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Measurement of Creativity Index at Tween Level

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ABSTRACT

The understanding of measuring the creativity of the students has always been neglected and the educated personals are not well aware how to measure the creativity. Educated personals failed to estimate creativity and also mythological understanding of creativity measurement. This study is an attempt to measure the creativity index of individuals at tween level. The objectives of the study were as; i) to accomplish an analytical mode of research in the area of fluency, flexibility, originality and elaboration and ii) to estimate the extent of novelty between boys and girls. Research questions were frame keeping in view the objectives using exploratory research approach in quantitative context. In order to achieve the objectives of the study, research instrument (test) was constructed to measure the creativity of tweens. The response value of answers was established after the Wallach and Kogan's creativity assessment model. The Wah Cantt consisted on 46 schools, was selected as the population of the study. Total sample size was 900 students including 464 boys and 436 girls. The data were interpreted by using Percentage and Principal Component Analysis. The Principal component analysis differentiated the Kaiser-Meyer-Olkin (KMO) significance. KMO test is to measure the how much data appropriate for the factor analysis. it is recommended that the promotional activities should be applied rather than formal and classical approach to further minimize the subject oriented discriminations, the creativity testing, intelligence testing and aptitude testing mode should be included in the entire evaluation system at tween level

Introduction

The creativity phenomenon is defined by dictionaries as the ability to use imaginations and novelty of ideas to create anything, similar to inventiveness, uniqueness, ingenuity, and imaginativeness. Creativity has been associated with a wide range of subjects. Most people agree that creative activity entails problem solving, adaptation, and creation. Todd Lubart and colleagues' defined creativity as two distinct styles of cognition: divergent-exploratory and convergent-integrative thinking. Divergent thinking, also known as lateral thinking, is characterized by flexibility, curiosity, elaboration, and risk-taking, and is often associated with creative performance. Divergent minds are insatiably curious, capable of generating and iterating both original and complex new ideas (Cossentino, 2015).

The phenomenon progressed from novelty to utility, and eventually, creativity was designated "the most economically significant resource of the twenty-first century," and it was recognized a desired trait for graduate students. Finally, creativity has been linked to problem-solving and other cognitive capabilities, as well as scholastic performance, mental wellbeing, and social well-being. It refers to the act of creating new ideas, which might lead to the creation of a new problem solution, a new method or technology, or a new artistic element or shape. (Parashar, S. & Pingle, S. 2015). Teresa Aambile, a Harvard Business School professor, argued in an article that creativity has three components, which are; i) Expertise, ii) Creative thinking skills and iii) Motivation. It's not enough to have domain knowledge. Applying concepts from various fields, integrating dissimilar notions, and examining the physical environment for ideas are all examples of creative thinking (Aambile, 2018).

Creativity may not only be defined but also quantified in its numerous manifestations. Since the early 1960s, educational academics are working on this. The Torrance Test, the Kogan and Wallach Test, and Guilford's Alternative Uses Task are the three most prominent tools for measurement or evaluation (Bayliss, 2016). Nattan Kogan and Michael A. Wallach were well-known psychologists. Nattan Kogan was an American Psychologist who lived from 1926 until 2013 (Stricker, 2014). Wallach was Professor Emeritus of Psychological and Brain Sciences at Duke University's Department of Psychology and Neuroscience. He was a Psychologist from the United States. He died at 87 (1933- 2020). Nathan Kogan is well-known for his contributions to creativity research. He was a master who supported in the formation of the field. Nat operationalized numerous of J. P. Guilford's concepts about divergent thinking and produced several of the most famous creativity activities that are being used today with Michael Wallach (Kaufman, 2014).

Wallach and Kogan Creativity Test

The Wallach and Kogan Creativity Test, which they discuss in their book "Modes of Thinking in Children" in 1965, is one of the most prominent instruments for evaluating or assessing creativity. Examinees are asked to come up with a large number of probable things that belong to a generic group in Kogan and Wallach's creativity test. These four components are used for test scoring:

- **Fluency-** The total number of answers is figured out. The score would be 5 in the case above.
- **Flexibility-** It is worked out how many distinct categories there are. The above example would receive a score of 2; the first four options are mode of transportation whereas "wheel revolving in your head" is a separate category from transportation, which we may call "metaphors."
- **Originality-** Each marked response is synthesized to the total number of replies received from everyone who participates in the exam. Only 5% of the people in the group responded, which was unusual (1 point). Only 1% of the sample provided responses making them unique (2 points). Higher overall scores reflect an ability to think creatively.
- **Elaboration-** The level of detail is determined. "A car," for example, equals 0, whereas "a car speeding down the street" equals 1. If the examinee could notice where the car was headed, they would get an extra point.

