy.ac.uk/creativity.html.

Kim, K. H. (2006). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). *Creativity Research Journal,* 18(1), 3–14.

Kleiman, P. (2005). Beyond the tingle factor: creativity and assessment in higher education. Paper presented at Economic and Social research Council (ESRC) seminar, University of Stracthclyde, Scotland, November 2005. Retrieved December 12, 2010 from http://lancs.academia.edu/PaulKleiman/Papers/10289/Beyond_the_Tingle_Factor_creativity_and_assessment_in_higher_education_2005.

Lartey, T. A. (2009). *Different strategies to fostering creativity in visual arts in senior high school.* (M.A. Thesis, Kwame Nkrumah University of Science & Technology, Kumasi, 2009). Retrieved May 13, 2012 from dspace.knust.edu.gh:8080/jspui/bitstream/123456789/.../Binder1.pdf.

Lowenfeld, V. & Brittain, L. W. (1987). *Creative and Mental Growth.* Macmillan Publishing Co Inc., London: Collier Macmillan Publishers.

Mensah, H. E. (2009), *Visual arts lessons for non-visual art teachers in senior high schools in Ejisu-Juaben District.* (M.A. Thesis, Kwame Nkrumah University of Science & Technology, Kumasi, 2009). Retrieved May 13, 2012 from dspace.knust.edu.gh:8080/.../MENSAH%20HARRY%20EKWAM.pdf.

Özdemir, S. M. & Çakmak, A. (2008). The effect of drama education on prospective Teachers' creativity. *International Journal of Instruction,* 1(1), 13-30.

Quayson, S. A. (2006). *Evaluation of the visual art programme in the Western Region of Ghana.* (M.A. Thesis, Kwame Nkrumah University of Science & Technology, Kumasi, 2006). Retrieved May 13, 2012 from dspace.knust.edu.gh:8080/.../SUSANA%20AKUA%20QUAYSON.pdf.

Rivas, R. (1999). Reading in recent ELT coursebooks. *ELT Journal, 53* (1), 12-21.

Runco, R. & Pritzker, S. R. (1999). In *Encyclopedia of creativity* (Vol 1). London: Academic Press.

Salvia, J. & Ysseldyke, J. (1988). *Assessment in special and remedial education (4ᵗʰ ed.).* Boston, MA: Houghton Mifflin Company.

Sebatane, E. (1998). Assessment and classroom learning: A response to Black & Wiliam. *Assessment in Education: Principles, Policy & Practice, 5* (1), 123-130.

Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., Martinez, J. L. & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: exploring the Reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts, 2(2), 68–85.*

Tawiah, V. N. (2006). *Assessment of linkages between the JSS pre-vocational skills programme and the SSS visual arts programmes: a case study of selected schools in Akwapim South District of Eastern Region, Ghana.* (M.A. Thesis, Kwame Nkrumah University of Science & Technology, Kumasi, 2006). Retrieved May 13, 2012 from dspace.knust.edu.gh:8080/.../VERNON%20NYAME%20TAWIAH.pdf.

Torrance, E. P. (1998). *The Torrance Tests of Creative Thinking norms technical manual figural (streamlined) forms A & B.* Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P. (1974). Norms-technical manual: Torrance tests of creative of creative thinking. Bensenville, IL: Scholastic Testing Service.

Treffinger, D. J. (1985). Review of the Torrance Test of Creative Thinking. In J V Mitchell Jr (Ed.) the Ninth Mental Measurements Year book, pp. 1632–1634. Lincoln: University of Nebraska, Burros Institute of Mental Measurements.

Tudor, R. (2008). The pedagogy of creativity: understanding higher order capability development in design and arts education. Proceedings of the 4th International Barcelona Conference on Higher Education. Higher Education: New challenges and emerging roles for Human and Social

Development. March 31st – 2nd April 2008. Retrieved November 17, 2010
http://upcommons.upc.edu/revistes/bitstream/2099/5756/1/l4_pap_Tudor.pdf.

Vaughan, S., Austerlitz, N., Blythman, M., Jones, B. A., Jones, C. A., Grove-White, A., Morgan, S. J., Orr, S., Alison Shreeve, A. and (2008). Mind the gap: expectations, ambiguity and pedagogy within art and design higher education. In: Drew, Linda, (ed) *The Student Experience in Art and Design Higher Education: Drivers for Change* (pp. 125-148). Cambridge: Jill Rogers Associates Limited.