Exploring the factors that affect creativity among adolescents

Abstract

Ideas are the key to innovation. In this competitive era the excellence of the mankind depends on their innovation. Innovative outcomes laid stress on how to think divergently. Creativity is varied in nature. Several factors are responsible to perform any creative task. Therefore, it is necessary to find out the most important factor which can help to expedite creativity among the person, more specifically to explore the scientific reason behind the specific factor and multivariate relationship between two or more factors. In the present study the investigator used Explanatory-case study method. A scatter analysis is used to compare two data sets for finding out the relationship between them. Simultaneously, curve fitting algorithm is used to examine the relationship between one or more predictors (independent variable) and a response variable (dependent variable) with the goal of defining a best fit model of the relationship. The major aim of this study is to find out the relationship between one or more predictors (independent variable) and a response variable (dependent variable) with the goal of defining a best fit model of the relationship. Exploring the effective factors of creativity is addressed on 14 years age of boys and girls.

Keywords: ***Innovation***, ***Creativity, Personality***

1.1 Introduction

"Ideas are the key to innovation, while generation of idea is described as the process of creating, developing and communicating abstract, concrete or visual ideas. Traits of divergent thinking are necessary to expedite creation and generation of new ideas. In this competitive era the excellence of the mankind depends on their innovation. Innovative outcomes laid stress on how to think divergently. In this context organizations are paying special attention on its workforce to behave innovatively and creatively" (Patterson et al., 2009). Divergent thinking is a key component of creativity and has been defined by Jones et al., (2009, p. 324) "the efficient generation of a variety of ideas to met a given question or problem" (cited in Guilford, 1980). "A divergent thinking task requires individuals to generate original and appropriate answers to open ended, vague problems and it is one of the most often used measures for creativity" (Furnham and Bachtiar, 2008). "Divergent thinking comprises of features such as fluency (e.g. the number of responses a person provides to a given question or problem), flexibility of thinking (e.g. the number of categories their responses fall into), originality (e.g. how uncommon a response is

within the population sample) and figural or verbal elaboration (e.g. the amount of detail the participant provides in their response)" (Batey and Furnham, 2006;"Creativity Test,").

"Creativity is varied in nature. Several factors are responsible to perform any creative task. A number of researchers observedthat divergent thinking is the result of interactions among multiple dimensions of creativity" (Gardner, 1993; Sternberg and Lubart, 1995; Amabile, 1996). Therefore, it is necessary to find out the most important factor which can help to expedite creativity among the person, more specifically to explore the scientific reason behind the specific factor and multivariate relationship between two or more factors.

"A most frequent scene observed by us, that a person engage himself/herself in a deep thinking to solve a problem while he/she faces a disequilibrium condition. To solve the problem either he/she repeats a well known path or to use an original idea for solving the problem. Traditionally novel, original ideas have no worth but in the recent century the excellence of mankind depends on the imagination and innovation of human being. The recent literature on 21st century also speaks to this emerging awareness of the need for creativity in our society" (Trilling and Fadel, 2009; Bellanca and Brandt, 2010; Thomas and Brown, 2011). "Researchers in this field argue that class environments need to shift away from rooms superbly designed for a teacher to stand in front of a class of thirty students set in neat rows, listening, taking notes and doing worksheets to be interactive and collaborative" (Pearlam, 2010; p.117).

"Curricular standards often stress creativity, innovation and critical thinking. Teachers rarely bring these standards to life as learning outcomes and objectives where rewarding students persist with an idea through failure and reiteration, a skill well known to be common in innovators" (Greene 2001; Johnson 2010). "So, it is the need of this moment to focus on hands-on-activities in the present teaching-learning system, which can give first hand experiences, that perceived and interpreted by the learner uniquely, resulting knowledge formation.Thinking is an important mental process. It is basically our mind-talking to us. It helps us to evaluate facts and decide what is true and false. Thus one should engage own-self to gather lots of experiences which can help him/her to invent new ways to carry out tasks, solve problems and meetchallenges. Learning as an active individual process that take place when learners are given the opportunity to reflect on a series of consequences and this process has been argued to help individuals for developing sense of the world and become actively engaged in their learning"

(Kolb 1984, Kuhlthau et.al., 2007). “The activities of personal meaning-making and information gathering rely on the engagement of students in order to actively gather and interpret information, simultaneously providing them with the opportunity to gain skills and concepts, which then allow them to learn throughout life while experimenting with and developing innovative and creative thought process” (Kolb 1984, Kuhlthau et.al., 2007). “Creative thinking engages and opens the mind. It frees the mind in a way that enables a person to absorb knowledge more easily. It opens the old patterns and allows one for non-linear thinking. It improves the problem solving process in our daily life. It improves the leadership qualities and boosts knowledge productivity.Creativity is such a thought process which helps to generate unorthodox ideas or new associations between existing concepts and their substantiation into a product that has novelty and originality” (Dewey,1980). “Experiential learning states that knowledge is created through the transformation brought about by experience” (Kolb 1984; Mainemelis et.al., 2002; Casanovas et.al., 2010). “Experience is the best medium for generating knowledge. Meaningful learning happens when knowledge is created through the transformation of experiences.Because each person experience a phenomenon uniquely, adopt it and through his reflective thinking interpret it in a different manner and by active experimentation and implementation of those ideas lead to create a new idea” (Khan and Chattopadhyay, 2019).