- **Administration-** No particular training is necessary to give Wallach and Kogan's exam. Materials can be prepared by the examiner and given to each examinee individually, or they can be exhibited to examinees for a group activity evaluation. The test is usually given in a classroom environment. Surprisingly, the examinees' first few minutes' comments are usually the least creative (Bayliss, 2016).

Index

An indication or measure of anything can be defined as an index. In order to measure trends, a statistic that allocates a single value to numerous separate data. The consumer price index is the most well-known index in the United States, and it provides an "average" number for inflation based on price deviations for a collection of items (Weisstein, 2022). In social science research, indexes and scales are significant and valuable instruments. They have a lot of similarities and a lot of differences. A belief, mood, or attitude is represented by an index, which is a technique of collecting one score from a number of questions or statements. Scales, on the other hand, quantify intensity at the variable level, such as how much someone agrees or disagrees with a statement. In quantitative social science research, indexes are important because they allow a researcher to generate a combined measure that summarizes responses to numerous rank-ordered concerned statements and questions (Crossman, 2019).

Tween

Youngsters aged 8 to 12 are referred to as tweens, since they are between children and teens. Tween years, also known as "Pre-adolescence" years (defined loosely as the years between eight and twelve), are a time of monumental shifts in child's physical, cognitive, emotional, and social development, according to Juliann Garey, a journalist, novelist, and clinical assistant professor at New York University (Garey, 2021). It usually ends with the start of puberty; however it can also be regarded as the start of the adolescent years. For example, most dictionary definitions place it between the ages of 10 and 13. It can also be defined as the period span between 9 and 14 years. The term "tween" is originated from "in-between" stage. The term's current use extends beyond marketing to include the tween as a developmental stage (Emily, 2017). Children go through various changes during their pre-teen and adolescent years, including physical, psychosocial, emotional, and cognitive changes. Physical development- The appearance of sexual traits is secondary to the growth of the body. The end of childhood and the beginning of adolescence are marked by the beginnings of puberty's physical and emotional changes, as well as the acquisition of adult reasoning processes. Between the ages of eight and fourteen, these shifts begin (Tyler, 2020).

Global Creativity Index

The first edition of Global Creativity Index report was introduced in 2004. In 2011, The Global Creativity Index evaluates the chances for long-term success in 82 countries based on a set of underlying economic, social, and cultural characteristics known as the 3Ts of economic development: Technology, Talent, and Tolerance (Florida, et al., (2011).

Richard Florida, Charlotta Mellander and Karen King were authors of the global Creativity Index report 2015. The Global Creativity Index for 2015 is presented in this study. Based on the 3Ts of economic development; talent, technology, and

tolerance. On each of these characteristics, as well as overall assessment of creativity and wealth, it scores and ranks 139 countries globally, including Pakistan. Australia has surpassed Sweden to claim the top place on the Global Creativity Index, which it held in the previous two editions in 2004 and 2011. The United States came in 2nd place (keeping its preceding ranking). New Zealand was 3rd. Pakistan was rated 111th (Florida, Mellander & King, (2015).

The difficulty now is how to assess tween students' originality. It doesn't just happen in the arts. Studying scientific and social sciences can help you be more creative and innovative. So the objective isn't to set new standards, but to collect the best experiences and provide opportunities for young people to experience things that will help them develop their creative side and engage them in creative thinking, analysis, critical thinking, and other activities. Injecting the measure creativity index into schools and increasing activity gives young children and high school students the opportunity to gain skills and experience in the activity of creativity and invention. The understanding of measuring the creativity of the students always neglected and the educated personals are not well aware how to measure the creativity. Educated personals failed to estimate creativity and also mythological understanding of creativity measurement. This study was an attempt to measure the creativity index of individuals at tween level.

Material and Methods

The study was based on the exploratory research design. The analysis was performed quantitatively with the statistical treatment and research tool. The study was adopted the Wallach and Kogan's model of Assessment of Creativity Test to score the responses. The research questions of the study were; i) what are the analytical achievements in the area of fluency, flexibility, originality and elaboration? And ii) what are the novel outcomes of boys and girls?

Population

The Federal Government Education Institutes (Cantt & Garrison) consist of twelve regions which are located at different areas of the country of Pakistan with 255 educational institutions. The Wah region was selected for the population of study. Wah region consisted of total 46 educational institutes. All 30 Federal Government Public High Schools were included in the population of study as the condition of the study objectives.