2.0 Significance of the Study

Since time immemorial human being are continuously engaging themselves by divergent thinking. It allows us to view and solve several problems more openly and with innovation. A society which has lost touch its creative side is an imprisoned society where generations of people may be closed minded. Research shows that people who are open to acquire new experiences and ideas are more creative than those who are more closed off. Experiences are the gateway of innovation. More one experience more they can generate creative ideas. Several factors are responsible to produce creative ideas. Thus a study is undertaken to explore the most responsible factor and simultaneously to discover the scientific reason behind the specific factor.

3.0 Discussions on Reviewed Studies

Factors influencing divergent thinking

Creativity by nature is multifaceted. Several factors are responsible to perform any creative task. A number of authors have recognized divergent thinking is seen as the result of interactions among the multiple dimensions of creativity (Gardner,1993; Sternberg and Lubart, 1995; Amabile, 1996).

Personality and working memory

Working memory is construct related to maintenance, updating and manipulation of information in active memory (Daneman and Carpenter, 1980; Engle et al.,1999; Kane and Engle, 2003; Unsworth et.al., 2004). It is such a dynamic process which is important in several cognitive processes, higher-order cognition, goal directed behavior and personality.

Working memory and creativity

"Working memory includes both temporary storage and active processing of information – the workbench of memory, where active mental effort is applied to both new and old information. Thus it is the information that a person are focusing on at a given moment. Traditionally it consists of the central executive as well as two additional storage systems, the phonological loop and the visuo-spatial sketchpad" (Baddely, 2003).

Vandervert et. al. (2007) is one of the few researchers examined the relationship between creativity and working memory. They believe that working memory is where creativity and invention begin. This could be because working memory is a system that allows people to piece together different ideas and thoughts, and is sometimes referred to as the blackboard of the mind (Vandervert et al., 2007, p. 3). De Drew et. al. (2012) suggested that creative ability is affected by a person's ability to maintain focussed attention and executive control. This type of control includes working memory which led to their hypothesis that creativity and working memory capacities are positively correlated.

Organizational climate and creativity

Creativity is the only phenomenon which separates man from machines and animals. The awareness of such creative vision produces happiness and joy within the person. Since creativity is an exclusive human trait, it helps one to achieve meaningful life identical to this infinite universe. Most of the people tend to believe that a person can be born as an artist, a poet, a writer, a creative problem solver but teaching these talents is not possible. The process that goes

on inside the human brain may still be a mystery but fortunately it is not known whether there are certain things that an organization can do to make the creative process more likely to occur and even flourish. One of the most important of these elements is organizational climate. Organizational climate is the total environmental qualities within an organization. Halpin (1963) defined organizational climate as a multidimensional perception by its members as well as non-members of the essential attributes or character of an organizational system. Organizational climate of schools may range from open to closed which matters in enhancing creativity among students. Organizational climate varies from school to school and has its effect on student's creativity.

Organizational Climate and Working Memory

Organizational climate is a relatively enduring quality of the internal environment that is experienced by its members, influences their behavior and can be described in terms of the value of a particular set of characteristics of the organizations where as working memory is such a capacity where the amount of information that people can hold in mind at once.

In the present study the effect of organizational climate mostly related with one's working memory in particular reference to several demographical dimensions.

Organizational climate and Personality

According to Tagiuri and Luthans (2006), organizational climate is the quality of the organization's internal environment that is relatively ongoing, experienced by members of the organization and relates to their behavior and can be described in a set of characteristics or characteristics of the organization. Colquitt, Lepine and Wesson (2011), describe commitment to the organization as the individual's desire to remain a member of the organization. Commitment to the organization is one of the determining factors whether he wants to remain a member of the organization or he tries to leave (looking for work in another organization). Factors that relate to commitment include: affective commitment, namely the desire to remain a member of the organization because of the individual's emotional involvement in the organization (emotional-based reasons). For example: many friends in the organization, continuance commitment is the desire to remain a member of the organization because it is realized that it will cause a lot of 'costs' if leaving the organization (cost-based reasons, 2011). For example: other organizations

are located further away from their current homes, so that if the salary is the same, the transportation costs will be heavier, normative commitment is the desire to remain a member of the organization because they feel they have an obligation (obligation-based reasons). For example, feel indebted to the organization. According to Muryati (2020), commitment to the organization is the desire of individuals to involve themselves in being part of the organization, accepting all the goals of the organization and not wanting to leave it.

According to Allen and Meyer in Luthan (2006), there are three factors that will affect organizational commitment, namely as follows Organizational experience This organizational experience includes the satisfaction & motivation of organizational members while in the organization, Organizational Characteristics, Individual Personal Characteristics. While this dispositional factor includes the personality and values of the members of the organization, this variable is strongly related to organizational commitment, because there are different experiences of each member of the organization. Stated by Luthans (2006) that organizational climate is the internal environment or organizational psychology. According to Muryati (2020) Organizational Climate is the perception of the state of the internal environment of an organization that is embedded in individuals or members of the organization which is the basis for carrying out all individual or group activities within an organization.

According to Davis and Newstorm (2002) there are two important aspects that must be considered in the organizational climate, namely the workplace itself and the treatment received from management. Employees feel that a certain organizational climate is pleasant when they do something useful that provides personal benefit.

According to Colquitt, Lepine and Welson (2015), personality is a long-lasting pattern of thought, emotion, and behavior that characterizes a person with the psychological processes behind these characteristics. According to Mehta, Y., & Hicks, R. (2018), personality is considered to remain stable after a person reaches a certain age. For example: the phase of human life, when you are a child, your personality will be different when you are a teenager and when you are an adult.

Personality and creativity

"A number of studies have examined correlations between personality and creativity. The framework of the Five-Factor Model (FFM), also known as the Big Five, is widely recognized in the personality-studies of community as a reliable approach to capturing individuals' personality traits" (Carsonet. al., 2005). "The FFM divides human personality into five traits: i) openness to experience, ii) conscientiousness, iii) extraversion, iv) agreeableness and v) emotional stability. Openness to experience refers to an individual's intellectual willingness to accept new experience and appreciate a variety of experiences, which may allow him/her to embrace novel ideas. Conscientiousness refers to socially prescribed impulse control, which can inhibit people from taking risks or experimenting and therefore may be detrimental to the generation of new ideas. Extraversion is the set of traits related to activity, energy, and positive emotions, which are likely to boost creativity. Agreeableness includes traits related to altruism and tender-heartedness. Agreeable people are likely to uphold the status quo and may have difficulty in expressing novel ideas or taking unusual actions. Lastly, emotional stability refers to an individual's level of calmness. Emotionally stable people often behave in a self-confident and approachable manner. Therefore, people with high emotional stability are more ready to become involved in the creative process" (Sung and Choi, 2009).Out of the five components of FFM, openness to experience has been the most positively and consistently associated with creative traits (Williams, 2004; Lee and Kemple, 2014). However, the relationship of other FFM personality factors to creativity has been less robust. Extraversion has been found to be positively related to creative behavior (Dollinger et.al. 2004), but the other two personality traits were found to be negatively correlated with creativity i.e. agreeableness and conscientiousness. Several studies have attempted to find personality correlates for creativity, beginning with work by the Institute of Personality Assessment and Research (IPAR) (MacKinnon, 1962; Barron, 1972; Helson, 1999). "Creative processes require certain personality characteristics, such as ego strength, because creative ideas do not conform to normative ideas, and a person therefore must have certain personality characteristics that demonstrate his creativity" (Runco, 2004).

An Indian adaptation of the Cattell"s 14 Personality Factor (PF) in Hindi has been developed by Kapoor and Mehrotra (1967) having questionnaire measuring 14 dimensions of personality was found useful for the present study. The questionnaire has two forms namely A and B in which form A and B were parallel hence form B was selected for this purpose. Junior (Jr.) Senior (Sr.) High School personality questionnaire (HSPQ) invented by Cattell (1962, 1963) was designed to

measure the 14 dimensions of personality. Each dimension measured by HSPQ has a technical name and an alphabetical symbol for reference, e.g. A, B, C etc. Each dimension is defined by two poles (extremes). Each pole of each factor describes the list of behaviours, presented to the left and right of the extreme opposite characteristics. In case of the measurement of personality high score or a low score in a test respectively does not always mean good or bad.

A person who scores low tends to be dependent, group joiner and sound follower while a person who scores high tends to be self -sufficient, prefers own decisions and resourceful.

4.0 Objectives of the study

1. To observe whether there is any connection exists between organizational climate and the personality of a student or not

2. To find out whether there is any relationship exists between personality and working memory of a student

3. To inquire whether there is any affinity exists between organizational climate and working memory of a specific student

4. To discover whether creativity will be affected by various types of personality of the student or not

5. To examine how organizational climate can influence the creativity of a student

6. To explore how creativity will be affected by the span of working memory of a particular student

7. To find out the interrelationship among working memory, organizational climate and personality with creativity

5.0 Research Questions

1. Is there any relation between Organizational Climate and Personality of a student?

2. Is there any relation between Personality and Working Memory of a student?

3. Is there any relation between Organizational Climate and Working Memory of a student?

4. Is there any relation between Creativity and Personality of a student?

5. Is there any relation between Organizational Climate and Creativity of a student?

6. Is there any relation between creativity and Working Memory of a student?

7. Is there any relation between Working Memory, Personality, Organizational Climate and Creativity of a student?

6.0 Methodology of the study

The investigator used **Explanatory-case study method** in her present study. Explanatory case studies examine the data closely both at a surface and deep level in order to explain the phenomena in the data. For instance, a researcher may ask the reason as to why a student uses an inferential strategy in reading (Zaidah, 2003). On the basis of the data, the researcher may then form a theory and set to test this theory (McDonough, 1997). Furthermore, explanatory cases are also developed for causal studies where pattern-matching can be used to investigate certain phenomena in different complex and multivariate cases. In the present case studies, an in-depth study of a single case or event is used. The in-depth study provides a systematic way of observing the events, collecting data, analyzing information, and reporting the results over a specific period of time.

Population

In the present study all 9^{th} grade students in West Bengal comprise the target population. Different schools from Burdwan, Nadia, Murshidabad and Kolkata districts are considered accessible population from where samples were drawn.

Sample

Different schools from Burdwan, Murshidabad, Kolkata and Nadia districts are selected purposively to access the willing students. Thus only the willing and accessible 31 subjects are chosen for this purpose. Out of 31 subjects, 20 students are from Bengali Medium School and remaining 11students are from English Medium School. These schools are affiliated to West Bengal Board of Secondary Education and CBSE Board.