Sample

The non-probability sampling method was adopted and convenient sampling technique was applied. The tween aged students were selected as subjects of the study. The sample was consisted of 30 students of class 7th per school (each boys and girls). Total sample size was 900 students including 464 boys and 436 girls.

Research Instrument

Research instrument was constructed to measure the creativity of tweens. Keeping in view the objectives of the study a test was developed for the study. The test was consisted on sixty items. The creativity test was comprised on the syllabus of class 7th. The syllabus was based on the areas of Linguistics, Sciences, Social Studies and religion or ethics.

Data Collection

The data was collected by researcher herself. Researcher personally visited the relevant schools. Total 1000 test papers were distributed and 900 valid test papers were collected from the students.

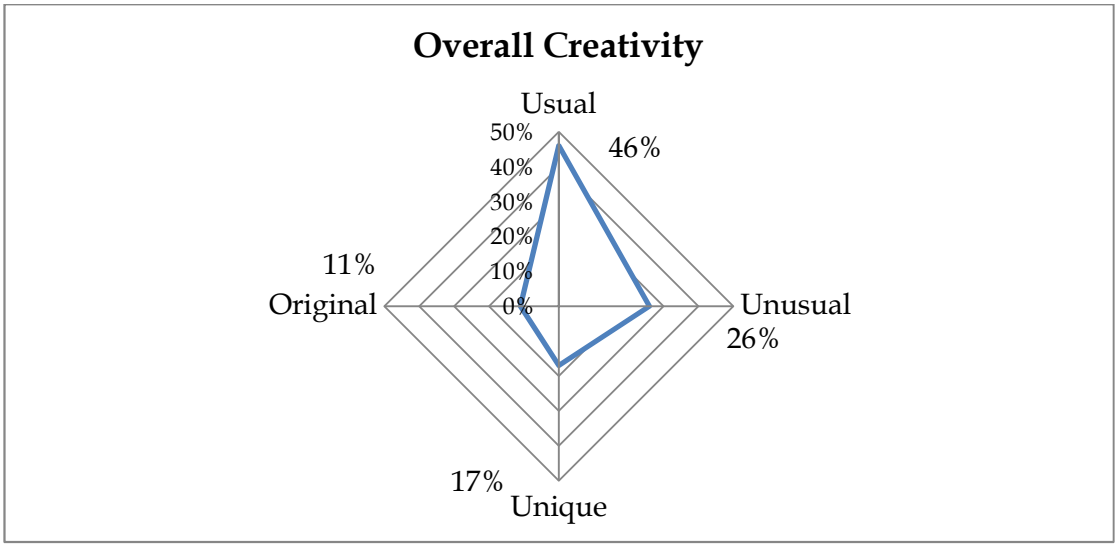
Data Analysis

Keeping in view of the specific needs of the study the responses were transferred into data base. The data was analyzed with the help of Percentage and Principal Component Analysis. The frequencies and percentages were assembled and calculated by following the Wallach and Kogan's creativity assessment model which had four steps. These steps are fluency, flexibility, originality and elaboration. After this process the Principal Component analysis was applied on the data which was replaced and labialized according to original responses. The Principal component analysis differentiated the Kaiser-Meyer-Olkin (KMO) significance among the six subjects.

Results and Discussion

Creativity index Report

This section has been based on the overall analysis report of creativity index.



It is shown in above figure that majority of the students are categorized in the usual option as the percentage is 46, whereas the original response of students is 11%.

Principle Component Analysis

KMO Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.749

The table shows that the significance value is .749 which is middling according to KMO significance levels.

The Scree Plot shows that the component 01 is most scattered from rest of the components on the bases of eigenvalue. Eigenvalue shows the diversity of the each component. On the basis of this diversity of one component is extracted by Principle Component Analysis extraction method.