Sampling Technique for the Present Study

The present research included under **non-probability sampling technique**. For conducting the present research work systematically researcher used **purposive sampling** method for sample selection. It is basically selected for solving several purposes properly. Therefore the willing and accessible participants are included as a sample. The present work is based on the purpose, i.e. to find out the responsible factors simultaneously to explore the scientific reason behind the specific factor more specifically multivariate relationship between two or more factors is the main objective of the present study.

Variables of the Study

Independent variable

The following independent variables are considered for collection of data

a) Organizational climate
b) Personality

Dependent variable

The dependent variables are as following:

a) Creative task
b) Working memory
c) Personality

Research Design

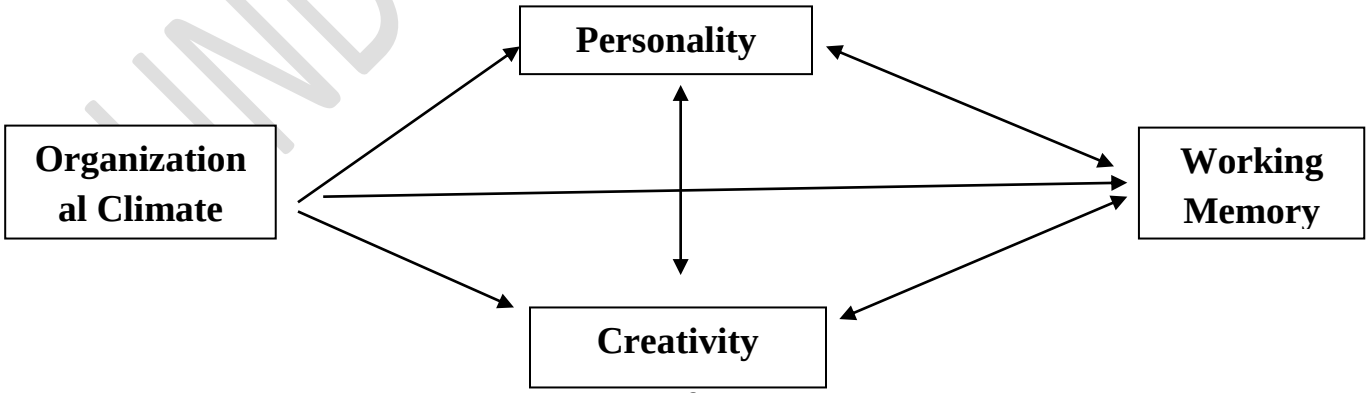


Fig. 1 Flowchart of research design

The research design is depicted through a flowchart (Fig. 1).

Tools used in the Study

For the present study the researcher has selected four types of tool for collection of data. These are:

1. Attitudinal Questionnaire towards one's own organizational climate

Creative Climate Questionnaire (CCQ) by G. Ekvall has been used to measure the attitude towards one's own organizational climate.

To measure organizational climate for creativity and innovation, it is applied which play a great and decisive role in motivating work force to think creatively and also augmenting organizational performance by having radical product innovations. The questionnaire covers 10 climatic dimensions: challenge, freedom, idea support, trust/openness, dynamism /liveliness, playfulness/ humor, debates, conflicts, risk taking, and idea time.

Basically CCQ is framed for collecting data of innovative production from several business sectors but the present study researcher tries to envisage learner's attitude towards their free, live and creative educational institutional climate.

On the basis of this the researcher prepared 30 Multiple Choice Questions (MCQ) with six dimensions (Table 1) and the ratings are four per question.

0 = Not at all applicable

1 = Applicable to some extent

2 = Fairly applicable

3 = Applicable to a high extent

2. Dr. Rakhi Bhargava's Span of Immediate Memory (SIM) (Visual and Auditory Quantitative Data)

The amount of material reproduced immediately after one exposure is respectively known as auditory or visual span of immediate memory. Immediate memory process depends on mental activity of perseveration. The effect of any stimulus experiences, do not perish immediately but

it's after effect persist for less or more time in consciousness, e.g. visual and auditory after images.

Span of Immediate Memory tool (Visual and Auditory) is developed by Dr. Rakhi Bhargava. The tool is enlisted in National Psychological Corporation's catalogue and is considered as a standardized tool.

The present tool has two subsequent divisions, e.g.

a) **Span of Auditory Immediate Memory**

   How many numbers can be reproduced after getting only one auditory exposure? There are three lists of numerals ranging from 3 to 12

b) **Span of Visual Immediate Memory**

   How many numbers can be reproduced after getting only one auditory exposure? There are three lists each of nine letters arranged in different form.

The subject was given a weight age of two for writing a letter at correct place and order, one mark for writing correct letter at wrong place or order. No marks were given for writing a wrong letter. While scoring the list attention was paid to the following errors;

1) **Mistake of Transposition**, e.g. writing MAR in place of MRA
2) **Mistake of Omission**, e.g. writing MR in place of MRA
3) **Mistake of Commission**, e.g. writing MRA X in place of MRA
4) **Mistake of Transposition and Commission**, e.g. writing MAT

3. B.K. Passi test of Creativity

Creativity is relatively a new area of research and has not been explored as thoroughly as intelligence and personality. The definition of creativity which was used as the basis of these tests i.e. Passi Test of Creativity (PTC) is as below: Creativity is a multi-dimensional (verbal and non-verbal) attribute differentially distributed among people and includes chiefly the factors of seeing problems, fluency, flexibility, originality, inquisitiveness and persistence.

The PTC (both in English and Hindi) are developed for the purpose of measuring creativity for school children. There are six subtests, namely:

- The Seeing Problems Test
- The Unusual Uses Test
- The Consequences Test
- The Test of Inquisitiveness
- The Square Puzzle Test
- The Blocks Test of Creativity

The nature of the Test of Creativity permitted freedom of responses, both qualitative and quantitative, within specified time limits, thus ensuring suitability of the tools for measuring divergent thinking. Instructions and practice items are provided before the actual commencement of the administration of the different tests. The subjects are supposed to write their responses in the answer book provided for the purpose. All tests are available both in Hindi and English. Responses are acceptable in any one of the known languages like English or Hindi etc.

4. HSPQ tool for personality measurement

An Indian adaptation of the Cattell‟s 14 Personality Factor (PF) in Hindi has been developed by Kapoor and Mehrotra (1967) having questionnaire measuring 14 dimensions of personality was found useful for the present study. The questionnaire has two forms namely A and B in which form A and B were parallel hence form B was selected for this purpose. Junior (Jr.) Senior (Sr.) High School personality questionnaire (HSPQ) invented by Cattell (1962, 1963) was designed to measure the 14 dimensions of personality. Each dimension measured by HSPQ has a technical name and an alphabetical symbol for reference, e.g. A, B, C etc. Each dimension is defined by two poles (extremes). Each pole of each factor describes the list of behaviours, presented to the left and right of the extreme opposite characteristics. In case of the measurement of personality high score or a low score in a test respectively does not always mean good or bad.

A person who scores low tends to be dependent, group joiner and sound follower while a person who scores high tends to be self -sufficient, prefers own decisions and resourceful.

Description of 14 personality factors

FACTOR A

The person who scores low tends to be reserved, detached, cool and critical. The person who scores high tends to be outgoing, warm-hearted, easy-going and participating.

FACTOR B

The persons who scores low tend to be concrete thinking, and less intelligent. The person who scores high tends to be more intelligent, bright and abstract thinking.

FACTOR C

The person who scores low tends to be unstable, emotional and affected by feelings. The person who scores high tends to be emotionally stable, faces reality, calm and mature.

FACTOR D

The person who scores low tends to be phlegmatic temperament, under demonstrative, deliberate, inactive and stodgy. The person who scores high tends to be excitable, impatient, demanding, overactive and unrestrained.

FACTOR E

The person who scores low tends to be humble, mild, accommodating and conforming. The person who scores high tends to be assertive, independent, aggressive, competitive and stubborn.

FACTOR F

The persons who score low tend to be sober, prudent, serious taciturn. The persons who score high tend to be happy go lucky, impulsively lively and enthusiastic.

FACTOR G

The persons who score low tend to be expedient, evade and feels few obligations. The person who scores high tends to be staid, rule bound, preserving and conscientious.

FACTOR H

The persons who score low tend to be shy, restrained, different and timid. The person who scores high tends to be venturesome, socially bold, inhibited and spontaneous.

FACTOR I

The persons who score low tend to be tough mind, self reliant, realistic and non sense. The persons who score high tend to be tender minded, dependent, over protected and sensitive.

FACTOR J

The persons who score low tend to be zestful and like group action. The persons who score high tend to has circumspect individualism, are reflective and are internally restrained.

FACTOR O

The persons who score low tends to be placid, serene, confident and self-assured. The person who scores high tends to be worrying, depressive, troubled and apprehensive.

FACTOR Q2

The person who scores low tends to be dependent, group joiner and sound follower. The person who scores high tends to be self-sufficient, prefers own decisions and resourceful.

FACTOR Q3

The persons who score low tends to be undisciplined and careless. The person who scores high tends to be controlled and socially precise.

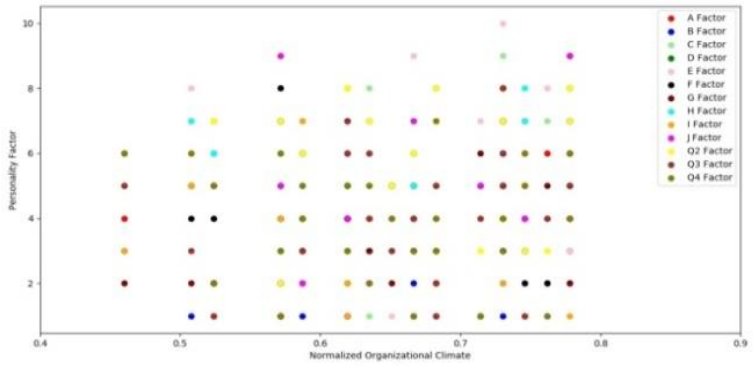
FACTOR Q4

The persons who scores low tend to be relaxed, tranquil, torpid un-frustrated and composed. The person who scores high tends to be tense, frustrated and overweight.

7.0 Results

The scores of organizational climate, personality, working memory and creativity of 31 students with their numerous demographical factors are plotted and analyzed through scatter diagram and a best fit model is established through curve fitting algorithm.