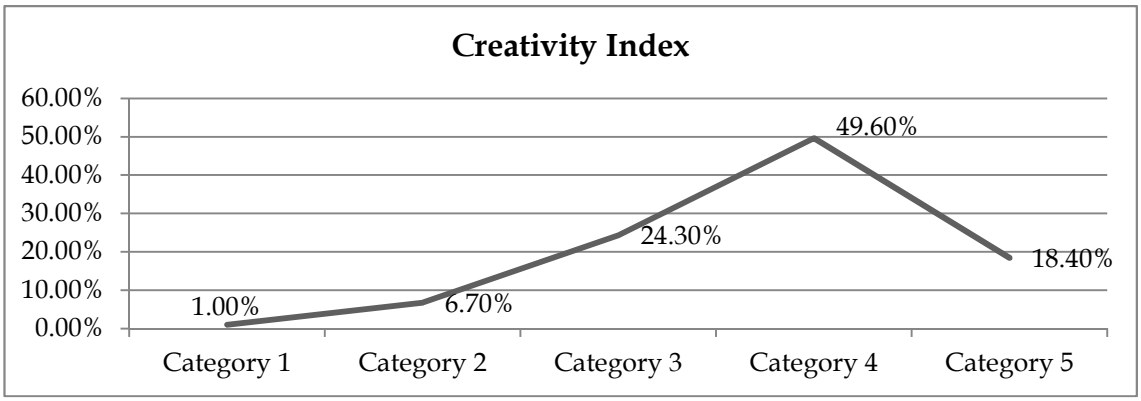
Index Intervals

Due to the limitation of the space it does not possible to expounded creativity index report of 900 tweens individually, so it is exhibited briefly in equal index intervals and classified into five categories.

Categories	Index intervals	Frequency	Percentage
01	3.991 to 2.774	09	1.0
02	2.773 to 1.558	60	6.7
03	1.557 to 0.342	219	24.3
04	0.341 to -0.874	446	49.6
05	-0.875 to -2.098	166	18.4
Total	3.991 to -2.098	900	100

It is shown in above table that highest creativity index of 3.991 and lowest -2.098 which are divided into 05 equal categories with interval of 1.216. The majority of the students are placed in category 04 with 49.6% and minorities of the students are placed in category 01 with 1.0%.