Fig.2 Relationship between organizational climate and personality scores of the students

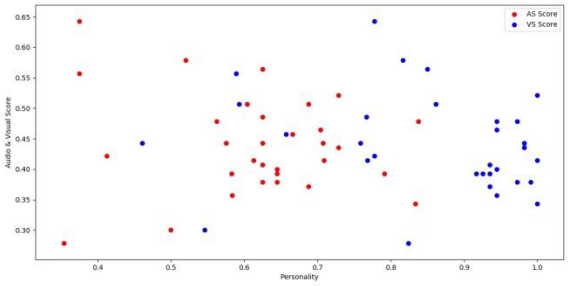


The above figure (Fig.2) is plotted between normalized scores of OC and personality factors of 31 subjects. The different personality factors are indicated by different colors as shown in the figure. Here it is to be mentioned that the normalized scores of OC is the fraction of individual OC score and maximum possible OC score. Consequently the scores of personality is the fraction of individual personality score and maximum possible score of personality factor. Fig 2 shows that the 14 factors of personality are affected by the different organizational climate scores. So it is undoubtedly considered that among the 14 factors of personality some of them are dominated in different ranges of normalized organizational climate scores. Remaining factors are not abolished but are submissive in nature.

For example, between the range of 0.4 to 0.5, five factors G, I, A, Q_3, Q_4 are dominating, and remaining factors are quite submissive. Similarly between the range of 0.5 to 0.6, nine factors E, F, G, H, I, J, Q_2, Q_3, Q_4 are dominating, and remaining factors are submissive in nature. Hence other part of the graph can be explained in this way.But if we explain the graph overall then we find that A and B factors are submissive while G and Q_4 factors are dominated in nature.

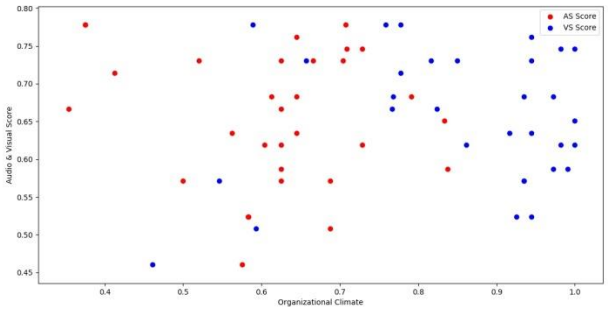
The above analysis of data and its discussion is related to Research Question No. 1

Fig.3 Relationship between personality and working memory scores of the students



The above figure (Fig.3) is plotted between normalized scores of personality factors and working memory scores of 31 subjects. The different working memory scores are indicated by different colors as shown in the figure. Here it is to be mentioned that the normalized scores of personality factors is the fraction of individual personality score and total possible personality score. Consequently the scores of working memory is the fraction of individual working memory score and maximum possible scores of working memory. Figure 3 reveals that the working memory scores are affected by different personality factor. So it is considered that audio working memory scores are affected more by the personality in the range between low to medium; while video working memory scores are affected more by the personality in the range between medium to high value. For example between the ranges of 0.5 to 0.7 audio working memory are more prominent while between the ranges of 0.7 to 1.0 scores of video working memory are more dominant. The above analysis of data and its discussion is related to Research Question No. 2

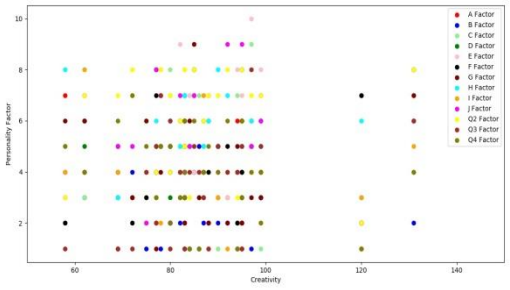
Fig.4 Relationship between organizational climate and working memory scores of the students



The above figure (Fig.4) is plotted between normalized scores of OC and working memory of 31 subjects. The different working memory scores are indicated by different colors as shown in the figure. Here it is to be mentioned that the normalized scores of OC is the fraction of individual OC score and maximum possible OC score. Consequently the scores of working memory is the fraction of individual working memory score and maximum possible scores of working memory. Figure 4 reveals that the working memory scores are affected by different OC scores. So it is considered that the audio working memory scores are more prominent in low to medium range of organizational climate while maximum video scores are falls in between medium to high ranges of organizational climate scores. It indicates organizational climate can expedite working memory power through direct learning experiences during teaching.

The above analysis of data and its discussion is related to Research Question No. 3

Fig.5 Relationship between creativity and personality scores of the students

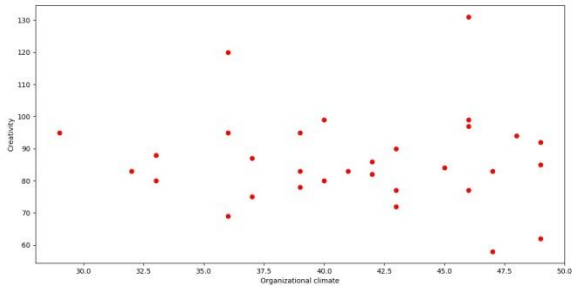


The above figure (Fig. 5) is plotted between normalized scores of creativity and personality factors of 31 subjects. The different personality factors are indicated by different colors as shown in the figure. Here it is to be mentioned that the normalized scores of creativity is the fraction of individual creativity score and maximum possible creativity score. Consequently the scores of personality is the fraction of individual personality score and maximum possible score of personality factor. Fig 5 depicted that the 14 factors of personality are affected by the different ranges of creativity scores. So it is undoubtedly considered that among the 14 factors of personality some of them are dominated in different ranges of normalized creativity scores. Remaining factors are not abolished but are submissive in nature. For example, between the

ranges of 60 to 80 creativity scores, eight factors F, G, H, I, J, Q_2, Q3, Q_4 of personality scores are dominating, and remaining factors are quite submissive. Similarly between the ranges of 80 to 100, twelve factors B, C, D, E, F, G, H, I, J, Q_2, Q_3, Q_4 are dominating, and remaining factors are submissive in nature. Hence other part of the graph can be explained in this way. But if we explain the graph overall then we find that A, C and D factors are submissive while Q_2 and Q_4 factors are dominated in nature.