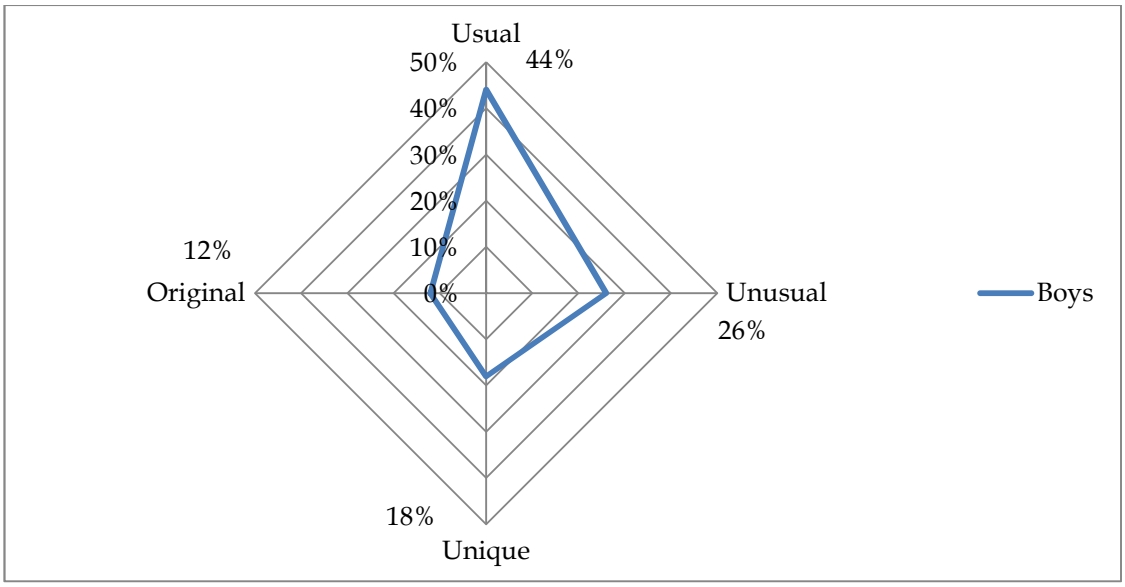
Creativity Index Curve



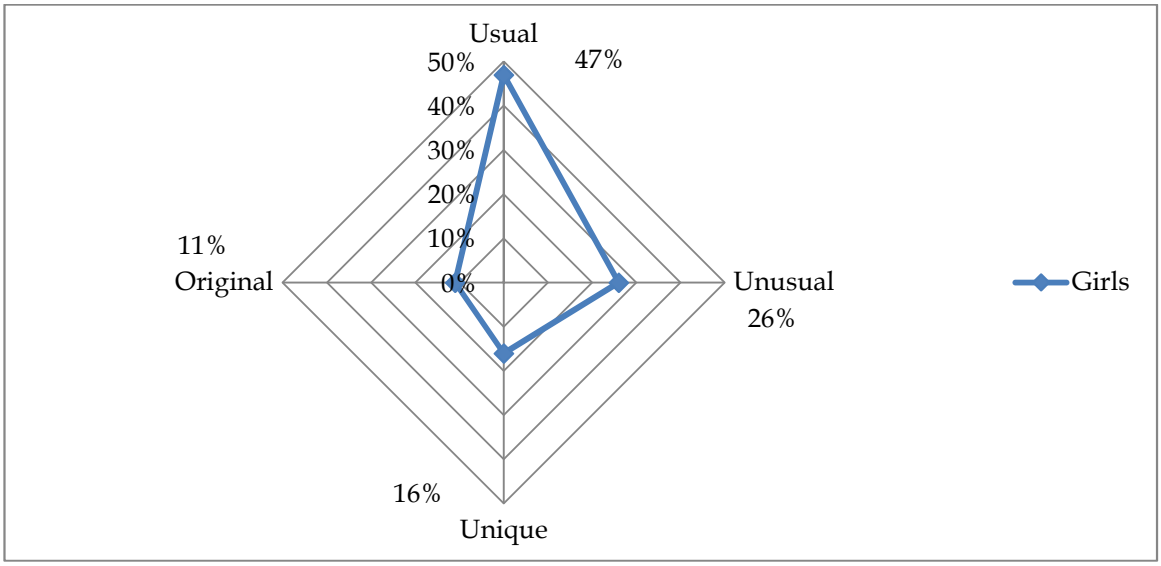
It is shown that the lesser tweens exhibited maximum creativity as 1.00 percent of tweens placed in category 01, 6.70 percent of category 2 and 24.30% of category 3. Whereas, majority of the tweens were came up with minimum creativity as the curve inclined to negative skew with 49.60 percent of tweens were placed in category 4 and 18.40 percent of category 5.

Creativity of Boys and Girls:

This section of article explained the novelty between boys and girls separately.



It is shown in above figure that majority of the boys are categorized in the usual option as the percentage is 44, whereas the original response of boys is 12%.



It is shown in above figure that majority of the girls are categorized in the usual option as the percentage is 47, whereas the original response of girls is 11%.

So it was revealed that the boys were exhibit more creativity with slightest difference then girls as the 12% of boys came up with original responses, whereas girls came up with 11% originality and least boys marked usual option as the percentage was 44% whereas 47% girls came up with usual response.

Discussion

There was huge support with the phenomenon that creativity could not be measured because it is seen as the obscure phenomenon. Undoubtedly measuring the creativity is challenging, but the area of creativity is very well equipped with reliable measures as the idea, process and product (Barbot, et al., (2019). The study was totally dependent upon Wallach and Kogan's model of creativity assessment because this is a standardized module for creativity assessment at global level. That is why it was used as analytical mode for local environment as well as suitable for the education system and students at tween level. The sole legacy in the area of sciences showed a systematic neglect in the education system in form of all three tiers of education (Curriculum, Methodology and Assessment). Overall creativity index indicated that least students were placed in category one and two because of their own interactive, social skill and mobility as the data listed in the category was not supporting.

It was further indicated that the co-curricular activities, scientific symposiums, independent scientific workshops and educational trips were neglected during the teaching learning process. The three tiers of the education are of traditional nature having traditional organization of the content in the areas of curriculum and subject matter taught through traditional methodology like lecture method, demonstrations etc. The assessment system is not at par with the creativity standards having stale designed test items and evaluation techniques. It is the sole necessity to suggest in other creative module in all of these tiers of education with a novelty of ideas to practice and achieve. The content developers did not adopt research oriented content matter with originality having conducive for the other areas. Nadjafikhah et al., (2013) recommended that pupils are encouraged to replicate their original ideas. It is strongly recommended that teachers should plan and execute educational activities that provide the secure environment for pupils to take risks, make mistakes, interrelate and share with others.

Conclusion and Recommendations

On the basis of results and discussion it is concluded and recommended that the creativity testing, intelligence testing and aptitude testing mode should be included in the entire evaluation system at tween level to eradicate the monotony and rote learning. The formal application of cognitive testing should be qualitative rather than quantitative and compact misunderstanding prevailing in the areas of guidance and counseling. The promotional activities should be applied rather than formal and classical approach to further minimize the gender and subject oriented discriminations.

To achieve the competitive rank value of Pakistan's creativity index at global creativity index ranking in form of achievement should be linked with the behavioral testing of the students by the educational psychologist provided in the system in form of diagnostic and promotional measures with the professional choices and trends.

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