The above analysis of data and its discussion is related to Research Question No. 4

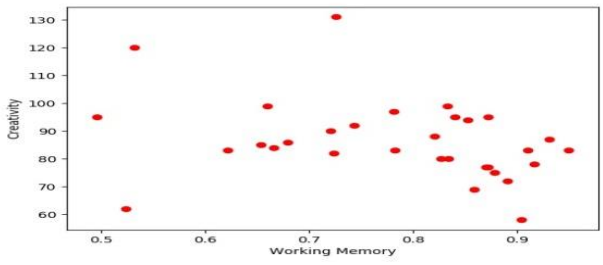
Fig.6 Relationship between creativity and organizational climate scores of the students



The above figure (Fig.6) is plotted between normalized scores of OC and creativity of 31 subjects. The creativity scores are indicated by red colors as shown in the figure. Here it is to be mentioned that the normalized scores of OC is the fraction of individual OC score and maximum possible OC score. Consequently the scores of creativity is the fraction of individual creativity score and maximum possible creativity score. Fig 6 shows that the scores of creativity vary in between the range of 70 – 100. But there is no as such influence of organizational climate scores with the creativity scores although some students who have 90 above creativity scores had a linear relationship with organizational climate scores.

The above analysis of data and its discussion is related to Research Question No. 5

Fig.7. Relationship between creativity and working memory scores of the students

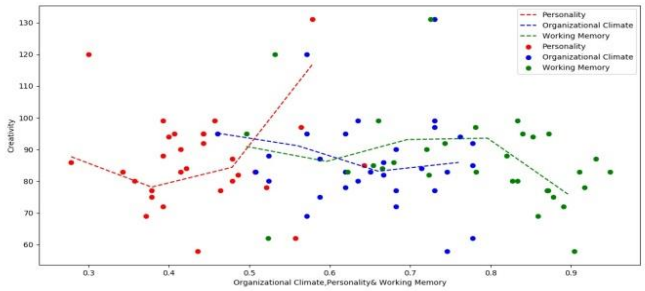


The above figure (Fig.7) is plotted between normalized scores of working memory and creativity of 31 subjects. The creativity scores are indicated by red colors as shown in the figure. Here it is to be mentioned that the normalized scores of working memory is the fraction of individual

working memory score and maximum possible working memory score. Consequently the scores of creativity is the fraction of individual creativity score and maximum possible scores of creativity. Fig 7 reveals that the ranges of creativity score falls in between 70 to 100. Creativity scores increases between 0.6 to 0.8 ranges of working memory scores but above 0.8 ranges of working memory scores, creativity scores drastically fallen down. The reason is when students are addicted by lots of information and video mode of teaching-learning they are crippled to think freely and independently.

The above analysis of data and its discussion is related to Research Question No. 6

Fig.8 Relationship between organizational climate, working memory, personality and creativity scores of the students



The above figure (Fig.8) is plotted between normalized scores of OC, working memory and personality factors with creativity of 31 subjects. The OC scores, working memory scores and personality factors are indicated by different colors as shown in the figure. Here it is to be mentioned that the normalized scores of OC, working memory and personality are the fraction of individual OC score, working memory score and personality score and maximum possible OC score, working memory score and personality score. Consequently the scores of creativity is the fraction of individual creativity score and maximum possible score of creativity.

Fig 8 reveals that creativity is the function of organizational climate (OC), personality (P) and working memory (WM) and is expressed as ***C= f (OC, WM, P).***

Thus human creativity depends on organizational climate, personality and working memory factors. When the value of this function is low i.e. 0.3 to 0.5 then creativity is mostly influenced by personality factors. When the function is in medium range creativity is influenced by the organizational climate factors consequently when the function is in high range it is mostly influenced by working memory.

Personality and creativity

When personality scores are in medium range i.e. 5 to 6, creativity scores decreased but when it is in high and low range consequently creativity scores increased.

Organizational climate and creativity

Fig 9 shows that there is as such no effect of organizational climate on creativity although high creativity scores are affected by organizational climate factors.

Working memory and creativity

The above graphical presentation reveals that initially increasing working memory scores increase creativity scores. Whereas high working memory scores deterred human creativity. But after a certain range creativity scores drastically decreases.

8.0 Findings

In the present study an explanative case study method was applied to find out the relationship between OC and personality with particular reference to WM and creativity. For this purpose different types of tools are used upon 31 subjects for collection of related data.

After analyzing the data, researcher has come to conclude the following findings. These are

The 14 factors of personality are affected by the different organizational climate scores. It is undoubtedly considered that among the 14 factors of personality some of them are dominated in different ranges of normalized organizational climate scores. Remaining factors are not abolished but are submissive in nature. Overall A and B factors of personality are submissive while G and Q_4 factors of personality are dominated in nature.
The working memory scores are affected by different personality factors. So it is considered that audio working memory scores are affected more by the personality in the range between low to medium; while video working memory scores are affected more by the personality in the range between medium to high value.

The working memory scores are affected by different OC scores. So it is considered that the audio working memory scores are more prominent in low to medium range of organizational climate while maximum video scores fall in between medium to high ranges of organizational climate scores. It indicates that organizational climate can expedite working memory power through direct learning experiences during teaching.

Personality is affected by the different ranges of creativity scores. So it is undoubtedly considered that among the 14 factors of personality some of them are dominated in different ranges of normalized creativity scores. Remaining factors are not abolished but are submissive in nature. Overall A, C and D factors of personality are submissive while Q_2 and Q_4 factors of personality are dominated in nature.

The scores of creativity vary in between the range of 70 – 100. But there is no as such influence of organizational climate scores on the creativity scores although some students who have creativity scores above 90 had a linear relationship with organizational climate scores.

There is an interrelationship between creativity and working memory. The ranges of creativity score lie in between 70 to 100. Creativity scores increases between 0.6 to 0.8 ranges of working memory scores but above 0.8 ranges of working memory scores creativity scores drastically fallen down. The reason is when students are addicted by lots of information and video mode of teaching-learning; they are crippled to think freely and independently.

Human creativity depends on organizational climate, personality and working memory factors. So, creativity is the function of organizational climate, personality and working memory and it is expressed as ***C= f (OC, WM, P).*** Thus when the value of this function is low i.e. 0.3 to 0.5 then creativity is mostly influenced by personality factors. When the function is in medium range creativity is influenced by the organizational climate factors. Consequently when the function is in high range it is mostly influenced by working memory.

When personality scores are in medium range i.e. 5 to 6 creativity scores are decreased but when it is in high and low range creativity scores increased.

There is as such no effect of organizational climate on creativity although high creativity scores are affected by organizational climate factors.

Initially increasing working memory scores increased creativity scores. Whereas high working memory scores hampers human creativity so after a certain range creativity scores drastically decreases.

9.0 Discussion and conclusion

In this competitive era the excellence of mankind depends on their innovation. Ideas are the key to innovation. Idea generation is described as the process of creating, developing and communicating abstract, concrete or visual ideas. While performing any creative task **it is necessary to find out the responsible factors simultaneously to explore the scientific reason behind the specific factor more specifically multivariate relationship between two or more factors.**

In the present study organizational climate, working memory and personality are the responsible factors of performing any creative task. Where creativity is considered as a function of organizational climate, working memory and personality, i.e**. *C= f (OC, WM, P).***

The scatter diagram plot (Fig. 2. to Fig. 9.) indicates that the effect of the scores of organizational climate, working memory and personality upon creativity varies in different

perspectives**. The most important feature of this study is that among several factors working memory is the most responsible factor of creativity.** Working memory is the combination of multiple mental tasks some of which include the ability to focus attention, mental rehearsal, and manipulation of information (Colomet.al.,2004).According to De Dreu et al. (2012), working memory is the system that keeps information available for complicated cognitive activity; this would include activities like language comprehension, planning, and reasoning. There are two basic responsibilities of working memory; the first is to keep new information in an enhanced state of activity and the second is to differentiate between information that is task-relevant or task-irrelevant (Unsworth and Engle, as cited in De Dreu et al., 2012, p.657). Working memory requires not only the retention of information but also the manipulation of information which measure this are characterized as dual tasks. This is because a person must shift their attention between the list items and the processing component of the task at hand (e.g. mentally rehearsing the directions, while driving to a location) (Engle, Tuholski et al., as cited in Colom et al., 2008, p.585; Alloway and Copello, 2013).

Working memory includes both temporary storage and active processing of information – the workbench of memory, where active mental effort is applied to both new and old information. Thus it is the information that a person is focused on at a given moment.

Vandervert et. al. (2007) is one of the few researchers who examined the relationship between creativity and working memory. They believe that working memory is where creativity and invention begin. This could be because working memory is a system that allows people to piece together different ideas and thoughts, and is sometimes referred to as the blackboard of the mind (Vandervert et al., 2007, p. 3). De Drew et. al. (2012) suggests that creative ability is affected by

a person's ability to maintain focused attention and executive control. Working memory capacity is the amount of information that people can hold in mind at once. All of us have a relatively limited amount of information we can think about at any one time, but there are differences between people in the size of working memory.

When a person start thinking about something, the first few things come up in his/her mind will have variations on ideas that he/she may have encountered in the past. After thinking those mundane ideas one is likely to start really generating something new. Therefore, when one has high working memory capacity, he/she is better able to pull out both the initial ideas that are not deeply original as well as other more novel ideas. So, thinking is the first and foremost step to generate something new. The recent literature of 21st century also speaks to this emerging

awareness of the need for creativity in our society (Bellanca and Brandt, 2010; Thomas and Brown, 2011). Because experience lead to generate divergent thinking. Experiences can help a person to observe at first according to their Working Memory, then the person think and makes comparisons between what they have done, reflect upon and what they already know. It emphasizes the practical application of ideas and solving problems. At last they are applied the new ideain a new field. At the time of application their new idea in a new field their personality and the necessary Organizational Climate influenced a lot. Thoughts and reflection emerge new ideas which lead generation of creativity among the learner.

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